```
PROGRAM APNC;
uses crt,kotak,unit1,Dos,Regresi1,Graph,Grafik,TOOLS,printer;

var
 a                : vektor;
 mouse            : char;
 kendaligrafik,modegrafik : integer;
 koef             : array[1..4] of string;
const
selisih=539;

{$I Grafbar2.pas}

(*************************************************************************)
LABEL LONCAT;
(*************************************************************************)
Procedure BukaFileEfisiensi;
Begin
 assign(fileEfis,'Efis.dta');
 {$I-} reset(fileEfis); {$I+}
 if IOresult <> 0 then rewrite(fileEfis);
 i := filesize(FILEEfis);
end;
(*************************************************************************)
Procedure HITUNGKONSENTRASI;
begin
 tunggu('');
 clrscr;
 with max_data[1] do
 begin
   q1 :=(max_data[1].paro*(max_data[1].gamma/100)*(max_data[1].iso/100)*
       max_data[1].lint)/(max_data[1].aa*(ln(2)));
   fc := q1*(1-(exp((-ln(2)*tic/max_data[1].paro)))) *
       (exp((-ln(2)*tdc/max_data[1].paro)))*
       (1-(exp((-ln(2)*tcc/max_data[1].paro))));
 end;
 READLN;
 with max_data[2] do
 begin
 tunggu('');
  q2 := (max_data[2].paro*(max_data[2].gamma/100)*(max_data[2].iso/100)*
       max_data[2].lint)/(max_data[2].aa*(ln(2)));
  fs := q2*(1-(exp((-ln(2)*tic/max_data[2].paro)))) *
       (exp((-ln(2)*tdc/max_data[2].paro)))*
       (1-(exp((-ln(2)*tcc/max_data[2].paro))));
 end;
 writeln('Hasil Fc : ',Fc);
 writeln('Hasil Fs : ',Fs);
END;
(*************************************************************************)
procedure KonsentrasiPilihan1;
label exit;
begin
 window(1,1,80,25);clrscr;
 latar;
```

```
begin
kotak2(14,6,65,15,lightgray,white,'D');
PesanKonsentrasi1;
repeat
tekan:=readkey;
until (tekan=#27) or (tekan=#13);
  if (tekan=#13)then begin  end;
  if (tekan=#27) then goto exit;clrscr;
bukafileatom;
gotoxy(5,10);
huruf :='Masukkan lambang unsur cuplikan ? ';cursoron;
MENCARI(1,HURUF);
huruf :='Data ini sebagai data cuplikan ..!! ';
tunggu(huruf);
huruf :='Masukkan lambang unsur standar  ? ';
MENCARI(2,HURUF);
huruf :='Data ini sebagai data standar ..!! ';
tunggu(huruf);KONSENTRASI1;HITUNGKonsentrasi;
WRITELN;
q3 :=((cnc*ms*fs)/(cns*fc));
Writeln('Massa isotop,',max_data[1].simbol,' dalam cuplikan adalah : ',q3 ,' gram');
Writeln('Konsentrasi isotop,',max_data[1].simbol,' dalam cuplikan adalah :  ',
q3*100/mc,' %');
TAMPIL_DEH;
exit:
end;
end;
(*************************************************************************)
procedure KonsentrasiPilihan2;
label exit;
begin
 window(1,1,80,25);clrscr;
 latar;
 begin
 kotak2(14,6,65,15,lightgray,white,'D');
 pesanKonsentrasi2;
 repeat
 tekan:=readkey;
 until (tekan=#27) or (tekan=#13);
  if (tekan=#13)then begin  end;
  if (tekan=#27) then goto exit;clrscr;
 bukafileatom;
 huruf :='Masukkan lambang unsur cuplikan ? ';
 MENCARI(1,HURUF);
 huruf :='Data ini sebagai data cuplikan ..!! ';
 tunggu(huruf);
 huruf :='Masukkan lambang unsur standar  ? ';
 MENCARI(2,HURUF);
 huruf :='Data ini sebagai data standar ..!! ';
 tunggu(huruf);KONSENTRASI2;HITUNGKonsentrasi;
 writeln;
 q3 :=((cnc*fls*ms*fs)/(cns*flc*fc));
 Writeln('Massa isotop,',max_data[1].simbol,' dalam cuplikan adalah : ',q3 ,' gram');
 Writeln('Konsentrasi isotop,',max_data[1].simbol,' dalam cuplikan adalah :  ',
q3*100/mc,' %');
```

```
  TAMPIL_DEH;
  exit:
  end;
 end;
 (*************************************************************************)
 procedure KonsentrasiPilihan3;
 label exit;
 begin
  window(1,1,80,25);clrscr;
  latar;
  begin
  kotak2(14,6,65,15,lightgray,white,'D');
  PesanKonsentrasi3;
  repeat
   tekan:=readkey;
  until (tekan=#27) or (tekan=#13);
   if (tekan=#13)then begin  end;
   if (tekan=#27) then goto exit;clrscr;
  bukafileatom;
  huruf :='Masukkan lambang unsur cuplikan ? ';
  MENCARI(1,HURUF);
  huruf :='Data ini sebagai data cuplikan ..!! ';
  tunggu(huruf);
  huruf :='Masukkan lambang unsur standar  (Al) atau (Cu) ? ';
  MENCARI(2,HURUF);
  huruf :='Data ini sebagai data standar ..!! ';
  tunggu(huruf);KONSENTRASI1;HITUNGKonsentrasi;
  WRITELN;
  q3 :=((cnc*ms*fs)/(cns*fc));
  Writeln('Massa isotop,',max_data[1].simbol,' dalam cuplikan adalah : ',q3 ,' gram');
  Writeln('Konsentrasi isotop,',max_data[1].simbol,' dalam cuplikan adalah :  ',
q3*100/mc,' %');
  TAMPIL_DEH;
  exit:
  end;
 end;
 (*************************************************************************)
 procedure TpLintangDanWaktuParo( NEM:STRING; I:INTEGER);
 begin
  TEXTCOLOR(18);WINDOW(1,1,80,25);
  Gotoxy(20,21);writeln(NEM);WINDOW(1,5,80,21);
  IF NEM<>'' THEN READLN;
  TEXTCOLOR(15);
  with RECATOMIC do
  begin
  HARGA:=0;hrg:=0;
  if (kw='S') or (kw='s') then harga :=paro;
  if (kw='M') or (kw='m') then harga :=paro*60;
  if (kw='h') or (kw='H') then harga :=paro*3600;
  if (kw='d') or (kw='D') then harga :=paro*3600*24;
  if (kT='B') or (kT='b') then hrg :=LINT*(1e-24);
  if (kT='mB') or (kT='Mb') or (kT='mb') or (kT='MB')then hrg :=LINT*(1e-27);
  if (kT='mkb') or (kT='MKB') or (kT='mkB') or (kT='Mkb')then hrg :=LINT*(1e-30);
  max_data[I].simbol := SIMBOL;
  max_data[I].unsur := unsur;
```

```
    max_data[I].z := z;
    max_data[I].aa := aa;
    max_data[I].iso := iso;
    max_data[I].paro := HARGA;
    max_data[I].KW := KW;
    max_data[I].lint := HRG;
    max_data[I].KT := KT;
    max_data[I].tenaga := tenaga;
    max_data[I].gamma := gamma;
    max_data[I].reaksi := reaksi;
    end;
  end;
  (*************************************************************************)
  PROCEDURE HitungBatasDeteksi;
  label exit;
  BEGIN
   window(1,1,80,25);clrscr;
   latar;
   begin
   kotak2(14,6,65,15,lightgray,white,'D');
   PesanBatasDeteksi;
   repeat
    tekan:=readkey;
   until (tekan=#27) or (tekan=#13);
    if (tekan=#13)then begin  end;
    if (tekan=#27) then goto exit;clrscr;
   bukafileAtom;
   huruf :='Masukkan lambang unsur (cuplikan)? ';
   Mencari(1,Huruf);
   huruf :='Data ini sebagai data cuplikan ....!! ';
   TpLintangDanWaktuParo(huruf,1);
   masukanBatasDeteksi;writeln;
   with max_data[1] do
   begin
    Q2 :=(1+sqrt(1+(4*(sqr(Q1))*tcc*Mc )
  +(4*(sqr(Q1))*(sqr(Mc))*tcs)))/(2*(Sqr(Q1))*Mc);
    q3 :=Q2*Mc;
    fs
  :=(q3*max_data[1].aa*(ln(2)))/(max_data[1].paro*(tds/100)*(max_data[1].gamma/100)*
       tdc*max_data[1].lint*(max_data[1].iso/100)*6.02e23);
    fc := (1-(exp((-ln(2)*mc/max_data[1].paro)))) *
        (exp((-ln(2)*mc/max_data[1].paro)))*
        (1-(exp((-ln(2)*cns/max_data[1].paro))));
    qs := fs/FC;
   end;
   GOTOXY(10,19);write('     Batas Deteksi Unsur ',max_data[1].simbol,' :',qs,' gram');
   readln; clrscr;
   exit:
   END;
  end;
  (*************************************************************************)
  PROCEDURE FLUKNeutron;
  label exit;
  Begin
   window(1,1,80,25);clrscr;
```

```
 latar;
 bukafileAtom;
 begin
 kotak2(14,6,65,15,lightgray,white,'D');
 PesanFlukNeutron;
 repeat
  tekan:=readkey;
 until (tekan=#27) or (tekan=#13);
  if (tekan=#13)then begin  end;
  if (tekan=#27) then goto exit;
 clrscr;
 huruf :='Masukkan lambang unsur ? ';
 Mencari(1,Huruf);
 huruf :='Data ini sebagai data sample ..!! ';
 tunggu('');
 masukan_3; WRITELN;
 with max_data[1] do
 begin
  q1 :=Cnc*aa*(ln(2));
  q2
:=paro*cns*(max_data[1].gamma/100)*mc*max_data[1].lint*(max_data[1].iso/100)*6.0
2e23;
   q3 :=(1-exp((-ln(2))*tic/max_data[1].paro ))*
      exp((-ln(2))*tcc/max_data[1].paro )*
      (1-exp((-ln(2))*tdc/max_data[1].paro ));
  Qc := q1/(q2*q3);
 end;
 Gotoxy(15,16);Writeln('Hasil Fluk Neutron : ', qc ,' n/cm-2.s');
 tAMPIL_DEH;clrscr;
 exit:
 end;
end;
(*************************************************************************)
Procedure HITUNGTampangLintang;
 begin
 tunggu('');
 clrscr;
 with max_data[1] do begin
   q1 :=max_data[1].paro*(max_data[1].gamma/100)*(max_data[1].iso/100)/
      max_data[1].aa;
   fc := q1*(1-(exp((-ln(2)*tic/max_data[1].paro)))) *
       (exp((-ln(2)*tdc/max_data[1].paro)))*
       (1-(exp((-ln(2)*tcc/max_data[1].paro))));
 end;
 with max_data[2] do
 begin
 tunggu('');
  q2 := max_data[2].paro*(max_data[2].gamma/100)*(max_data[2].iso/100)/
       max_data[2].aa;
  fs := q2*(1-(exp((-ln(2)*tic/max_data[2].paro)))) *
       (exp((-ln(2)*tdc/max_data[2].paro)))*
       (1-(exp((-ln(2)*tcc/max_data[2].paro))));
 end;
END;
(*************************************************************************)
```

```
PROCEDURE TampangLintangPilihan1;
label exit;
begin
 window(1,1,80,25);clrscr;
 latar;
 kotak2(14,6,65,15,lightgray,white,'D');
 PesanTampangLintang1;
 repeat
  tekan:=readkey;
 until (tekan=#27) or (tekan=#13);
  if (tekan=#13)then begin  end;
  if (tekan=#27) then goto exit;
 clrscr;
 bukafileatom;
 gotoxy(5,10);
 huruf :='Masukkan lambang unsur cuplikan ? ';cursoron;
 MENCARI(1,HURUF);
 huruf :='Data ini sebagai data cuplikan ..!! ';
 tunggu(huruf);cursoron;
 huruf :='Masukkan lambang unsur standar  ? ';
 MENCARI(2,HURUF);
 huruf :='Data ini sebagai data standar ..!! ';
 tunggu(huruf);cursoron;
 MasukanTampangLintang1;HITUNGTampangLintang;
 WRITELN;
 q3 :=((cnc*max_data[2].lint*fs)/(cns*fc));
 bukafileatom; clrscr;
 kotak2(1,1,79,24,lightgray,white,'D');
 gotoxy(5,10);Writeln('Tampang Lintang reaksi isotop, ',max_data[1].simbol);
 gotoxy(5,11);Writeln('adalah  : ',q3 ,' cm2');
 gotoxy(5,13);Writeln('atau    : ',q3*1e27,' miliBarn');
 TAMPIL_DEH;
 exit:
end;
(*************************************************************************)
PROCEDURE TampangLintangPilihan2;
label exit;
begin
 window(1,1,80,25);clrscr;
 Latar;
 kotak2(14,6,65,15,lightgray,white,'D');
 PesanTampangLintang2;
 repeat
  tekan:=readkey;
 until (tekan=#27) or (tekan=#13);
  if (tekan=#13)then begin  end;
  if (tekan=#27) then goto exit;clrscr;
 WINDOW(1,1,80,25);bukafileatom;
 gotoxy(5,10);
 huruf :='Masukkan lambang unsur cuplikan ? ';cursoron;
 MENCARI(1,HURUF);
 huruf :='Data ini sebagai data cuplikan ..!! ';
 tunggu(huruf);
 MasukanTampangLintang2;
 tunggu('');
```

```
 clrscr;
 with max_data[1] do begin
   q1
:=(max_data[1].paro*(qc/100)*(max_data[1].gamma/100)*mc*(max_data[1].iso/100)*6.
02e23)/
       (max_data[1].aa*(ln(2)));
   fc := q1*(1-(exp((-ln(2)*tic/max_data[1].paro)))) *
       (exp((-ln(2)*tdc/max_data[1].paro)))*
       (1-(exp((-ln(2)*tcc/max_data[1].paro))));
   q2 := 0.5*(flc+fls);
   q3 :=Cnc/(fc*q2);
 end;
 WRITELN;
 WINDOW(1,1,80,25);bukafileatom;
 gotoxy(5,10);Writeln('Tampang Lintang reaksi isotop,',max_data[1].simbol,' adalah : ',q1
,' cm2');
 gotoxy(5,12);Writeln('atau                              : ',q3*1e27,' miliBarn');
 TAMPIL_DEH; exit:
end;
(*************************************************************************)
procedure tampilhasilsensitivitas;
begin
 bukafiledataterpilih;
 for i:=1 to filesize(FILETOMIC_3) do
 begin
  j:=1;
  for j:=1 to  filesize(FILETOMIC_3) do
  gotoxy(5,j+1); writeln(qs);readln;
 end;
end;
(*************************************************************************)
procedure tampil_gol;
begin
 window(1,1,80,25);clrscr;
 Latar;
 Golongan;
 for i:=1 to 13 do
 begin
   gotoxy(46,5+I);Writeln(gol[i]:5);
 end;
 TEXTCOLOR(rED+BLINK);
 GOTOXY(50,23);wRITELN('Tekan ENTER.....!');
 READLN;exit;
 Close(Filetomic_3);
end;
(*************************************************************************)
PROCEDURE MENU_9;
var Bs: array [1..80] of real;
label exit;
Begin

 clrscr;
 BukaFileDataTerpilih;
 latar;
 begin
```

```
    kotak2(14,6,65,14,lightgray,white,'D');
    PesanSensitivitasTunggal;
    repeat
     tekan:=readkey;
     until (tekan=#27) or (tekan=#13);
      if (tekan=#13)then begin  end;
      if (tekan=#27) then goto exit;
    window(1,1,80,25);clrscr;
    Latar;  cursoron;
    masukanmenu9;
    for i:=1 to 13 do
    begin
     gol[i]:=0;
    end;
    for i:=1 to filesize(FILETOMIC_3) do
    begin
     iu:=0;
     seek(FILETOMIC_3,i-1);
     read(FILETOMIC_3,RECATOMIC_3);
     tunggu_1('',1);
     with recatomic_3 do
     begin
      fs := (cns*max_data[1].aa*(ln(2))/max_data[1].paro)/
          (tcc*(max_data[1].gamma/100)*(max_data[1].iso/100)*
          tds*max_data[1].lint);
      fc := (1-(exp((-ln(2)*tdc/max_data[1].paro)))) *
          (exp((-ln(2)*mc/max_data[1].paro)))*
          (1-(exp((-ln(2)*q1/max_data[1].paro))));
      Qs:= fs/(fc*6.02e23);
      if qs < 1e-6 then begin inc(gol[1]);end;
      if (qs>= 1e-6) and (qs<1e-5) then inc(gol[2]);
      if (qs>=1e-5) and (qs<2e-5)  then inc(gol[3]);
      if (qs>=2e-5) and (qs<5e-5)  then inc(gol[4]);
      if (qs>=5e-5) and (qs<1e-4)  then inc(gol[5]);
      if (qs>=1e-4) and (qs<2e-4)  then inc(gol[6]);
      if (qs>=2e-4) and (qs<5e-4)  then inc(gol[7]);
      if (qs>=5e-4) and (qs<1e-3)  then inc(gol[8]);
      if (qs>=1e-3) and (qs<2e-3)  then inc(gol[9]);
      if (qs>=2e-3) and (qs<5e-3)  then inc(gol[10]);
      if (qs>=5e-3) and (qs<1e-2)  then inc(gol[11]);
      if (qs>=1e-2) and (qs<2e-2)  then inc(gol[12]);
      if (qs>=2e-2) then inc(gol[13]);
     end;
   end;
   tampil_gol;BATANG(TDS,TCC);
   exit:
   end;
end;
(*************************************************************************)
PROCEDURE MENU_13;
var a1,a2,a3,a4,a5:real;
label exit;

Begin
 BukaFileDataTerpilih;
```

```
CLRSCR;
begin
 latar;
 kotak2(14,6,65,15,lightgray,white,'D');
 PesanSensitivitasSiklik;
 repeat
  tekan:=readkey;
 until (tekan=#27) or (tekan=#13);
  if (tekan=#13)then begin  end;
  if (tekan=#27) then goto exit;
clrscr;
latar;cursoron;
MasukanMenu13;
GOTOXY(40,11);readln(cns);
GOTOXY(40,12);readln(tic);
GOTOXY(40,13);readln(tdc);
GOTOXY(40,14);readln(tcc);
GOTOXY(40,15);readln(ms);
GOTOXY(40,16);readln(fc);
GOTOXY(40,17);readln(fs);

for i:=1 to 13 do
begin
  gol[i]:=0;
end;
for i:=1 to filesize(FILETOMIC_3) do
begin
  seek(FILETOMIC_3,i-1);
  read(FILETOMIC_3,RECATOMIC_3);
  tunggu_1('',1);
  with recatomic_3 do
  begin
    q1 := tic +(2*tdc) + tcc;
    a1 := n/(1-exp((-ln(2))*q1/max_data[1].paro));
    a2 := exp((-ln(2))*q1/max_data[1].paro);
    a3 := 1-(exp((-ln(2))*fs*q1/max_data[1].paro));
    a4 := sqr(1-exp((-ln(2))*q1/max_data[1].paro));
    a5 := cns/(a1-(a2*a3/a4));

    cnc := (a5*max_data[1].aa*(ln(2))/max_data[1].paro)/
      ((fc/100)*(max_data[1].gamma/100)*ms*(max_data[1].iso/100)*
      max_data[1].lint);
   mc := (1-(exp((-ln(2)*tic/max_data[1].paro)))) *
      (exp((-ln(2)*tdc/max_data[1].paro)))*
      (1-(exp((-ln(2)*tcc/max_data[1].paro))));
   Qs:= cnc/(mc*6.02e23);

  {  write(qs);readln;}
   if(Qs< 1e-6) then begin inc(gol[1]);end;
   if(Qs>=1e-6) and (Qs<4e-6)  then inc(gol[2]);
   if(Qs>=4e-6) and (Qs<1e-5)  then inc(gol[3]);
   if(Qs>=1e-5) and (Qs<2e-5)  then inc(gol[4]);
   if(Qs>=2e-5) and (Qs<5e-4)  then inc(gol[5]);
   if(Qs>=5e-4) and (Qs<1e-4)  then inc(gol[6]);
   if(Qs>=1e-4) and (Qs<2e-4)  then inc(gol[7]);
```

```
        if(Qs>=2e-4) and (Qs<5e-4)  then inc(gol[8]);
        if(Qs>=5e-4) and (Qs<1e-3)  then inc(gol[9]);
        if(Qs>=1e-3) and (Qs<2e-3)  then inc(gol[10]);
        if(Qs>=2e-3) and (Qs<5e-3)  then inc(gol[11]);
        if(Qs>=5e-3) and (Qs<1e-2)  then inc(gol[12]);
        if(Qs>=1e-2) then inc(gol[13]);
       end;
     end;
    tampil_gol;{BATANG(TDs,Tcc);}
   exit:
   end;
 end;
(*************************************************************************)
Procedure Tampilan; forward;
(*************************************************************************)
Procedure tambah;
var kode : string[5];
    kunsur : string;
    lag : char;
    I   : INTEGER;
label balik,loncat;
begin
 balik:
 clrscr;
 with RECDataEfis do
  begin
    cOFER;
    kotak2(1,5,79,24,lightgray,white,'D');
    GotoXy(20,7);Writeln('PROGRAM TAMBAH DATA');
    textcolor(white);textbackground(lightgray);
    if (filesize(FILEEfis)>10) or (filesize(FILEEfis)=10) then
    begin
     textcolor(15+blink);cursoroff;suara;
     GotoXy(37,12);Writeln('Maaf, max data hanya 10 ..... !! ');
     textcolor(15);readln;cursoron;
     goto loncat;
    end;
 cursoron;
GotoXy(2,6);Writeln('Jumlah data : ',filesize(FILEEfis));
textcolor(white+blink);
GotoXy(54,9);Writeln('Maximal 6 Digit .... '); textcolor(14);
GotoXy(42,23);Writeln(' Tekan <Enter> ke menu utama... ');
textcolor(15);
GotoXy(20,9);writeln('[A] Isotop        : [      ]');
GotoXy(45,9);readln(kunsur);
if kunsur=' ' then goto loncat;
for i:=1 to filesize(FILEEfis) do
Begin
 seek(FILEEfis,i-1);
 read(FILEEfis,RECDataEfis);
end;
Isotop:=kunsur;
while Isotop<> '' do
begin
 kunsur:=copy(Isotop,5,2);
```

```
  GotoXy(20,10);writeln('[B] Energi (keV)   :');
  GotoXy(20,11);write  ('[C] Cacah per sekon : ');
  GotoXy(20,12);write  ('[D] Yield gamma    : ');
  Gotoxy(20,13);write  ('[E] Aktifitas      : ');
  GotoXy(42,10);readln(energi);
  GotoXy(42,11);readln(cps);
  GotoXy(42,12);readln(YGamma);
  GotoXy(42,13);readln(dps);
  Efisiensi:=Cps*100/(dps*YGamma);
  LnEnergi :=(Ln(Energi));
  LnEfis   :=(Ln(Efisiensi));
  Gotoxy(20,14);write  ('[F] Efisiensi      : ',Efisiensi:3:4);
  Gotoxy(20,15);write  ('[G] Ln Energi      : ',LnEnergi:3:4);
  Gotoxy(20,16);write  ('[H] Ln Efisiensi   : ',LnEfis:3:4);
  GotoXy(25,20);write('Data Apakah Sudah Benar.. [Y/T].!');ok:=readkey;
  if UPCASE(ok)='Y' then
  begin
    seek(FILEEfis,i);
    write(FILEEfis,RECDataEfis);
    i:=i+1;
    cursoroff;
    GotoXy(25,20);write('Ada Data lain lagi.....!');
    textcolor(15+blink);
    GotoXy(60,20);Writeln('[Y/T]');lag:=readKEY;textcolor(15);
    cursoron;
    if upcase(lag)='Y' then goto balik
    else
      goto loncat;
    end;
    writeln;
    if upcase(ok)='T' then goto balik;
    clrscr;
    end;
  end;
  loncat :
  CLOSE(FILEEfis);
end;
(*************************************************************************)
Procedure tampil;
 begin
  clrscr;
  textcolor(blue);
  cofer;
  kotak2(1,5,80,24,lightgray,white,'D');
  bukafileefisiensi;
  Tampilan;
  textcolor(11+blink);
  gotoXy(45,23);Writeln('Tekan <ENTER> ke menu utama .... ');readln;
  textcolor(15);
  textbackground(0);
end;
(*************************************************************************)
Procedure Tampilan;
VAR I : INTEGER;
label loncat;
```

```
 Begin
   lowvideo;
   cursoroff;
   textcolor(15);
   iu:=0;
   judultabelefis;
   bukafileefisiensi;
   with RECDataEfis do
   begin
     for i:=1 to filesize(FILEEfis) do
     begin
       seek(FILEEfis,i-1);
       read(FILEEfis,RECDataEfis);
       iu:=iu+1;textcolor(blue);
       GotoXy( 2,8+iu);writeln(filepos(FileEfis));
       GotoXy(5,8+iu);writeln(energi:7:3);
       GotoXy(14,8+iu);writeln(cps:6:3);
       GotoXy(23,8+iu);writeln(YGamma:6:4);
       GotoXy(31,8+iu);writeln(Dps:6:3);
       GotoXy(42,8+iu);writeln(Efisiensi:7:4);
       GotoXy(54,8+iu);writeln(LnEnergi:7:4);
       GotoXy(68,8+iu);writeln(LnEfis:7:4);
     end;
   end;

 gotoxy(2,10+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
   if iu=0 then
   Begin
     suara;textcolor(15+blink);
     GotoXy(20,14);Writeln('Tidak ada datanya ...... ');
     textcolor(white);
   end;
   loncat :
   close(fileefis);
 end;
(*******************************************************************)
Procedure CetakDataEfisiensi;
VAR I : INTEGER;
label loncat;
Begin
  bukafileEfisiensi;
  iu:=0;
  judultabelefis;
  with RECDataEfis do
  begin
    for i:=1 to filesize(FILEEfis) do
    begin
      seek(FILEEfis,i-1);
      read(FILEEfis,RECDataEfis);
      iu:=iu+1;
      writeln(lst,' ',i,' ',Energi:8:3,' ',cps:7:3,' ',YGamma:6:4,' ',dps:6:3,' ',Efisiensi:7:3,'
',LnEnergi:7:3,
             '      ',LnEfis:7:5);
    end;
  end;
```

```
gotoxy(2,8+iu);writeln('ffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff')
;
 if iu=0 then
 loncat :
 close(filetomic);
end;
(************************************************************************)
Procedure Koreksi;
var
 koreksi : string[4];
 I      : INTEGER;
 mn     : byte;
label ulang,loncat;
Begin
 ulang:
 Clrscr;
 kotak2(1,1,80,4,lightgray,white,'D');
 koreksi:='';
 kotak2(1,5,80,24,white,blue,'D');
 Tampilan;
 bukafileEfisiensi;
 cursorOn;
 textcolor(red);
 kotak2(20,2,60,2,brown,white,'c');
 GotoXy(24,2);writeln('   KOREKSI   DATA   EFISIENSI');
 textbackground(lightgray);
 textcolor(red);
 GotoXy(18,20);Write('    Masukkan Nomor (0 - Batal) : ');Readln(krk);
 IF KRK=0 THEN goto loncat;
 begin
 k:=2;
 with RECDataEfis do
  begin
   for i:=1 to filesize(FILEEfis) do
   Begin
    seek(FileEfis,krk-1);
    read(FILEEfis,RECDataEfis);
    mn:=0;
    while mn=0 do
    begin
     k:=1;
     clrscr;
     GotoXy(13,7);writeln('P R O G R A M   K O R E K S I  D A T A');
     GotoXy(15, 8);Writeln('    No Record . ',Filepos(FileEfis));
     GotoXy(15,10);Writeln('[A] Energi          : ',Energi:7:2);
     GotoXy(15,11);Writeln('[B] Cacah persekon  : ',cps:8:4);
     GotoXy(15,12);writeln('[C] IGamma          : ',YGamma:7:3);
     GotoXy(15,13);writeln('[D] Aktifitas (dps) : ',dps:12:4);
     GotoXy(15,20);Write('Masukan No Koreksi [A..D / 0 = Exit]');
     cursoroff;
          Korek:=readkey;
          cursoron;
     case UPCASE(korek) of
     'A' : Begin GotoXy(50,10);Write('=====> ');Readln(Energi);mn:=0;end;
```

```
          'B' : Begin GotoXy(50,11);Write('=====> ');Readln(Cps);mn:=0;end;
          'C' : Begin GotoXy(50,12);Write('=====> ');Readln(YGamma);mn:=0;end;
          'D' : Begin GotoXy(50,13);Write('=====> ');Readln(Dps);mn:=0;end;
          '0' : Begin
          Efisiensi:=(Cps*100/(dps*YGamma));
          LnEfis  :=Ln(Efisiensi);
          LnEnergi :=Ln(Energi);
          seek(FILEEfis,krk-1);
          write(FILEEfis,RECDataEfis);
          goto loncat;
         end;
        end;
       end;
      end;
      end;
      if k=2 then
       begin
        clrscr;
        textcolor(15+blink);
        GotoXy(20,12);Writeln('Data yang akan dikoreksi ... ndak ada.! ');
        textcolor(15);
       end;
      cursoroff;
      textcolor(15);
      GotoXy(22,14);Writeln(' Koreksi data lagi .....[Y / T].!      ');
      ok:=readkey;
      cursoron;
      if upcase(ok)='Y' then goto ulang
      ELSE
       loncat :
      end;
    close(fileefis);
  end;
  (*************************************************************************)
  Procedure HapusEfisiensi;
  var
   hapus,I : integer;
   hps,h : char;
   mn:byte;
   io,o,jk   : byte;
   label ulang,loncat;
  Begin
   ulang :
   Clrscr;
   kotak2(1,1,80,4,brown,white,'D');
   GotoXy(24,2);writeln(' PENGHAPUSAN   DATA   EFISIENSI');
   kotak2(1,5,80,24,lightgray,white,'D');
   Tampilan;
   cursorOn;
   textcolor(red);
   textbackground(lightgray);
   textcolor(red);
   GotoXy(18,20);Write('Masukkan No. Record yang akan dihapus (0 - Batal) :
  ');Readln(hapus);
    if iu=0 then exit;CursorOn;
```

```
 IF hapus=0 THEN goto loncat;
k:=2;
with RECdataEfis do
begin
for i:=1 to filesize(FILEEfis) do
Begin
 seek(FileEfis,hapus-1);
 read(FILEEfis,RECDataEfis);
 mn:=0;
 while mn=0 do
 begin
  k:=1;
  clrscr;
  kotak2(1,1,79,24,lightgray,white,'D');
  COFER;
  kotak2(18,6,57,15,brown,white,'D');
  GotoXy(19,7);writeln(' P R O G R A M  H A P U S  D A T A ');
  GotoXy(19,9);writeln('      No. Record  : ',iu);
  GotoXy(19,11);Writeln('[A] Energi        : ',energi:7);
  GotoXy(19,12);Writeln('[B] Cacah persekon : ',cps:7:4);
  GotoXy(19,13);writeln('[C] IGamma        : ',YGamma:7:3);
  GotoXy(19,14);writeln('[D] Aktifitas     : ',dps:12:4);
 textcolor(red+blink);textbackground(lightgray);
 GotoXy(19,20);Write(' Data ini akan dihapus .....[Y / T] ');
 cursoroff;
 hps:=readkey;GotoXy(53,14);Writeln('[',hps,']');
 cursoron;
 if upcase(hps)='Y' then
 begin
  seek(FILEEfis,filepos(FILEEfis)-1);
  Isotop:='';
  write(FILEEfis,RECDataEfis);
  mn:=1;
  clrscr;
  Assign(FileDelete,'Delete.dta');
  {$I-} reset(fileDelete); {$I+}
  If IOresult <> 0 then rewrite(fileDelete);
  JK:=1;
  for io:=1 to filesize(FILEEfis) do
  begin
   seek(FILEEfis,io-1);
   Read(FILEEfis,RECDataEfis);
   if RECDataEfis.Isotop<>'' then
   Begin
    Seek(fileDelete,JK-1);
    Write(filedelete,recDataEfis);
    JK:=JK+1;
   end;
  end;
 CLOSE(FILEDelete);
 CLOSE(FILEEfis);
 erase(fileEfis);
 RENAME(fileDelete,'Efis.DTA');
 BukaFileEfisiensi;
 GotoXy(15,20);Write(' Hapus lagi ..... [Y / T] ');
```

```
      h:=readkey;GotoXy(53,20);Writeln('[',h,']');
      if upcase(h)='Y' then goto ulang;
      goto loncat;
     end;
     if upcase(hps)='T' then goto loncat;
     end;
   end;
  end;
  if k=2 then
  begin
   clrscr;
   textcolor(15+blink);
   GotoXy(22,20);Writeln('Data yang akan dihapus ... ndak ada.! ');
   textcolor(15);
   GotoXy(15,20);Write(' Hapus lagi ..... [Y / T] ');
   h:=readkey;GotoXy(53,20);Writeln('[',h,']');
   if upcase(h)='Y' then goto ulang;
   exit;
  end;
  loncat :
end;
(*************************************************************************)
Procedure Masukan (var m,n : integer;var X : Matriks;var y : Vektor);
Var
 J,i,l  : integer;
Begin
 ClrScr;
 gotoxy(5,10);Write('Orde polinom (maks.3)  :');
 gotoxy(5,32);Read(m);
 n:=filesize(FileEfis);
 with recdataEfis do
  begin
   For i := 1 To n Do
    Begin
     seek(fileEfis,i-1);
     read(fileEfis,recDataEfis);
     x[i,1]:=1;
     x[i,2]:=LnEnergi;
     For j := 3 To m+1 Do
     Begin
      x[i,j] := x[i,2];
      For l := 1 To j-2 Do
      x[i,j] :=x[i,j] * x[i,2];
     End;
     y[i]:=LnEfis;
    End;
  end;
  m := m+1;
End;
(*************************************************************************)
procedure UrutkanDataEfisiensi;
var i,j : byte;
begin
 with RecdataEfis do
 begin
```

```
    for i:=1 to filesize(FILEEfis) do
    begin
     seek(FILEEfis,i-1);
     read(FILeEfis,RECdataEfis);
     max_dat[i].isotop := isotop;
     max_dat[i].energi := energi;
     max_dat[i].yGamma := Ygamma;
     max_dat[i].Cps := Cps;
     max_dat[i].Dps := Dps;
     max_dat[i].Efisiensi :=Efisiensi;
     max_dat[i].LnEnergi :=LnEnergi;
     max_dat[i].LnEfis :=LnEfis;
     iu:=iu+1;
    end;
   end;
   for i:=1 to filesize(FILEEfis)-1 do
    for j:=1 to filesize(FILEEfis)-I do
    if max_dat[j].LnEnergi > max_dat[j+1].LnEnergi then
    begin
     recdataEfis :=max_dat[j];
     max_dat[j]:=max_dat[j+1];
     max_dat[j+1]:=recdataEfis;
    end;
  close(fileEfis);
end;
(*****************************************************************)
procedure menu_2;
 var
 dtx : string[10];
 dty : string[2];
 k1,m:integer;
 ag:string;
Begin
 i:=0;k:=0;n:=0;j:=0;{ x:=0; y:=0;}
 bukafileEfisiensi;
 Masukan(k,n,x,y);
 Kali_transpose_1(k,n,x,y,z);
 Kali_transpose_2(k,n,x,x);
 Matriks_invers(k,x,x);
 Kali_matriks(k,k,1,x,z,a);
 UrutkanDataEfisiensi;
 bukafileEfisiensi;
{ n:=filesize(FileEfis);}
{  clrscr;
 kotak2(1,1,79,24,lightgray,white,'D');
 kotak2(17,2,58,14,blue,white,'D');}

 for i:=1 to n do
 begin
  titikx[i]:=max_dat[i].LnEnergi;
  titiky[i]:=max_dat[i].LnEfis;
  sumbux[i]:=(max_dat[i].Energi);
  sumbuy[i]:=(max_dat[i].Efisiensi);
  str(titikx[i]:7:4,angkax[i]);
  str(titiky[i]:4:2,angkay[i]);
```

```
  str(sumbux[i]:7:4,plotx[i]);
  str(sumbuy[i]:4:2,ploty[i]);
  anova(k,n,a,y,z,r,mse);
  end;
readln;
kendaligrafik:=2;
initgraph(modegrafik,kendaligrafik,'c:\agung\pascal');
winds(2,2,637,475,blue,3);

line(30,30,30,470);
line(30,350,600,350);
 outtextxy(4,5,'Copyright (C) 1996 by Agoenk');
 outtextxy(400,30,'Grs Merah -');
 outtextxy(400,50,'Cetak  - ');
 outtextxy(400,70,'Keluar  - ');

 SETCOLOR(LightRed);
 Str(r:2:6,ag);
 Outtextxy(400,190,'Koef_Korel:'+ag);
 outtextxy(500,30,'Garis Regresi');
 outtextxy(500,50,'Shift+PrntScrn');
 outtextxy(500,70,'Esc');
 outtextxy(400,90,'Koefisien-koefisien regresi:');
 for i :=1 to k do
 begin
  Str (a[i]:10:5,dtx);
  Str(i,dty);
  Outtextxy(400,90+(20*i),' a['+dty+'] = '+dtx);
 end;

SETCOLOR(white);
settextstyle(6,0,9);
for i:=1 to 2 do
outtextxy(190,450+i,'GRAFIK KALIBRASI EFISIENSI');
setcolor(lightred);
settextstyle(6,1,2);
outtextxy(2,60,'Efisiensi');
settextstyle(6,0,2);
outtextxy(530,360,'Energi (KeV)');
settextstyle(2,0,4);
setcolor(white);
for i:=1 to n do
outtextxy(35,350-round(titiky[i]*80),ploty[i]);
{************ grafik I **************}
q1:=titikx[1];
outtextxy(40+round(titikx[1]*60),355,plotx[1]);
moveto(50+round(titikx[1]*60),350);
lineto(50+round(titikx[1]*60),350-round(titiky[1]*80));
outtextxy(50+round(titikx[1]*60),350-round(titiky[1]*80),'*');
k1:=-1;
for i:=2 to n do
begin
k1:=k1*(-1);
if k1<0 then
 begin
```

```
      jenis:=-10;
      end
     else
      jenis:=0;
    lineto(50+round(titikx[i]*60),350-round(titiky[i]*80));
    lineto(50+round(titikx[i]*60),350);
    outtextxy(50+round(titikx[i]*60),365+jenis,plotx[i]);
    outtextxy(50+round(titikx[i]*60),350-round(titiky[i]*80),'*');
    moveto(50+round(titikx[i]*60),350-round(titiky[i]*80));
    end;
    {************ grafik II ***************}
    SetlineStyle(0,0,2);
    q1 :=2.5; q2 :=(A[1]+(A[2]*(q1))+(A[3]*(sqr(q1)))+(A[4]*(sqr(q1)*(q1))) );
    moveto(50+round(q1*60),350-round(q2*80));
    setcolor(lightred);
    repeat
    begin
      q1:=q1+0.1;
      q2:=(A[1]+(A[2]*(q1))+  (A[3]* (sqr(q1)))+ ((sqr(q1)*q1)*A[4]) );
      lineto(50+round(q1*60),350-round(q2*80));
    end;
    until q1>=titikx[n]+0.4;
    repeat
      tekan:=readkey;
      until tekan = #27;
    closegraph;
    restorecrtmode;
  {  For i := 1 To n Do
    begin
    z[i] := x[i,2];
   end;}
  end;
  (*****************************************************************************)
  procedure absolut;
  var power,hasil : real;
  begin
   bukafileEfisiensi;
   Masukan(k,n,x,y);
   Kali_transpose_1(k,n,x,y,z);
   Kali_transpose_2(k,n,x,x);
   Matriks_invers(k,x,x);
   Kali_matriks(k,k,1,x,z,a);
   clrscr;
   kotak2(1,1,79,24,lightgray,white,'d');
   kotak2(3,9,77,20,blue,white,'d');
   Gotoxy(4,10);Write('Persamaan regresi polinomialnya adalah : ');
   gotoxy(4,11);writeln('Y = exp(',a[1],')+(',a[2],'LnE)+(',a[3],'Ln2E)');
   gotoxy(4,12);writeln('              +',a[4],'ln3E');
   Gotoxy(4,13);Writeln('Dengan Y  = Efisiensi dalam %    ');
   gotoxy(4,14);writeln('     LnE = Ln (Energi)          ');
   cursoron;
   gotoxy(4,18);writeln('Efisiensi pada energi :            keV');
   gotoxy(30,18);readln(Power);
   hasil:= exp(a[1]+ (a[2]*(ln(power))) + (a[3]*(sqr(ln(power))))+
  (A[4]*(sqr(ln(power))*ln(power))));
```

```
 gotoxy(4,19);writeln('adalah : ',hasil);
 tekan_esc;
end;
(*************************************************************************)
procedure titik;
var pwr,hasil1,hasil2,jrk,rd : real;
begin
 bukafileEfisiensi;
 Masukan(k,n,x,y);

 Kali_transpose_1(k,n,x,y,z);
 Kali_transpose_2(k,n,x,x);
 Matriks_invers(k,x,x);
 Kali_matriks(k,k,1,x,z,a);
 textbackground(black);
 ClrScr;
 latar;
 kotak2(4,6,74,18,blue,white,'D');
 gotoxy(9,8);writeln('Y = exp(',a[1],')+(',a[2],'LnE)+');
 gotoxy(9,9);writeln('(',a[3],' Ln2E)+','(',a[4],'ln3E)*Fak.Geometri');
 gotoxy(9,10);anova(k,n,a,y,z,r,mse);
 cursoron;
 gotoxy(9,12);write('Efisiensi pada energi :          keV ');
 gotoxy(9,13);write('Jarak sumber-Detektor :           m  ');
 gotoxy(9,14);write('Diameter Detektor     :           m  ');
 gotoxy(33,12);readln(Pwr);
 gotoxy(33,13);readln(jrk);
 gotoxy(33,14);readln(rd);

 hasil1:=0.5 * (1 - (0.1/(sqrt(sqr(jrk)+sqr(rd) ))));
 hasil2:= exp(a[1]+ (a[2]*(ln(pwr))) + (a[3]*(sqr(ln(pwr))))+
       (A[4]*(sqr(ln(pwr))*ln(pwr))))*hasil1;
 gotoxy(9,16); writeln('Faktor Geometri    : ',hasil1);
 gotoxy(9,17); writeln('Efisiensi intrinsik  : ',hasil2);
 tekan_esc;
 clrscr;
end;
(*************************************************************************)
procedure disx;
var pwr,hasil1,hasil2,jrk,rd,rs,hit1,hit2 : real;
begin
  bukafileEfisiensi;
  Masukan(k,n,x,y);

  Kali_transpose_1(k,n,x,y,z);
  Kali_transpose_2(k,n,x,x);
  Matriks_invers(k,x,x);
  Kali_matriks(k,k,1,x,z,a);
  ClrScr;
  cursoron;
  kotak2(1,1,80,25,lightgray,white,'D');
  gotoxy(5,5);writeln('Y = exp(',a[1],')+(',a[2],'LnE)+(',a[3],'Ln2E)');
  gotoxy(5,6);writeln('              + (',a[4],'ln3E) * F.Geometri');
  gotoxy(5,7);anova(k,n,a,y,z,r,mse);
 writeln;
```

```
  kotak2(4,9,75,20,blue,white,'D');
  gotoxy(10,11);write('    Efisiensi pada energi :              keV');
  gotoxy(10,12);write('    Jarak sumber-Detektor :               m');
  gotoxy(10,13);write('    Diameter Detektor     :               m');
  gotoxy(10,14);write('    Diameter Sumber       :               m');
  gotoxy(40,11);readln(Pwr);
  gotoxy(40,12);readln(jrk);
  gotoxy(40,13);readln(rd);
  gotoxy(40,14);readln(rs);

  hit1 := rd/jrk;hit2:=rs/jrk;
  hasil1:=(Sqr(hit1)/4) * (1- (3/4*(Sqr(hit2)+Sqr(hit1))) +
          (15/8*(((Sqr(Sqr(hit2)+ Sqr(Sqr(hit1)) ) /3)+
          (Sqr(hit2)*Sqr(hit1))))-(35/16*((((Sqr(Sqr(hit2))*
          Sqr(hit2))+(Sqr(Sqr(hit1)*Sqr(hit1)))/4)+
          (3/2*Sqr(hit2)*Sqr(hit1)*(Sqr(hit2)+Sqr(hit1)))))));
   hasil2:= exp(a[1]+ (a[2]*(ln(pwr))) + (a[3]*(sqr(ln(pwr))))+
            (A[4]*(sqr(ln(pwr))*ln(pwr))))/hasil1;
  gotoxy(10,17); writeln('Faktor Geometri     : ',hasil1);
  gotoxy(10,18); writeln('Efisiensi intrinsik  : ',hasil2);
  tekan_esc;
  clrscr;
end;
(*************************************************************************)
Procedure TitikDisx;
label ulang;
begin
 ulang:
 clrscr;
 cursoron;latar;
 kotak2(25,7,60,13,lightgray,white,'D');
 gotoxy(30,8);writeln('Sampel yang digunakan :');
 gotoxy(30,9);writeln('  1. Berbentuk titik   ');
 gotoxy(30,10);writeln('  2. Berbentuk lempeng ');
 textcolor(white);
 textbackground(blue);
 gotoxy(26,12);writeln('    Pilih 1 atau 2  ?        ');
 gotoxy(49,12);readln(q1);
 if q1=1 then begin titik;end;
 if q1=2 then begin disx;end;
 if (q1<>1) and (q1 <> 2)  then begin goto ulang;end;

end;
(*************************************************************************)
Procedure TambahDataAtom;
var kode : string[5];
kunsur : string[5];
lag : char;
label balik,loncat;
begin
 bukafileAtom;
 balik:
 textcolor(white);
 textbackground(0);
 clrscr;
```

```
  with RECATOMIC do
begin

 COFER_2;
    kotak2(1,1,79,24,lightgray,white,'D');

        GotoXy(20,7);Writeln(' P R O G R A M  T A M B A H  D A T A ');
        textcolor(white);textbackground(lightgray);
{ garis;}
cursoron;
textcolor(white+blink);
GotoXy(55,5);Writeln(' Maximal 5 Digit ..... ');
textcolor(14);
        GotoXy(45,23);Writeln('Tekan ENTER kembali ke menu .... ');
textcolor(15);
        GotoXy(20,9);writeln('[A] Lambang Unsur   : [    ]');
        GotoXy(44,9);readln(KUNSUR);
GotoXy(52,23);Writeln('                          ');
GotoXy(55,5);Writeln('                    ');
 if KUNSUR=' ' then goto loncat;
  for i:=1 to filesize(FILETOMIC) do
   Begin
    seek(FILETOMIC,i-1);
    read(FILETOMIC,RECATOMIC);
   end;
   SIMBOL:=KUNSUR;
  while SIMBOL<> '' do
   begin
    kunsur:=copy(simbol,5,2);
    GotoXy(20,10);writeln('[B] Nama Unsur     : [            ]');
    GotoXy(43,10);readln(UNSUR);
    GotoXy(20,11);write  ('[C] Nilai Z  : ');readln(Z);
    GotoXy(20,12);write  ('[D] Nilai AA : ');readln(AA);
    Gotoxy(20,13);write  ('[E] K.Isotop : ');readln(Iso);
    Gotoxy(20,14);write  ('[F] U.Paro   : ');readln(paro);
    Gotoxy(65,14);write  ('s/m/h/d');
    Gotoxy(50,14);READLN(KW);
    Gotoxy(20,15);write  ('[G] T.Lintang: ');readln(lint);
    Gotoxy(65,15);write  ('mkB/mB/B');
    Gotoxy(50,15);READLN(KT);
    Gotoxy(20,16);write  ('[H] Tenaga ke(V) : ');readln(tenaga);
    Gotoxy(20,17);write  ('[I] I.Gamma  : ');readln(gamma);
    Gotoxy(20,18);write  ('[J] Reaksi   : ');readln(reaksi);
    writeln;
    GotoXy(25,20);write('Data Apakah Sudah Benar.. [Y/T].!');ok:=readkey;
    if UPCASE(ok)='Y' then
       begin
         seek(FILETOMIC,i);
         write(FILETOMIC,RECATOMIC);
         i:=i+1;
         cursoroff;
         GotoXy(25,20);write('Ada Data lain lagi.....!');
         textcolor(15+blink);
         GotoXy(60,20);Writeln('[Y/T]');lag:=readKEY;textcolor(15);
         cursoron;
```

```
        if upcase(lag)='Y' then goto balik
        else
         goto loncat;
       end;
    writeln;
                        if upcase(ok)='T' then goto balik;
  end;
 end;
 loncat :
 CLOSE(FILETOMIC);
end;
(*********************************************************************)
Procedure TampilDataAtom;
label loncat;
Begin
 lowvideo;
 bukafileatom;
 cursoroff;
 textcolor(15);
 clrscr;
 kotak2(1,1,79,24,blue,white,'D');
 kotak2(14,2,66,2,LIGHTGRAY,wHITE,'C');
 GotoXy(15,2);writeln('  D A T A   N U K L I R   T E R U R U T');
 iu:=0;
 TEXTCOLOR(WHITE);
 TEXTBACKGROUND(BLUE);
 judultabelNo;
  for i:=1 to filesize(FILETOMIC) do
  begin
   with max_data[i] do
   begin
      iu:=iu+1;
      GotoXy( 2,7+iu);writeln(i:3);
      GotoXy( 6,7+iu);Writeln(SIMBOL:5);
      GotoXy(12,7+iu);writeln(z:3);
      GotoXy(16,7+iu);writeln(aa:6:1);
      GotoXy(23,7+iu);writeln(iso:6:1);
      GotoXy(32,7+iu);writeln(paro:5:2,kt);
      GotoXy(40,7+iu);writeln(lint:4:2,kw);
      GotoXy(48,7+iu);writeln(tenaga:6:1);
      GotoXy(57,7+iu);writeln(gamma:5:2);
      GotoXy(64,7+iu);writeln(reaksi:9);
      seek(FILETOMIC,i-1);
      write(FILETOMIC,max_data[i]);
      if iu=14 then
      begin

gotoxy(2,8+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ')
;
       gotoxy(2,9+iu);writeln('Tekan ENTER untuk melanjutkan .....!!');
       readln;
       for iu:=1 to 16 do
       begin
        gotoxy(2,7+iu);writeln('                                              ');
       end;
```

```
          iu:=0;
         end;
       end;
     end;

 gotoxy(2,8+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ')
;
    gotoxy(2,9+iu);writeln('Data sudah urut semua ENTER ....!!!');
    readln;
  close(filetomic);
end;

(**********************************************************************)
procedure UrutkanDataAtom;
var i,j : byte;
begin
  with RECATOMIC do
  begin
   for i:=1 to filesize(FILETOMIC) do
   begin
      seek(FILETOMIC,i-1);
      read(FILETOMIC,RECATOMIC);
      max_data[i].simbol := simbol;
      max_data[i].unsur := unsur;
      max_data[i].z := z;
      max_data[i].aa := aa;
      max_data[i].iso := iso;
      max_data[i].paro := paro;
      max_data[i].KW := KW;
      max_data[i].lint := lint;
      max_data[i].KT := KT;
      max_data[i].tenaga := tenaga;
      max_data[i].gamma := gamma;
      max_data[i].reaksi := reaksi;
      iu:=iu+1;
   end;
 end;

   for i:=1 to filesize(FILETOMIC)-1 do
     for j:=1 to filesize(FILETOMIC)-I do
       if max_data[j].simbol > max_data[j+1].simbol then
       begin
         recatomic :=max_data[j];
         max_data[j]:=max_data[j+1];
         max_data[j+1]:=recatomic;
       end;
close(filetomic);
end;
(**********************************************************************)
procedure UrutkanEnergi;
var i,j : byte;
begin
  with RECATOMIC do
  begin
   for i:=1 to filesize(FILETOMIC) do
```

```
    begin
       seek(FILETOMIC,i-1);
       read(FILETOMIC,RECATOMIC);
       max_data[i].simbol := simbol;
       max_data[i].unsur := unsur;
       max_data[i].z := z;
       max_data[i].aa := aa;
       max_data[i].iso := iso;
       max_data[i].paro := paro;
       max_data[i].KW := KW;
       max_data[i].lint := lint;
       max_data[i].KT := KT;
       max_data[i].tenaga := tenaga;
       max_data[i].gamma := gamma;
       max_data[i].reaksi := reaksi;
       iu:=iu+1;
    end;
  end;

    for i:=1 to filesize(FILETOMIC)-1 do
      for j:=1 to filesize(FILETOMIC)-I do
        if max_data[j].tenaga > max_data[j+1].tenaga then
        begin
          recatomic :=max_data[j];
          max_data[j]:=max_data[j+1];
          max_data[j+1]:=recatomic;
        end;
 close(filetomic);
end;
(*************************************************************************)
procedure PilihDataAtom;
var i,j : byte;
begin
  BukaFileDataTerpilih;
  TEXTCOLOR(15);CLRSCR;COFER;
  textcolor(15);
  kotak2(1,1,79,24,blue,white,'D');
  kotak2(1,1,79,24,blue,white,'D');
  kotak2(14,2,66,2,LIGHTGRAY,wHITE,'C');
  GotoXy(15,2);writeln('  D A T A   N U K L I R   T E R P I L I H');
  KATA:='';iu:=0;KRK:=0;
  TEXTCOLOR(WHITE);
  TEXTBACKGROUND(BLUE);
  judultabelNo;
  with RECATOMIC do
  begin
   for i:=1 to filesize(FILETOMIC) do
   begin
      seek(FILETOMIC,i-1);
      read(FILETOMIC,RECATOMIC);
      IF KATA ='' THEN
        BEGIN
          KATA:=COPY(simbol,1,2);
          max_data[1].simbol := SIMBOL;
          max_data[1].unsur := unsur;
```

```
        max_data[1].z := z;
        max_data[1].aa := aa;
        max_data[1].iso := iso;
        max_data[1].paro := paro;
        max_data[1].KW := KW;
        max_data[1].lint := lint;
        max_data[1].KT := KT;
        max_data[1].tenaga := tenaga;
        max_data[1].gamma := gamma;
        max_data[1].reaksi := reaksi;
      END
    ELSE
      BEGIN
      KATA:=COPY(simbol,1,2);
      IF KATA<>COPY(MAX_DATA[1].SIMBOL,1,2) THEN
        BEGIN
         with max_data[1] do
         begin
          iu:=iu+1;INC(KRK);
          GotoXy( 2,7+iu);writeln(KRK:3);
          GotoXy( 6,7+iu);Writeln(SIMBOL:5);
          GotoXy(12,7+iu);writeln(z:3);
          GotoXy(16,7+iu);writeln(aa:6:1);
          GotoXy(23,7+iu);writeln(iso:6:1);
          GotoXy(32,7+iu);writeln(paro:5:2,kw);
          GotoXy(40,7+iu);writeln(lint:4:2,kt);
          GotoXy(48,7+iu);writeln(tenaga:6:1);
          GotoXy(57,7+iu);writeln(gamma:5:2);
          GotoXy(64,7+iu);writeln(reaksi:9);
         . if iu=14 then begin

gotoxy(2,8+iu);writeln('ffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff')
;
          gotoxy(2,9+iu);writeln('Tekan ENTER untuk melanjutkan .....!!');

          END;
          recatomic_3.simbol := simbol;
          recatomic_3.unsur := unsur;
          recatomic_3.z := z;
          recatomic_3.aa := aa;
          recatomic_3.iso := iso;
          recatomic_3.paro := paro;
          recatomic_3.KW := KW;
          recatomic_3.lint := lint;
          recatomic_3.KT := KT;
          recatomic_3.tenaga := tenaga;
          recatomic_3.gamma := gamma;
          recatomic_3.reaksi := reaksi;
          seek(FILETOMIC_3,KRK-1);
          write(FILETOMIC_3,RECATOMIC_3);

          max_data[1].simbol := recatomic.simbol;
          max_data[1].unsur := recatomic.unsur;
          max_data[1].z := RECATOMIC.z;
          max_data[1].aa := RECATOMIC.aa;
```

```
max_data[1].iso := RECATOMIC.iso;
max_data[1].paro := RECATOMIC.paro;
max_data[1].KW := RECATOMIC.KW;
max_data[1].lint := RECATOMIC.lint;
max_data[1].KT := RECATOMIC.KT;
max_data[1].tenaga := RECATOMIC.tenaga;
max_data[1].gamma := RECATOMIC.gamma;
max_data[1].reaksi := RECATOMIC.reaksi;
if iu=14 then
begin

gotoxy(2,8+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ')
;
gotoxy(2,9+iu);writeln('Tekan Enter lanjutkan ....!!!');
READLN;
for iu:=1 to 16 do
begin
gotoxy(2,7+iu);writeln('                                                    ');
end;iu:=0;
end;
end;
END
ELSE
BEGIN
IF (max_data[1].lint<RECATOMIC.LINT) OR
  (max_data[1].iso <RECATOMIC.ISO) OR
  (max_data[1].gamma<RECATOMIC.GAMMA) THEN
BEGIN
IF (max_data[1].lint<RECATOMIC.LINT) THEN
BEGIN
max_data[1].simbol := RECATOMIC.simbol;
max_data[1].unsur := RECATOMIC.unsur;
max_data[1].z := RECATOMIC.z;
max_data[1].aa := RECATOMIC.aa;
max_data[1].iso := RECATOMIC.iso;
max_data[1].paro := RECATOMIC.paro;
max_data[1].KW := RECATOMIC.KW;
max_data[1].lint := RECATOMIC.lint;
max_data[1].KT := RECATOMIC.KT;
max_data[1].tenaga := RECATOMIC.tenaga;
max_data[1].gamma := RECATOMIC.gamma;
max_data[1].reaksi := RECATOMIC.reaksi;
END;
IF (max_data[1].lint=RECATOMIC.LINT) AND
 (max_data[1].iso <RECATOMIC.ISO) THEN
BEGIN
max_data[1].simbol := RECATOMIC.simbol;
max_data[1].unsur := RECATOMIC.unsur;
max_data[1].z := RECATOMIC.z;
max_data[1].aa := RECATOMIC.aa;
max_data[1].iso := RECATOMIC.iso;
max_data[1].paro := RECATOMIC.paro;
max_data[1].KW := RECATOMIC.KW;
max_data[1].lint := RECATOMIC.lint;
max_data[1].KT := RECATOMIC.KT;
```

```
            max_data[1].tenaga := RECATOMIC.tenaga;
            max_data[1].gamma := RECATOMIC.gamma;
            max_data[1].reaksi := RECATOMIC.reaksi;
           END;

           IF (max_data[1].lint=RECATOMIC.LINT) AND
             (max_data[1].iso =RECATOMIC.ISO) AND
             (max_data[1].gamma<RECATOMIC.GAMMA) THEN
           BEGIN
            max_data[1].simbol := RECATOMIC.simbol;
            max_data[1].unsur := RECATOMIC.unsur;
            max_data[1].z := RECATOMIC.z;
            max_data[1].aa := RECATOMIC.aa;
            max_data[1].iso := RECATOMIC.iso;
            max_data[1].paro := RECATOMIC.paro;
            max_data[1].KW := RECATOMIC.KW;
            max_data[1].lint := RECATOMIC.lint;
            max_data[1].KT := RECATOMIC.KT;
            max_data[1].tenaga := RECATOMIC.tenaga;
            max_data[1].gamma := RECATOMIC.gamma;
            max_data[1].reaksi := RECATOMIC.reaksi;
           END;
          END;
          END;
        end;
      end;
    END;
    with max_data[1] do
    begin
    recatomic_3.simbol := simbol;
    recatomic_3.unsur := unsur;
    recatomic_3.z := z;
    recatomic_3.aa := aa;
    recatomic_3.iso := iso;
    recatomic_3.paro := paro;
    recatomic_3.KW := KW;
    recatomic_3.lint := lint;
    recatomic_3.KT := KT;
    recatomic_3.tenaga := tenaga;
    recatomic_3.gamma := gamma;
    recatomic_3.reaksi := reaksi;
    seek(FILETOMIC_3,KRK-1);
    write(FILETOMIC_3,RECATOMIC_3);
    END;

gotoxy(2,8+iu);writeln('ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ')
;
  READLN;
  close(filetomic_3);
END;
(**************************************************************)
procedure CetakDataTerpilih;
var i,j : byte;
begin
  TEXTCOLOR(15);CLRSCR;
```

```
KATA:='';iu:=0;KRK:=0;

 BukaFileDataTerpilih;
with RECATOMIC_3 do
 begin
  for i :=1 to filesize(filetomic_3) do
  begin
  seek(filetomic_3,i-1);
  read(filetomic_3,recatomic_3);
  iu:=iu+1;INC(KRK);
  writeln(lst,' ',krk,'  ',simbol,'  ',z:3,' ',aa:6:1,' ',iso:6:3,'   ',paro:5:3,'  ',lint:4:2,
          ' ',tenaga:6:1,' ',gamma:5:2,' ',reaksi:8);
 end;
 if iu=26 then
   begin
    judultabelNo;
    for iu:=1 to 26 do
    begin
     gotoxy(1,8+iu);writeln(lst,'                                                    ');
    end;iu:=0;
    end;

 END;

gotoxy(2,8+iu);writeln(lst,'ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');

 close(filetomic_3);
END;
(**************************************************************)
Procedure Tampilan10;
label loncat;
Begin
  kotak2(1,1,79,24,lightgray,white,'D');
  kotak2(15,5,60,8,blue,white,'D');
  GotoXy(17,6);Write('    Masukkan lambang unsur : ');
  GotoXy(47,6);Readln(nama[1]);
  if nama[1]='' then begin goto loncat;end;
  clrscr;
  lowvideo;
  cursoroff;
  kotak2(1,1,79,24,lightgray,white,'D');
  Cofer_2;
  iu:=0;
  judultabelrec;
with RECATOMIC do
 begin
  for i:=1 to filesize(FILETOMIC) do
  begin
     seek(FILETOMIC,i-1);
     read(FILETOMIC,RECATOMIC);
     jml:=length(nama[1]);angka[1]:=simbol;
     if jml=1 then begin
     if (copy(angka[1],1,jml)=nama[1]) and (length(angka[1])=4) then
      begin
       iu:=iu+1;
```

```
          textbackground(lightgray);
          GotoXy( 2,7+iu);writeln(filepos(Filetomic));
          GotoXy( 6,7+iu);Writeln(SIMBOL:5);
          GotoXy(12,7+iu);writeln(z:3);
          GotoXy(15,7+iu);writeln(aa:6:1);
          GotoXy(22,7+iu);writeln(iso:6:1);
          GotoXy(31,7+iu);writeln(paro:5:2,kw);
          GotoXy(39,7+iu);writeln(lint:4:2,kt);
          GotoXy(49,7+iu);writeln(tenaga:6:1);
          GotoXy(58,7+iu);writeln(gamma:5:2);
          GotoXy(65,7+iu);writeln(reaksi:8);

        end;
        end
        else
        begin
         if (copy(angka[1],1,jml)=nama[1]) and (length(angka[1])=5) then
         begin
         iu:=iu+1;
         GotoXy( 2,7+iu);writeln(filepos(Filetomic));
         GotoXy( 8,7+iu);Writeln(SIMBOL:5);
         GotoXy(14,7+iu);writeln(z:3);
         GotoXy(17,7+iu);writeln(aa:6:1);
         GotoXy(24,7+iu);writeln(iso:6:1);
         GotoXy(33,7+iu);writeln(paro:5:3,kw);
         GotoXy(41,7+iu);writeln(lint:4:2,kt);
         GotoXy(49,7+iu);writeln(tenaga:6:1);
         GotoXy(58,7+iu);writeln(gamma:5:2);
         GotoXy(65,7+iu);writeln(reaksi:8);
         end;
         end;
    end;
  end;
  if iu=0 then
     Begin
      textcolor(15+blink);
      GotoXy(20,14);Writeln('Tidak ada datanya ..... ');
      textcolor(white);
     end;
     loncat :
 close(filetomic);
end;
(*************************************************************************)
Procedure TampilMenurutIsotop;
 begin
  clrscr;
  cursoron;
  COFER_2;
  tampilan10;
  textcolor(11+blink);
  gotoXy(58,23);Writeln('Tekan ENTER .... ');readln;
  textcolor(15);
  textbackground(blue);
end;
(*************************************************************************)
```

```
Procedure TampilMenurutEnergi;
label loncat;
Begin
  clrscr;
  kotak2(1,1,79,24,lightgray,white,'D');
  kotak2(15,5,60,8,blue,white,'D');
  cursoron;
  {SI-}
  GotoXy(17,6);Write('Masukkan energi :      .      keV ');
  if IOResult<>0  then begin goto loncat;end;
  GotoXy(34,6);Readln(Energi);
  clrscr;
  kotak2(1,1,79,24,lightgray,white,'D');
  Cofer_2;
  iu:=0;
  judultabelEnergi;
  with RECATOMIC do
  begin
   for i:=1 to filesize(FILETOMIC) do
   begin
    seek(FILETOMIC,i-1);
    read(FILETOMIC,RECATOMIC);
    If Energi = Tenaga then
     begin
     iu:=iu+1;
     GotoXy( 2,7+iu);writeln(iu);
     GotoXy(5,7+iu);writeln(tenaga:6:1);
     GotoXy(13,7+iu);Writeln(SIMBOL:5);
     GotoXy(20,7+iu);writeln(z:3);
     GotoXy(24,7+iu);writeln(aa:6:1);
     GotoXy(31,7+iu);writeln(iso:6:1);
     GotoXy(40,7+iu);writeln(paro:5:2,kw);
     GotoXy(48,7+iu);writeln(lint:4:2,kt);
     GotoXy(57,7+iu);writeln(gamma:5:2);
     GotoXy(64,7+iu);writeln(reaksi:8);
    end;
  end;
 textcolor(11+blink);
 gotoXy(58,23);Writeln('Tekan ENTER .... ');readln;
 if iu=0 then
    Begin
     textcolor(15+blink);
     GotoXy(20,14);Writeln('Tidak ada datanya ..... ');
     readln;
    end;
    loncat :
 close(filetomic);
end; {SI+}
end;
(*****************************************************************************)
Procedure tampil_fl;
label loncat;
Begin
 clrscr;
 lowvideo;
```

```
cursoroff;
textcolor(15);
 kotak2(1,1,79,24,blue,white,'D');
 kotak2(14,2,66,2,lightred,wHITE,'C');
 GotoXy(15,2);writeln('            D A T A    N U K L I R  ');
iu:=0;textbackground(blue);
judultabelrec;
with RECATOMIC do
begin
  for i:=1 to filesize(FILETOMIC) do
  begin
      seek(FILETOMIC,i-1);
      read(FILETOMIC,RECATOMIC);
      max_data[i].simbol := simbol;
      max_data[i].unsur := unsur;
      max_data[i].z := z;
      max_data[i].aa := aa;
      max_data[i].iso := iso;
      max_data[i].paro := paro;
      max_data[i].lint := lint;
      max_data[i].tenaga := tenaga;
      max_data[i].gamma := gamma;
      max_data[i].reaksi := reaksi;
        iu:=iu+1; textbackground(blue);
        GotoXy( 2,7+iu);writeln(filepos(Filetomic));
        GotoXy( 6,7+iu);Writeln(SIMBOL:5);
        GotoXy(12,7+iu);writeln(z:3);
        GotoXy(16,7+iu);writeln(aa:6:1);
        GotoXy(23,7+iu);writeln(iso:6:1);
        GotoXy(32,7+iu);writeln(paro:5:2,kw);
        GotoXy(40,7+iu);writeln(lint:4:2,kt);
        GotoXy(49,7+iu);writeln(tenaga:6:1);
        GotoXy(57,7+iu);writeln(gamma:5:2);
        GotoXy(64,7+iu);writeln(reaksi:9);
        if iu=14 then begin

gotoxy(2,8+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ')
;
        gotoxy(2,9+iu);writeln('Tekan ENTER untuk melanjutkan .....!!');
        readln;
        for iu:=1 to 16 do
        begin
           gotoxy(2,7+iu);writeln('                                                    ');
        end;
        iu:=0;
        end;
  end;
end;

gotoxy(2,8+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ')
;
 if iu=0 then
    Begin
      textcolor(15+blink);
      GotoXy(20,14);Writeln('Tidak ada datanya ...... ');
```

```
      textcolor(white);
     end;
     loncat :
  close(filetomic);
  textbackground(0);
end;
(*************************************************************************)
Procedure KoreksiDataAtom;
 var koreksi : string[4];
  mn:byte;
  label ulang,loncat;
Begin
 ulang:
  Clrscr;
  koreksi:='';
  bukafileAtom;
  cursorOn;
  kotak2(1,1,79,24,lightgray,white,'D');
  kotak2(15,2,60,4,blue,white,'D');
  GotoXy(16,3);writeln('  K O R E K S I  D A T A  N U K L I R ');
  textbackground(lightgray);
  kotak2(15,20,60,22,blue,white,'C');
  GotoXy(16,21);Write('      Masukkan No. Record, 0=Exit : ');Readln(krk);
  if krk=0 then goto loncat;
  k:=2;
  with RECATOMIC do
   begin
    for i:=1 to filesize(FILETOMIC) do
    Begin
     seek(Filetomic,krk-1);
     read(FILETOMIC,RECATOMIC);
      mn:=0;
      while mn=0 do
       begin
        k:=1;
        clrscr;
        COFER_2;
        kotak2(1,1,79,5,lightgray,white,'D');
        textcolor(red);
        GotoXy(16,3);writeln('  K O R E K S I  D A T A  N U K L I R ');
        kotak2(1,6,79,24,blue,white,'D');
        GotoXy(15, 8);Writeln('   No Record . ',Filepos(Filetomic));
        GotoXy(15, 9);Writeln('[A] Lambang unsur: ',SIMBOL);
        GotoXy(15,10);Writeln('[B] Nama unsur   : ',UNSUR);
        GotoXy(15,11);writeln('[C] Nilai Z      : ',Z:3);
        GotoXy(15,12);writeln('[D] Nilai AA     : ',AA:6:1);
        Gotoxy(15,13);writeln('[E] K.Isotop     : ',Iso:6:1);
        Gotoxy(15,14);writeLN('[F] U.Paro       : ',paro:5:3);
        Gotoxy(52,14);writeLN(KW);
        Gotoxy(15,15);writeln('[G] T.Lintang    : ',lint:4:2);
        Gotoxy(50,15);writeLN(KT);
        Gotoxy(15,16);writeln('[H] Tenaga ke(V) : ',tenaga:6:1);
        Gotoxy(15,17);writeln('[I] I.Gamma      : ',gamma:5:2);
        Gotoxy(15,18);writeln('[J] Reaksi       : ',reaksi:15);
        GotoXy(15,20);Write('Masukan No Koreksi [A..J / 0 = Exit]');
```

```
                cursoroff;
              Korek:=readkey;
                cursoron;
        case UPCASE(korek) of
         'A' : Begin GotoXy(34,9);Readln(SIMBOL);mn:=0;end;
         'B' : Begin GotoXy(34,10);Readln(UNSUR);mn:=0;end;
         'C' : Begin GotoXy(34,11);Readln(z);mn:=0;end;
         'D' : Begin GotoXy(34,12);Readln(AA);mn:=0;end;
         'E' : Begin GotoXy(34,13);Readln(Iso);mn:=0;end;
         'F' : Begin GotoXy(34,14);Readln(Paro);GotoXy(52,14);Readln(KW);
               mn:=0;end;
         'G' : Begin GotoXy(34,15);Readln(Iint);GotoXy(50,15);Readln(KT);
               mn:=0;end;
         'H' : Begin GotoXy(34,16);Readln(tenaga);mn:=0;end;
         'I' : Begin GotoXy(34,17);Readln(Gamma);mn:=0;end;
         'J' : Begin GotoXy(34,18);Readln(Reaksi);mn:=0;end;
         '0' : Begin
               seek(FILETOMIC,krk-1);
               write(FILETOMIC,RECATOMIC);
               goto loncat;
              end;
        end;
       end;
     end;
   end;
   if k=2 then
     begin
      clrscr;
      textcolor(15+blink);
      GotoXy(20,12);Writeln('Data yang akan dikoreksi ... ndak ada.! ');
      textcolor(15);
     end;
   cursoroff;
   textcolor(15);
   GotoXy(22,14);Writeln(' Koreksi data lagi .....[Y / T].!       ');
   ok:=readkey;
   cursoron;
   if upcase(ok)='Y' then goto ulang;
   loncat :
   Close(Filetomic);
end;
(*************************************************************************)
Procedure HapusAtom;
VAR
 io,o,jk   : byte;

Begin
Assign(Filehps,'Nampung.dta');
{$I-} reset(filehps); {$I+}
If IOresult <> 0 then rewrite(filehps);
JK:=1;
for io:=1 to filesize(FILETOMIC) do
 begin
  seek(FILETOMIC,io-1);
  Read(FILETOMIC,RECATOMIC);
```

```
  if RECATOMIC.SIMBOL<>'' then
   Begin
    Seek(filehps,JK-1);
    Write(filehps,recATOMIC);
    JK:=JK+1;
   end;
  end;
  CLOSE(FILEHPS);
  CLOSE(FILETOMIC);
  erase(fileTOMic);
  RENAME(filehps,'ATOM.DTA');
end;
(*************************************************************************)
Procedure HapusDataAtom;
 var hapus : integer;
   hps,h : char;
  mn:byte;
 label ulang,loncat;
 Begin
  ulang :
  Clrscr;
  textcolor(white+blink);
  GotoXy(57,23);Writeln(' Key Return to menu ... ');
  textcolor(15);textbackground(0);
  COFER_2;
  tampil_fl;
  if iu=0 then exit;
  CursorOn;bukafileAtom;
  GotoXy(18,15);Write('Masukkan No. Record yang akan dihapus  [ 0 =Batal ]:
');Readln(hapus);
  ig:=2;
  if hapus=0 then goto loncat;
  with RECATOMIC do
   begin
    for i:=1 to filesize(FILETOMIC) do
    Begin
     seek(Filetomic,hapus-1);
     read(FILETOMIC,RECATOMIC);
      mn:=0;
      while mn=0 do
       begin
        ig:=1;
        clrscr;
        COFER_2;
        GotoXy(13,7);writeln(' P R O G R A M   H A P U S   D A T A ');
        GotoXy(15,9);Writeln('[A] Lambang unsur : ',SIMBOL);
        GotoXy(15,10);Writeln('[B] Nama unsur   : ',UNSUR);
        GotoXy(15,11);writeln('[C] Nilai Z      : ',Z:3);
        GotoXy(15,12);writeln('[D] Nilai AA     : ',AA:6:1);
        Gotoxy(15,13);writeln('[E] K.Isotop     : ',Iso:6:1);
        Gotoxy(15,14);write('[F] U.Paro       : ',paro:5:3);
        WRITELN('  ',KW);
        Gotoxy(15,15);write('[G] T.Lintang    : ',lint:4:2);
        WRITELN('  ',KT);
        Gotoxy(15,16);writeln('[H] Tenaga ke(V)  : ',tenaga:6:1);
```

```
        Gotoxy(15,17);writeln('[I] LGamma      : ',gamma:5:2);
        Gotoxy(15,18);writeln('[J] Reaksi      : ',reaksi:15);
        GotoXy(15,20);Write(' Data ini akan dihapus .....[Y / T] ');
            cursoroff;
            hps:=readkey;GotoXy(53,14);Writeln('[',hps,']');
        cursoron;
        if upcase(hps)='Y' then
         begin
          seek(FILETOMIC,filepos(FILETOMIC)-1);
          SIMBOL:='';
          write(FILETOMIC,RECATOMIC);
          mn:=1;
          clrscr;
          HapusAtom;
          BukaFileAtom;
          GotoXy(15,20);Write(' Hapus lagi ..... [Y / T] ');
          h:=readkey;GotoXy(53,20);Writeln('[',h,']');
          if upcase(h)='Y' then goto ulang;
          goto loncat;
         end;
         if upcase(hps)='T' then goto loncat;
       end;
      end;
    end;
   loncat :
 end;
{*************************************************************************}
function hurufbesar(huruf :string):string;
begin
   for Ig:= 1 to length(huruf) do
      hurufbesar[Ig] := upcase(huruf[Ig]);
   hurufbesar[0] := huruf[0];
end;
{*************************************************************************}
{program utama}
{*************************************************************************}
var
 i,md,kg   :integer;
 p,q       :word;
 kol,bar    :string[5];
begin
 kg:= detect;
 initgraph(kg,md,'');
 winds(50,50,600,450,7,3);
 settextstyle(3,0,8);
 SETCOLOR(LIGHTRED);
 for i:=1 to 12 do
 outtextxy(120+i,120,'APNC');
 settextstyle(6,0,5);
 setcolor(blue);
 for i:=1 to 5 do
 outtextxy(180,200+i,'Versi 1.0');
 settextstyle(6,0,2);
 setcolor(blue);
 for i:=1 to 2 do
```

```
outtextxy(80,400+i,'Copyright 1996 @ By Agung');

delay(4000);
closegraph;clrscr;cursoroff;
window(1,1,80,25); textbackground(lightgray);
gotoxy(1,1);writeln('                                                    ');
textbackground(white);cursoroff;
 gotoxy(1,2);textbackground(3);textcolor(0);
  write('                Copyright @ By AGUNG SURADIYO ' );
  write('                ');
highvideo; kotak2(1,3,80,24,lightgray,white,'D');
textcolor(blue);
   for i:=2 to 79 do
   begin
     for jg:=4 to 23 do
     begin
       gotoxy(i,jg);writeln('±');
     end;
   end;
  window(1,1,80,25);
  textbackground(4);textcolor(15);
  gotoxy(1,25);write('        Gerakkan kursor      atau tekan huruf yang besar            ');
  textbackground(4);textcolor(14);
  gotoxy(29,25);write(chr(27),'/',chr(26),'/',chr(24),'/',chr(25));
  for ig := 1 to 9 do
  begin
   with data_menu do
   begin
    gotoxy(posisi_menu_utama[ig],1);
    textbackground(7);textcolor(0);write(isi_menu_utama[ig]);
    gotoxy(posisi_karakter_menu_utama[ig],1);
    textbackground(7);textcolor(4);write(karakter_menu_utama[ig]);
   end;
  end;
  move(layar,layarsimpan,4000);
  mouse := 'T';
  menuatausub := 'M';
  pilih :=1;
  lebarmenuutama := data_menu.lebar_menu_utama[pilih];
  kolom1 := data_menu.posisi_menu_utama[pilih];
  rubahatribut(kolom1,1,kolom1+lebarmenuutama-1,1,$15);
  mouse:='T';

  repeat
    while menuatausub = 'M' do
    begin
      tekanmenu := ' ';
      pilihsebelum := pilih;
      gotoxy(kolom1,1);
      if mouse = 'T' then
      begin
        tekanmenu := readkey;
        if tekanmenu <> #0 then
        begin
          menuatausub := 'H';
```

```
        case upcase(tekanmenu) of
         'B' : pilih := 1;
         'P' : pilih := 2;
         'T' : pilih := 3;
         'F' : pilih := 4;
         'E' : pilih := 5;
         'K' : pilih := 6;
         'S' : pilih := 7;
         'L' : pilih := 8;
         'D' : pilih := 9;
         #13 : pilih := pilihsebelum;
        else
         begin
           write(#7);
           menuatausub := 'M';
         end;
        end;
      end;
      if tekanmenu = #0 then
      begin
       tekanmenu := readkey;
       case tekanmenu of
        #75 : begin
              if pilih = 1 then pilih := 9
             else
              pilih := pilih-1;
             end;
        #77 : begin
              if pilih = 9 then pilih := 1
             else
              pilih := pilih + 1;
             end;
        else
          write(#7);
       end;
      end;
    end;

    if pilih <> pilihsebelum then
    begin
      lebarmenuutama := data_menu.lebar_menu_utama[pilihsebelum];
      kolom1 := data_menu.posisi_menu_utama[pilihsebelum];
      kembalikankelayarsemula(kolom1,1,kolom1+lebarmenuutama,1,layarsimpan);
      lebarmenuutama := data_menu.lebar_menu_utama[pilih];
      kolom1 := data_menu.posisi_menu_utama[pilih];
      rubahatribut(kolom1,1,kolom1+lebarmenuutama-1,1,$15);

    end;
    if (upcase(tekanmenu) = 'D') or ((pilih = 9) and (tekanmenu = #13)) then
    begin
      selesai := ' ';
      while not ((selesai = 'Y') or (selesai = 'T')) do
      begin
        textbackground(blue);
        textcolor(yellow);
```

```
        window(1,1,80,25);cursoron;
        gotoXy(29,11);Writeln('É'»');
        gotoxy(29,12);writeln('º Yakin (Y/T) ?      º');
        gotoXy(29,13);Writeln('È'¼');
        gotoxy(45,12);read(selesai);
        selesai := upcase(selesai);
        end;
        if selesai = 'Y' then halt;
        kembalikankelayarsemula(28,10,65,20,layarsimpan);
        menuatausub := 'M';
    end;
end;

if menuatausub = 'H' then
begin
  pilihsebelum := pilih;
  pilihsub := 1;
  kolom1 := data_menu.posisi_menu_utama[pilih];
  kolom2 := kolom1 + data_menu.lebar_sub_menu[pilih];
  jumlahpilihan := data_menu.jumlah_pilihan[pilih];
  tampilkansubmenu(pilih,kolom1,kolom2,jumlahpilihan,data_menu);

  while menuatausub = 'H' do
  begin
    pilihsubsebelum := pilihsub;
    if mouse = 'T'then
    begin
      cursoroff;
      tekansubmenu := readkey;
      if tekansubmenu <> #0 then
      begin
        menuatausub := 'M';
        for ig := 1 to jumlahpilihan do
        begin
          if upcase(tekansubmenu) = data_menu.karakter_sub_menu[pilih,ig] then
          begin
            pilihsub := ig;
            tekansubmenu := #13;
          end;
        end;
      end;
      if tekansubmenu = #0 then
      begin
      tekansubmenu := readkey;
      case tekansubmenu of
      #75 : begin
            menuatausub := 'M';
            if pilih = 1 then pilih := 9
           else
            pilih := pilih-1;
           end;
      #77 : begin
            menuatausub := 'M';
          if pilih = 9 then pilih := 1
          else
```

```
            pilih := pilih + 1;
          end;
        #80 : begin
            if pilihsub <jumlahpilihan then
            pilihsub := pilihsub+1
          else
            pilihsub := 1;
          end;
        #72 : begin
            if pilihsub > 1 then
            pilihsub := pilihsub - 1
          else
            pilihsub := jumlahpilihan
          end;
        else
          write(#7);
        end;
    end;
  end;

if pilihsub <> pilihsubsebelum then
begin
    rubahatribut(kolom1,pilihsubsebelum+2,kolom2,pilihsubsebelum+2,$20);

    textbackground(0);textcolor(7);
    rubahatribut(kolom1,pilihsub+2,kolom2,pilihsub+2,$43);
end;
if tekansubmenu = #13 then
begin
   textbackground(0);textcolor(10);cursoron;
   reg.ax := 2;
   intr($33,reg);

   if pilih = 1 then

   begin
    if pilihsub = 1 then begin Help1; end;
    if pilihsub = 2 then begin PenggunaanProgram1; end;
   end;

   if pilih = 2 then
   begin
    bukafileAtom;
    if pilihsub = 1 then begin TampilMenurutIsotop; end;
    if pilihsub = 2 then begin TampilMenurutEnergi; end;
    if pilihsub = 3 then begin UrutkanEnergi;bukafileatom;TampilDataAtom; end;
    if pilihsub = 4 then begin TambahDataAtom; end;
    if pilihsub = 5 then begin KoreksiDataAtom; end;
    if pilihsub = 6 then begin HapusDataAtom; end;
   end;
   if pilih = 3 then
   begin
    IF PILIHSub=1 then begin TampangLintangPilihan1;end;
    IF PILIHSub=2 then begin TampangLintangPilihan2;end;
   end;
```

```
          if pilih = 4 then
          begin
           FlukNeutron;
          end;
          if pilih = 5 then
          begin
            if pilihsub=1 then begin bukafileEfisiensi;tambah; end;
            if pilihsub=2 then begin koreksi; end;
            if pilihsub=3 then begin bukafileEfisiensi;tampil; end;
            if pilihsub=4 then begin bukafileEfisiensi;HapusEfisiensi; end;
            if pilihsub=5 then begin menu_2; end;
            if pilihsub=6 then begin absolut; end;
            if pilihsub=7 then begin titikdisx; end;
            if pilihsub=8 then begin end;
          end;
          if pilih = 6 then
            begin
            bukafileAtom;
            if pilihsub = 1 then begin KonsentrasiPilihan1; end;
            if pilihsub = 2 then begin KonsentrasiPilihan2; end;
            if pilihsub = 3 then begin KonsentrasiPilihan3; end;
            end;
          if pilih = 7 then
          begin
          bukafileAtom;
          if pilihsub = 1  then begin tampil_fl; end;
          if pilihsub = 2  then begin UrutkanDataAtom;TampilDataAtom; end;
          if pilihsub = 3  then begin UrutkanDataAtom;TampilDataAtom;
                                bukafileatom;pilihDataAtom; end;
          if pilihsub = 4  then begin CetakDataTerpilih; end;
          if pilihsub = 5  then begin menu_9; end;
          if pilihsub = 6  then begin menu_13; end;
          end;

          if pilih = 8 then
          begin
          bukafileAtom;
          if pilihsub = 1  then begin tampil_fl; end;
          if pilihsub = 2  then begin UrutkanDataAtom;TampilDataAtom; end;
          if pilihsub = 3  then begin PilihDataAtom; end;
          if pilihsub = 4  then begin HitungBatasDeteksi; end;
          end;

         kembalikankelayarsemula(1,1,80,25,layarsimpan);
        end;
      end;
      end;
      LONCAT :
        kembalikankelayarsemula(kolom1-1,2,kolom2+1,4+jumlahpilihan,layarsimpan);
        lebarmenuutama := data_menu.lebar_menu_utama[pilih];
        kolom1 := data_menu.posisi_menu_utama[pilih];
        rubahatribut(kolom1,1,kolom1+lebarmenuutama-1,1,$15);
    until false
end.
```

```
unit unit1;
(*************************************)
INTERFACE
(*************************************)
USES DOS,CRT,regresi1,Graph,printer,KOTAK,tools,mouse;

type
   DATAEFIS = record
         isotop:String[7];
         Energi,YGamma, Cps,Efisiensi,
         Dps, LnEnergi, LnEfis : Real;
        end;
   ATOMIC = record
         SIMBOL: string[5];
         KT,KW : STRING[3];
         UNSUR : string[15];
         AA,ISO,PARO,LINT,TENAGA,GAMMA : real;
         Z : integer;
         REAKSI : STRING[15];
         end;

pixel    = record
          karakter  : char;
          atribut   : byte;
         end;
         bufferlayar = array[1..25,1..80] of pixel;
         buffer = array [0..511] of byte;
         string10 = string[15];
         string30 = string[30];

record_menu = record
         lebar_menu_utama          : array[1..9] of byte;
         posisi_menu_utama         : array[1..9] of byte;
         karakter_menu_utama       : array[1..9] of char;
         posisi_karakter_menu_utama  : array[1..9] of byte;
         isi_menu_utama            : array[1..9] of string10;
         isi_pesan_sub_menu        : array[1..9] of string;
         jumlah_pilihan            : array[1..9] of byte;
         lebar_sub_menu            : array[1..9] of byte;
         karakter_sub_menu         : array[1..9,1..9] of char;
         isi_sub_menu              : array[1..9,1..9] of string30;
        end;


const
 data_menu : record_menu =
       ( lebar_menu_utama          : (7,7,7,5,9,11,8,5,3);
         posisi_menu_utama         : (2,11,20,29,36,47,60,70,77);
         karakter_menu_utama       : 'BPTFEKSLD';
         posisi_karakter_menu_utama  : (2,11,20,29,36,47,60,70,77);
         isi_menu_utama            : ('Bantuan','Pustaka','Tampang','Fluks',
                                      'Efisiensi','Konsentrasi','Sensitif','Limit',
                                      'DOS');
         isi_pesan_sub_menu        : ('File Bantuan',
                                      'Pustaka Analisa Pegaktifan Neutron Cepat',
```

```
                    'Menghitung Tampang lintang reaksi',
                    'Menghitung Fluk Neutron',
                    'Menghitung Efisiensi Detektor',
                    'Menghitung Konsentrasi unsur dalam cuplikan',
                    'Menghitung Sensitivitas Analitik ',
                    'Menghitung Batas Deteksi ',
                    'Keluar ke DOS      ');

jumlah_pilihan          : (2,6,2,1,7,3,6,4,0);
lebar_sub_menu          : (18,12,17,22,9,15,18,9,0);
karakter_sub_menu       : ('      ',
                           '      ',
                           '      ',
                           '      ',
                           '      ',
                           '      ',
                           '      ',
                           '      ',
                           '      ',
                           '      ');
isi_sub_menu            : (('Baca Aku Dulu     ',
                          'Penggunaan Program ',",",",",",",",",",
                           ('Tampil Isotop',
                           'Tampil Energi',
                           'Urut Energi  ',
                           'Tambah Data  ',
                           'Koreksi Data ',
                           'Hapus Data   ',
                           ",",",",",",
                           ('Tampang Lintang I ',
                           'Tampang Lintang II',",",",",",",",",",",",
                           ('Menghitung Fluk Neutron',",",",",",",",",",",",
                           ('Masukkan  ',
                           'Perbaikan ',
                           'Tampilkan ',
                           'Hapus     ',
                           'Grafik    ',
                           'Absolut   ',
                           'Intrinsik ',
                           ",
                           "),
                           (' Konsentrasi I  ',
                           ' Konsentrasi II ',
                           ' Konsentrasi III',
                           ",",",",",",",",",",
                           ('Tampilkan data     ',
                           'Urutkan data       ',
                           'Pilih data         ',
                           'Cetak data terpilih',
                           'Sensitif tunggal   ',
                           'Sensitif siklik    ',",",",",",",",",",
```

```
                    ('Tampil Dta',
                     'Urutkan  ',
                     'Pilah    ',
                     'Hitung   ',',',',',',',',''),

                    ('DOS Shell',
                     'Keluar',',',',',',',',',''));

var
   modegrafik,kendaligrafik          : integer;
    xasp, yasp                       : word;
   nilai,row                         : array [1..100] of real;
   nama,angka                        : array [1..100] of string[5];
   titikx,titiky ,sumbux,sumbuy      : array[1..10] of real;
   angkax,angkay,plotx,ploty         : array[1..10] of string[5];
   MN1,Z1,S,ss,MN2,MN3               : array[1..9] of string[20];
   max_data                          : array[1..300] of atomic;
   min,max                           : array[1..4] of Real;
   gol                               : array [1..13] of byte;
   smu                               : array[1..5] of string[20];
   KATA                              : STRING[2];
   x,xx                              : Matriks;
   a,t,y,z                           : vektor;
   FILEEfis,FILEdelete               : file of DATAEFIS;
   RECDATAEFIS                       : DATAEFIS;
   max_dat                           : array[1..20] of dataefis;
   FILEtomic_3, FILEtomic_1,FILETOMIC,FILEHPS : file of ATOMIC;
   RECatomic_3,RECatomic_1,RECATOMIC : ATOMIC;
   reg                               : registers;
   layar                             : bufferlayar Absolute $B800:$0000;
   layarsimpan                       : bufferlayar;
   jo                                : buffer;
   kolom1,baris1,kolom2,baris2,lebarmenuutama,
   jumlahpilihan, pilih,pilihsebelum,
   pilihsub,piiihsubsebelum,ro,yc,n2,iG,jG  : byte;

   tekanmenu,TEKAN,ok,pil,korek,
   tekansubmenu, menuatausub,selesai : char;
   huruf,namau,namad                 : string;

   krk,iu,jml,jenis,MaxX,XC,i,j,K,N  : integer;
   RATIO,fls,flc, cnc,cns,ms,mc,tdc,tds,tcc,fS,
   fC,energi,lebar,tam,col,r,mse,T1,tcs,q1,q2,
   q3,qc,qs,tic,tis,total,harga,hrg,ych : REAL;

(*************************************************************************)
procedure masukanmenu13;
Procedure Golongan;
Procedure PesanKonsentrasi1;
Procedure PesanKonsentrasi2;
Procedure PesanKonsentrasi3;
Procedure PesanBatasDeteksi;
Procedure PesanFlukNeutron;
Procedure PesanTampangLintang1;
Procedure PesanTampangLintang2;
```

```
Procedure PesanSensitivitasTunggal;
Procedure PesanSensitivitasSiklik;
Procedure BukaFileAtom;
Procedure BukaFileDataTerpilih;
Procedure BukaFileUrutEnergi;
procedure tunggu( NEM : STRING );
procedure tunggu_1( NEM : STRING ; k :  INTEGER);
procedure help1;
Procedure PenggunaanProgram1;
Procedure CursorOn;
Procedure CursorOff;
procedure judultabelRec;
procedure judultabelcetak;
procedure judultabelNo;
procedure judultabelefis;
procedure judultabelEnergi;
Procedure COFER;
Procedure COFER_2;
procedure suara;
procedure inisialisasi;
procedure buka_layar(xka,yka,xki,yki,warback,wartext :integer);
procedure kembalikankelayarsemula(kolom1,baris1,kolom2,baris2:byte;
          var layarsimpan :bufferlayar);
procedure rubahatribut(kolom1,baris1,kolom2,baris2,atribut :byte);
procedure tampilkansubmenu(pilih,kolom1,kolom2,jumlahpilihan :byte;
          var data_menu : record_menu);
Procedure Teks_1;
PROCEDURE TAMPIL_DEH;
PROCEDURE KONSENTRASI1;
PROCEDURE Konsentrasi2;
PROCEDURE MASUKAN_3;
procedure masukanmenu9;
PROCEDURE MASUKANTampangLintang2;
procedure masukanTampangLintang1;
procedure masukanBatasDeteksi;
Procedure simbol( NEM : string);
PROCEDURE MENCARI(C : INTEGER;NEM : STRING);
Procedure Latar;
(*************************************************************************)
IMPLEMENTATION
(*************************************************************************)
procedure masukanmenu13;
begin
kotak2(18,7,55,7,lightgray,YELLOW,'c');
 GOTOXY(17,7);writeLN('    MASUKKAN DATA HASIL PENGUKURAN ');
 kotak2(9,10,65,18,lightgray,white,'D');
 GOTOXY(10,11);write('     Cacah total        :        Cacah');
 GOTOXY(10,12);write('     Waktu irradiasi    :         Detik');
 GOTOXY(10,13);write('     Waktu tunda        :        Detik');
 GOTOXY(10,14);write('     Waktu cacah        :        Detik');
 GOTOXY(10,15);write('     Fluk neutron       :        n/cm2.detik');
 GOTOXY(10,16);write('     Efisiensi detektor :          %');
 GOTOXY(10,17);write('     Pengulangan        :        kali');
end;
Procedure Golongan;
```

```
 begin
  kotak2(16,3,60,20,lightgray,white,'D');
  TEXTCOLOR(WHITE);
  TEXTBACKGROUND(BLUE);
  GotoXy(17,4);writeln('      RANGE          FREKWENSI     ');
  TEXTCOLOR(BLACK);
  TEXTBACKGROUND(LIGHTGRAY);
  gotoXy(17,5);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
  gotoxy(19,6);writeln('  0    - 1e-6 :');
  gotoxy(19,7);writeln('  1e-6 - 1e-5 :');
  gotoxy(19,8);writeln('  1e-5 - 2e-5 :');
  gotoxy(19,9);writeln('  2e-5 - 5e-5 :');
  gotoxy(19,10);writeln('  5e-5 - 1e-4 :');
  gotoxy(19,11);writeln('  1e-4 - 2e-4 :');
  gotoxy(19,12);writeln('  2e-4 - 5e-4 :');
  gotoxy(19,13);writeln('  5e-4 - 1e-3 :');
  gotoxy(19,14);writeln('  1e-3 - 2e-3 :');
  gotoxy(19,15);writeln('  2e-3 - 5e-3 :');
  gotoxy(19,16);writeln('  5e-3 - 1e-2 :');
  gotoxy(19,17);writeln('  1e-2 - 2e-2 :');
  gotoxy(19,18);writeln('  2e-2 -  <<  :');
 end;
 Procedure PesanKonsentrasi1;
 begin
    GOTOXY(16,7);write('  Konsentrasi I adalah  perhitungan  untuk');
    GOTOXY(16,8);write('  mencari kadar suatu isotop  dalam  suatu');
    GOTOXY(16,9);write('  sampel, dimana sampel dan standar dicacah ');
    GOTOXY(16,10);write('  secara bersama sama                    ');
    GOTOXY(16,11);write('  Sehingga Fluks sampel = fluks standar   ');
    GOTOXY(16,12);write('                                          ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,14);write('   ESC-Batal !          ENTER-Lanjut      ');
 end;
 (*************************************************************************)
 Procedure PesanKonsentrasi2;
 begin
    GOTOXY(16,7);write('  Konsentrasi II adalah  perhitungan  untuk');
    GOTOXY(16,8);write('  mencari kadar isotop  dalam  suatu sampel');
    GOTOXY(16,9);write('  dimana sampel dan standar tidak diiradiasi');
    GOTOXY(16,10);write('  secara bersama-sama                    ');
    GOTOXY(16,11);write('                                         ');
    GOTOXY(16,12);write('                                         ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,14);write('   ESC-Batal !          ENTER-Lanjut      ');
 end;
 (*************************************************************************)
 Procedure PesanKonsentrasi3;
 begin
    GOTOXY(16,7);write('  Konsentrasi III adalah  perhitungan  untuk');
    GOTOXY(16,8);write('  mencari kadar suatu isotop dalam suatu sampel');
    GOTOXY(16,9);write('  dimana standartnya sudah ditentukan yaitu ');
    GOTOXY(16,10);write('  Aluminium (Al) atau Tembaga (Cu)        ');
    GOTOXY(16,11);write('                                          ');
```

```
    GOTOXY(16,12);write('                              ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,14);write('  ESC-Batal !          ENTER-Lanjut    ');
end;
(*************************************************************************)
Procedure PesanBatasDeteksi;
begin
    GOTOXY(16,7);write('    BATAS DETEKSI  adalah perhitungan  ');
    GOTOXY(16,8);write('  untuk mencari massa terkecil dari suatu  ');
    GOTOXY(16,9);write('  yang dapat dideteksi dengan metoda akti  ');
    GOTOXY(16,10);write('  vasi neutron                  ');
    GOTOXY(16,11);write('                              ');
    GOTOXY(16,12);write('                              ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,14);write('  ESC-Batal !          ENTER-Lanjut    ');
end;
(*************************************************************************)
Procedure PesanFlukNeutron;
begin
    GOTOXY(16,7);write('  Perhitungan  FLUK NEUTRON  adalah untuk');
    GOTOXY(16,8);write('  menentukan besarnya fluk neutron yang di');
    GOTOXY(16,9);write('  terima sampel dalam peristiwa pengaktifan  ');
    GOTOXY(16,10);write('  neutron.  ');
    GOTOXY(16,11);write('                    ');
    GOTOXY(16,12);write('                    ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,14);write('  ESC-Batal !          ENTER-Lanjut    ');
end;
(*************************************************************************)
Procedure PesanTampangLintang1;
begin
    GOTOXY(16,7);write('  Perhitungan TAMPANG LINTANG Pilihan I ');
    GOTOXY(16,8);write('  digunakan jika proses  iradiasi sampel ');
    GOTOXY(16,9);write('  standar dan cuplikan yangakan dicari  ');
    GOTOXY(16,10);write('  tampang lintangnya diiradiasi dengan  ');
    GOTOXY(16,11);write('  cara bersamaan sehingga          ');
    GOTOXY(16,12);write('  Fluk cuplikan = Fluk Standar      ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,14);write('  ESC-Batal !          ENTER-Lanjut    ');
end;
(*************************************************************************)
Procedure PesanTampangLintang2;
begin
    GOTOXY(16,7);write('  Perhitungan  TAMPANG LINTANG  Pilihan II ');
    GOTOXY(16,8);write('  digunakan jika  proses  menggunakan  dua  ');
    GOTOXY(16,9);write('  buah sampel standar dan satu sampel yang ');
    GOTOXY(16,10);write('  akan dicari Tampang Lintangnya,sehingga ');
    GOTOXY(16,11);write('  Fluk cuplikan =                ');
    GOTOXY(16,12);write('  0,5*(Fluk Standar1 + Fluk Standar2    ');
    textcolor(white);
    TEXTBACKGROUND(BLUE);
```

```
   GOTOXY(15,14);write('   ESC-Batal !              ENTER-Lanjut      ');
end;
(*************************************************************************)
Procedure PesanSensitivitasTunggal;
begin
    GOTOXY(16,7);write('     SENSITIVITAS TUNGGAL adalah perhitungan   ');
    GOTOXY(16,8);write('   Sensitivitas dimana proses dilakukan tanpa  ');
    GOTOXY(16,9);write('   pengulangan.                                ');
    GOTOXY(16,10);write('   Jadi prosesnya adalah sebagai berikut      ');
    GOTOXY(16,11);write('   Irradiasi - Dicacah                        ');
    GOTOXY(16,12);write('                                              ');
    textcolor(WHITE);
    TEXTBACKGROUND(BLUE);
    GOTOXY(15,13);write('   ESC-Batal !              ENTER-Lanjut      ');
end;
(*************************************************************************)
Procedure PesanSensitivitasSiklik;
begin
   GOTOXY(16,7);write('     SENSITIVITAS SIKLIK  adalah perhitungan   ');
   GOTOXY(16,8);write('   Sensitivitas dimana proses dilakukan secara  ');
   GOTOXY(16,9);write('   berulang sebanyak n kali pengulangan.        ');
   GOTOXY(16,10);write('   Proses pengulangannya adalah sebagai berikut ');
   GOTOXY(16,11);write('   Iradiasi I - Pencacahan I - Iradiasi II -    ');
   GOTOXY(16,12);write('   Pencacahan II                                ');
   textcolor(white);
   TEXTBACKGROUND(BLUE);
   GOTOXY(15,14);write('   ESC-Batal !              ENTER-Lanjut      ');
end;
(*************************************************)
Procedure BukaFileAtom;
 Begin
  assign(filetomic,'atom.dta');
  {$I-} reset(filetomic); {$I+}
  if IOresult <> 0 then rewrite(filetomic);
  i := filesize(FILETOMIC);
 end;
(*************************************************************************)
Procedure BukaFileDataTerpilih;
 Begin
  assign(filetomic_3,'pilah.dta');
  {$I-} reset(filetomic_3); {$I+}
  if IOresult <> 0 then rewrite(filetomic_3);
 end;
(*************************************************************************)
Procedure BukaFileUrutEnergi;
 Begin
  assign(filetomic_1,'pilah.dta');
  {$I-} reset(filetomic_1); {$I+}
  if IOresult <> 0 then rewrite(filetomic_1);
 end;

(*************************************************************************)
procedure tunggu( NEM : STRING );
begin
   cursoroff;
```

```
   TEXTCOLOR(blink+yellow);WINDOW(1,1,80,25);
   Gotoxy(20,21);writeln(NEM);WINDOW(1,5,80,21);
   IF NEM<>'' THEN READLN;
   TEXTCOLOR(15);
end;
{*****************************************************************}
procedure tunggu_1( NEM : STRING ; k :  INTEGER);
begin
   TEXTCOLOR(18);WINDOW(1,1,80,25);
   Gotoxy(20,21);writeln(NEM);WINDOW(1,5,80,21);
   IF NEM<>'' THEN READLN;
   TEXTCOLOR(15);
   with RECATOMIC_3 do
   begin
   HARGA:=0;hrg:=0;
   if (kw='S') or (kw='s') then harga :=paro;
   if (kw='M') or (kw='m') then harga :=paro*60;
   if (kw='h') or (kw='H') then harga :=paro*3600;
   if (kw='d') or (kw='D') then harga :=paro*3600*24;

   if (kT='B') or (kT='b') then hrg :=LINT*(1e-24);
   if (kT='mB') or (kT='Mb') or (kT='mb') or (kT='MB')then hrg :=LINT*(1e-27);
   if (kT='mkb') or (kT='MKB') or (kT='mkB') or (kT='Mkb')then hrg :=LINT*(1e-30);

   max_data[k].simbol := SIMBOL;
   max_data[k].unsur := unsur;
   max_data[k].z := z;
   max_data[k].aa := aa;
   max_data[k].iso := iso;
   max_data[k].paro := HARGA;
   max_data[k].KW := KW;
   max_data[k].lint := HRG;
   max_data[k].KT := KT;
   max_data[k].tenaga := tenaga;
   max_data[k].gamma := gamma;
   max_data[k].reaksi := reaksi;
   end;
end;
{*****************************************************************}
function xm(xr : real)  : integer;
begin
 xm := round(MaxX/360*(xr + 180));
end;

function ym(yr : real) : integer;
begin
 ym := round(-340/360*yr+170);
end;

function xa(xr : real)  : integer;
begin
 xa := round(MaxX/280*(xr+40));
end;

function ya(yr : real) : integer;
```

```
begin
 ya := round(-yr*4+40);
end;
(*************************************************************************)
Procedure Help1;
LABEL LONCAT;
var
 md,kg   :integer;
 p,q      :word;
 kol,bar    :string[5];
begin
 kg:=detect;
 Clrscr;
 initgraph(kg,md,'');
  Getaspectratio(xasp,yasp);
  ratio := yasp/xasp;
  MaxX  := round (170 * ratio);
  winds(2,2,637,475,LIGHTGRAY,3);
  Setbkcolor(lightgray);
  SetColor(LIGHTGRAY);
  rectangle(0,0,getmaxx,getmaxy);
  SetColor(LIGHTblue);
  SetTextStyle(1,HorizDir,2);
  OutTextXY(xm(-100),ym(170),'          Program APNC Versi 1.0 ');
  OutTextXY(xm(-100),ym(155),'----------------------------------------');
  OutTextXY(xm(-100),ym(135),'Berisi 9 Menu yang terdiri dari  : ');
  OutTextXY(xm(-100),ym(110),'-Bantuan ');
  OutTextXY(xm(-100),ym(85),'-Pustaka');
  OutTextXY(xm(-100),ym(60),'-Tampang');
  OutTextXY(xm(-100),ym(35),'-Fluks');
  OutTextXY(xm(-100),ym(10),'-Efisiensi ');
  OutTextXY(xm(-100),ym(-15),'-Konsentrasi');
  OutTextXY(xm(-100),ym(-40),'-Sensitiv');
  OutTextXY(xm(-100),ym(-65),'-Limit ');
  OutTextXY(xm(-100),ym(-90),'-DOS');
  SetTextStyle(3,HorizDir,2);
  OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
  tekan:=readkey;
  repeat until (tekan=#13) OR (TEKAN =#27);
  IF READKEY = #27
  THEN
   BEGIN
    GOTO LONCAT;
   END
  ELSE
  BEGIN
   cleardevice;
  END;
  winds(2,2,637,475,LIGHTGRAY,3);
  SetColor(LIGHTblue);
  SetTextStyle(1,HorizDir,2);
  OutTextXY(xm(-100),ym(170),'          Menu  Bantuan      ');
  OutTextXY(xm(-100),ym(155),'----------------------------------------');
  OutTextXY(xm(-100),ym(135),'Berisi 2 Sub Menu yang terdiri dari  : ');
  OutTextXY(xm(-100),ym(110),'-Baca Aku dulu ');
```

```
OutTextXY(xm(-100),ym(85),'-Menggunakan Program');
OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
 ELSE
 BEGIN
  cleardevice;
 END;
winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
OutTextXY(xm(-100),ym(170),'       6 Sub  Menu  Pustaka       ');
OutTextXY(xm(-100),ym(155),'-----------------------------------------');
OutTextXY(xm(-100),ym(135),'-Tampil Isotop ');
OutTextXY(xm(-100),ym(110),' * Digunakan untuk menampilkan isotop berdasar');
OutTextXY(xm(-100),ym(85),'   Simbol Unsur');
OutTextXY(xm(-100),ym(60),'-Tampil Energi');
OutTextXY(xm(-100),ym(35),' * Digunakan untuk menampilkan isotop berdasar');
OutTextXY(xm(-100),ym(10),'  Energi Gamma');
OutTextXY(xm(-100),ym(-15),'-Urut Energi');
OutTextXY(xm(-100),ym(-40),' * Digunakan untuk menampilhan semua data isotop');
OutTextXY(xm(-100),ym(-65),'  berdasar urutan Energi');
OutTextXY(xm(-100),ym(-90),'-Tambah Data');
OutTextXY(xm(-100),ym(-115),' * Digunakan untuk menambah/memasukkan data dalam');
OutTextXY(xm(-100),ym(-140),'  file data');
OutTextXY(xm(-100),ym(-165),'-Koreksi Data');
OutTextXY(xm(-100),ym(-190),' * Digunakan untuk membetulkan data isotop');
OutTextXY(xm(-100),ym(-215),'-HapusData ');
OutTextXY(xm(-100),ym(-240),' * Di gunakan untuk menghapus data isotop');
 OuttextXY(xm(-100),ym(-295),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
 ELSE
 BEGIN
  cleardevice;
 END;
winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
OutTextXY(xm(-100),ym(170),'            Menu  Tampang      ');
OutTextXY(xm(-100),ym(155),'-----------------------------------------');
OutTextXY(xm(-100),ym(135),'Berisi 2 Sub Menu yang terdiri dari  : ');
OutTextXY(xm(-100),ym(110),'-Pilihan I ');
OutTextXY(xm(-100),ym(85),'   * Dapat dilihat secara jelas dalam program');
OutTextXY(xm(-100),ym(60),'-Pilihan II ');
```

```
OutTextXY(xm(-100),ym(35),'   * Dapat dilihat jelas dalam program');

OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
 ELSE
 BEGIN
  cleardevice;
 END;
 winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
OutTextXY(xm(-100),ym(170),'          Menu Fluks      ');
OutTextXY(xm(-100),ym(155),'-----------------------------------');
OutTextXY(xm(-100),ym(135),'Berisi 1 Sub Menu yaitu : ');
OutTextXY(xm(-100),ym(110),'-Menghitung fluks neutron ');
OutTextXY(xm(-100),ym(85),' * Dapat dilihat jelas dalam program ');
OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
 ELSE
 BEGIN
  cleardevice;
 END;
 winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
OutTextXY(xm(-100),ym(170),'          Menu Efisiensi    ');
OutTextXY(xm(-100),ym(155),'-----------------------------------');
OutTextXY(xm(-100),ym(135),'Berisi 7 Sub Menu yang terdiri dari : ');
OutTextXY(xm(-100),ym(110),'Masukkan -------->masukkan data efisiensi');
OutTextXY(xm(-100),ym(85),'Perbaikan -------> koreksi data efisiensi');
OutTextXY(xm(-100),ym(60),'Tampilkan -------> tampilkan data efisiensi');
OutTextXY(xm(-100),ym(35),'Hapus    --------> hapus data efisiensi');
OutTextXY(xm(-100),ym(10),'Grafik   --------> tampil grafik efisiensi');
OutTextXY(xm(-100),ym(-15),'Absolut --------> hitung efisiensi absolut');
OutTextXY(xm(-100),ym(-40),'Intrinsik ------> hitung efisiensi intrinsik');
OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
```

```
 ELSE
 BEGIN
  cleardevice;
 END;
 winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
OutTextXY(xm(-100),ym(170),'              Menu Konsentrasi    ');
OutTextXY(xm(-100),ym(155),'-----------------------------------------');
OutTextXY(xm(-100),ym(135),'Berisi 3 Sub Menu yang terdiri dari  : ');
OutTextXY(xm(-100),ym(110),'- Pilihan I');
OutTextXY(xm(-100),ym(85),'- Pilihan II');
OutTextXY(xm(-100),ym(60),'- Pilihan III');
OutTextXY(xm(-100),ym(35),' * Sudah jelas dalam program');
OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
 ELSE
 BEGIN
  cleardevice;
 END;
 winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
OutTextXY(xm(-100),ym(170),'              Menu Sensitif      ');
OutTextXY(xm(-100),ym(155),'-----------------------------------------');
OutTextXY(xm(-100),ym(135),'Berisi 6 Sub menu yaitu : ');
OutTextXY(xm(-100),ym(110),'Tampilkan data ---> menampilkan semua data');
OutTextXY(xm(-100),ym(85),'Urutkan data---> Urutkan data berdasar Abjad');
OutTextXY(xm(-100),ym(60),'Pilih data---> memilih data (lihat algoritma !)');
OutTextXY(xm(-100),ym(35),'Cetak Data terpilih ----> cetak data terpilih');
OutTextXY(xm(-100),ym(10),'Sensitiv Tunggal ---> menghitung sensitivitas');
OutTextXY(xm(-100),ym(-15),'                tanpa pengulangan');
OutTextXY(xm(-100),ym(-40),'Sensitiv Tunggal ---> menghitung sensitivitas');
OutTextXY(xm(-100),ym(-65),'                tanpa pengulangan');
OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
tekan:=readkey;
repeat until (tekan=#13) OR (TEKAN =#27);
IF READKEY = #27
THEN
BEGIN
GOTO LONCAT;
 END
 ELSE
 BEGIN
  cleardevice;
 END;
winds(2,2,637,475,LIGHTGRAY,3);
SetColor(LIGHTblue);
SetTextStyle(1,HorizDir,2);
```

```
    OutTextXY(xm(-100),ym(170),'              Menu Limit      ');
    OutTextXY(xm(-100),ym(155),'-----------------------------------------');
    OutTextXY(xm(-100),ym(135),'Berisi 4 Sub menu yaitu : ');
    OutTextXY(xm(-100),ym(110),'Tampilkan data ---> menampilkan semua data');
    OutTextXY(xm(-100),ym(85),'Urutkan data---> Urutkan data berdasar Abjad');
    OutTextXY(xm(-100),ym(60),'Pilih data---> memilih data (lihat algoritma !)');
    OutTextXY(xm(-100),ym(35),'Hitung ----> menghitung batas deteksi suatu ');
    OutTextXY(xm(-100),ym(35),'                              isotop ');
    OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
    tekan:=readkey;
    repeat until (tekan=#13) OR (TEKAN =#27);
    IF READKEY = #27
    THEN
    BEGIN
    GOTO LONCAT;
     END
     ELSE
     BEGIN
      cleardevice;
     END;
     winds(2,2,637,475,LIGHTGRAY,3);
    SetColor(LIGHTblue);
    SetTextStyle(1,HorizDir,2);
    OutTextXY(xm(-100),ym(170),'              Menu Dos        ');
    OutTextXY(xm(-100),ym(155),'-----------------------------------------');
    OutTextXY(xm(-100),ym(135),'Berisi 2 Sub Menu yang terdiri dari  : ');
    OutTextXY(xm(-100),ym(110),'*OSShell ----------> keluar sementara ');
    OutTextXY(xm(-100),ym(85),'*Keluar ----------> keluar secara tetap');
    OuttextXY(xm(-100),ym(-290),'                          Enter-Lanjut');
    readln;
    cleardevice;closegraph; exit;
    LONCAT:
    cleardevice;
    CLOSEGRAPH;
 end;
(*************************************************************************)
Procedure PenggunaanProgram1;
LABEL LONCAT;
var
 md,kg   :integer;
 p,q     :word;
 kol,bar    :string[5];
begin
  kg:=detect;
  Clrscr;
  initgraph(kg,md,'');
   Getaspectratio(xasp,yasp);
   ratio := yasp/xasp;
   MaxX  := round (170 * ratio);
   winds(2,2,637,475,LIGHTGRAY,3);
   Setbkcolor(lightgray);
   SetColor(LIGHTGRAY);
   rectangle(0,0,getmaxx,getmaxy);
   SetColor(LIGHTblue);
   SetTextStyle(1,HorizDir,2);
```

```
    OutTextXY(xm(-100),ym(170),'            Program APNC Versi 1.0 ');
    OutTextXY(xm(-100),ym(155),'---------------------------------------');
    OutTextXY(xm(-100),ym(135),'Peringatan                    : ');
    OutTextXY(xm(-100),ym(110),'1. Penulisan simbol unsur gunakan ');
    OutTextXY(xm(-100),ym(85),'  *. Huruf pertama Kapital dan Huruf kedua kecil');
    OutTextXY(xm(-100),ym(60),'    Contoh : Mg, Al, N, dsb ');
    OutTextXY(xm(-100),ym(35),'2. Efisiensi Detektor dalam % (bukan desimal)');
    OutTextXY(xm(-100),ym(10),'3. Sebelum menggunakan Sub Menu Pilih Data pada');
    OutTextXY(xm(-100),ym(-15),'  Menu Sensitivitas sebaiknya data diurutkan dulu ');
    OutTextXY(xm(-100),ym(-40),'  dengan Sub Menu  Urutkan Data');
    SetTextStyle(3,HorizDir,2);
    OuttextXY(xm(-100),ym(-290),'Esc-kembali                    Enter-Lanjut');
    tekan:=readkey;
    repeat until tekan=#13;
    cleardevice;
    CLOSEGRAPH;
     END;
(*************************************************************************)
procedure judultabelRec;
begin
 TEXTCOLOR(WHITE);
 GotoXy(2,5);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
 GotoXy(2,6);writeln('Rec Isotop  Z  BA  K.Isotop  U.Paro  T.Lint.  Tenaga  I.Gamma  Reaksi
');
 gotoxy(2,7);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
end;
(*************************************************************************)
procedure judultabelcetak;
begin

GotoXy(2,5);writeln(lst,'_____
_____');
 GotoXy(2,6);writeln(lst,' No. Isotop  Z  BA  K.Isotop  U.Paro  T.Lint.  Tenaga  I.Gamma
Reaksi  ');

GotoXy(2,7);writeln(lst,'=====
=====');
end;
(*************************************************************************)
procedure judultabelNo;
begin
 gotoxy(2,5);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
 GotoXy(2,6);writeln(' No Isotop  Z   BA  K.Isotop U.Paro  T.Lint. Tenaga  I.Gamma    Reaksi
');
 gotoxy(2,7);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
end;
(*************************************************************************)
procedure judultabelefis;
begin
textcolor(blue);
gotoxy(2,6);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
GotoXy(2,7);writeln('No.  Energi   Cps   IGamma   At(dps)   Efisiensi  Ln(Energi)
Ln(Efisiensi)');
gotoxy(2,8);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
end;
```

```
(*********************************************************************)
procedure judultabelEnergi;
begin
 gotoxy(2,5);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
 GotoXy(2,6);writeln(' No Tenaga Isotop  Z  BA  K.Isotop U.Paro T.Lint. I.Gamma  Reaksi
');
 gotoxy(2,7);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
end;
(*********************************************************************)
Procedure COFER;
  Begin
     textcolor(white);
     highvideo;
     kotak2(1,1,80,4,lightblue,white,'D');
          GotoXy(2,2);Writeln('                DATA EFISIENSI DETEKTOR                ');
          GotoXy(2,3);Writeln('            UNTUK ANALISA PENGAKTIFAN NEUTRON
CEPAT          ');
     for yc:=2 to 78 do begin gotoXy(yc,4);writeln('Í'); end;
          textbackground(lightgray);
     textcolor(15);
   end;
(*********************************************************************)
Procedure COFER_2;
 Begin
  textcolor(white);
  highvideo;
  textbackground(blue);
  GotoXy(2,2);Writeln('                PUSTAKA                ');
  GotoXy(2,3);Writeln('            ANALISA PENGAKTIFAN NEUTRON CEPAT
');
  textbackground(lightgray);
  for yc:=2 to 78 do begin gotoXy(yc,4);writeln('Í'); end;
end;
(*********************************************************************)
Procedure CursorOn;
  Begin
    reg.AH:=1;
    reg.CH:=6;
    reg.CL:=7;
    intr($10,reg);
  end;
(*********************************************************************)
Procedure CursorOff;
  Begin
     reg.AH:=1;
     reg.CH:=8;
     reg.CL:=0;
     intr($10,reg);
  end;
(*********************************************************************)
procedure inisialisasi;
var
    gd,gm: Integer;
    i :   Integer;
    R :   Integer;
```

```
 Begin
    directvideo := false;
    gd:= DETECT;
    Gm := VGAHi;
    InitGraph(gd,gm,'a:\bgi');
    If GraphResult<>GrOK Then Halt(1);
 end;
(*************************************************************************)
procedure suara;
var sr : integer;
begin
   for sr:=10 to 30 do
   begin
     sound(sr*50);delay(10);
     nosound;
   end;
end;
(*************************************************************************)
procedure buka_layar(xka,yka,xki,yki,warback,wartext :integer);
   begin
      gotoxy(xka,yka); write('É');
      for iu:=1 to (xki-xka-1) do
      begin
        gotoxy(xka+iu,yka); write ('Í');
      end;
      gotoxy(xki,yka); write('»');
      for iu:=1 to (yki-yka-1) do
      begin
        gotoxy(xka,yka+iu); write('º'); gotoxy(xki,yka+iu); write('º');
      end;
      gotoxy(xka,yki); write('È');
      for iu:=1 to (xki-xka-1) do
      begin
        gotoxy(xka+iu,yki); write ('Í');
      end;
      gotoxy(xki,yki); write('¼');
      window(xka+1,yka+1,xki-1,yki-1);
      textbackground(warback);
      textcolor(wartext);
      clrscr;
   end;
(*************************************************************************)
procedure kembalikankelayarsemula(kolom1,baris1,kolom2,baris2:byte;
                var layarsimpan :bufferlayar);
var
 posisi :word;
 begin
   for Ig:= baris1 to baris2 do
   begin
    for jg := kolom1 to kolom2 do
    with layarsimpan[ig,jg] do
    begin
     posisi := (((Ig-1)*80+Jg)-1)*2;
     mem[$B800:$0000+Posisi] := ord(karakter);
     mem[$B800:$0000+posisi+1]:= atribut;
```

```
    end;
   end;
  end;
(*************************************************************************)
procedure rubahatribut(kolom1,baris1,kolom2,baris2,atribut :byte);
var
posisi :word;
begin
 for Ig := baris1 to baris2 do
 begin
   for jg:= kolom1 to kolom2 do
   begin
    posisi := (((Ig-1)*80+jg)-1)*2;
    mem[$B800:$0000+posisi+1] := atribut;
   end;
  end;
end;
(*************************************************************************)
procedure tampilkansubmenu(pilih,kolom1,kolom2,jumlahpilihan :byte;
                    var data_menu :record_menu);
begin
 with data_menu do
 begin
  gotoxy(kolom1-1,2);textbackground(2);textcolor(4);write(chr(218));
  for ig := kolom1 to kolom2 do
  begin
   textbackground(2);textcolor(4);write(chr(196));
  end;
   textbackground(2);textcolor(4);write(chr(191));
  for jg := 1 to jumlahpilihan do
  begin
   gotoxy(kolom1-1,2+jg);textbackground(2);textcolor(4);write(chr(179));
   textbackground(2);textcolor(0);write(isi_sub_menu[pilih,jg]);
   gotoxy(kolom2+1,2+jg);textbackground(2);textcolor(0);write(chr(179));
  end;
  gotoxy(kolom1-1,3+jumlah_pilihan[pilih]);
  textbackground(2);textcolor(4);write(chr(192));
  for ig:= kolom1 to kolom2 do
  begin
   textbackground(2);textcolor(0);write(chr(196));
  end;
  textbackground(2);textcolor(0);write(chr(217));
  rubahatribut(kolom1,3,kolom2,3,$43);
 end;
end;
(*************************************************************************)
PROCEDURE TAMPIL_DEH;
BEGIN
 WINDOW(1,1,80,25);
 textcolor(11+blink);
 gotoXy(50,23);Writeln('Please any key .... ');readln;
 textcolor(15);
 textbackground(0);
end;
(*************************************************************************)
```

```
  Procedure Teks_1;
  begin
     Setbkcolor(blue);
     SetColor(white);
     rectangle(0,0,getmaxx,getmaxy);
     SetColor(lightcyan);
     SetTextStyle(1,HorizDir,4);
     OutTextXY(xm(360),ym(180),'SIMULASI ');
     OutTextXY(xm(-170),ym(140),'ANALISA PENGAKTIFAN NEUTRON CEPAT');
     OutTextXY(xm(210),ym(100),'                    ');
     OutTextXY(xm(-155),ym(60),'                    ');
     SetTextStyle(3,HorizDir,2);
     OutTextXY(xm(150),ym(-30),'                    ');
     OutTextXy(xm(320),ym(-60),' (Agung Suradiyo)');
     SetTextStyle(1,HorizDir,3);
     OutTextXY(xm(330),ym(-110),'J 401 91 0637 ');
     SetTextStyle(1,HorizDir,1);
     OutTextXY(xm(195),ym(-210),'FAKULTAS MIPA JURUSAN FISIKA ');
     OutTextXY(xm(150),ym(-250),'UNIVERSITAS DIPONEGORO SEMARANG');
     SetTextStyle(3,HorizDir,2);
     OuttextXY(xm(435),ym(-290),'1996');
     OuttextXY(xm(820),ym(-290),'Tekan Enter');
     repeat until keypressed;
     cleardevice;
  end;
  (*****************************************************************)
  PROCEDURE KONSENTRASI1;
  BEGIN
     clrscr;
     kotak2(1,1,79,24,lightgray,white,'D');
     kotak2(18,3,55,3,lightred,YELLOW,'c');cursoron;
     GOTOXY(17,3);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
     kotak2(9,7,65,18,lightblue,white,'D');
     GOTOXY(10,8);   write('Cacah cuplikan          : ');
     GOTOXY(10,9);   write('Cacah standar           : ');
     GOTOXY(10,10);  write('Masa unsur yang dicari  : ');
     GOTOXY(10,11);  write('Masa unsur standar      : ');
     GOTOXY(10,12);  write('Waktu iradiasi cuplikan : ');
     GOTOXY(10,13);  write('Waktu iradiasi standar  : ');
     GOTOXY(10,14);  write('Waktu tunda cuplikan    : ');
     GOTOXY(10,15);  write('Waktu tunda standar     : ');
     GOTOXY(10,16);  write('Waktu Cacah cuplikan    : ');
     GOTOXY(10,17);  write('Waktu Cacah standar     : ');
     GOTOXY(41,8);   readln(cnc);
     GOTOXY(41,9);   readln(cns);
     GOTOXY(41,10);  readln(Mc);
     GOTOXY(41,11);  readln(Ms);
     GOTOXY(41,12);  readln(tic);
     GOTOXY(41,13);  readln(tis);
     GOTOXY(41,14);  readln(tdc);
     GOTOXY(41,15);  readln(tds);
     GOTOXY(41,16);  readln(tcc);
     GOTOXY(41,17);  readln(tcs);
  END;
  (*****************************************************************)
```

```
PROCEDURE KONSENTRASI2;
BEGIN
  clrscr;
  kotak2(1,1,79,24,lightgray,white,'D');
  kotak2(18,5,55,5,lightred,YELLOW,'c');cursoron;
  GOTOXY(17,5);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
  kotak2(9,7,65,20,lightblue,white,'D');
  GOTOXY(10,8);  write('Cacah cuplikan          : ');readln(cnc);
  GOTOXY(10,9);  write('Cacah standar           : ');readln(cns);
  GOTOXY(10,10); write('Masa unsur yang dicari  : ');readln(Mc);
  GOTOXY(10,11); write('Masa unsur standar      : ');readln(Ms);
  GOTOXY(10,12); write('Waktu iradiasi cuplikan : ');readln(tic);
  GOTOXY(10,13); write('Waktu Cacah standar     : ');readln(tis);
  GOTOXY(10,14); write('Waktu tunda cuplikan    : ');readln(tdc);
  GOTOXY(10,15); write('Waktu tunda standar     : ');readln(tds);
  GOTOXY(10,16); write('Waktu Cacah cuplikan    : ');readln(tcc);
  GOTOXY(10,17); write('Waktu Cacah standar     : ');readln(tcs);
  GOTOXY(10,18); write('Fluks neutron cuplikan  : ');readln(FLC);
  GOTOXY(10,19); write('Waktu neutron standar   : ');readln(FLS);
  GOTOXY(41,8);  readln(cnc);
  GOTOXY(41,9);  readln(cns);
  GOTOXY(41,10); readln(Mc);
  GOTOXY(44,11); readln(Ms);
  GOTOXY(41,12); readln(tic);
  GOTOXY(44,13); readln(tis);
  GOTOXY(41,14); readln(tdc);
  GOTOXY(41,15); readln(tds);
  GOTOXY(41,16); readln(tcc);
  GOTOXY(41,17); readln(tcs);
END;
(*************************************************************************)
PROCEDURE MASUKAN_2;
BEGIN
  write('Fluk cuplikan      : ');readln(Qc);
  write('Fluk standar       : ');readln(Qs);
END;
(*************************************************************************)
PROCEDURE MASUKAN_3;
BEGIN
  clrscr;
  kotak2(1,1,79,24,lightgray,white,'D');
  kotak2(18,5,55,5,brown,blue,'B');cursoron;
  GOTOXY(17,5);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
  kotak2(9,7,65,17,cyan,blue,'D');
  GOTOXY(15,8);write('Cacah netto          :        cacah ');
  GOTOXY(15,9);write('Efisiensi detektor   :              ');
  GOTOXY(15,10);write('Masa unsur J        :        gram ');
  GOTOXY(15,11);write('Waktu irradiasi     :        detik ');
  GOTOXY(15,12);write('Waktu cacah         :        detik ');
  GOTOXY(15,13);write('Waktu tunda         :        detik ');
  GOTOXY(45,8);readln(cnc);
  GOTOXY(45,9);readln(cns);
  GOTOXY(45,10);readln(Mc);
  GOTOXY(45,11);readln(tic);
  GOTOXY(45,12);readln(tdc);
```

```
    GOTOXY(45,13);readln(tcc);
  END;
  procedure masukanmenu9;
  begin
  kotak2(18,7,55,7,lightgray,YELLOW,'c');
   GOTOXY(17,7);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
   kotak2(9,10,65,17,lightgray,white,'D');
   GOTOXY(10,11);writeLN('     Cacah netto          :        cacah ');
   GOTOXY(10,12);writeLN('     Waktu irradiasi      :        detik ');
   GOTOXY(10,13);writeln('     Waktu tunda          :        detik ');
   GOTOXY(10,14);writeln('     Waktu cacah          :        detik ');
   GOTOXY(10,15);writeln('     Fluk neutron         :        n/cm2.detik');
   GOTOXY(10,16);writeln('     Efisiensi detektor   :        ');
   GOTOXY(40,11);readln(Cns);
   GOTOXY(40,12);readln(q1);
   GOTOXY(40,13);readln(Mc);
   GOTOXY(40,14);readln(Tdc);
   GOTOXY(40,15);readln(Tds);
   GOTOXY(40,16);readln(Tcc);
  end;
  (*************************************************************************)
  PROCEDURE MASUKANTampangLintang2;
  BEGIN
     clrscr;
     cursoron;
     kotak2(1,1,79,24,lightgray,white,'D');
     kotak2(18,5,55,5,blue,white,'c');
     GOTOXY(17,5);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
     kotak2(9,7,65,17,brown,white,'D');
     GOTOXY(10,8);write('Fluk neutron Standar I      :          n/cm2.dt ');
     GOTOXY(10,9);write('Fluk neutron Standar II     :          n/cm2.dt ');
     GOTOXY(10,10);write('Waktu Irradiasi cuplikan (dt) :          detik ');
     GOTOXY(10,11);write('Waktu Tunda cuplikan    (dt) :          detik');
     GOTOXY(10,12);write('Waktu Cacah cuplikan    (dt) :          detik');
     GOTOXY(10,13);write('Cacah Netto cuplikan      :          cacah');
     GOTOXY(10,14);write('Massa unsur               :          gram');
     GOTOXY(10,15);write('Efisiensi detektor        :          % ');

     GOTOXY(43,8);readln(flc);
     GOTOXY(43,9);readln(fls);
     GOTOXY(43,10);readln(tic);
     GOTOXY(43,11);readln(tdc);
     GOTOXY(43,12);readln(tcc);
     GOTOXY(43,13);readln(cnc);
     GOTOXY(43,14);readln(mc);
     GOTOXY(43,15);readln(qc);
  END;
  (*************************************************************************)
  procedure masukanTampangLintang1;
  begin
     clrscr;
     cursoron;
     kotak2(1,1,79,24,lightgray,white,'D');
     kotak2(18,5,55,5,blue,YELLOW,'c');
     GOTOXY(17,5);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
```

```
    kotak2(9,7,65,17,lightgray,white,'D');
    GOTOXY(10,8);writeLN('Cacah netto cuplikan      :        cacah ');
    GOTOXY(10,9);writeLN('Cacah netto standar       :       cacah ');
    GOTOXY(10,10);writeln('Waktu cacah cuplikan      :        detik ');
    GOTOXY(10,11);writeln('Waktu cacah standar       :       detik ');
    GOTOXY(10,12);writeln('Waktu Tunda cuplikan      :        detik');
    GOTOXY(10,13);writeln('Waktu tunda standar       :       detik');
    GOTOXY(10,14);writeln('Waktu irradiasi cuplikan  :        detik');
    GOTOXY(10,15);writeln('Waktu irradiasi standar   :        detik');
    GOTOXY(40,8);readln(cnc);
    GOTOXY(40,9);readln(cns);
    GOTOXY(40,10);readln(tcc);
    GOTOXY(40,11);readln(tcs);
    GOTOXY(40,12);readln(tdc);
    GOTOXY(40,13);readln(tds);
    GOTOXY(40,14);readln(tic);
    GOTOXY(40,15);readln(tis);
  end;
(*****************************************************************)
procedure masukanBatasDeteksi;
begin
    clrscr;
    kotak2(1,1,80,25,lightgray,white,'D');
    kotak2(18,5,55,5,blue,YELLOW,'c');cursoron;
    GOTOXY(17,5);writeLN('     MASUKKAN DATA HASIL PENGUKURAN ');
    kotak2(9,9,70,20,magenta,white,'D');
    GOTOXY(10,10);write('     Waktu irradiasi        :        detik');
    GOTOXY(10,11);write('     Waktu tunda            :       detik');
    GOTOXY(10,12);write('     Waktu cacah            :        detik');
    GOTOXY(10,13);write('     Fluk neutron           :       n/cm2.detik');
    GOTOXY(10,14);write('     Efisiensi detektor     :         %   ');
    GOTOXY(10,15);write('     Cacah latar            :      cacah');
    GOTOXY(10,16);write('     Ralat cacah latar      :       cacah');
    GOTOXY(10,17);write('     Ralat terbesar         :           ');

    GOTOXY(45,10);readln(cns);
    GOTOXY(45,11);readln(cnc);
    GOTOXY(45,12);readln(Mc);
    GOTOXY(45,13);readln(tdc);
    GOTOXY(45,14);readln(tds);
    GOTOXY(45,15);readln(tcc);
    GOTOXY(45,16);readln(tcs);
    GOTOXY(45,17);readln(q1);
  end;
(*****************************************************************)
Procedure simbol( NEM : string);
Begin
  CLRSCR;lowvideo;
  textcolor(15);
  write(NEM);readln(kata);clrscr;
END;
(*****************************************************************)
PROCEDURE MENCARI(C : INTEGER;NEM : STRING);
LABEL AA;
BEGIN
```

```
clrscr;window(1,1,80,25);
bukafileatom;
AA :
CLRSCR;
kotak2(10,10,69,14,blue,white,'D');
gotoxy(15,12);
write(NEM);readln(kata);clrscr;
kotak2(1,1,79,24,lightgray,white,'D');
Cofer_2;
iu:=0;
judultabelrec;
IF LENGTH(KATA)=1 THEN KATA:=KATA+'-';
with RECATOMIC do
begin
 for i:=1 to filesize(FILETOMIC) do
 begin
     seek(FILETOMIC,i-1);
     read(FILETOMIC,RECATOMIC);
      if kata=COPY(SIMBOL,1,2) then
      begin
      iu:=iu+1;
      GotoXy( 2,7+iu);writeln(filepos(Filetomic));
      GotoXy( 6,7+iu);Writeln(SIMBOL:5);
      GotoXy(13,7+iu);writeln(z:3);
      GotoXy(16,7+iu);writeln(aa:6:1);
      GotoXy(23,7+iu);writeln(iso:6:1);
      GotoXy(31,7+iu);writeln(paro:5:3,kw);
      GotoXy(41,7+iu);writeln(lint:4:2,kt);
      GotoXy(49,7+iu);writeln(tenaga:6:1);
      GotoXy(57,7+iu);writeln(gamma:5:2);
      GotoXy(66,7+iu);writeln(reaksi:8);
      end;
 end;
end;
gotoxy(2,8+iu);writeln('ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ');
if iu=0 then
 Begin
 textcolor(15+blink);
 GotoXy(20,10);Writeln('Tidak ada datanya ...... ');
 textcolor(white); GOTO AA;
 end
else
 begin
 cursoron;
 gotoxy(12,18+iu);write('Masukkan no.record  !! ');readln(I);
 with RECATOMIC do
 begin
    seek(FILETOMIC,i-1);
    read(FILETOMIC,RECATOMIC);
    CLRSCR;
    kotak2(10,3,69,18,blue,yellow,'D');
    GotoXy(15, 5);Writeln('    No Record . ',Filepos(Filetomic));
    GotoXy(15, 7);Writeln('[A] Lambang unsur: ',SIMBOL);
    GotoXy(15,8);Writeln('[B] Nama unsur    : ',UNSUR);
    GotoXy(15,9);writeln('[C] Nilai Z       : ',Z:3);
```

```
      GotoXy(15,10);writeln('[D] Nilai AA    : ',AA:6:1);
      Gotoxy(15,11);writeln('[E] K.Isotop    : ',Iso:6:1);
      Gotoxy(15,12);write('[F] U.Paro      : ',paro:5:3);
      writeLN(' ',KW);
      Gotoxy(15,13);write('[G] T.Lintang   : ',lint:4:2);
      writeLN(' ',KT);
      Gotoxy(15,14);writeln('[H] Tenaga ke(V) : ',tenaga:6:1);
      Gotoxy(15,15);writeln('[I] L.Gamma     : ',gamma:5:2);
      Gotoxy(15,16);writeln('[J] Reaksi      : ',reaksi:15);
      HARGA:=0;hrg:=0;
      if (kw='S') or (kw='s') then harga :=paro;
      if (kw='M') or (kw='m') then harga :=paro*60;
      if (kw='h') or (kw='H') then harga :=paro*3600;
      if (kw='d') or (kw='D') then harga :=paro*3600*24;

      if (kT='B') or (kT='b') then hrg :=LINT*(exp(-24*ln(10)));
      if (kT='mB') or (kT='Mb') then hrg :=LINT*(exp(-27*ln(10)));
      if (kT='mK') or (kT='Mk') then hrg :=LINT*(exp(-30*ln(10)));
      IF C<>0 THEN BEGIN
      max_data[C].simbol := SIMBOL;
      max_data[C].unsur := unsur;
      max_data[C].z := z;
      max_data[C].aa := aa;
      max_data[C].iso := iso;
      max_data[C].paro := HARGA;
      max_data[C].KW := KW;
      max_data[C].lint := HRG;
      max_data[C].KT := KT;
      max_data[C].tenaga := tenaga;
      max_data[C].gamma := gamma;
      max_data[C].reaksi := reaksi;
      END;
      end;
    end;
Close(FileTomic);
END;

Procedure Latar;
begin
 TEXTBACKGROUND(LIGHTGRAY);
 textcolor(blue);
    for i:=1 to 79 do
    begin
      for jg:=2 to 24 do
      begin
        gotoxy(i,jg);writeln('±');
       end;
    end;
end;
END.
```

LAMPIRAN II

DATA NUKLIR ISOTOP-ISOTOP

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1	5	B-11	10.881	80.2	13.8 s	25 mb	2124.8	33	(n,p)Be-11
2	5	B-11	10.881	80.2	13.8 s	25 mb	6790.5	4.51	(n,p)Be-11
3	5	B-11	10.881	80.2	13.8 s	25 mb	5851.8	2.13	(n,p)Be-11
4	5	B-11	10.881	80.2	13.8 s	25 mb	4666.3	2	(n,p)Be-11
5	5	B-11	10.881	80.2	13.8 s	25 mb	7974.7	1.74	(n,p)Be-11
6	7	N-14	14.006	99.635	9.96 m	7 mb+	5299	68	(n,2n)N-13
7	7	N-15	14.006	0.365	2.46 s	16 mb	6128	69	(n,p)C-15
8	7	N-15	14.006	0.365	2.46 s	16 mb	7117	5	(n,p)C-15
9	7	N-15	14.006	0.365	2.46 s	16 mb	2750	1	(n,p)C-15
10	8	O-16	15.999	99.756	7.13 s	39 mb	6128	69	(n,p)N-16
11	8	O-16	15.999	99.756	7.13 s	39 mb	7117	5	(n,p)N-16
12	8	O-16	15.999	99.756	7.13 s	39 mb	2750	1	(n,p)N-16
13	9	F-19	18.998	100	109.7 m	55 mb+	511	193	(n,2n)F-18mg
14	9	F-19	18.998	100	7.13 s	20 mb+	2750	1	(n,a)N-16
15	9	F-19	18.998	100	7.13 s	20 mb+	7117	5	(n,a)N-16
16	9	F-19	18.998	100	7.13 s	20 mb+	6128	69	(n,a)N-16
17	9	F-19	18.998	100	27.1 s	19 mb	197.4	97	(n,p)O-19
18	9	F-19	18.998	100	27.1 s	19 mb	1375.6	59	(n,p)O-19
19	9	F-19	18.998	100	27.1 s	19 mb	1440	2.7	(n,p)O-19
20	11	Na-23	22.998	100	2.601 a	44 mb	1274.5	90	(n,2n)Na-22
21	11	Na-23	22.998	100	37.6 s	43 mb	439	100	(n,p)Ne-23
22	11	Na-23	22.998	100	10.0 s	150 mb+	1633.1	100	(n,a)F-20
23	11	Na-23	22.998	100	2.601 a	44 mb	511	181	(n,2n)Na-22
24	12	Mg-24	24.305	78.99	15.02 h	190 mb	1369.6	100	(n,p)Na-24(cum)
25	12	Mg-24	24.305	78.99	15.02 h	190 mb	2754.1	100	(n,p)Na-24(cum)
26	12	Mg-26	24.305	11.01	37.6 s	77 mb	439	33	(n,a)Ne-23
27	12	Mg-26	24.305	11.01	1.00 s	27 mb	1809	100	(n,p)Na-26
28	12	Mg-25	24.305	10	60 s	44 mb	585.9	13	(n,p)Na-25
29	12	Mg-25	24.305	10	60 s	44 mb	1611.9	8.8	(n,p)Na-25
30	12	Mg-25	24.305	10	60 s	44 mb	390.7	12.8	(n,p)Na-25
31	12	Mg-25	24.305	10	60 s	44 mb	975.2	12.8	(n,p)Na-25
32	13	Al-27	26.981	100	6.35 s	<0.17 mb	1808.7	100	(n,2n)Al-26m
33	13	Al-27	26.981	100	6.35 s	<0.17 mb	511	164	(n,2n)Al-26m
34	13	Al-27	26.981	100	9.45 m	75 mb+	843.8	72	(n,p)Mg-27
35	13	Al-27	26.981	100	9.45 m	75 mb+	1014.4	28	(n,p)Mg-27
36	13	Al-27	26.981	100	15.02 h	116 mb	2754.1	100	(n,a)Na-24
37	13	Al-27	26.981	100	15.02 h	116 mb	1368.6	100	(n,a)Na-24
38	14	Si-28	28.086	92.2	2.246 m	230 mb	1778.8	100	(n,p)Al-28
39	14	Si-29	28.086	4.7	6.52 m	120 mb	511	200	(n,p)Al-29
40	14	Si-29	28.086	4.7	6.52 m	120 mb	2028	3.4	(n,p)Al-29
41	14	Si-29	28.086	4.7	6.52 m	120 mb	1273	91	(n,p)Al-29
42	14	Si-29	28.086	4.7	6.52 m	120 mb	2426	5.5	(n,p)Al-29
43	14	Si-30	28.086	3.1	9.45 m	70 mb	1014.4	28	(n,a)Mg-27
44	14	Si-30	28.086	3.1	9.45 m	70 mb	843.8	72	(n,a)Mg-27
45	14	Si-30	28.086	3.1	3.3 s	180 ub	1262	36.8	(n,p)Al-30
46	14	Si-30	28.086	3.1	3.3 s	180 ub	2594.7	6.6	(n,p)Al-30
47	14	Si-30	28.086	3.1	3.3 s	180 ub	2235.5	65.6	(n,p)Al-30
48	14	Si-30	28.086	3.1	3.3 s	180 ub	2498.2	32.6	(n,p)Al-30
49	15	P-31	30.973	100	2.62 h	85 mb	1266.2	0.07	(n,p)Si-31
50	15	P-31	30.973	100	2.246 m	116 mb	1778.8	100	(n,a)Al-28
51	15	P-31	30.973	100	2.50 m	10.9 mb	511	200	(n,2n)P-30
52	16	S-34	32.064	4.2	12.4 s	75 mb	511	200	(n,p)P-34
53	17	Cl-35	35.453	75.77	32.2 m	(7 mb)	511	200	(n,2n)Cl-34m
54	17	Cl-35	35.453	75.77	1.58 s	(45 mb)(1	511	200	(n,2n)Cl-34g
55	17	Cl-35	35.453	75.77	32.2 m	(7 mb)	2128.5	48.4	(n,2n)Cl-34m
56	17	Cl-35	35.453	75.77	32.2 m	(7 mb)	145.7	35.8	(n,2n)Cl-34m
57	17	Cl-35	35.453	75.77	32.2 m	(7 mb)	1177.4	14.2	(n,2n)Cl-34m
58	17	Cl-37	35.453	24.33	5.06 m	33 mb	3102.4	90	(n,p)S-37
59	17	Cl-37	35.453	24.23	12.4 s	112 mb	2128	15	(n,a)P-34
60	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	1460	90	(n,p)Cl-40
61	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	330	22	(n,p)Cl-40
62	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	650	13	(n,p)Cl-40

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
63	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	2610	10	(n,p)Cl-40
64	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	2850	12	(n,p)Cl-40
65	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	1430	11	(n,p)Cl-40
66	18	Ar-40	39.948	99.59	1.42 m	15.7 mb	3100	21	(n,p)Cl-40
67	18	Ar-40	39.948	99.59	5.06 m	10 mb	3102.4	90	(n,a)S-37
68	18	Ar-38	39.948	0.063	37.2 m	75 mb	1642.4	32.8	(n,p)Cl-38
69	18	Ar-38	39.948	0.063	37.2 m	75 mb	2167.5	44	(n,p)Cl-38
70	19	K-39	39.102	93.3	929 ms	800 ub(14	511	200	(n,2n)K-38m
71	19	K-39	39.102	93.3	7.63 m	3.5 mb+	2166.8	100	(n,2n)K-38g
72	19	K-39	39.102	93.3	7.63 m	3.5 mb+	511	200	(n,2n)K-38g
73	19	K-41	39.102	6.7	1.83 h	49 mb	1293.6	99.2	(n,p)Ar-41
74	19	K-41	39.102	6.7	37.2 m	39 mb	1642.4	32.8	(n,a)Cl-38g(cum)
75	19	K-41	39.102	6.7	37.2 m	39 mb	2167.5	55	(n,a)Cl-38g(cum)
76	20	Ca-40	40.08	96.94	870 ms	(8 mb)(14	511	200	(n,2n)Ca-39
77	20	Ca-44	40.08	2.08	1.83 h	35 mb	1293.6	99.2	(n,a)Ar-41
78	20	Ca-44	40.08	2.08	22 m	35.5 mb	1156.8	85	(n,p)K-44
79	20	Ca-44	40.08	2.08	22 m	35.5 mb	2150	29	(n,p)K-44
80	20	Ca-44	40.08	2.08	22 m	35.5 mb	1127	13.5	(n,p)K-44
81	20	Ca-44	40.08	2.08	22 m	35.5 mb	2519	10	(n,p)K-44
82	20	Ca-44	40.08	2.08	22 m	35.5 mb	1024	10	(n,p)K-44
83	20	Ca-42	40.08	0.65	12.36 h	182 mb	1524.7	200	(n,p)K-42
84	20	Ca-48	40.08	0.19	3.41 d	dau	159.4	70	Sc-47
85	20	Ca-48	40.08	0.19	4.54 d	920 mb	807.8	7.4	(n,2n)Ca-47
86	20	Ca-48	40.08	0.19	4.54 d	920 mb	488.9	7	(n,2n)Ca-47
87	20	Ca-48	40.08	0.19	4.54 d	920 mb	1296.8	75	(n,2n)Ca-47
88	20	Ca-43	40.08	0.14	22.2 h	110 mb	396	18	(n,p)K-43
89	20	Ca-43	40.08	0.14	22.2 h	110 mb	616	65	(n,p)K-43
90	20	Ca-43	40.08	0.14	22.2 h	110 mb	593	16	(n,p)K-43
91	20	Ca-43	40.08	0.14	22.2 h	110 mb	372	82	(n,p)K-43
92	21	Sc-45	44.955	100	3.93 h	182 mb	1157	99.8	(n,2n)Sc-44g
93	21	Sc-45	44.955	100	3.93 h	182 mb	511	192	(n,2n)Sc-44g
94	21	Sc-45	44.955	100	58.6 h	149 mb	271.4	86	(n,2n)Sc-44 m+
95	21	Sc-45	44.955	100	12.36 h	56 mb	1524.7	17.9	(n,a)K-42
96	22	Ti-48	47.9	73.7	43.7 h	61 mb	1037.4	98	(n,p)Sc-48
97	22	Ti-48	47.9	73.7	43.7 h	61 mb	983.3	100	(n,p)Sc-48
98	22	Ti-48	47.9	73.7	43.7 h	61 mb	1311.7	100	(n,p)Sc-48
99	22	Ti-46	47.9	8	83.8 d	280 mb	889.31	100	(n,p)Sc-46
100	22	Ti-46	47.9	8	3.078 h	30 mb+	320	95	(n,2n)Ti-45
101	22	Ti-46	47.9	8	83.8 d	280 mb	1120.5	100	(n,p)Sc-46
102	22	Ti-46	47.9	8	3.078 h	30 mb+	928.5	5	(n,2n)Ti-45
103	22	Ti-47	47.9	7.5	3.41 d	120 mb	159.4	70	(n,p)Sc-47
104	22	Ti-49	47.9	5.5	57.3 m	35 mb	178	0.03	(n,p)Sc-49
105	22	Ti-50	47.9	5.3	1.71 m	17 mb	1121	100	(n,p)Sc-50
106	22	Ti-50	47.9	5.3	1.71 m	17 mb	1553.7	100	(n,p)Sc-50
107	22	Ti-50	47.9	5.3	1.71 m	17 mb	523.5	88	(n,p)Sc-50
108	22	Ti-50	47.9	5.3	4.54 d	9.5 mb	1296.8	75	(n,a)Ca-47
109	22	Ti-50	47.9	5.3	3.41 d	dau	159.4	70	Sc-47
110	23	V-51	50.941	99.75	5.76 m	35.5 mb	320	95	(n,p)Ti-51
111	23	V-51	50.941	99.75	5.76 m	35.5 mb	928.5	5	(n,p)Ti-51
112	23	V-51	50.941	99.75	43.7 h	17 mb	1311.7	100	(n,a)Sc-48
113	23	V-51	50.941	99.75	43.7 h	17 mb	983.3	100	(n,a)Sc-48
114	23	V-51	50.941	99.75	43.7 h	17 mb	1037.4	98	(n,a)Sc-48
115	24	Cr-52	51.966	83.79	3.755 m	94 mb	1434.2	100	(n,p)V-52
116	24	Cr-52	51.966	83.79	27.71 d	318 mb	320	9.8	(n,2n)Cr-51
117	24	Cr-53	51.966	9.5	1.55 m	40 mb+	1287	88.7	(n,p)V-53
118	24	Cr-53	51.966	9.5	1.55 m	40 mb+	1006	9.8	(n,2n)Cr-51
119	24	Cr-53	51.966	9.5	1.55 m	40 mb+	1287	11.3	(n,p)V-53
120	24	Cr-50	51.966	4.35	42.0 m	19 mb+	152	29.5	(n,2n)Cr-49
121	24	Cr-50	51.966	4.35	42.0 m	19 mb+	90.6	59	(n,2n)Cr-49
122	24	Cr-50	51.966	4.35	42.0 m	19 mb+	62.3	20	(n,2n)Cr-49
123	24	Cr-50	51.966	4.35	42.0 m	19 mb+	511	192	(n,2n)Cr-49
124	25	Mn-55	54.938	100	312.5 d	890 mb+	834.8	100	(n,2n)Mn-54

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
125	25	Mn-55	54.938	100	3.755 m	32 mb	1434.2	100	(n,a)V-52
126	25	Mn-55	54.938	100	3.56 m	41 mb+	1528.2	0.043	(n,p)Cr-55
127	26	Fe-56	55.847	91.7	2.582 h	103 mb	2112.6	15.5	(n,p)Mn-56
128	26	Fe-56	55.847	91.7	2.582 h	103 mb	1811.2	30	(n,p)Mn-56
129	26	Fe-56	55.847	91.7	2.582 h	103 mb	846.6	99	(n,p)Mn-56
130	26	Fe-54	55.847	5.8	2.53 m	840 ub	1329	79	(n,2n)Fe-53m+
131	26	Fe-54	55.847	5.8	2.53 m	840 ub	1011.1	79	(n,2n)Fe-53m+
132	26	Fe-54	55.847	5.8	8.53 m	15.5 mb	377.2	43	(n,2n)Fe-53m+g
133	26	Fe-54	55.847	5.8	312.5 d	310 mb	834.8	100	(n,p)Mn-54
134	26	Fe-54	55.847	5.8	8.53 m	15.5 mb	511	196	(n,2n)Fe-53m+g
135	26	Fe-54	55.847	5.8	2.53 m	840 ub	701.7	100	(n,2n)Fe-53m+
136	26	Fe-54	55.847	5.8	2.53 m	840 ub	2341.2	21	(n,2n)Fe-53m+
137	26	Fe-54	55.847	5.8	27.71 d	98 mb	320.1	9.8	(n,a)Cr-51
138	26	Fe-57	55.847	2.19	1.59 m	75 mb	692	2.7	(n,p)Mn-57
139	26	Fe-57	55.847	2.19	1.59 m	75 mb	122	9.5	(n,p)Mn-57
140	26	Fe-57	55.847	2.19	1.59 m	75 mb	353	1	(n,p)Mn-57
141	26	Fe-57	55.847	2.19	1.59 m	75 mb	136	1.1	(n,p)Mn-57
142	26	Fe-58	55.847	0.31	3.56 m	21.5 mb(1	1528.2	0.043	(n,a)Cr-55
143	27	Co-59	58.933	100	44.6 d	80 mb	1291.6	44	(n,p)Fe-59
144	27	Co-59	58.933	100	44.6 d	80 mb	1099.3	56	(n,p)Fe-59
145	27	Co-59	58.933	100	70.78 d	720 mb	810.6	99.4	(n,2n)Co-58
146	27	Co-59	58.933	100	70.78 d	720 mb	810.6	99.4	(n,2n)Co-58
147	27	Co-59	58.933	100	70.78 d	720 mb	511	30	(n,2n)Co-58
148	27	Co-59	58.933	100	2.582 h	30 mb	846.6	99	(n,a)Mn-56
149	27	Co-59	58.933	100	2.582 h	30 mb	1811.2	30	(n,a)Mn-56
150	27	Co-59	58.933	100	2.582 h	30 mb	2112.6	15.5	(n,a)Mn-56
151	28	Ni-58	58.71	67.88	36.0 h	31 mb	511	99	(n,2n)Ni-57
152	28	Ni-58	58.71	67.88	36.0 h	31 mb	127.3	15	(n,2n)Ni-57
153	28	Ni-58	58.71	67.88	70.78 d	370 mb	511	30	(n,p)Co-58(cum)
154	28	Ni-58	58.71	67.88	36.0 h	31 mb	1919.6	15	(n,2n)Ni-57
155	28	Ni-58	58.71	67.88	271 d	dau	14.4	9.5	Co-57
156	28	Ni-58	58.71	67.88	271 d	dau	122.1	85.6	Co-57
157	28	Ni-58	58.71	67.88	271 d	dau	136.5	10.6	Co-57
158	28	Ni-58	58.71	67.88	70.78 d	370 mb	610.6	99.4	(n,p)Co-58(cum)
159	28	Ni-58	58.71	67.88	36.0 h	31 mb	1377.6	84.9	(n,2n)Ni-57
160	28	Ni-60	58.71	26.23	271 d	25 mb(14	58.6	99.75	(n,p)Co-60m
161	28	Ni-62	58.71	3.66	44.6 d	20 mb	1291.6	44	(n,a)Fe-59
162	28	Ni-62	58.71	3.66	44.6 d	20 mb	1099.3	56	(n,a)Fe-59
163	28	Ni-61	58.71	1.19	1.650 h	103 mb	67.4	90	(n,p)Co-61
164	28	Ni-64	58.71	1.08	6.1 m	5.2 mb(14	1204	42.6	(n,a)Fe-61
165	28	Ni-64	58.71	1.08	6.1 m	5.2 mb(14	1025	42.6	(n,a)Fe-61
166	28	Ni-64	58.71	1.08	6.1 m	5.2 mb(14	1636	8.1	(n,a)Fe-61
167	28	Ni-64	58.71	1.08	6.1 m	5.2 mb(14	297.3	21	(n,a)Fe-61
168	28	Ni-64	58.71	1.08	6.1 m	5.2 mb(14	1873	4.3	(n,a)Fe-61
169	29	Cu-63	63.546	69.1	5.272 a	35.7 mb	1332.5	100	(n,a)C0-60g
170	29	Cu-63	63.546	69.1	10.48 m	23 mb(14	58.6	99.75	(n,a)Co-60m
171	29	Cu-63	63.546	69.1	5.272 a	35.7 mb	1173.2	99.9	(n,a)C0-60g
172	29	Cu-63	63.546	69.1	9.78 m	522 mb	511	196	(n,2n)Cu-62
173	29	Cu-65	63.546	30.9	13.9 m	7.5 mb	1172	99	(n,a)Co-62g
174	29	Cu-65	63.546	30.9	1.51 m	1.9 mb	1172.3	63	(n,a)Co-62m
175	29	Cu-65	63.546	30.9	13.9 m	7.5 mb	1163	71	(n,a)Co-62g
176	29	Cu-65	63.546	30.9	12.74 h	956 mb+	511	37	(n,2n)Cu-64
177	29	Cu-65	63.546	30.9	2.520 h	21 mb	1481.7	25.4	(n,p)Ni-65
178	29	Cu-65	63.546	30.9	13.9 m	7.5 mb	2003.9	16.5	(n,a)Co-62g
179	29	Cu-65	63.546	30.9	1.51 m	1.9 mb	2302	15.5	(n,a)Co-62m
180	29	Cu-65	63.546	30.9	2.520 h	21 mb	1115.5	15.2	(n,p)Ni-65
181	29	Cu-65	63.546	30.9	1.51 m	1.9 mb	1128	15	(n,a)Co-62m
182	29	Cu-65	63.546	30.9	13.9 m	7.5 mb	2104	7	(n,a)Co-62g
183	29	Cu-65	63.546	30.9	2.520 h	21 mb	366.5	4.8	(n,p)Ni-65
184	29	Cu-65	63.546	30.9	12.74 h	956 mb+	1345.8	0.48	(n,2n)Cu-64
185	30	Zn-65	65.37	48.9	38.5 m	165 mb+	511	185	(n,2n)Zn-63
186	30	Zn-65	65.37	48.9	12.74 h	185 mb	511	37	(n,p)Cu-64

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
187	30	Zn-65	65.37	48.9	38.5 m	165 mb+	669.6	8.5	(n,2n)Zn-63
188	30	Zn-65	65.37	48.9	38.5 m	165 mb+	961.9	6.7	(n,2n)Zn-63
189	30	Zn-66	65.37	27.8	243.7 d	650 mb+	1115.5	49.8	(n,2n)Zn-65
190	30	Zn-66	65.37	27.8	5.10 m	65 mb	1039	9	(n,p)Cu-66
191	30	Zn-68	65.37	18.6	2.520 h	9 mb	1115.5	15.2	(n,a)Ni-65
192	30	Zn-68	65.37	18.6	18 s	7.8 mb(14	1653.9	74	(n,a)Ni-67
193	30	Zn-68	65.37	18.6	18 s	7.8 mb(14	874.1	65	(n,a)Ni-67
194	30	Zn-68	65.37	18.6	61.7 h	dau	91.3	7	Cu-67
195	30	Zn-68	65.37	18.6	18 s	7.8 mb(14	1072.2	100	(n,a)Ni-67
196	30	Zn-68	65.37	18.6	61.7 h	dau	184.6	45	Cu-67
197	30	Zn-68	65.37	18.6	18 s	7.8 mb(14	708.5	68	(n,a)Ni-67
198	30	Zn-68	65.37	18.6	30 s	22 mb	1260.9	16.1	(n,p)Cu-68g
199	30	Zn-68	65.37	18.6	30 s	22 mb	1077.4	61.2	(n,p)Cu-68g
200	30	Zn-68	65.37	18.6	18 s	7.8 mb(14	1653.9	74	(n,a)Ni-67
201	30	Zn-68	65.37	18.6	61.7 h	dau	93.3	16	Cu-67
202	30	Zn-68	65.37	18.6	2.520 h	9 mb	1481.7	25.4	(n,a)Ni-65
203	30	Zn-68	65.37	18.6	2.520 h	9 mb	366.5	4.8	(n,a)Ni-65
204	30	Zn-67	65.37	4.1	61.7 h	43 mb	91.3	7	(n,p)Cu-67
205	30	Zn-67	65.37	4.1	61.7 h	43 mb	184.6	45	(n,p)Cu-67
206	30	Zn-67	65.37	4.1	61.7 h	43 mb	93.3	16	(n,p)Cu-67
207	30	Zn-70	65.37	0.62	57 m	1.307 b(1·	318.4	0.0015	(n,2n)Zn-69g
208	30	Zn-70	65.37	0.62	13.9 h	600 mb	438.9	100	(n,2n)Zn-69m
209	31	Ga-71	69.72	40	3.97 h	12 mb	386.3	93	(n,p)Zn-71m
210	31	Ga-71	69.72	40	3.97 h	12 mb	487.3	62.3	(n,p)Zn-71m
211	31	Ga-71	69.72	40	3.97 h	12 mb	620.2	56.7	(n,p)Zn-71m
212	31	Ga-71	69.72	40	2.4 m	5.4 mb(14	511.6	32	(n,p)Zn-71g
213	31	Ga-71	69.72	40	3.97 h	12 mb	511.5	28.4	(n,p)Zn-71m
214	31	Ga-71	69.72	40	3.97 h	12 mb	596.1	27.9	(n,p)Zn-71m
215	31	Ga-71	69.72	40	2.4 m	5.4 mb(14	910.3	8	(n,p)Zn-71g
216	31	Ga-71	69.72	40	2.4 m	5.4 mb(14	390	3.9	(n,p)Zn-71g
217	31	Ga-71	69.72	40	2.4 m	5.4 mb(14	121.5	3	(n,p)Zn-71g
218	31	Ga-69	69.72	60	57 m	17 mb	318.4	0.0015	(n,p)Zn-69g
219	31	Ga-69	69.72	60	5.1 m	16 mb	1039	9	(n,a(Cu-66
220	31	Ga-69	69.72	60	13.9 h	21 mb	438.9	100	(n,p)Zn-69m
221	31	Ga-69	69.72	60	68.2 m	957 mb	511	176	n,2n)Ga-68
222	31	Ga-69	69.72	60	68.2 m	957 mb	1077.4	3.2	n,2n)Ga-68
223	32	Ge-74	72.59	36.4	3.97 h	3.32 mb	596.1	27.9	(n,a)Zn-71m+
224	32	Ge-74	72.59	36.4	3.97 h	3.32 mb	511.5	28.4	(n,a)Zn-71m+
225	32	Ge-74	72.59	36.4	3.97 h	3.32 mb	620.2	56.7	(n,a)Zn-71m+
226	32	Ge-74	72.59	36.4	3.97 h	3.32 mb	487.3	62.3	(n,a)Zn-71m+
227	32	Ge-74	72.59	36.4	3.97 h	3.32 mb	386.3	93	(n,a)Zn-71m+
228	32	Ge-74	72.59	36.4	8.2 m	13.2 mb	595.88	92	(n,p)Ga-74
229	32	Ge-74	72.59	36.4	8.2 m	13.2 mb	2353.5	49.1	(n,p)Ga-74
230	32	Ge-74	72.59	36.4	2.4 m	10 mb+	511.6	32	(n,a)Zn-71g
231	32	Ge-74	72.59	36.4	8.2 m	13.2 mb	608.4	14.7	(n,p)Ga-74
232	32	Ge-74	72.59	36.4	8.2 m	13.2 mb	867.8	8.9	(n,p)Ga-74
233	32	Ge-74	72.59	36.4	2.4 m	10 mb+	910.3	8	(n,a)Zn-71g
234	32	Ge-74	72.59	36.4	8.2 m	13.2 mb	1204.3	7.6	(n,p)Ga-74
235	32	Ge-74	72.59	36.4	2.4 m	10 mb+	390	3.9	(n,a)Zn-71g
236	32	Ge-74	72.59	36.4	2.4 m	10 mb+	121.5	3	(n,a)Zn-71g
237	32	Ge-72	72.59	27.5	14.10 h	31 mb	629.9	25.5	(n,p)Ga-72
238	32	Ge-72	72.59	27.5	14.10 h	31 mb	2507.7	13.4	(n,p)Ga-72
239	32	Ge-72	72.59	27.5	14.10 h	31 mb	2201.6	27.3	(n,p)Ga-72
240	32	Ge-72	72.59	27.5	14.10 h	31 mb	894.2	10.3	(n,p)Ga-72
241	32	Ge-72	72.59	27.5	14.10 h	31 mb	834	100	(n,p)Ga-72
242	32	Ge-72	72.59	27.5	13.9 h	7 mb (14.:	438.9	100	(n,a)Zn-69m+
243	32	Ge-72	72.59	27.5	57 m	8 mb(14.9	318	0.0015	(n,a)Zn-69g
244	32	Ge-70	72.59	20.7	21.1 m	110 mb(1·	1039.4	0.5	(n,p)Ga-70
245	32	Ge-70	72.59	20.7	39.2 h	610 mb	511	68	(n,2n)Ge-69
246	32	Ge-70	72.59	20.7	39.2 h	610 mb	1106.5	26	(n,2n)Ge-69
247	32	Ge-70	72.59	20.7	39.2 h	610 mb	1336.2	2.95	(n,2n)Ge-69
248	32	Ge-70	72.59	20.7	39.2 h	610 mb	872	9.6	(n,2n)Ge-69

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
249	32	Ge-70	72.59	20.7	21.1 m	110 mb(1·	175.3	0.2	(n,p)Ga-70
250	32	Ge-70	72.59	20.7	39.2 h	610 mb	574	11.8	(n,2n)Ge-69
251	32	Ge-73	72.59	7.7	4.88 h	26 mb	53.5	7	(n,p)Ga-73
252	32	Ge-76	72.59	7.7	82.8 m	1.21 b	264.8	12	(n,2n)Ge-75m+g
253	32	Ge-73	72.59	7.7	4.88 h	26 mb	297.4	87	(n,p)Ga-73
254	32	Ge-76	72.59	7.7	48.9 s	967 mb	139.8	40	(n,2n)Ge-75m+
255	32	Ge-73	72.59	7.7	4.88 h	26 mb	325.7	13	(n,p)Ga-73
256	33	As-75	74.921	100	17.76 d	1.05 b	511	59	(n,2n)As-74
257	33	As-75	74.921	100	14.1 h	12 mb	2507.7	13.4	(n,a)Ga-72
258	33	As-75	74.921	100	14.1 h	12 mb	894.2	10.3	(n,a)Ga-72
259	33	As-75	74.921	100	82.8 m	,20 mb	264.8	12	(n,p)Ge-75g(cum)
260	33	As-75	74.921	100	17.76 d	1.05 b	595.7	59.5	(n,2n)As-74
261	33	As-75	74.921	100	17.76 d	1.05 b	634.8	15	(n,2n)As-74
262	33	As-75	74.921	100	14.1 h	12 mb	629.9	25.5	(n,a)Ga-72
263	33	As-75	74.921	100	48.9 s	16 mb	129.8	40	(n,p)Ge-75m+
264	33	As-75	74.921	100	14.1 h	12 mb	2201.6	27.3	(n,a)Ga-72
265	33	As-75	74.921	100	14.1 h	12 mb	834	100	(n,a)Ga-72
266	34	Se-80	78.96	50	38.8 h	dau	520.9	0.61	As-77
267	34	Se-80	78.96	50	54.3 s	6 mb(14.9	215.5	20.9	(n,a)Ge-77m+
268	34	Se-80	78.96	50	17.5 s	dau	161.9	59.5	Se-77m
269	34	Se-80	78.96	50	16.5 s	16 mb(14	1645.1	6.5	(n,p)As-80
270	34	Se-80	78.96	50	11.3 h	6 mb(14.9	264.5	53	(n,a)Ge-77+
271	34	Se-80	78.96	50	11.3 h	6 mb(14.9	215.6	27.5	(n,a)Ge-77+
272	34	Se-80	78.96	50	11.3 h	6 mb(14.9	416.3	21.7	(n,a)Ge-77+
273	34	Se-80	78.96	50	11.3 h	6 mb(14.9	211	28	(n,a)Ge-77+
274	34	Se-80	78.96	50	38.8 h	dau	239	1.65	As-77
275	34	Se-80	78.96	50	11.3 h	6 mb(14.9	557.9	16.4	(n,a)Ge-77+
276	34	Se-80	78.96	50	11.3 h	6 mb(14.9	367.4	12.7	(n,a)Ge-77+
277	34	Se-80	78.96	50	16.5 s	16 mb(14	1206.8	4.2	(n,p)As-80
278	34	Se-80	78.96	50	16.5 s	16 mb(14	665.8	41.8	(n,p)As-80
279	34	Se-80	78.96	50	54.3 s	6 mb(14.9	159.7	11.3	(n,a)Ge-77m+
280	34	Se-78	78.96	23.5	82.8 m	7 mb+	264.8	12	(n,a)Ge-75 g
281	34	Se-78	78.96	23.5	1.5 h	24 mb	694.9	18	(n,p)As-78
282	34	Se-78	78.96	23.5	1.5 h	24 mb	1239.9	6	(n,p)As-78
283	34	Se-78	78.96	23.5	1.5 h	24 mb	827.6	7	(n,p)As-78
284	34	Se-78	78.96	23.5	17.5 s	804 mb	161.9	59.5	(n,2n)Se-77 m
285	34	Se-78	78.96	23.5	1.5 h	24 mb	613.6	54	(n,p)As-78
286	34	Se-78	78.96	23.5	48 s	7.6 mb	139.8	40	(n,a)Ge-75m+
287	34	Se-78	78.96	23.5	1.5 h	24 mb	1308.8	11	(n,p)As-78
288	34	Se-76	78.96	9	26.3 h	56 mb	559.1	4.6	(n,p)As-76
289	34	Se-76	78.96	9	120 d	808 mb+	135.9	58	(n,2n)Se-75
290	34	Se-76	78.96	9	120 d	808 mb+	400.7	12	(n,2n)Se-75
291	34	Se-82	78.96	9	18.5 m	225 mb	275.9	0.51	(n,2n)Se-81g
292	34	Se-76	78.96	9	26.3 h	56 mb	1216.3	3.7	(n,p)As-76
293	34	Se-82	78.96	9	57.3 m	894 mb	103	8	(n,2n)Se-81m
294	34	Se-76	78.96	9	120 d	808 mb+	121.1	16.5	(n,2n)Se-75
295	34	Se-82	78.96	9	18.5 m	225 mb	290	0.44	(n,2n)Se-81g
296	34	Se-82	78.96	9	18.5 m	225 mb	828.3	0.2	(n,2n)Se-81g
297	34	Se-76	78.96	9	26.3 h	56 mb	657	6.4	(n,p)As-76
298	34	Se-76	78.96	9	120 d	808 mb+	279.5	25	(n,2n)Se-75
299	34	Se-76	78.96	9	120 d	808 mb+	264.5	58.5	(n,2n)Se-75
300	34	Se-77	78.96	7.5	17.5 s	dau	161.9	59.5	Se-77 m
301	34	Se-77	78.96	7.5	38 h	35 mb	239	1.65	(n,p)As-77
302	34	Se-77	78.96	7.5	38 h	35 mb	520.9	0.61	(n,p)As-77
303	34	Se-74	78.96	0.9	40 m	210 mb+	511	40	(n,2n)Se-73m
304	34	Se-74	78.96	0.9	7.1 h	185 mb+	511	125	(n,2n)Se-73
305	34	Se-74	78.96	0.9	17.76 d	135 mb	595.7	59.5	(n,p)As-74
306	34	Se-74	78.96	0.9	40 m	210 mb+	254.3	1.15	(n,2n)Se-73m
307	34	Se-74	78.96	0.9	7.1 h	185 mb+	67	72	(n,2n)Se-73
308	34	Se-74	78.96	0.9	17.76 d	135 mb	511	59	(n,p)As-74
309	34	Se-74	78.96	0.9	7.1 h	185 mb+	361.1	98	(n,2n)Se-73

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
310	34	Se-74	78.96	0.9	76 d	dau	53.4	10	As-73
311	34	Se-74	78.96	0.9	17.76 d	135 mb	634.8	15	(n,p)As-74
312	35	Br-79	80.904	50.69	6.4 m	932 mb+	511	185	(n,2n)Br-78
313	35	Br-79	80.904	50.69	6.4 m	932 mb+	613.6	13.6	(n,2n)Br-78
314	35	Br-79	80.904	50.69	26.3 h	16 mb	559.1	44.6	(n,a)As-76
315	35	Br-79	80.904	50.69	26.3 h	16 mb	1216.3	3.7	(n,a)As-76
316	35	Br-79	80.904	50.69	26.3 h	16 mb	657	6.4	(n,a)As-76
317	35	Br-79	80.904	50.69	3.89 m	10 mb(14	95.7	10	(n,p)Se-79 m+
318	35	Br-81	80.904	49.31	17.4 m	410 mb	617	7.2	(n,2n)Br-80 g
319	35	Br-81	80.904	49.31	1.515 h	6 mb(14.9	613.6	54	(n,a)As-78
320	35	Br-81	80.904	49.31	1.515 h	6 mb(14.9	1239	6	(n,a)As-78
321	35	Br-81	80.904	49.31	18.5 m	7 mb (14.!	275.9	0.51	(n,p)Se-81 g
322	35	Br-81	80.904	49.31	17.4 m	410 mb	511	5	(n,2n)Br-80 g
323	35	Br-81	80.904	49.31	1.515 h	6 mb(14.9	827.6	7	(n,a)As-78
324	35	Br-81	80.904	49.31	1.515 h	6 mb(14.9	1308.8	11	(n,a)As-78
325	35	Br-81	80.904	49.31	1.515 h	6 mb(14.9	694.9	18	(n,a)As-78
326	35	Br-81	80.904	49.31	18.5 m	7 mb (14.!	290	0.44	(n,p)Se-81 g
327	35	Br-81	80.904	49.31	4.42 h	730 mb	37	40	(n,2n)Br-80 m+
328	35	Br-81	80.904	49.31	18.5 m	7 mb (14.!	826.3	0.2	(n,p)Se-81 g
329	35	Br-81	80.904	49.31	57.3 m	22 mb	103	8	(n,p)Se-83 m
330	36	Kr-84	83.8	57	31.8 m	8.5 mb	881.6	41.6	(n,p)Br-84g
331	36	Kr-84	83.8	57	31.8 m	8.5 mb	1897.6	14.7	(n,p)Br-84g
332	36	Kr-84	83.8	57	31.8 m	8.5 mb	2484.1	6.7	(n,p)Br-84g
333	36	Kr-84	83.8	57	31.8 m	8.5 mb	802.2	6	(n,p)Br-84g
334	36	Kr-84	83.8	57	31.8 m	8.5 mb	1015.9	6.2	(n,p)Br-84g
335	36	Kr-84	83.8	57	31.8 m	8.5 mb	3927.5	6.8	(n,p)Br-84g
336	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	356	75	(n,a)Se-83 g
337	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	512	45	(n,a)Se-83 g
338	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	226	35	(n,a)Se-83 g
339	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	720	22.4	(n,a)Se-83 g
340	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	801	15	(n,a)Se-83 g
341	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	837	14	(n,a)Se-83 g
342	36	Kr-86	83.8	17.3	22.5 m	1.2 mb	2291	13	(n,a)Se-83 g
343	36	Kr-82	83.8	11.6	35.4 h	23 mb	554.3	72	(n,p)Br-84g+
344	36	Kr-82	83.8	11.6	35.4 h	23 mb	776.6	83.2	(n,p)Br-84g+
345	36	Kr-82	83.8	11.6	35.4 h	23 mb	1044	28	(n,p)Br-84g+
346	36	Kr-82	83.8	11.6	35.4 h	23 mb	1317.4	27	(n,p)Br-84g+
347	36	Kr-82	83.8	11.6	35.4 h	23 mb	698.4	28	(n,p)Br-84g+
348	36	Kr-82	83.8	11.6	35.4 h	23 mb	619.1	39	(n,p)Br-84g+
349	36	Kr-80	83.8	2.25	34.9 h	810 mb(1·	606	8	(n,2n)Kr-79g(cum)
350	36	Kr-80	83.8	2.25	4.42 h	55 mb	37	40	(n,p)Br-80m+
351	36	Kr-80	83.8	2.25	34.9 h	810 mb(1·	511	15	(n,2n)Kr-79g(cum)
352	36	Kr-80	83.8	2.25	34.9 h	810 mb(1·	261.3	11	(n,2n)Kr-79g(cum)
353	36	Kr-80	83.8	2.25	34.9 h	810 mb(1·	397.6	8	(n,2n)Kr-79g(cum)
354	37	Rb-85	85.467	72.17	35.4 h	7 mb	698.4	28	(n,a)Br-82
355	37	Rb-85	85.467	72.17	4.48 h	4.1 mb	304.5	13.5	(n,p)Kr-85m+
356	37	Rb-85	85.467	72.17	35.4 h	7 mb	1317.4	27	(n,a)Br-82
357	37	Rb-85	85.467	72.17	35.4 h	7 mb	554.3	72	(n,a)Br-82
358	37	Rb-85	85.467	72.17	34 d	1.411 b(1·	81.5	75.3	(n,2n)Rb-84 m+g(cum)
359	37	Rb-85	85.467	72.17	34 d	1.411 b(1·	511	42	(n,2n)Rb-84 m+g(cum)
360	37	Rb-85	85.467	72.17	35.4 h	7 mb	1044	28	(n,a)Br-82
361	37	Rb-85	85.467	72.17	35.4 h	7 mb	776.5	83.2	(n,a)Br-82
362	37	Rb-85	85.467	72.17	4.48 h	4.1 mb	151	76.1	(n,p)Kr-85m+
363	37	Rb-85	85.467	72.17	35.4 h	7 mb	619.1	39	(n,a)Br-82
364	37	Rb-87	85.467	27.83	76 m	4.9 mb(14	845.6	7.3	(n,p)Kr-87
365	37	Rb-87	85.467	27.83	31.8 m	1.8 mb	2484.1	6.7	(n,a)Br-84 g
366	37	Rb-87	85.467	27.83	6 m	1.9 mb (1·	424	100	(n,a)Br-84 m+
367	37	Rb-87	85.467	27.83	31.8 m	1.8 mb	802.2	6	(n,a)Br-84 g
368	37	Rb-87	85.467	27.83	76 m	4.9 mb(14	402.7	48.3	(n,p)Kr-87
369	37	Rb-87	85.467	27.83	18.65 d	1.817 b(1·	1076.6	8.76	(n,2n)Rb-86 m+g(cum)
370	37	Rb-87	85.467	27.83	31.8 m	1.8 mb	881.6	41	(n,a)Br-84 g
371	37	Rb-87	85.467	27.83	31.8 m	1.8 mb	1015.9	6.2	(n,a)Br-84 g

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
372	37	Rb-87	85.467	27.83	31.8 m	1.8 mb	1897.6	14.7	(n,a)Br-84 g
373	37	Rb-87	85.467	27.83	6 m	1.9 mb (1·	881.5	98	(n,a)Br-84 m+
374	37	Rb-87	85.467	27.83	31.8 m	1.8 mb	3927	6.8	(n,a)Br-84 g
375	37	Rb-87	85.467	27.83	76 m	4.9 mb(14	2554.5	8.7	(n,p)Kr-87
376	37	Rb-87	85.467	27.83	6 m	1.9 mb (1·	1462.8	97	(n,a)Br-84 m+
377	38	Sr-86	87.62	9.9	67.7 m	347 mb	151.3	11.6	(n,2n)Sr-85 m+
378	38	Sr-86	87.62	9.9	67.7 m	347 mb	231.7	85	(n,2n)Sr-85 m+
379	38	Sr-86	87.62	9.9	1.018 m	9 mb(14.9	555.8	98.2	(n,p)Rb-86 m+
380	38	Sr-86	87.62	9.9	18.65 d	42 mb	1076.6	8.76	(n,p)Rb-86
381	38	Sr-86	87.62	9.9	65.2 d	924 mb+	514	99.3	(n,2n)Sr-85 g(cum)
382	38	Sr-84	87.62	0.56	83 d	dau	552.6	16.3	Rb-83
383	38	Sr-84	87.62	0.56	83 d	dau	529.5	30	Rb-83
384	38	Sr-84	87.62	0.56	32.4 h	227 mb(1·	381.6	19.6	(n,2n)Sr-83
385	38	Sr-84	87.62	0.56	83 d	dau	520.4	46.1	Rb-83
386	38	Sr-84	87.62	0.56	32.4 h	227 mb(1·	511	46.8	(n,2n)Sr-83
387	38	Sr-84	87.62	0.56	32.4 h	227 mb(1·	418.4	5	(n,2n)Sr-83
388	38	Sr-84	87.62	0.54	32.4 h	227 mb(1·	762.7	30	(n,2n)Sr-83
389	39	Y-89	88.905	100	1.018 m	910 ub(1·	555.8	98.2	(n,a)Rb-86 m+
390	39	Y-89	88.905	100	1.018 m	910 ub(1·	555.8	98.2	(n,a)Rb-86 m+
391	39	Y-89	88.905	100	18.65 d	5 mb	1076.6	8.76	(n,a)Rb-86 g
392	39	Y-89	88.905	100	106.6 d	930 mb	1836.1	99.4	(n,2n)Y-88
393	39	Y-89	88.905	100	50.5 d	24 mb	909.1	0.009	(n,p)Sr-89
394	39	Y-89	88.905	100	106.6 d	930 mb	898	93	(n,2n)Y-88
395	40	Zr-90	91.22	51.4	3.19 h	12.9 mb	202.5	96.5	(n,p)Y-90 m+
396	40	Zr-90	91.22	51.4	3.19 h	12.9 mb	482.5	90	(n,p)Y-90 m+
397	40	Zr-90	91.22	51.4	4.18 m	120 mb+	1508	6.7	(n,2n)Zr-89 m+
398	40	Zr-90	91.22	51.4	4.18 m	120 mb+	587.8	93	(n,2n)Zr-89 m+
399	40	Zr-90	91.22	51.4	3.271 d	714 mb+	909.1	99.Y-89m	(n,2n)Zr-89 g(cum)+
400	40	Zr-90	91.22	51.4	64.0 h	45 mb	1760.7	0.02	(n,p)Y-90 g(cum)
401	40	Zr-90	91.22	51.4	3.271 d	714 mb+	511	47	(n,2n)Zr-89 g(cum)+
402	40	Zr-90	91.22	51.4	15.7 s	dau	909.1	99	Y-89 m
403	40	Zr-90	91.22	51.4	2.81 h	2.8 mb	388.4	83	(n,a)Sr-87 m
404	40	Zr-90	91.22	51.4	4.18 m	120 mb+	511	2.8	(n,2n)Zr-89 m+
405	40	Zr-92	91.22	17.1	58.6 d	dau	1204.9	0.3	Y-91 g
406	40	Zr-92	91.22	17.1	19 m	8 mb	550.1	6.1	(n,p)Y-94
407	40	Zr-92	91.22	17.1	19 m	8 mb	1672	4.6	(n,p)Y-94
408	40	Zr-92	91.22	17.1	19 m	8 mb	918.2	73.5	(n,p)Y-94
409	40	Zr-92	91.22	17.1	9.48 h	5 mb	652.9	7.6	(n,a)Sr-91+
410	40	Zr-92	91.22	17.1	9.48 h	5 mb	749.8	22.8	(n,a)Sr-91+
411	40	Zr-92	91.22	17.1	9.48 h	5 mb	1024.3	33	(n,a)Sr-91+
412	40	Zr-92	91.22	17.1	-	5 mb	555.6	60.7	(n,a)Sr-91+
413	40	Zr-92	91.22	17.1	3.53 h	19 mb	1045.4	4.8	(n,p)Y-92
414	40	Zr-92	91.22	17.1	3.53 h	19 mb	448.5	2.5	(n,p)Y-92
415	40	Zr-92	91.22	17.1	3.53 h	19 mb	561.1	2.6	(n,p)Y-92
416	40	Zr-92	91.22	17.1	3.53 h	19 mb	934.5	14	(n,p)Y-92
417	40	Zr-92	91.22	17.1	50.5 d	10 mb+	909.1	0.09	(n,a)Sr-89
418	40	Zr-91	91.22	11.2	58.6 d	40 mb	1204.9	0.3	(n,p)Y-91 g(cum
419	40	Zr-91	91.22	11.2	49.7 m	18.6 mb	555.6	95.4	(n,p)Y-91 m+
420	40	Zr-96	91.22	2.8	3.61 d	dau	235.4	45	Nb-95 m
421	40	Zr-96	91.22	2.8	65.5 d	1.456 b	724.2	43	(n,2n)Zr-95
422	40	Zr-96	91.22	2.8	7.5 m	3 mb+	876.9	26	(n,a)Sr-93
423	40	Zr-96	91.22	2.8	65.5 d	1.456 b	756.7	54.6	(n,2n)Zr-95
424	40	Zr-96	91.22	2.8	10.2 h	dau	267.5	6.4	Y-93
425	40	Zr-96	91.22	2.8	2.3 m	13 mb(14	1000	un	(n,p)Y-96
426	40	Zr-96	91.22	2.8	7.5 m	3 mb+	889.5	23	(n,a)Sr-93
427	40	Zr-96	91.22	2.8	7.5 m	3 mb+	711.3	23	(n,a)Sr-93
428	40	Zr-96	91.22	2.8	2.3 m	13 mb(14	1723	un	(n,p)Y-96
429	40	Zr-96	91.22	2.8	7.5 m	3 mb+	590.9	74	(n,a)Sr-93
430	40	Zr-96	91.22	2.8	10.2 h	dau	947.1	2.2	Y-93
431	40	Zr-96	91.22	2.8	10.2 h	dau	1914.2	1.52	Y-93
432	40	Zr-96	91.22	2.8	2.3 m	13 mb(14	1805	un	(n,p)Y-96
433	40	Zr-92	91.22	2.8	49.7 m	dau	555.6	95.4	Y-91 m

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
434	40	Zr-96	91.22	2.8	35.1 d	dau	765.8	99	Nb-95 g
435	41	Nb-93	92.904	100	10.13 d	480 mb	934.5	95.5	(n,2n)Nb-92 m+
436	41	Nb-93	92.904	100	3.19 h	5.5 mb	202.5	96.5	(n,a)Y-90 m+
437	41	Nb-93	92.904	100	3.19 h	5.5 mb	482.5	90	(n,a)Y-90 m+
438	41	Nb-93	92.904	100	64.1 h	9 mb	1760.7	0.02	(n,a)Y-90
439	42	Mo-98	95.94	23.78	35.1	dau	765.8	99	Nb-95
440	42	Mo-98	95.94	23.78	65.5 b	8.1 mb(14	724.2	43	(n,a)Zr-95+
441	42	Mo-98	95.94	23.78	3.61 d	dau	235.4	45	Nb-95 m
442	42	Mo-98	95.94	23.78	65.5 b	8.1 mb(14	756.7	54.6	(n,a)Zr-95+
443	42	Mo-96	95.94	16.53	23.4 h	21 mb	1200.5	21	(n,p)Nb-96
444	42	Mo-96	95.94	16.53	23.4 h	21 mb	850.2	22	(n,p)Nb-96
445	42	Mo-96	95.94	16.53	23.4 h	21 mb	778	97	(n,p)Nb-96
446	42	Mo-96	95.94	16.53	23.4 h	21 mb	1091.5	49	(n,p)Nb-96
447	42	Mo-96	95.94	16.53	23.4 h	21 mb	569	59	(n,p)Nb-96
448	42	Mo-96	95.94	16.53	23.4 h	21 mb	460	28	(n,p)Nb-96
449	42	Mo-95	95.94	15.72	35.1 d	37 mb(14	765.8	99	(n,p)No-95 m+g(cum)+
450	42	Mo-95	95.94	15.72	3.61 d	37 mb(14	765.8	99	(n,p)No-95 m+g(cum)+
451	42	Mo-92	95.94	14.8	15.5 m	170 mb	3027.7	11.2	(n,2n)Mo-91 g+
452	42	Mo-92	95.94	14.8	10.13 d	62.5 mb	934.5	95.5	(n,p)Nb-92 m
453	42	Mo-92	95.94	14.8	64 s	13 mb	652.9	53	(n,2n)Mo-91 m+
454	42	Mo-92	95.94	14.8	64 s	13 mb	1208.2	19.3	(n,2n)Mo-91 m+
455	42	Mo-92	95.94	14.8	62 d	dau	1205	3.4	Nb-91 m
456	42	Mo-92	95.94	14.8	64 s	13 mb	1508	25	(n,2n)Mo-91 m+
457	42	Mo-92	95.94	14.8	3.271 d	18 mb	909.1	99	(n,a)Zr-89 g+
458	42	Mo-92	95.94	14.8	15.5 m	170 mb	1636.9	40	(n,2n)Mo-91 g+
459	42	Mo-92	95.94	14.8	15.5 m	170 mb	616	8.7	(n,2n)Mo-91 g+
460	42	Mo-92	95.94	14.8	4.18 m	2.5 mb(14	587.8	93	(n,a)Zr-89 m+
461	42	Mo-92	95.94	14.8	4.18 m	2.5 mb(14	1503	6.7	(n,a)Zr-89 m+
462	42	Mo-92	95.94	14.8	64 s	13 mb	511	76	(n,2n)Mo-91 m+
463	42	Mo-92	95.94	14.8	3.271 d	18 mb	511	47	(n,a)Zr-89 g+
464	42	Mo-92	95.94	14.8	15.7 s	dau	909.1	99	Y-89 m
465	42	Mo-92	95.94	14.8	4.18 m	2.5 mb(14	511	2.8	(n,a)Zr-89 m+
466	42	Mo-92	95.94	14.8	15.5 m	170 mb	2631.3	14.6	(n,2n)Mo-91 g+
467	42	Mo-92	95.94	14.8	15.5 m	170 mb	1.581	27.6	(n,2n)Mo-91 g+
468	42	Mo-100	95.94	9.63	66.02 h	1.38 b+	739.7	14	(n,2n)Mo-99+
469	42	Mo-100	95.94	9.63	6.02 h	dau	140.5	85	Tc-99 m
470	42	Mo-100	95.94	9.63	16.8 h	25 mb (14	743.4	94	(n,a)Zr-97+
471	42	Mo-100	95.94	9.63	66.02 h	1.38 b+	140.5	81.3	(n,2n)Mo-99+
472	42	Mo-100	95.94	9.63	54 s	dau	743.4	98	Nb-97 m
473	42	Mo-100	95.94	9.63	73.6 m	dau	657.9	98.2	Nb-97
474	42	Mo-100	95.94	9.63	66.02 h	1.38 b+	181.1	6.85	(n,2n)Mo-99+
475	42	Mo-97	95.94	9.46	54 s	7.4 mb	743.4	98	(n,p)Nb-97 m+
476	42	Mo-97	95.94	9.46	73.6 m	15.9 mb	657.9	98.2	(n,p)Nb-97 g
477	42	Mo-94	95.94	9.04	6.85 h	3 mb(14.1	1477.2	99.4	(n,2n)Mo-93 m+
478	42	Mo-94	95.94	9.04	6.85 h	3 mb(14.1	263.2	61.2	(n,2n)Mo-93 m+
479	42	Mo-94	95.94	9.04	6.85 h	3 mb(14.1	684.6	91.9	(n,2n)Mo-93 m+
480	42	Mo-94	95.94	9.04	6.26 m	6.0 mb(14	871.1	0.48	(n,p)Nb-94+
481	42	Mo-94	95.94	9.04	6.26 m	6.0 mb(14	16.6	11	(n,p)Nb-94+
482	44	Ru-102	101.07	31.6	5.3 s	2 mb(14.9	1102	6	(n,p)Tc-102 g
483	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	2032	6	(n,a)Mo-101
484	44	Ru-98	101.07	1.9	2.89 d	1.169 b	324.4	10.4	(n,2n)Ru-97
485	44	Ru-104	101.07	18.6	56 m	dau	39.8	0.08	Rh-103 m
486	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	1012.4	11.3	(n,a)Mo-101
487	44	Ru-104	101.07	18.6	14.2 m	dau	306.9	62.6	Tc-101
488	44	Ru-100	101.07	12.62	16 s	17 mb (14	539.6	6.6	(n,p)Tc-100
489	44	Ru-96	101.07	5.5	4.3 d	146 mb	850.3	99	(n,p)Tc-96
490	44	Ru-104	101.07	18.6	18 m	7.2 mb(14	530.4	15	(n,p)Tc-104
491	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	590.8	19.3	(n,a)Mo-101
492	44	Ru-96	101.07	5.5	1.64 h	638 mb(1·	511	30	(n,2n)Ru-95
493	44	Ru-96	101.07	5.5	1.64 h	638 mb(1·	336.4	70	(n,2n)Ru-95
494	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	191.9	18.1	(n,a)Mo-101
495	44	Ru-100	101.07	12.62	16 s	17 mb (14	590.8	5.4	(n,p)Tc-100

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
496	44	Ru-102	101.07	31.6	5.3 s	2 mb(14.9	628	10	(n,p)Tc-102 g
497	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	1532.3	5.5	(n,a)Mo-101
498	44	Ru-98	101.07	1.9	2.89 d	1.169 b	215.2	86.2	(n,2n)Ru-97
499	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	505.9	11.4	(n,a)Mo-101
500	44	Ru-96	101.07	5.5	4.3 d	146 mb	778.3	100	(n,p)Tc-96
501	44	Ru-104	101.07	18.6	39.6 d	1.44 b	497.1	86.4	(n,2n)Ru-103
502	44	Ru-104	101.07	18.6	18 m	7.2 mb(14	534.9	12	(n,p)Tc-104
503	44	Ru-96	101.07	5.5	4.3 d	146 mb	812.8	82	(n,p)Tc-96
504	44	Ru-99	101.07	12.72	6.02 h	<16mb (1·	140.5	85	(n,p)Tc-99 m+
505	44	Ru-102	101.07	31.6	5.3 s	2 mb(14.9	468	8	(n,p)Tc-102 g
506	44	Ru-102	101.07	31.6	5.3 s	2 mb(14.9	1106	4	(n,p)Tc-102 g
507	44	Ru-96	101.07	5.5	4.3 d	146 mb	1127.2	15	(n,p)Tc-96
508	44	Ru-104	101.07	18.6	18 m	7.2 mb(14	357.8	85	(n,p)Tc-104
509	44	Ru-104	101.07	18.6	14.6 m	2.6 mb(14	695.5	6.6	(n,a)Mo-101
510	44	Ru-104	101.07	18.6	18 m	7.2 mb(14	883.5	12	(n,p)Tc-104
511	44	Ru-96	101.07	5.5	1.64 h	639 mb(1·	1096.8	22	(n,2n)Ru-95
512	44	Ru-96	101.07	5.5	1.64 h	639 mb(1·	626.8	80	(n,2n)Ru-95
513	44	Ru-102	101.07	31.6	5.3 s	2 mb(14.9	474.8	53	(n,p)Tc-102 g
514	45	Rh-103	102.91	100	207 d	530 mb	511	30	(n,2n)Rh-102 g
515	45	Rh-103	102.91	100	2.9 a	400 mb	1112.7	16.9	(n,2n)Rh-102 m+
516	45	Rh-103	102.91	100	207 d	530 mb	475	57	(n,2n)Rh-102 g
517	45	Rh-103	102.91	100	2.9 a	400 mb	416.3	10.2	(n,2n)Rh-102 m+
518	45	Rh-103	102.91	100	2.9 a	400 mb	697.1	44.6	(n,2n)Rh-102 m+
519	45	Rh-103	102.91	100	2.9 a	400 mb	766.8	33.5	(n,2n)Rh-102 m+
520	45	Rh-103	102.91	100	39.6 d	16.9 mb	497.1	86.4	(n,p)Ru-103
521	45	Rh-103	102.91	100	207 d	530 mb	1103.4	36	(n,2n)Rh-102 g
522	45	Rh-103	102.91	100	56 m	dau	39.8	0.06	Rh-103 m
523	45	Rh-103	102.91	100	2.9 a	400 mb	631.1	55.8	(n,2n)Rh-102 m+
524	45	Rh-103	102.91	100	2.9 a	400 mb	1046.6	32.6	(n,2n)Rh-102 m+
525	45	Rh-103	102.91	100	2.9 a	400 mb	475	93	(n,2n)Rh-102 m+
526	45	Rh-103	102.91	100	16 s	11 mb(14	590.8	5.4	(n,a)Tc-100
527	45	Rh-103	102.91	100	16 s	11 mb(14	539.6	6.6	(n,a)Tc-100
528	46	Pd-102	106.4	0.96	8.3 h	1.03 b(14	590.4	11.3	(n,2n)Pd-101+
529	46	Pd-108	106.4	26.71	35.5 h	dau	319.2	19.6	Rh-105 g
530	46	Pd-105	106.4	22.23	35.5 h	(37.6 mb)	319.2	19.6	(n,p)Rh-105 g
531	46	Pd-104	106.4	10.97	4.35 m	31 mb(14	99.1	2.6	(n,p)Rh-104 m
532	46	Pd-108	106.4	26.71	4.44 h	2.6 mb	20.2	17	(n,a)Ru-105+
533	46	Pd-110	106.4	11.8	4.69 m	498 mb	188.9	58	(n,2n)Pd-109 m+
534	46	Pd-104	106.4	10.97	4.35 m	31 mb(14	20.2	40	(n,p)Rh-104 m
535	46	Pd-108	106.4	26.71	4.44 h	2.6 mb	724.2	44.5	(n,a)Ru-105+
536	46	Pd-106	106.4	27.33	39.6 d	5.6 mb	497.1	86.4	(n,a)Ru-103
537	46	Pd-110	106.4	11.8	4.2 m	13.8 mb	194.3	14.3	(n,a)Ru-107+
538	46	Pd-106	106.4	27.33	56 m	dau	20.2	8.4	Rh-103 m
539	46	Pd-102	106.4	0.96	3 a	dau	19.3	66.6	Rh-101 g
540	46	Pd-108	106.4	26.71	17 s	8.3 mb	619	19	(n,p)Rh-108 g
541	46	Pd-106	106.4	27.33	2.18 h	6.0 mb	717.1	29	(n,p)Rh-106 m
542	46	Pd-108	106.4	26.71	4.44 h	2.6 mb	316.5	10.2	(n,a)Ru-105+
543	46	Pd-104	106.4	10.97	17.5 d	945 mb(1·	39.7	0.07	(n,2n)Pd-103
544	46	Pd-105	106.4	22.23	45 s	23 mb(14	130	25	(n,p)Rh-105 m+
545	46	Pd-106	106.4	27.33	2.18 h	6.0 mb	1045.7	30	(n,p)Rh-106 m
546	46	Pd-108	106.4	26.71	45 s	dau	130	25	Rh-105 m
547	46	Pd-106	106.4	27.33	2.18 h	6.0 mb	450.9	21.5	(n,p)Rh-106 m
548	46	Pd-102	106.4	0.96	4.47 d	dau	306.8	86.7	Rh-101 m
549	46	Pd-104	106.4	10.97	4.35 m	31 mb(14	51.4	57	(n,p)Rh-104 m
550	46	Pd-105	106.4	22.23	35.5 h	(37.6 mb)	306.3	5.45	(n,p)Rh-105 g
551	46	Pd-102	106.4	0.96	8.3 h	1.03 b(14	20.2	60	(n,2n)Pd-101+
552	46	Pd-108	106.4	26.71	35.5 h	dau	306.3	5.45	Rh-105 g
553	46	Pd-105	106.4	22.23	45 s	23 mb(14	20.2	40	(n,p)Rh-105 m+
554	46	Pd-110	106.4	11.8	22 m	dau	302.8	65.9	Rh-107
555	46	Pd-108	106.4	26.71	45 s	dau	20.2	40	Rh-105 m
556	46	Pd-108	106.4	26.71	21.3 s	517 mb(1·	214	71.4	(n,2n)Pd-107 m+
557	46	Pd-104	106.4	10.97	56 m	dau	20.2	6.4	Rh-103 m

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
558	46	Pd-108	106.4	26.71	17 s	8.3 mb	511	10	(n,p)Rh-108 g
559	46	Pd-110	106.4	11.8	4.2 m	13.8 mb	374.4	9.6	(n,a)Ru-107+
560	46	Pd-110	106.4	11.8	13.46 h	1.975 b	88.1	5	(n,2n)Pd-109 g
561	46	Pd-104	106.4	10.97	17.5 d	945 mb(1·	357.5	0.022	(n,2n)Pd-103
562	46	Pd-102	106.4	0.96	8.3 h	1.03 b(14	296.3	18.3	(n,2n)Pd-101+
563	46	Pd-108	106.4	26.71	17 s	8.3 mb	433.7	43	(n,p)Rh-108 g
564	46	Pd-106	106.4	27.33	29.9 s	16 mb	621.8	88	(n,p)Rh-106 g
565	46	Pd-104	106.4	10.97	56 m	dau	39.7	0.08	Rh-103 m
566	46	Pd-104	106.4	10.97	4.35 m	31 mb(14	77.7	2.5	(n,p)Rh-104 m
567	46	Pd-106	106.4	27.33	2.18 h	6.0 mb	616	19	(n,p)Rh-106 m
568	46	Pd-108	106.4	26.71	4.44 h	2.6 mb	676.3	15	(n,a)Ru-105+
569	46	Pd-108	106.4	26.71	4.44 h	2.6 mb	469.4	17.5	(n,a)Ru-105+
570	46	Pd-102	106.4	0.96	8.3 h	1.03 b(14	511	14.4	(n,2n)Pd-101+
571	46	Pd-102	106.4	0.96	3 a	dau	127.2	67.9	Rh-101 g
572	46	Pd-106	106.4	27.33	2.18 h	6.0 mb	511.8	86.5	(n,p)Rh-106 m
573	46	Pd-110	106.4	11.8	22 m	dau	392.5	8.8	Rh-107
574	46	Pd-110	106.4	11.8	13.46 h	1.975 b	22.1	36	(n,2n)Pd-109 g
575	46	Pd-106	106.4	27.33	56 m	dau	39.8	0.08	Rh-103 m
576	46	Pd-106	106.4	27.33	29.9 s	16 mb	511.8	20.6	(n,p)Rh-106 g
577	46	Pd-102	106.4	0.96	4.47 d	dau	19.3	58.6	Rh-101 m
578	46	Pd-110	106.4	11.8	4.69 m	498 mb	21.2	20	(n,2n)Pd-109 m+
579	46	Pd-104	106.4	10.97	42 s	2.7 mb(14	555.8	2	(n,p)Rh-104 g
580	46	Pd-102	106.4	0.96	4.47 d	dau	21.8	11.1	Rh-101 m
581	46	Pd-102	106.4	0.96	3 a	dau	198	65.9	Rh-101 g
582	46	Pd-106	106.4	27.33	2.18 h	6.0 mb	194.9	17	(n,p)Rh-106 m
583	46	Pd-102	106.4	0.96	3 a	dau	325.2	12.4	Rh-101 g
584	46	Pd-104	106.4	10.97	4.35 m	31 mb(14	555.8	2	(n,p)Rh-104 m
585	47	Ag-107	107.87	51.83	24.1 m	(790 mb)+	511	127	(n,2n)Ag-106 g
586	47	Ag-107	107.87	51.83	8.4 d	605 mb	1045.8	29.7	(n,2n)Ag-106 m+
587	47	Ag-107	107.87	51.83	21.3 s	15 mb(14	214	71.4	(n,p)Pd-107 m+
588	47	Ag-109	107.87	48.17	2.41 m	740 mb	433.9	0.47	(n,2n)Ag-108 g
589	47	Ag-109	107.87	48.17	2.18 h	12 mb	194.9	17	(n,a)Rh-106 m+
590	47	Ag-109	107.87	48.17	2.18 h	12 mb	717	29	(n,a)Rh-106 m+
591	47	Ag-109	107.87	48.17	4.69 m+	13 mb	88.1	15	(n,p)Pd-109 m+g+
592	47	Ag-109	107.87	48.17	2.18 h	12 mb	450.9	21.5	(n,a)Rh-106 m+
593	47	Ag-109	107.87	48.17	2.41 m	740 mb	511	0.55	(n,2n)Ag-108 g
594	47	Ag-107	107.87	51.83	8.4 d	605 mb	451	28.4	(n,2n)Ag-106 m+
595	47	Ag-107	107.87	51.83	21.3 s	15 mb(14	21.2	16.5	(n,p)Pd-107 m+
596	47	Ag-107	107.87	51.83	8.4 d	605 mb	616.2	21.7	(n,2n)Ag-106 m+
597	47	Ag-109	107.87	48.17	2.18 h	12 mb	1045	30	(n,a)Rh-106 m+
598	47	Ag-107	107.87	51.83	8.4 d	605 mb	717.3	29.1	(n,2n)Ag-106 m+
599	47	Ag-107	107.87	51.83	24.1 m	(790 mb)+	511.6	18	(n,2n)Ag-106 g
600	47	Ag-109	107.87	48.17	2.41 m	740 mb	632.9	1.7	(n,2n)Ag-108 g
601	47	Ag-109	107.87	48.17	13.46 h	13 mb	22.1	36	(n,p)Pd-109 m+g+
602	47	Ag-107	107.87	51.83	8.4 d	605 mb	511.9	88.2	(n,2n)Ag-106 m+
603	47	Ag-109	107.87	48.17	2.18 h	12 mb	616	19	(n,a)Rh-106 m+
604	47	Ag-107	107.87	51.83	8.4 d	605 mb	748.4	20.1	(n,2n)Ag-106 m+
605	47	Ag-109	107.87	48.17	2.18 h	12 mb	511.9	86.5	(n,a)Rh-106 m+
606	48	Cd-114	112.4	28.8	22 m	500 ub (1·	560.1	0.82	(n,a)Pd-111 g
607	48	Cd-114	112.4	28.8	5.5 h	150 ub	172.1	32.4	(n,a)Pd-111 m+
608	48	Cd-113	112.4	12.3	5.3 h	8 mb (14.	316.2	1.5	(n,p)Ag-113+
609	48	Cd-113	112.4	12.3	5.3 h	8 mb (14.	258.8	1.3	(n,p)Ag-113+
610	48	Cd-112	112.4	24	4.69 m+	3.1 mb	22.1	26	(n,a)Pd-109 m+g+
611	48	Cd-114	112.4	28.8	7.47 d	dau	342.1	4.6	Ag-111
612	48	CD-106	112.4	1.2	55.5 m	928 mb	511	200	(n,2n)Cd-105
613	48	CD-106	112.4	1.2	55.5 m	928 mb	1692.9	6.2	(n,2n)Cd-105
614	48	Cd-112	112.4	24	13.46 h	3.1 mb	88.1	5	(n,a)Pd-109 m+g+
615	48	Cd-116	112.4	7.6	-	-	336.3	45	In-115 m
616	48	Cd-108	112.4	0.9	6.5 h	915 mb	22.1	90	(n,2n)Cd-107
617	48	CD-106	112.4	1.2	55.5 m	928 mb	961.1	7.7	(n,2n)Cd-105
618	48	Cd-112	112.4	24	3.13 h	15 mb	1387	5.4	(n,p)Ag0112
619	48	Cd-116	112.4	7.6	53.5 h	830 mb+	527.9	27.5	(n,2n)Cd-115 g

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
620	48	Cd-114	112.4	28.8	74 s	dau	59.9	0.6	Ag-111 m
621	48	Cd-116	112.4	7.6	2.5 m	5.4 mb	513.5	84.3	(n,p)Ag-116 g
622	48	CD-106	112.4	1.2	24.1 m	91 mb	511	127	(n,p)Ag-106 g
623	48	Cd-112	112.4	24	3.13 h	15 mb	616.8	43.5	(n,p)Ag0112
624	48	Cd-114	112.4	28.8	5.5 h	150 ub	21.2	20	(n,a)Pd-111 m+
625	48	Cd-114	112.4	28.8	5.5 h	150 ub	391.2	5.3	(n,a)Pd-111 m+
626	48	Cd-110	112.4	12.4	24.6 s	8 mb (14.:	657.7	4.5	(n,p)Ag-110 g
627	48	Cd-116	112.4	7.6	-	-	24.2	27	In-115 m
628	48	Cd-110	112.4	12.4	453 d	1.22 b	21.2	86	(n,2n)Cd-109
629	48	Cd-114	112.4	28.8	4.6 s	3 mb (14.:	576.1	0.75	(n,p)Ag-114
630	48	Cd-114	112.4	28.8	22 m	500 ub (1·	21.1	18	(n,a)Pd-111 g
631	48	Cd-111	112.4	12.75	74s+7.47	15 mb	342.1	4.6	(n,p)Ag-111+
632	48	Cd-116	112.4	7.6	44.6 d	790 mb+	1289.9	0.9	(n,2n)Cd-115 m+
633	48	Cd-114	112.4	28.8	4.6 s	3 mb (14.:	1302.9	0.52	(n,p)Ag-114
634	48	Cd-116	112.4	7.6	44.6 d	790 mb+	934.1	1.9	(n,2n)Cd-115 m+
635	48	Cd-112	112.4	24	48.7 m	600 mb+	150.6	30	(n,2n)Cd-111 m
636	48	Cd-114	112.4	28.8	74 s	dau	22.1	18	Ag-111 m
637	48	Cd-112	112.4	24	48.7 m	600 mb+	23.2	34	(n,2n)Cd-111 m
638	48	Cd-113	112.4	12.3	5.3 h	8 mb (14.	298.6	7.2	(n,p)Ag-113+
639	48	CD-106	112.4	1.2	24.1 m	91 mb	511.6	18	(n,p)Ag-106 g
640	48	Cd-110	112.4	12.4	453 d	1.22 b	88	4	(n,2n)Cd-109
641	48	Cd-114	112.4	28.8	4.6 s	3 mb (14.:	558	9.4	(n,p)Ag-114
642	48	Cd-114	112.4	28.8	74 s	dau	.245.4	1	Ag-111 m
643	48	Cd-116	112.4	7.6	2.5 m	5.4 mb	699.6	13	(n,p)Ag-116 g
644	48	Cd-112	112.4	24	48.7 m	600 mb+	245.4	94	(n,2n)Cd-111 m
645	48	Cd-108	112.4	0.9	6.5 h	915 mb	93.1	4.6	(n,2n)Cd-107
646	48	Cd-116	112.4	7.6	53.5 h	630 mb+	492.3	8.1	(n,2n)Cd-115 g
647	48	CD-106	112.4	1.2	55.5 m	928 mb	1301.8	7.5	(n,2n)Cd-105
648	48	Cd-108	112.4	0.9	6.5 h	915 mb	511	0.48	(n,2n)Cd-107
649	49	In-113	114.82	4.3	14.4 m	316 mb	23.1	19.5	(n,2n)In-112 g
650	49	In-115	114.82	95.7	53.5 h	15.5 mb	24.2	2.7	(n,p)Cd-115 g
651	49	In-113	114.82	4.3	20.8 m	1.317 b	155.4	11.2	(n,2n)In-112 m+
652	49	In-115	114.82	95.7	71.9 s	295 mb	1300.2	0.17	(n,2n)In-114 g
653	49	In-115	114.82	95.7	53.5 h	15.5 mb	492.3	8.1	(n,p)Cd-115 g
654	49	In-113	114.82	4.3	20.8 m	1.317 b	24.2	36	(n,2n)In-112 m+
655	49	In-113	114.82	4.3	14.4 m	316 mb	511	43	(n,2n)In-112 g
656	49	In-115	114.82	95.7	49.51 d	1.515 b	24.2	30	(n,2n)In-114 m+
657	49	In-115	114.82	95.7	49.51 d	1.515 b	189.9	17.7	(n,2n)In-114 m+
658	49	In-115	114.82	95.7	44.6 d	3.5 mb	1289.9	0.9	(n,p)Cd-115 m+
659	49	In-113	114.82	4.3	14.4 m	316 mb	618.2	5.3	(n,2n)In-112 g
660	49	In-115	114.82	95.7	3.13 h	2.8 mb	1387	5.4	(n,a)Ag-112
661	49	In-115	114.82	95.7	3.13 h	2.8 mb	616.8	43.5	(n,a)Ag-112
662	49	In-115	114.82	95.7	53.5 h	15.5 mb	527.9	27.5	(n,p)Cd-115 g
663	49	In-115	114.82	95.7	49.51 d	1.515 b	558.3	4.65	(n,2n)In-114 m+
664	49	In-115	114.82	95.7	49.51 d	1.515 b	725.2	4.55	(n,2n)In-114 m+
665	49	In-115	114.82	95.7	44.6 d	3.5 mb	934.1	1.9	(n,p)Cd-115 m+
666	50	Sn-112	118.69	0.96	14.4 m	13 mb	618.2	5.3	(n,p)In-112 g
667	50	Sn-117	118.69	7.61	1.95 h	4.7 mb	24.2	17	(n,p)In-117 m+
668	50	Sn-120	118.69	32.85	49 s	4 mb	940	12	(n,p)In-120 g
669	50	Sn-124	118.69	5.8	40.1 m	547 mb	159.7	84	(n,2n)Sn-123 m+
670	50	Sn-116	118.69	14.3	54.2 m	8 mb	1097.1	53	(n,p)In-116 m+
671	50	Sn-124	118.69	5.8	129.2 d	900 mb	1089	0.6	(n,2n)Sn-123 g
672	50	Sn-112	118.69	0.96	21 m	9 mb	24.2	36	(n,p)In-112 m+
673	50	Sn-116	118.69	14.3	14.2 s	11 mb	1293.3	1.2	(n,p)In-116 g
674	50	Sn-117	118.69	7.61	38 m	9.8 mb	156.8	87	(n,p)In-117 g
675	50	Sn-114	118.69	0.66	115 d	1.55 b(14	24.2	80	(n,2n)Sn-113 g+
676	50	Sn-119	118.69	8.58	245 d	dau	25.3	23.4	Sn-119 m+
677	50	Sn-118	118.69	24.03	4.4 m	11 mb	692.5	49	(n,2n)In-118 m+
678	50	Sn-118	118.69	24.03	53.5 h	1.1 mb	492.3	8.1	(n,a)Cd-115 g
679	50	Sn-117	118.69	7.61	1.95 h	4.7 mb	158.6	15	(n,p)In-117 m+
680	50	Sn-115	118.69	0.35	45 h	3.5 mb	24.2	27	(n,p)In-115 m+
681	50	Sn-119	118.69	8.58	18 m	2.6 mb	910	0	(n,p)In-119 m+

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
682	50	Sn-112	118.69	0.96	35.3 m	1.489 b(1·	1152.5	2.3	(n,2n)Sn-111+
683	50	Sn-120	118.69	32.85	245 d	1.44 b	23.9	16	(n,2n)Sn-119 m+
684	50	Sn-114	118.69	0.66	115 d	1.55 b(14	391.7	64.2	(n,2n)Sn-113 g+
685	50	Sn-118	118.69	24.03	53.5 h	1.1 mb	527.9	27.5	(n,a)Cd-115 g
686	50	Sn-112	118.69	0.96	14.4 m	13 mb	511	43	(n,p)In-112 g
687	50	Sn-118	118.69	24.03	4.5 h	dau	336.3	45	In-115 m+
688	50	Sn-124	118.69	5.8	40.1 m	547 mb	26.3	9	(n,2n)Sn-123 m+
689	50	Sn-115	118.69	0.35	45 h	3.5 mb	336.3	45	(n,p)In-115 m+
690	50	Sn-120	118.69	32.85	49 s	4 mb	90	12	(n,p)In-120 g
691	50	Sn-118	118.69	24.03	14 d	966 mb	158.4	65	(n,2n)Sn-117 m+
692	50	Sn-120	118.69	32.85	49 s	4 mb	1020	61	(n,p)In-120 g
693	50	Sn-120	118.69	32.85	49 s	4 mb	710	12	(n,p)In-120 g
694	50	Sn-119	118.69	8.58	2.5 m	2.6 mb	820	95	(n,p)In-119 g
695	50	Sn-118	118.69	24.03	5 s	400 ub(14	528.2	5.5	(n,p)In-118 g
696	50	Sn-118	118.69	24.03	4.4 m	11 mb	1049.8	79	(n,2n)In-118 m+
697	50	Sn-116	118.69	14.3	54.2 m	8 mb	818.8	17	(n,p)In-116 m+
698	50	Sn-116	118.69	14.3	54.2 m	8 mb	2112	16	(n,p)In-116 m+
699	50	Sn-119	118.69	8.58	18 m	2.6 mb	300	0	(n,p)In-119 m+
700	50	Sn-114	118.69	0.66	1.658 h	dau	24.2	19.6	In-113 m
701	50	Sn-118	118.69	24.03	5 s	400 ub(14	1229.5	15	(n,p)In-118 g
702	50	Sn-120	118.69	32.85	49 s	4 mb	860	34	(n,p)In-120 g
703	50	Sn-120	118.69	32.85	49 s	4 mb	1280	14	(n,p)In-120 g
704	50	Sn-116	118.69	14.3	54.2 m	8 mb	1293.4	80	(n,p)In-116 m+
705	50	Sn-116	118.69	14.3	54.2 m	8 mb	417	30	(n,p)In-116 m+
706	50	Sn-112	118.69	0.96	35.3 m	1.489 b(1·	511	54	(n,2n)Sn-111+
707	50	Sn-119	118.69	8.58	245 d	dau	23.9	16	Sn-119 m+
708	50	Sn-112	118.69	0.96	35.3 m	1.489 b(1·	24.2	45	(n,2n)Sn-111+
709	50	Sn-116	118.69	24.03	44.6 d	300 ub(14	934.1	1.9	(n,a)Cd-115 m+
710	50	Sn-114	118.69	0.66	1.658 h	dau	391.7	64.1	In-113 m
711	50	Sn-120	118.69	32.85	245 d	1.44 b	25.3	23.4	(n,2n)Sn-119 m+
712	50	Sn-112	118.69	0.96	21 m	9 mb	155.4	11.2	(n,p)In-112 m+
713	50	Sn-118	118.69	24.03	14 d	966 mb	25.2	50	(n,2n)Sn-117 m+
714	50	Sn-112	118.69	0.96	14.4 m	13 mb	23.1	19.5	(n,p)In-112 g
715	50	Sn-117	118.69	7.61	1.95 h	4.7 mb	315.3	15	(n,p)In-117 m+
716	50	Sn-118	118.69	24.03	4.4 m	11 mb	1229	97.5	(n,2n)In-118 m+
717	50	Sn-112	118.69	0.96	2.83 d	dau	536.3	87	In-111
718	51	Sb-123	127.75	42.75	40 m	2.8 mb(14	25.2	35	(n,p)Sn-123 m
719	51	Sb-123	127.75	42.75	40 m	2.8 mb(14	159.7	84	(n,p)Sn-123 m
720	51	Sb-121	127.75	57.25	5.76 d	550 mb+	1023.1	99	(n,2n)Sb-120 m+
721	51	Sb-123	127.75	42.75	129 d	1.8 mb(14	1089	0.6	(n,p)Sn-123 g
722	51	Sb-123	127.75	42.75	4.2 m	731mb	76.3	17	(n,2n)Sb-122 m+
723	51	Sb-121	127.75	57.25	5.76 d	1.08 b	25.2	35	(n,2n)Sb-120 g
724	51	Sb-121	127.75	57.25	5.76 d	550 mb+	89.9	77	(n,2n)Sb-120 m+
725	51	Sb-123	127.75	42.75	4.2 m	731mb	61.6	50	(n,2n)Sb-122 m+
726	51	Sb-123	127.75	42.75	40 m	2.8 mb(14	511	87	(n,p)Sn-123 m
727	51	Sb-123	127.75	42.75	2.72 d	1.602 b(1·	564	63	(n,2n) Sb-122 g
728	51	Sb-121	127.75	57.25	5.76 d	550 mb+	197.2	89	(n,2n)Sb-120 m+
729	51	Sb-121	127.75	57.25	5.76 d	1.08 b	159.7	84	(n,2n)Sb-120 g
730	51	Sb-121	127.75	57.25	5.76 d	550 mb+	25.2	62	(n,2n)Sb-120 m+
731	51	Sb-121	127.75	57.25	5.76 d	550 mb+	1171.3	100	(n,2n)Sb-120 m+
732	51	Sb-121	127.75	57.25	5.76 d	1.08 b	511	87	(n,2n)Sb-120 g
733	51	Sb-123	127.75	42.75	4.2 m	731mb	26.3	60	(n,2n)Sb-122 m+
734	52	Te-128	127.6	31.79	9.65 d	530 ub(14	822.6	3.9	(n,a)Sn-125 g
735	52	Te-128	127.6	18.71	40 m	800 ub(14	26.3	9	(n,a)Sn-123 m+
736	52	Te-130	127.6	34.5	40 m	610 mb(1·	330.9	78	(n,p)Sb-130 g
737	52	Te-120	127.6	0.089	4.7 d	535 mb(1·	26.3	70	(n,2n)Te-119 m+
738	52	Te-128	127.6	31.79	10.4 m	1 mb(14.9	753.9	100	(n,p)Sb-128 m+
739	52	Te-130	127.6	34.5	2.1 h	390 ub(14	26.3	20.4	(n,a)Sn-127 g+
740	52	Te-128	127.6	31.79	10.4 m	1 mb(14.9	743.2	100	(n,p)Sb-128 m+
741	52	Te-122	127.6	2.46	17 d	725 mb	26.31	77	(n,2n)Te-121 g
742	52	Te-130	127.6	34.5	6.3 m	550 mb(1·	1017.5	30	(n,p)Sb-130 m+
743	52	Te-126	127.6	18.71	12.4 d	1.6 mb(14	414.8	86	(n,p)Sb-126 g

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
744	52	Te-124	127.6	4.61	60.3 d	9 mb(14.9	722.8	11.8	(n,p)Sb-124 g
745	52	Te-126	127.6	18.71	19 m	4.5 mb(14	415	83.3	(n,p)Sb-126 m+
746	52	Te-120	127.6	0.089	16 h	685 mb(1·	699.6	10.6	(n,2n)Te-119 g
747	52	Te-130	127.6	34.5	109 d	dau	27.4	29.6	Te-127 m
748	52	Te-130	127.6	34.5	33.4 d	(940 mb)+	696	2.9	(n,2n)Te-129 m+
749	52	Te-130	127.6	34.5	33.4 d	(940 mb)+	27.4	23	(n,2n)Te-129 m+
750	52	Te-126	127.6	18.71	19 m	4.5 mb(14	694	86	(n,p)Sb-126 m+
751	52	Te-130	127.6	34.5	9.4 h	dau	417.9	1	Te-127
752	52	Te-126	127.6	18.71	12.4 d	1.6 mb(14	666.2	99.7	(n,p)Sb-126 g
753	52	Te-128	127.6	31.79	9.4 h	780 mb	417.9	1	(n,2n)Te-127 g
754	52	Te-124	127.6	4.61	60.3 d	9 mb(14.9	1691	50	(n,p)Sb-124 g
755	52	Te-128	127.6	31.79	9.65 d	530 ub(1<	1088.9	4.2	(n,a)Sn-125 g
756	52	Te-120	127.6	0.089	16 h	685 mb(1·	644	88	(n,2n)Te-119 g
757	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	526.5	45	(n,p)Sb-128 g
758	52	Te-128	127.6	31.79	2.77 a	dau	636.2	11.2	Sb-125
759	52	Te-124	127.6	4.61	119.7 d	980 mb+	27.4	40.5	(n,2n)Te-123 m
760	52	Te-124	127.6	4.61	119.7 d	980 mb+	159	83.5	(n,2n)Te-123 m
761	52	Te-128	127.6	31.79	109 d	940 mb	27.4	30	(n,2n)Te-127 m+
762	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	628.7	31	(n,p)Sb-128 g
763	52	Te-128	127.6	31.79	58 d	dau	27.4	94	Te-125 m
764	52	Te-130	127.6	34.5	6.3 m	550 mb(1·	182.3	41	(n,p)Sb-130 m+
765	52	Te-130	127.6	34.5	70 m	(660 mb)+	27.8	16.4	(n,2n)Te-129 g
766	52	Te-130	127.6	34.5	3.8 d	dau	623.1	8.3	Sb-127
767	52	Te-120	127.6	0.089	38.1 h	dau	28.5	13	Sb-119
768	52	Te-124	127.6	4.61	60.3 d	9 mb(14.9	602.7	98.1	(n,p)Sb-124 g
769	52	Te-130	127.6	34.5	40 m	610 mb(1·	793.4	100	(n,p)Sb-130 g
770	52	Te-122	127.6	2.46	150 d	690 mb	212.2	81	(n,2n)Te-121 m+
771	52	Te-120	127.6	0.089	4.7 d	535 mb(1·	270.6	25	(n,2n)Te-119 m+
772	52	Te-120	127.6	0.089	38.1 h	dau	25.2	62	Sb-119
773	52	Te-126	127.6	18.71	129 d	800 ub(1<	1089	0.6	(n,a)Sn-123 g
774	52	Te-128	127.6	31.79	9.65 d	530 ub(1<	1066.6	9	(n,a)Sn-125 g
775	52	Te-130	127.6	34.5	3.8 d	dau	10996	15.2	Sb-127
776	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	754	100	(n,p)Sb-128 g
777	52	Te-128	127.6	31.79	2.77 a	dau	428	29.6	Sb-125
778	52	Te-130	127.6	34.5	40 m	610 mb(1·	732	22	(n,p)Sb-130 g
779	52	Te-126	127.6	18.71	40 m	800 ub(1<	59.7	84	(n,a)Sn-123 m+
780	52	Te-126	127.6	18.71	12.4 d	1.6 mb(14	720	57	(n,p)Sb-126 g
781	52	Te-128	127.6	31.79	58 d	dau	35.5	6.9	Te-125 m
782	52	Te-126	127.6	18.71	12.4 d	1.6 mb(14	695.1	99.7	(n,p)Sb-126 g
783	52	Te-126	127.6	18.71	12.4 d	1.6 mb(14	856	17.5	(n,p)Sb-126 g
784	52	Te-126	127.6	18.71	19 m	4.5 mb(14	665	86	(n,p)Sb-126 m+
785	52	Te-130	127.6	34.5	3.8 d	dau	1114.3	29.7	Sb-127
786	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	636.3	36	(n,p)Sb-128 g
787	52	Te-130	127.6	34.5	109 d	dau	57.6	0.52	Te-127 m
788	52	Te-128	127.6	31.79	9.65 d	530 ub(1<	915.5	4.3	(n,a)Sn-125 g
789	52	Te-130	127.6	34.5	6.3 m	550 mb(1·	839.4	100	(n,p)Sb-130 m+
790	52	Te-120	127.6	0.089	38.1 h	dau	24	16	Sb-119
791	52	Te-130	127.6	34.5	40 m	610 mb(1·	839.4	100	(n,p)Sb-130 g
792	52	Te-126	127.6	31.79	2.77 a	dau	600.8	18.4	Sb-125
793	52	Te-126	127.6	31.79	10.4 m	1 mb(14.9	314	95	(n,p)Sb-128 m+
794	52	Te-122	127.6	2.46	2.72 d	14 mb(14	564.1	63	(n,p)Sb-122
795	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	314.1	61	(n,p)Sb-128 g
796	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	743.3	100	(n,p)Sb-128 g
797	52	Te-130	127.6	34.5	6.3 m	550 mb(1·	793.4	86	(n,p)Sb-130 m+
798	52	Te-126	127.6	18.71	12.4 d	1.6 mb(14	697	32	(n,p)Sb-126 g
799	52	Te-128	127.6	31.79	9.32 h	1.3 mb(14	813.6	13	(n,p)Sb-128 g
800	52	Te-120	127.6	0.089	4.7 d	535 mb(1·	153	62	(n,2n)Te-119 m+
801	52	Te-122	127.6	2.46	17 d	725 mb	507.5	19.4	(n,2n)Te-121 g
802	52	Te-130	127.6	34.5	40 m	610 mb(1·	182.3	65	(n,p)Sb-130 g
803	52	Te-128	127.6	31.79	109 d	940 mb	57.6	0.52	(n,2n)Te-127 m+
804	52	Te-122	127.6	2.46	17 d	725 mb	573.1	79.1	(n,2n)Te-121 g
805	52	Te-130	127.6	34.5	40 m	610 mb(1·	468	18	(n,p)Sb-130 g

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
806	52	Te-120	127.6	0.089	4.7 d	535 mb(1·	1212.6	67	(n,2n)Te-119 m+
807	52	Te-128	127.6	31.79	2.77 a	dau	463.5	10	Sb-125
808	52	Te-120	127.6	0.089	16 h	685 mb(1·	1749.1	4.2	(n,2n)Te-119 g
809	52	Te-128	127.6	31.79	9.2 m	450 ub(1·	332	99	(n,a)n-125 m+
810	52	Te-122	127.6	2.46	150 d	890 mb	26.3	48.5	(n,2n)Te-121 m+
811	52	Te-124	127.6	4.61	60.3 d	9 mb(14.8	2091.2	6	(n,p)Sb-124 g
812	52	Te-130	127.6	34.5	40 m	610 mb(1·	834.9	19	(n,p)Sb-130 g
813	52	Te-130	127.6	34.5	70 m	(660 mb)+	459.5	7.1	(n,2n)Te-129 g
814	53	I-127	126.9	100	109 d	5.3 mb(14	27.4	29.6	(n,p)Te-127 m+
815	53	I-127	126.9	100	60.3 d	1.5 mb	722.8	11.8	(n,a)Sb-124 g
816	53	I-127	126.9	100	13.0 d	1.649 b	666.2	31.2	(n,2n)I-126
817	53	I-127	126.9	100	109 d	5.3 mb(14	57.6	0.52	(n,p)Te-127 m+
818	53	I-127	126.9	100	13.0 d	1.649 b	27.4	35.5	(n,2n)I-126
819	53	I-127	126.9	100	60.3 d	1.5 mb	1691	50	(n,a)Sb-124 g
820	53	I-127	126.9	100	60.3 d	1.5 mb	2091.2	6	(n,a)Sb-124 g
821	53	I-127	126.9	100	60.3 d	1.5 mb	602.7	98.1	(n,a)Sb-124 g
822	53	I-127	126.9	100	9.4 h	11.7 mb	418	1	(n,p)Te-127 g
823	53	I-127	126.9	100	13.0 d	1.649 b	388.5	32.4	(n,2n)I-126
824	54	Xe-134	131.3	10.44	52.6 m	2.2 mb	884.1	66	(n,p)I-134+
825	54	Xe-131	131.3	21.18	8.041 d	5.3 mb	29.7	4	(n,p)I-131
826	54	Xe-130	131.3	4.08	8 d	1.435 b+	29.7	96	(n,2n)Xe-129 m
827	54	Xe-132	131.3	26.89	2.285 h	2.5 mb	772.6	78	(n,p)I-132
828	54	Xe-132	131.3	26.89	2.285 h	2.5 mb	667.7	101.3	(n,p)I-132
829	54	Xe-134	131.3	10.44	2.23 d	665 mb	233.2	14	(n,2n)Ze-133 m+
830	54	Xe-126	131.3	0.09	57 s	700 mb	141	19.5	(n,2n)Xe-125 m+
831	54	Xe-134	131.3	10.44	52.6 m	2.2 mb	847	96	(n,p)I-134+
832	54	Xe-124	131.3	0.09	2.0 h	1.13 b+	511	40.4	9n,2n)Xe-123+
833	54	Xe-132	131.3	26.89	11.99 d	775 mb+	233.2	2	(n,2n)Xe-131 m+
834	54	Xe-132	131.3	26.89	2.285 h	2.5 mb	954.6	18.5	(n,p)I-132
835	54	Xe-130	131.3	4.08	12.4 h	6.7 mb+	668.5	96.7	(n,p)I-130
836	54	Xe-131	131.3	21.18	8.041 d	5.3 mb	636.9	6.9	(n,p)I-131
837	54	Xe-126	131.3	0.09	17 h	1.355 b+	243.4	29	(n,2n)Xe-125 g(cum)
838	54	Xe-131	131.3	21.18	8.041 d	5.3 mb	284.3	5.8	(n,p)I-131
839	54	Xe-134	131.3	10.44	52.6 m	2.2 mb	1072.5	14.3	(n,p)I-134+
840	54	Xe-132	131.3	26.89	2.285 h	2.5 mb	630.2	14.1	(n,p)I-132
841	54	Xe-124	131.3	0.09	13.1 h	dau	27.4	71	I-123
842	54	Xe-134	131.3	10.44	52.6 m	2.2 mb	621.8	10.8	(n,p)I-134+
843	54	Xe-136	131.3	8.9	8.17 h	1.7 b+	249.8	90.3	(n,2n)Xe-135 g(cum)
844	54	Xe-128	131.3	1.92	36.41 d	1.53 b+	172.1	20	(n,2n)Xe-127 g(cum)
845	54	Xe-130	131.3	4.08	12.4 h	6.7 mb+	739.5	82.7	(n,p)I-130
846	54	Xe-128	131.3	1.92	36.41 d	1.53 b+	375	17.5	(n,2n)Xe-127 g(cum)
847	54	Xe-126	131.3	0.09	60.1 d	dau	27.4	112	I-125
848	54	Xe-126	131.3	0.09	17 h	1.355 b+	188.4	55	(n,2n)Xe-125 g(cum)
849	54	Xe-126	131.3	0.09	60.1 d	dau	35.5	6.6	I-125
850	54	Xe-130	131.3	4.08	8 d	1.435 b+	196.6	3.3	(n,2n)Xe-129 m
851	54	Xe-134	131.3	10.44	5.29 d	236 b+	30.9	37.5	(n,2n)Xe-133 g
852	54	Xe-126	131.3	0.09	57 s	700 mb	111	82.4	(n,2n)Xe-125 m+
853	54	Xe-130	131.3	4.08	12.4 h	6.7 mb+	531.1	99.5	(n,p)I-130
854	54	Xe-134	131.3	10.44	52.6 m	2.2 mb	595.4	11.2	(n,p)I-134+
855	54	Xe-126	131.3	0.09	60.1 d	dau	31	24	I-125
856	54	Xe-132	131.3	26.89	11.99 d	775 mb+	29.7	53	(n,2n)Xe-131 m+
857	54	Xe-136	131.3	8.9	15.3 m	750 mb	526.8	80	(n,2n)Xe-135 m+
858	54	Xe-128	131.3	1.92	72 s	840 mb	124.6	67.6	(n,2n)Xe-127 m
859	54	Xe-130	131.3	4.08	12.4 h	6.7 mb+	418	34.2	(n,p)I-130
860	54	Xe-134	131.3	10.44	5.29 d	236 b+	81	36.6	(n,2n)Xe-133 g
861	54	Xe-136	131.3	8.9	15.3 m	750 mb	29.7	12	(n,2n)Xe-135 m+
862	54	Xe-131	131.3	21.18	12 d	dau	164	2	Xe-131 m
863	54	Xe-132	131.3	26.89	2.285 h	2.5 mb	522.7	16.5	(n,p)I-132
864	54	Xe-128	131.3	1.92	72 s	840 mb	172.7	37.9	(n,2n)Xe-127 m
865	54	Xe-134	131.3	10.44	2.23 d	665 mb	33.6	10.5	(n,2n)Ze-133 m+
866	54	Xe-130	131.3	4.08	8 d	1.435 b+	39.6	7.5	(n,2n)Xe-129 m
867	54	Xe-130	131.3	4.08	8 d	1.435 b+	33.6	22	(n,2n)Xe-129 m

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
868	54	Xe-128	131.3	1.92	36.41 d	1.53 b+	202.8	58.2	(n,2n)Xe-127 g(cum)
869	54	Xe-132	131.3	26.89	11.99 d	775 mb+	33.6	12	(n,2n)Xe-131 m+
870	54	Xe-130	131.3	4.08	12.4 h	6.7 mb+	1157.5	11	(n,p)I-130
871	54	Xe-126	131.3	0.09	17 h	1.355 b+	28.6	85	(n,2n)Xe-125 g(cum)
872	54	Xe-124	131.3	0.096	13.1 h	dau	159.1	83	I-123
873	54	Xe-124	131.3	0.096	2.0 h	1.13 b+	28.6	16	9n,2n)Xe-123+
874	54	Xe-124	131.3	0.096	2.0 h	1.13 b+	178	16.1	9n,2n)Xe-123+
875	54	Xe-131	131.3	21.18	12 d	dau	29.7	53	Xe-131 m
876	54	Xe-126	131.3	0.09	57 s	700 mb	29.7	49.5	(n,2n)Xe-125 m+
877	54	Xe-128	131.3	1.92	72 s	840 mb	29.7	44	(n,2n)Xe-127 m
878	54	Xe-131	131.3	21.18	12 d	dau	22.6	12	Xe-131 m
879	54	Xe-124	131.3	0.096	2.0 h	1.13 b+	148.7	50	9n,2n)Xe-123+
880	54	Xe-131	131.3	21.18	8.041 d	5.3 mb	364.5	82.4	. (n,p)I-131
881	54	Xe-134	131.3	10.44	2.23 d	665 mb	29.7	46.5	(n,2n)Ze-133 m+
882	55	Cs-133	132.91	100	2.23 d	4.8 mb(14	233.2	8.85	(n,p)Xe-133 m+
883	55	Cs-133	132.91	100	5.29 d	5.7 mb(14	81	36.5	(n,p)Xe-133 m+g
884	55	Cs-133	132.91	100	12.4 h	1.9 mb	1157.5	11	(n,a)I-130
885	55	Cs-133	132.91	100	2.23 d	4.8 mb(14	29.7	46.5	(n,p)Xe-133 m+
886	55	Cs-133	132.91	100	12.4 h	1.9 mb	668.5	96.7	(n,a)I-130
887	55	Cs-133	132.91	100	12.4 h	1.9 mb	418	34.2	(n,a)I-130
888	55	Cs-133	132.91	100	5.29 d	5.7 mb(14	30.9	37.5	(n,p)Xe-133 m+g
889	55	Cs-133	132.91	100	6.47 d	1.52 b	29.7	60	(n,2n)Cs-132
890	55	Cs-133	132.91	100	12.4 h	1.9 mb	536.1	99.5	(n,a)I-130
891	55	Cs-133	132.91	100	12.4 h	1.9 mb	739.5	82.7	(n,a)I-130
892	55	Cs-133	132.91	100	6.47 d	1.52 b	667.7	100	(n,2n)Cs-132
893	56	Ba-130	137.34	0.101	32.06 h	dau	411.3	21.9	Cs-129
894	56	Ba-130	137.34	0.101	22 h+	-	892.7	21	(n,2n)Ba-129 m+g+
895	56	Ba-138	137.34	71.66	32.2 m	3 mb	1009.7	26.5	(n,p)Cs-138
896	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	1048.1	180	(n,p)Cs-136
897	56	Ba-134	137.34	2.42	10.4 a	1.55 b(14	30.9	44	-
898	56	Ba-138	137.34	71.66	9.17 h	3.6 mb(14	249.8	90.3	(n,a)Xe-135 g(cum)
899	56	Ba-136	137.34	7.81	28.7 h	1.149 b+	32.2	57	(n,2n)Ba-135 m
900	56	Ba-134	137.34	2.42	10.4 a	1.55 b(14	81	32.8	(n,2n)Ba-133 m+g
901	56	Ba-130	137.34	0.101	32.06 h	dau	371.9	31.7	Cs-129
902	56	Ba-130	137.34	0.101	22 h+	-	220.8	29.7	(n,2n)Ba-129 m+g+
903	56	Ba-134	137.34	2.42	38.9 h	783 mb	32.2	55.5	(n,2n)Ba-133 m
904	56	Ba-138	137.34	71.66	32.2 m	3 mb	2218	16.5	(n,p)Cs-138
905	56	Ba-134	137.34	2.42	38.9 h	783 mb	275.9	17	(n,2n)Ba-133 m
906	56	Ba-130	137.34	0.101	22 h+	-	420.2	25	(n,2n)Ba-129 m+g+
907	56	Ba-138	137.34	71.66	2.55 m	1.046 b+	661.6	84.6	(n,2n)Ba-137 m+
908	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	340.6	49.9	(n,p)Cs-136
909	56	Ba-138	137.34	71.66	32.2 m	3 mb	462.7	27	(n,p)Cs-138
910	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	273.7	12.7	(n,p)Cs-136
911	56	Ba-132	137.34	0.095	11.7 d	1.57 b	496.3	41.3	(n,2n)Ba-131+
912	56	Ba-130	137.34	0.101	22 h+	-	214.3	48.7	(n,2n)Ba-129 m+g+
913	56	Ba-130	137.34	0.101	2.13 h+	1.37 b	129.1	28.6	(n,2n)Ba-129 m+g+
914	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	818.5	100	(n,p)Cs-136
915	56	Ba-134	137.34	2.42	10.4 a	1.55 b(14	302.7	18.6	(n,2n)Ba-133 m+g
916	56	Ba-130	137.34	0.101	22 h+	-	1459.3	56	(n,2n)Ba-129 m+g+
917	56	Ba-132	137.34	0.095	11.7 d	1.57 b	123.7	32	(n,2n)Ba-131+
918	56	Ba-136	137.34	7.81	28.7 h	1.149 b+	268.2	15.5	(n,2n)Ba-135 m
919	56	Ba-138	137.34	71.66	9.17 h	3.6 mb(14	608.2	2.9	(n,a)Xe-135 g(cum)
920	56	Ba-138	137.34	71.66	9.17 h	3.6 mb(14	30.9	3.7	(n,a)Xe-135 g(cum)
921	56	Ba-132	137.34	0.095	11.7 d	1.57 b	216	21	(n,2n)Ba-131+
922	56	Ba-138	137.34	71.66	15.3 m	550 ub	29.7	12	(n,a)Xe-135 m+
923	56	Ba-130	137.34	0.101	22 h+	-	182.3	56	(n,2n)Ba-129 m+g+
924	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	1235.3	0	(n,p)Cs-136
925	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	176.6	13.6	(n,p)Cs-136
926	56	Ba-138	137.34	71.66	32.2 m	3 mb	1435.7	75	(n,p)Cs-138
927	56	Ba-138	137.34	71.66	15.3 m	550 ub	526.6	80	(n,a)Xe-135 m+
928	56	Ba-134	137.34	2.42	10.4 a	1.55 b(14	355.9	62.3	(n,2n)Ba-133 m+g
929	56	Ba-136	137.34	7.81	13.0 d	38.3 mb	66.9	12.5	(n,p)Cs-136

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
930	56	Ba-130	137.34	0.101	32.06 h	dau	29.7	100	Cs-129
931	56	Ba-130	137.34	0.101	22 h+	-	202.3	21.9	(n,2n)Ba-129 m+g+
932	57	La-139	138.91	99.91	83.3 m	5 mb	33.4	13	(n,p)Ba-139
933	57	La-139	138.91	99.91	11xE10 a	1.73 b(14	816.5	100	(n,2n)La-138
934	57	La-139	138.91	99.91	11xE10 a	1.73 b(14	340.6	46.9	(n,2n)La-138
935	57	La-139	138.91	99.91	13 d	2 mb	66.9	12.5	(n,a)Cs-136
936	57	La-139	138.91	99.91	13 d	2 mb	273.7	12.7	(n,a)Cs-136
937	57	La-139	138.91	99.91	83.3 m	5 mb	165.8	22.6	(n,p)Ba-139
938	57	La-139	138.91	99.91	11xE10 a	1.73 b(14	1235.3	19.8	(n,2n)La-138
939	57	La-139	138.91	99.91	11xE10 a	1.73 b(14	1049.1	80	(n,2n)La-138
940	57	La-139	138.91	99.91	13 d	2 mb	176.6	13.6	(n,a)Cs-136
941	58	Ce-136	140.12	0.193	17.7 h	1.318 b	265.6	42.5	(n,2n)Ce-135+
942	58	Ce-136	140.12	0.193	17.7 h	1.318 b	300	23	(n,2n)Ce-135+
943	58	Ce-140	140.12	88.48	40.23 h	9.5 mb	328.8	20.6	(n,p)La-140
944	58	Ce-140	140.12	88.48	40.23 h	9.5 mb	1596.2	95.5	(n,p)La-140
945	58	Ce-136	140.12	0.193	17.7 h	1.318 b	783.6	10.6	(n,2n)Ce-135+
946	58	Ce-140	140.12	88.48	40.23 h	9.5 mb	487	46.1	(n,p)La-140
947	58	Ce-136	140.12	0.193	17.7 h	1.318 b	518	13.6	(n,2n)Ce-135+
948	58	Ce-142	140.12	11.07	92.4 m	9.5 mb	2397.7	16.6	(n,p)La-142
949	58	Ce-136	140.12	0.193	17.7 h	1.318 b	606.8	19.5	(n,2n)Ce-135+
950	58	Ce-138	140.12	0.26	34.3 h	958 mb	255	11	(n,2n)Ce-137 m+
951	58	Ce-142	140.12	11.07	92.4 m	9.5 mb	641.2	52.5	(n,p)La-142
952	58	Ce-138	140.12	0.26	34.3 h	958 mb	34.7	61	(n,2n)Ce-137 m+
953	58	Ce-136	140.12	0.193	17.7 h	1.318 b	33.4	74	(n,2n)Ce-135+
954	58	Ce-140	140.12	88.48	56 s	1.2 b	34.7	5.2	(n,2n)Ce-139 m+
955	58	Ce-140	140.12	88.48	137.5 d	1.78 b+	33.4	14	(n,2n)Ce-139
956	58	Ce-142	140.12	11.07	92.4 m	9.5 mb	2542.7	11.3	(n,p)La-142
957	58	Ce-140	140.12	88.48	137.5 d	1.78 b+	165.9	81	(n,2n)Ce-139
958	58	Ce-140	140.12	88.48	2.55 m	11 mb	661.6	84.6	(n,a)Ba-137 m+
959	58	Ce-140	140.12	88.48	40.23 h	9.5 mb	815.8	22.3	(n,p)La-140
960	58	Ce-142	140.12	11.07	92.4 m	9.5 mb	1901.3	8.7	(n,p)La-142
961	58	Ce-142	140.12	11.07	83.3 m	6.5 mb	165.8	22.6	(n,a)Ba-139
962	58	Ce-142	140.12	11.07	83.3 m	6.5 mb	33.4	13	(n,a)Ba-139
963	58	Ce-142	140.12	11.07	32.51 d	1.73 b	36	13.5	(n,2n)Ce-141
964	58	Ce-140	140.12	88.48	56 s	1.2 b	754.4	93	(n,2n)Ce-139 m+
965	58	Ce-136	140.12	0.193	17.7 h	1.318 b	572.3	10.6	(n,2n)Ce-135+
966	58	Ce-142	140.12	11.07	32.51 d	1.73 b	145.5	48	(n,2n)Ce-141
967	58	Ce-142	140.12	11.07	92.4 m	9.5 mb	894.9	9.1	(n,p)La-142
968	59	Pr-141	140.91	100	32.51 d	4.5 mb	145.5	48	(n,p)Ce-141
969	59	Pr-141	140.91	100	3.39 m	1.84 b	34.7	34	(n,2n)Pr-140
970	59	Pr-141	140.91	100	3.39 m	1.84 b	511	95	(n,2n)Pr-140
971	59	Pr-141	140.91	100	32.51 d	4.5 mb	36	13.5	(n,p)Ce-141
972	59	Pr-141	140.91	100	3.39 m	1.84 b	1598.5	0.5	(n,2n)Pr-140
973	60	Nd-148	144.24	5.73	10.99 d	1.626 b(1.	531	13.5	(n,2n)Nd-147
974	60	Nd-148	144.24	5.73	10.99 d	1.626 b(1.	91.1	28.3	(n,2n)Nd-147
975	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	155.9	5.8	(n,2n)Nd-149
976	60	Nd-142	144.24	27.11	2.46 h	1.64 b	1126.9	0.68	(n,2n)Nd-141 g(cum)
977	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	38.7	18	(n,2n)Nd-149
978	60	Nd-150	144.24	5.62	53.1 h	dau	285.9	3.1	Pm-149
979	60	Nd-148	144.24	5.73	5.98 h	dau	37.3	0.56	Pr-145
980	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	211.3	24	(n,2n)Nd-149
981	60	Nd-142	144.24	27.11	2.46 h	1.64 b	36	62	(n,2n)Nd-141 g(cum)
982	60	Nd-148	144.24	5.73	2.62	dau	121.2	0.004	Pm-147
983	60	Nd-148	144.24	5.73	10.99 d	1.626 b(1.	38.7	35	(n,2n)Nd-147
984	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	114.3	19	(n,2n)Nd-149
985	60	Nd-142	144.24	27.11	19.16 h	13.5 mb	1575.9	3.7	(n,p)Pr-142
986	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	423.6	7	(n,2n)Nd-149
987	60	Nd-148	144.24	5.73	3.3 m	5 mb(14.9	915	11.1	(n,a)Ce-145
988	60	Nd-148	144.24	5.73	3.3 m	5 mb(14.9	725	65.4	(n,a)Ce-145
989	60	Nd-148	144.24	5.73	3.3 m	5 mb(14.9	63	13.5	(n,a)Ce-145
990	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	270.3	10	(n,2n)Nd-149
991	60	Nd-142	144.24	27.11	140 d	10 mb	165.9	81	(n,a)Ce-130 g

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
992	60	Nd-142	144.24	27.11	62 s	610 mb	756.5	91	(n,2n)Nd-141 m+
993	60	Nd-144	144.24	23.85	32.51 d	9 mb(14.1	145.5	48	(n,a)Ce-141
994	60	Nd-142	144.24	27.11	140 d	10 mb	33.4	14	(n,a)Ce-130 g
995	60	Nd-148	144.24	5.73	5.98 h	dau	674	0.51	Pr-145
996	60	Nd-148	144.24	5.73	5.98 h	dau	749	0.43	Pr-145
997	60	Nd-148	144.24	5.73	3.3 m	5 mb(14.9	36	26.5	(n,a)Ce-145
998	60	Nd-148	144.24	5.73	1.98 m	3.5 mb+	310	-	n,p)Pr-148
999	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	654.8	8.4	(n,2n)Nd-149
1000	60	Nd-142	144.24	27.11	2.46 h	1.64 b	511	4.8	(n,2n)Nd-141 g(cum)
1001	60	Nd-144	144.24	23.85	32.51 d	9 mb(14.1	36	13.5	(n,a)Ce-141
1002	60	Nd-150	144.24	5.62	1.73 h	1.728 b+	540.5	6.5	(n,2n)Nd-149
1003	60	Nd-142	144.24	27.11	62 s	610 mb	37.3	5.6	(n,2n)Nd-141 m+
1004	60	Nd-142	144.24	27.11	56 s	2 mb	754.4	93	(n,a)Ce-139 m+
1005	62	Sm-144	150.4	3.1	2.46 h	11 mb(14	36	62	(n,a)Nd-141
1006	62	Sm-154	150.4	22.8	46.5 h	1.5 b(14.9	256	11.6	(n,2n)Sm-153
1007	62	Sm-154	150.4	22.8	1.8 m	3.5 mb	1393.4	17	(n,p)Pm-154 m
1008	62	Sm-154	150.4	22.8	46.5 h	1.5 b(14.9	38.7	11	(n,2n)Sm-153
1009	62	Sm-154	150.4	22.8	12.4 m	9 mb(14.9	117.1	25	(n,a)Nd-151
1010	62	Sm-144	150.4	3.1	64 s	540 mb	754.4	69.1	(n,2n)Sm-143 m+
1011	62	Sm-144	150.4	3.1	265 d	dau	742	38.5	Pm-143
1012	62	Sm-152	150.4	26.7	1.73 h	9 mb	654.8	8.4	(n,a)Nd-149
1013	62	Sm-154	150.4	22.8	1.8 m	3.5 mb	81.9	11	(n,p)Pm-154 m
1014	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	915.2	19.5	(n,p)Pm-148 m+
1015	62	Sm-152	150.4	26.7	1.73 h	9 mb	114.3	19	(n,a)Nd-149
1016	62	Sm-154	150.4	22.8	46.5 h	1.5 b(14.9	1180.7	9	(n,2n)Sm-153
1017	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	288	11.4	(n,p)Pm-148 m+
1018	62	Sm-144	150.4	3.1	8.83 m	1.478 b	38.7	35	(n,2n)Sm-143 mg(cum)
1019	62	Sm-148	150.4	11.2	5.37 s	14.3 mb(1	912	15	(n,p)Pm-148 g
1020	62	Sm-144	150.4	3.1	8.83 m	1.478 b	1056.6	2	(n,2n)Sm-143 mg(cum)
1021	62	Sm-152	150.4	26.7	53.1 h	dau	585.9	3.1	Pm-149
1022	62	Sm-144	150.4	3.1	2.46 h	11 mb(14	1126.9	0.68	(n,a)Nd-141
1023	62	Sm-154	150.4	22.8	46.5 h	1.5 b(14.9	117.1	25	(n,2n)Sm-153
1024	62	Sm-144	150.4	3.1	2.46 h	11 mb(14	511	4.8	(n,a)Nd-141
1025	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	1013.8	20	(n,p)Pm-148 m+
1026	62	Sm-148	150.4	11.2	5.37 s	14.3 mb(1	1465.1	22	(n,p)Pm-148 g
1027	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	550.2	91	(n,p)Pm-148 m+
1028	62	Sm-152	150.4	26.7	1.73 h	9 mb	38.7	18	(n,a)Nd-149
1029	62	Sm-152	150.4	26.7	1.73 h	9 mb	211.3	24	(n,a)Nd-149
1030	62	Sm-154	150.4	22.8	1.8 m	3.5 mb	40.1	18.8	(n,p)Pm-154 m
1031	62	Sm-144	150.4	3.1	8.83 m	1.478 b	511	92.8	(n,2n)Sm-143 mg(cum)
1032	62	Sm-154	150.4	22.8	12.4 m	9 mb(14.9	1180.7	9	(n,a)Nd-151
1033	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	725.7	32	(n,p)Pm-148 m+
1034	62	Sm-152	150.4	26.7	1.73 h	9 mb	270.3	10	(n,a)Nd-149
1035	62	Sm-154	150.4	22.8	28.4 h	dau	340.1	21	Pm-151
1036	62	Sm-154	150.4	22.8	1.8 m	3.5 mb	839.8	13	(n,p)Pm-154 m
1037	62	Sm-154	150.4	22.8	1.8 m	3.5 mb	2058.6	19	(n,p)Pm-154 m
1038	62	Sm-154	150.4	22.8	12.4 m	9 mb(14.9	256	11.6	(n,a)Nd-151
1039	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	414.1	17.9	(n,p)Pm-148 m+
1040	62	Sm-154	150.4	22.8	12.4 m	9 mb(14.9	38.7	11	(n,a)Nd-151
1041	62	Sm-148	150.4	11.2	5.37 s	14.3 mb(1	550.2	26	(n,p)Pm-148 g
1042	62	Sm-148	150.4	11.2	41.3 d	18.8 mb(1	629	-	(n,p)Pm-148 m+
1043	63	Eu-153	151.96	52.2	21.68 h	9 mb (14.9	1324.5	18	(n,a)Pm-150
1044	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	725.7	32	(n,a)Pm-148 m+
1045	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	550.2	91	(n,a)Pm-148 m+
1046	63	Eu-153	151.96	52.2	21.68 h	9 mb (14.9	1165.8	16.3	(n,a)Pm-150
1047	63	Eu-151	151.96	47.8	12.6 h	540 mb(1·	4065	2.8	(n,2n)Eu-150 g
1048	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	288	11.4	(n,a)Pm-148 m+
1049	63	Eu-153	151.96	52.2	21.68 h	9 mb (14.9	333.9	70	(n,a)Pm-150
1050	63	Eu-151	151.96	47.8	12.6 h	540 mb(1·	40.1	6.7	(n,2n)Eu-150 g
1051	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	915.2	19.5	(n,a)Pm-148 m+
1052	63	Eu-153	151.96	52.2	46.5 h	7.4 mb+	41.5	46	(n,p)Sm-153
1053	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	629.9	87	(n,a)Pm-148 m+

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1054	63	Eu-151	151.96	47.8	12.6 h	540 mb(1·	333.9	4	(n,2n)Eu-150 g
1055	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	1013.8	20	(n,a)Pm-148 m+
1056	63	Eu-151	151.96	47.8	41.3 d	19.1 mb(1	414.1	17.8	(n,a)Pm-148 m+
1057	63	Eu-153	151.96	52.2	46.5 h	7.4 mb+	103.2	28.3	(n,p)Sm-153
1058	63	Eu-153	151.96	52.2	21.68 h	9 mb (14.:	631.9	12.3	(n,a)Pm-150
1059	64	Gd-160	157.25	21.7	18.6 h	1.668 b+	363.6	10.3	(n,2n)Gd-159
1060	64	Gd-157	157.25	15.7	15.2 h	11.3 mb	373	11	(n,p)Eu-157
1061	64	Gd-160	157.25	21.7	18.6 h	1.668 b+	44.4	9.6	(n,2n)Gd-159
1062	64	Gd-160	157.25	21.7	15.2 h	dau	64	18.6	Eu-157
1063	64	Gd-152	157.25	0.2	120 d	1.79 b(14	243.6	6.7	(n,2n)Gd-151
1064	64	Gd-154	157.25	2.2	241.5 d	1.855 b	103.2	21.8	(n,2n)Gd-153
1065	64	Gd-157	157.25	15.7	15.2 h	11.3 mb	413	18.6	(n,p)Eu-157
1066	64	Gd-158	157.25	24.7	22.2 m	2.3 mb+	41.5	15.3	(n,a)Sm-155
1067	64	Gd-152	157.25	0.2	120 d	1.79 b(14	41.4	72	(n,2n)Gd-151
1068	64	Gd-157	157.25	15.7	15.2 h	11.3 mb	43	43	(n,p)Eu-157
1069	64	Gd-158	157.25	24.7	45.9 m	2.6 mb	43	20	(n,p)Eu-158
1070	64	Gd-154	157.25	2.2	241.5 d	1.855 b	97.5	30	(n,2n)Gd-153
1071	64	Gd-160	157.25	21.7	18.6 h	1.668 b+	58	2	(n,2n)Gd-159
1072	64	Gd-152	157.25	0.2	120 d	1.79 b(14	153.7	7.4	(n,2n)Gd-151
1073	64	Gd-158	157.25	24.7	45.9 m	2.6 mb	899	20	(n,p)Eu-158
1074	64	Gd-158	157.25	24.7	22.2 m	2.3 mb+	1024.2	73	(n,a)Sm-155
1075	64	Gd-160	157.25	21.7	15.2 h	dau	413	18.6	Eu-157
1076	64	Gd-160	157.25	21.7	15.2 h	dau	373	11	Eu-157
1077	64	Gd-158	157.25	24.7	45.9 m	2.6 mb	946	55	(n,p)Eu-158
1078	64	Gd-160	157.25	21.7	15.2 h	dau	43	43	Eu-157
1079	64	Gd-157	157.25	15.7	15.2 h	11.3 mb	64	18.6	(n,p)Eu-157
1080	64	Gd-156	157.25	20.6	46.5 h	6.5 mb(14	41.5	46	(n,a)Sm-153
1081	64	Gd-160	157.25	21.7	83 s	2 mb(14.8	121.5	-	(n,a(Sm-157
1082	64	Gd-158	157.25	24.7	45.9 m	2.6 mb	978	12	(n,p)Eu-158
1083	64	Gd-158	157.25	24.7	45.9 m	2.6 mb	80	11	(n,p)Eu-158
1084	64	Gd-156	157.25	20.6	46.5 h	6.5 mb(14	103.2	28.3	(n,a)Sm-153
1085	64	Gd-158	157.25	24.7	45.9 m	2.6 mb	1188	16	(n,p)Eu-158
1086	64	Gd-154	157.25	2.2	241.5 d	1.855 b	41.4	92	(n,2n)Gd-153
1087	65	Tb-159	158.93	100	150 a	1.875 b(1·	48.5	13.2	(n,2n)Tb-158 m+g+
1088	65	Tb-159	158.93	100	150 a	1.875 b(1·	944.2	43.6	(n,2n)Tb-158 m+g+
1089	65	Tb-159	158.93	100	150 a	1.875 b(1·	962.2	20.1	(n,2n)Tb-158 m+g+
1090	65	Tb-159	158.93	100	15.2 d	2.2 mb	1153.9	8.5	(n,a)Eu-156
1091	65	Tb-159	158.93	100	15.2 d	2.2 mb	1230.7	9	(n,a)Eu-156
1092	65	Tb-159	158.93	100	18.6 h	3.4 mb(14	363.6	10.3	(n,p)Gd-159
1093	65	Tb-159	158.93	100	15.2 d	2.2 mb	811.7	10.8	(n,a)Eu-156
1094	65	Tb-159	158.93	100	150 a	1.875 b(1·	79.6	11.5	(n,2n)Tb-158 m+g+
1095	65	Tb-159	158.93	100	15.2 d	2.2 mb	88.8	11.4	(n,a)Eu-156
1096	65	Tb-159	158.93	100	150 a	1.875 b(1·	43	56	(n,2n)Tb-158 m+g+
1097	65	Tb-159	158.93	100	18.6 h	3.4 mb(14	44.4	9.6	(n,p)Gd-159
1098	65	Tb-159	158.93	100	15.2 d	2.2 mb	43	11.5	(n,a)Eu-156
1099	66	Dy-158	162.5	0.1	150 a	dau	43	20	Tb-157
1100	66	Dy-156	162.5	0.06	5.32 d	dau	48.7	20	Tb-155
1101	66	Dy-156	162.5	0.06	9.6 h	1.943 b	50.4	21.5	(n,2n)Dy-155
1102	66	Dy-161	162.5	18.9	6.9 d	Dau	46.9	9.5	Tb-161
1103	66	Dy-164	162.5	28.2	3.7 m	6 mb(14.7	102.5	15.3	(n,a)d-161
1104	66	Dy-158	162.5	0.1	8.1 h	2.047 b	44.4	66	(n,2n)Dy-157
1105	66	Dy-160	162.5	2.3	144 d	2.015 b	58.2	4	(n,2n)Dy-159
1106	66	Dy-156	162.5	0.06	9.6 h	1.943 b	44.4	86	(n,2n)Dy-155
1107	66	Dy-160	162.5	2.3	144 d	2.015 b	44.4	78	(n,2n)Dy-159
1108	66	Dy-162	162.5	25.5	18.6 h	3.56 mb	363.6	10.3	(n,a)Gd-159
1109	66	Dy-162	162.5	25.5	18.6 h	3.56 mb	44.4	9.6	(n,a)Gd-159
1110	66	Dy-158	162.5	0.1	150 a	dau	54.6	0.02	Tb-157
1111	66	Dy-164	162.5	28.2	3.7 m	6 mb(14.7	44.4	20.3	(n,a)d-161
1112	66	Dy-156	162.5	0.06	5.32 d	dau	180.1	10.6	Tb-155
1113	66	Dy-156	162.5	0.06	5.32 d	dau	86.5	21.5	Tb-155
1114	66	Dy-158	162.5	0.1	8.1 h	2.047 b	326.4	94.5	(n,2n)Dy-157
1115	66	Dy-164	162.5	28.2	3.7 m	6 mb(14.7	361	61	(n,a)d-161

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1116	66	Dy-160	162.5	2.3	144 d	2.015 b	50.4	20	(n,2n)Dy-159
1117	66	Dy-161	162.5	18.9	6.9 d	Dau	52.1	3	Tb-161
1118	66	Dy-156	162.5	0.06	9.6 h	1.943 b	227	60	(n,2n)Dy-155
1119	66	Dy-156	162.5	0.06	5.32 d	dau	43	83	Tb-155
1120	66	Dy-161	162.5	18.9	6.9 d	Dau	46	11.8	Tb-161
1121	66	Dy-161	162.5	18.9	6.9 d	Dau	74.6	5.9	Tb-161
1122	66	Dy-156	162.5	0.06	5.32 d	dau	105.3	20.2	Tb-155
1123	66	Dy-164	162.5	28.2	3.7 m	6 mb(14.7	315	20.3	(n,a)d-161
1124	66	Dy-158	162.5	0.1	150 a	dau	48.7	4.9	Tb-157
1125	67	Ho-165	164.93	100	7.6 m	1.2 mb(14	46	13.6	(n,a)Tb-162
1126	67	Ho-165	164.93	100	24 m	1.08 b+	52.1	9.6	(n,2n)o-164 m+g
1127	67	Ho-165	164.93	100	7.6 m	1.2 mb(14	862	12	(n,a)Tb-162
1128	67	Ho-165	164.93	100	7.6 m	1.2 mb(14	185	16.2	(n,a)Tb-162
1129	67	Ho-165	164.93	100	24 m	1.08 b+	91.5	2.3	(n,2n)o-164 m+g
1130	67	Ho-165	164.93	100	37 m	1.76 b+	47.5	58	(2,2n)Ho-164 m+
1131	67	Ho-165	164.93	100	37 m	1.76 b+	53.8	14.7	(2,2n)Ho-164 m+
1132	67	Ho-165	164.93	100	24 m	1.08 b+	46	38.3	(n,2n)o-164 m+g
1133	67	Ho-165	164.93	100	37 m	1.76 b+	56.1	6.5	(2,2n)Ho-164 m+
1134	67	Ho-165	164.93	100	7.6 m	1.2 mb(14	888	40	(n,a)Tb-162
1135	67	Ho-165	164.93	100	7.6 m	1.2 mb(14	807	46	(n,a)Tb-162
1136	67	Ho-165	164.93	100	24 m	1.08 b+	73.5	1.9	(n,2n)o-164 m+g
1137	68	Er-170	167.26	15	3.1 h	dau	321.3	27	Ho-167
1138	68	Er-170	167.26	15	9.3 d	1.895 b(1·	109.7	0.0013	(n,2n)Er-169
1139	68	Er-170	167.26	15	4.4 m	1 mb(14.9	190	0	(n,a)Dy-167+
1140	68	Er-170	167.26	15	43 s	1.8 mb(14	1972	0	(n,p)Ho-170 g
1141	68	Er-168	167.26	27	2.3 s	(750 mb)+	49.1	15.6	(n,2n)Er-167 m
1142	68	Er-170	167.26	15	43 s	1.8 mb(14	1893	0	(n,p)Ho-170 g
1143	68	Er-164	167.26	1.6	75 m	1.995 b(1·	53.8	17	(n,2n)Er-163
1144	68	Er-168	167.26	27	1.256 m	1 mb(14.9	46	55	(n,a)Dy-165 m+
1145	68	Er-170	167.26	15	3.1 h	dau	207.8	13	Ho-167
1146	68	Er-170	167.26	15	3.1 h	dau	79.3	14	Ho-167
1147	68	Er-167	167.26	22.9	3.1 h	4 mb(14.9	207.8	13	(n,p)Ho-167
1148	68	Er-167	167.26	22.9	3.1 h	4 mb(14.9	79.3	14	(n,p)Ho-167
1149	68	Er-168	167.26	27	2.3 s	(750 mb)+	208	4.3	(n,2n)Er-167 m
1150	68	Er-168	167.26	27	2.35 h	500 ub(14	47.5	6.2	(n,a)Dy-165 g
1151	68	Er-168	167.26	27	3 m	2.5 mb(14	49.1	5.4	(n,p)Ho-168
1152	68	Er-162	167.26	0.14	6.73 a	dau	47.5	12.4	Ho-161 m
1153	68	Er-170	167.26	15	43 s	1.8 mb(14	811	0	(n,p)Ho-170 g
1154	68	Er-162	167.26	0.14	2.5 h	dau	103	3.4	Ho-161
1155	68	Er-162	167.26	0.14	6.73 a	dau	211.2	35	Ho-161 m
1156	68	Er-168	167.26	27	1.256 m	1 mb(14.9	108.2	21.2	(n,a)Dy-165 m+
1157	68	Er-170	167.26	15	43 s	1.8 mb(14	1168	0	(n,p)Ho-170 g
1158	68	Er-162	167.26	0.14	3.1 h	1.81 b+	826.6	61.5	(n,2n)Er-161+
1159	68	Er-170	167.26	15	43 s	1.8 mb(14	878	0	(n,p)Ho-170 g
1160	68	Er-162	167.26	0.14	2.5 h	dau	25.7	24	Ho-161
1161	68	Er-162	167.26	0.14	3.1 h	1.81 b+	53.8	18.5	(n,2n)Er-161+
1162	68	Er-162	167.26	0.14	2.5 h	dau	46	67	Ho-161
1163	68	Er-168	167.26	27	2.35 h	500 ub(14	53.8	1.5	(n,a)Dy-165 g
1164	68	Er-164	167.26	1.6	75 m	1.995 b(1·	47.5	64	(n,2n)Er-163
1165	68	Er-167	167.26	22.9	3.1 h	4 mb(14.9	321.3	27	(n,p)Ho-167
1166	68	Er-162	167.26	0.14	3.1 h	1.81 b+	47.5	75	(n,2n)Er-161+
1167	68	Er-167	167.26	22.9	3.1 h	4 mb(14.9	346.5	58	(n,p)Ho-167
1168	68	Er-162	167.26	0.14	3.1 h	1.81 b+	21.2	11.7	(n,2n)Er-161+
1169	68	Er-170	167.26	15	3.1 h	dau	346.5	58	Ho-167
1170	68	Er-170	167.26	15	4.4 m	1 mb(14.9	570	0	(n,a)Dy-167+
1171	68	Er-162	167.26	0.14	2.5 h	dau	52.1	17	Ho-161
1172	68	Er-168	167.26	27	1.256 m	1 mb(14.9	515.5	11.7	(n,a)Dy-165 m+
1173	68	Er-168	167.26	27	2.35 h	500 ub(14	545.7	1.8	(n,a)Dy-165 g
1174	68	Er-170	167.26	15	43 s	1.8 mb(14	79	0	(n,p)Ho-170 g
1175	68	Er-168	167.26	27	1.256 m	1 mb(14.9	52.1	13.5	(n,a)Dy-165 m+
1176	69	Tm-169	168.93	100	93.1 d	2 b(14.9)	198.3	52	(n,2n)Tm-168
1177	69	Tm-169	168.93	100	93.1 d	2 b(14.9)	49.1	75	(n,2n)Tm-168

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1178	69	Tm-169	168.93	100	93.1 d	2 b(14.9)	447.5	22.2	(n,2n)Tm-168
1179	69	Tm-169	168.93	100	93.1 d	2 b(14.9)	816	48.2	(n,2n)Tm-168
1180	70	Yb-168	173.04	0.14	17.7 m	1.85 b(14	113.3	57.6	(n,2n)Yb-167
1181	70	Yb-176	173.04	12.7	4.19 d	1.81 b	113.5	1.9	(n,2n)Yb-175
1182	70	Yb-168	173.04	0.14	9.25 d	dau	55.6	25	Tm-167
1183	70	Yb-170	173.04	3	46 s+31 d	2.08 b	57.5	30	(n,2n)Yb-169+
1184	70	Yb-170	173.04	3	46 s+31 d	2.08 b	130.5	11.5	(n,2n)Yb-169+
1185	70	Yb-168	173.04	0.14	17.7 m	1.85 b(14	50.7	115	(n,2n)Yb-167
1186	70	Yb-168	173.04	0.14	9.25 d	dau	49.1	81	Tm-167
1187	70	Yb-176	173.04	12.7	4.19 d	1.81 b	396	6	(n,2n)Yb-175
1188	70	Yb-176	173.04	12.7	12.0 m	200 ub(14	197	59.5	(n,a)Er-173
1189	70	Yb-176	173.04	12.7	12.0 m	200 ub(14	87	10.3	(n,a)Er-173
1190	70	Yb-176	173.04	12.7	8.2 h	dau	399	89	Tm-173
1191	70	Yb-168	173.04	0.14	17.7 m	1.85 b(14	106.2	23.1	(n,2n)Yb-167
1192	70	Yb-170	173.04	3	46 s+31 d	2.08 b	307.7	11.1	(n,2n)Yb-169+
1193	70	Yb-170	173.04	3	46 s+31 d	2.08 b	177.2	22	(n,2n)Yb-169+
1194	70	Yb-170	173.04	3	46 s+31 d	2.08 b	63.1	45	(n,2n)Yb-169+
1195	70	Yb-176	173.04	12.7	12.0 m	200 ub(14	395	30	(n,a)Er-173
1196	70	Yb-176	173.04	12.7	12.0 m	200 ub(14	155	18.4	(n,a)Er-173
1197	70	Yb-168	173.04	0.14	17.7 m	1.85 b(14	57.5	29	(n,2n)Yb-167
1198	70	Yb-168	173.04	0.14	17.7 m	1.85 b(14	176.2	21	(n,2n)Yb-167
1199	70	Yb-176	173.04	12.7	12.0 m	200 ub(14	520	20	(n,a)Er-173
1200	70	Yb-176	173.04	12.7	4.19 d	1.81 b	54	2.9	(n,2n)Yb-175
1201	70	Yb-170	173.04	3	46 s+31 d	2.08 b	198	36	(n,2n)Yb-169+
1202	70	Yb-176	173.04	12.7	12.0 m	200 ub(14	182	20	(n,a)Er-173
1203	70	Yb-168	173.04	0.14	9.25 d	dau	207.8	42	Tm-167
1204	70	Yb-170	173.04	3	46 s+31 d	2.08 b	50.7	120	(n,2n)Yb-169+
1205	70	Yb-170	173.04	3	46 s+31 d	2.08 b	109.8	18	(n,2n)Yb-169+
1206	70	Yb-176	173.04	12.7	4.19 d	1.81 b	282.6	3.7	(n,2n)Yb-175
1207	71	Lu-175	174.97	97.4	3.31 a	1.285 b(1	52.4	63	(n,2n)Lu-174 g
1208	71	Lu-175	174.97	97.4	4.19 d	3.42 mb	113.5	1.9	(n,p)Yb-175
1209	71	Lu-175	174.97	97.4	3.31 a	1.285 b(1	59.5	16	(n,2n)Lu-174 g
1210	71	Lu-175	174.97	97.4	3.31 a	1.285 b(1	1241.8	6	(n,2n)Lu-174 g
1211	71	Lu-175	174.97	97.4	3.31 a	1.285 b(1	76.5	5.4	(n,2n)Lu-174 g
1212	71	Lu-175	174.97	97.4	4.19 d	3.42 mb	396.6	6	(n,p)Yb-175
1213	71	Lu-175	174.97	97.4	4.19 d	3.42 mb	54	2.9	(n,p)Yb-175
1214	71	Lu-175	174.97	97.4	4.19 d	3.42 mb	282.6	3.7	(n,p)Yb-175
1215	71	Lu-175	174.97	97.4	142 d	655 mb(1	67.1	8.3	(n,2n)Lu-174 m+
1216	72	Hf-178	178.49	27.2	4.19 d	2.1 mb	54	2.9	(n,a)Yb-175
1217	72	Hf-176	178.49	5.2	70 d	2 b+	343.6	85	(n,2n)Hf-175
1218	72	Hf-178	178.49	27.2	21 m	1.02 mb(1	55.7	65.5	(n,p)Lu-178 m+
1219	72	Hf-178	178.49	27.2	28.4 m	1.72 mb(1	93.2	8	(n,p)Lu-178 g
1220	72	Hf-178	178.49	27.2	4.3 s	dau	213.5	81.4	Hf-178 m1
1221	72	Hf-178	178.49	27.2	21 m	1.02 mb(1	325.3	93.7	(n,p)Lu-178 m+
1222	72	Hf-178	178.49	27.2	28.4 m	1.72 mb(1	1340.8	4.6	(n,p)Lu-178 g
1223	72	Hf-174	178.49	0.17	23.6 h	2.04 b(14	54	88	(n,2n)Hf-173
1224	72	Hf-176	178.49	5.2	70 d	2 b+	61.5	14	(n,2n)Hf-175
1225	72	Hf-178	178.49	27.2	21 m	1.02 mb(1	88.5	56.8	(n,p)Lu-178 m+
1226	72	Hf-178	178.49	27.2	4.3 s	dau	55.7	65	Hf-178 m1
1227	72	Hf-174	178.49	0.17	1.37 a	dau	272.1	26.4	Lu-173
1228	72	Hf-180	178.49	35.1	1.9 h	2.2 mb	1080.1	4.7	(n,a)Yb-177
1229	72	Hf-178	178.49	27.2	4.19 d	2.1 mb	282.6	3.7	(n,a)Yb-175
1230	72	Hf-174	178.49	0.17	1.37 a	dau	78.7	12.5	Lu-173
1231	72	Hf-178	178.49	27.2	21 m	1.02 mb(1	426.2	96.2	(n,p)Lu-178 m+
1232	72	Hf-178	178.49	27.2	21 m	1.02 mb(1	93.2	17.4	(n,p)Lu-178 m+
1233	72	Hf-178	178.49	27.2	4.3 s	dau	88.9	56.8	Hf-178 m1
1234	72	Hf-174	178.49	0.17	23.6 h	2.04 b(14	311	11	(n,2n)Hf-173
1235	72	Hf-178	178.49	27.2	4.3 s	dau	426.5	96.2	Hf-178 m1
1236	72	Hf-180	178.49	35.1	6.71 d	dau	208.3	11	Lu-177
1237	72	Hf-178	178.49	27.2	21 m	1.02 mb(1	213.5	81.4	(n,p)Lu-178 m+
1238	72	Hf-178	178.49	27.2	4.19 d	2.1 mb	113.5	1.9	(n,a)Yb-175
1239	72	Hf-174	178.49	0.17	1.37 a	dau	52.3	71	Lu-173

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1240	72	Hf-174	178.49	0.17	23.6 h	2.04 b(14	123.6	76	(n,2n)Hf-173
1241	72	Hf-174	178.49	0.17	23.6 h	2.04 b(14	297	45	(n,2n)Hf-173
1242	72	Hf-180	178.49	35.1	6.71 d	dau	113	6.5	Lu-177
1243	72	Hf-176	178.49	5.2	70 d	2 b+	54.5	54	(n,2n)Hf-175
1244	72	Hf-178	178.49	27.2	28.4 m	1.72 mb(1	55.7	7.2	(n,p)Lu-178 g
1245	72	Hf-178	178.49	27.2	4.3 s	dau	325.6	93.7	Hf-178 m1
1246	72	Hf-178	178.49	27.2	4.19 d	2.1 mb	396.1	6	(n,a)Yb-175
1247	72	Hf-180	178.49	35.1	1.9 h	2.2 mb	150.4	17.2	(n,a)Yb-177
1248	73	Ta-181	180.95	99.988	4.3 s	dau	55.7	104	Hf-178 m
1249	73	Ta-181	180.95	99.988	42.4 d	3 mb	482.2	86	(n,p)Hf-181
1250	73	Ta-181	180.95	99.988	28.4 m	500 ub(1<	93.2	6	(n,a)Lu-178 g
1251	73	Ta-181	180.95	99.988	21 m	1.2 mb(14	216.7	87	(n,a)Lu-178 m+
1252	73	Ta-181	180.95	99.988	42.4 d	3 mb	133	43	(n,p)Hf-181
1253	73	Ta-181	180.95	99.988	4.3 s	dau	325.3	93.7	Hf-178 m
1254	73	Ta-181	180.95	99.988	8.12 h	2.07 b(14	63.5	15	(n,2n)Ta-180 m
1255	73	Ta-181	180.95	99.988	8.12 h	2.07 b(14	55.7	60	(n,2n)Ta-180 m
1256	73	Ta-181	180.95	99.988	21 m	1.2 mb(14	495	76	(n,a)Lu-178 m+
1257	73	Ta-181	180.95	99.988	28.4 m	500 ub(1<	55.7	7.2	(n,a)Lu-178 g
1258	73	Ta-181	180.95	99.988	42.4 d	3 mb	55.8	24.5	(n,p)Hf-181
1259	73	Ta-181	180.95	99.988	4.3 s	dau	213.5	81.4	Hf-178 m
1260	73	Ta-181	180.95	99.988	8.12 h	2.07 b(14	93.1	4	(n,2n)Ta-180 m
1261	73	Ta-181	180.95	99.988	28.4 m	500 ub(1<	1340.8	4.6	(n,a)Lu-178 g
1262	73	Ta-181	180.95	99.988	4.3 s	dau	88.5	56.8	Hf-178 m
1263	73	Ta-181	180.95	99.988	21 m	1.2 mb(14	55.7	65.6	(n,a)Lu-178 m+
1264	73	Ta-181	180.95	99.988	4.3 s	dau	426.2	96.2	Hf-178 m
1265	73	Ta-181	180.95	99.988	21 m	1.2 mb(14	575.2	93.6	(n,a)Lu-178 m+
1266	73	Ta-181	180.95	99.988	4.3 s	dau	93.2	17.4	Hf-178 m
1267	73	Ta-181	180.95	99.988	42.4 d	3 mb	346	14	(n,p)Hf-181
1268	74	W-186	180.95	28.6	10.5 m	2.3 mb	122.3	23	(n,p)Ta-186
1269	74	W-183	180.95	14.3	5.0 d	2.8 mb(14	161.3	100.2	(n,p)Ta-183
1270	74	W-184	183.85	30.7	8.7 h	4.8 mb	252.8	58	(n,p)Ta-184
1271	74	W-182	183.85	26.3	115 d	2.3 mb(14	67.5	49	(n,p)Ta-182
1272	74	W-186	183.85	28.6	10.5 m	2.3 mb	510.6	44.7	(n,p)Ta-186
1273	74	W-186	183.85	28.6	1.64 m	540 mb(1<	67.5	1.5	(n,2n)W-185 m+
1274	74	W-184	183.85	30.7	8.7 h	4.8 mb	413.1	79	(n,p)Ta-184
1275	74	W-182	183.85	26.3	115 d	2.3 mb(14	1121.2	37	(n,p)Ta-182
1276	74	W-183	183.85	14.3	5.0 d	2.8 mb(14	246.1	25.9	(n,p)Ta-183
1277	74	W-183	183.85	14.3	5.0 d	2.8 mb(14	99	11.5	(n,p)Ta-183
1278	74	W-186	183.85	28.6	10.5 m	2.3 mb	197.9	59.6	(n,p)Ta-186
1279	74	W-186	183.85	28.6	10.5 m	2.3 mb	737.5	34.6	(n,p)Ta-186
1280	74	W-186	183.85	28.6	10.5 m	2.3 mb	615.3	33.4	(n,p)Ta-186
1281	74	W-182	183.85	26.3	121.2 d	2.23 b(14	152	0.1	(n,2n)W-181
1282	74	W-182	183.85	26.3	115 d	2.3 mb(14	1189	17.1	(n,p)Ta-182
1283	74	W-182	183.85	26.3	121.2 d	2.23 b(14	57.5	62	(n,2n)W-181
1284	74	W-182	183.85	26.3	115 d	2.3 mb(14	222.1	8	(n,p)Ta-182
1285	74	W-183	183.85	14.3	5.0 d	2.8 mb(14	107.9	10	(n,p)Ta-183
1286	74	W-182	183.85	26.3	115 d	2.3 mb(14	1221.3	28.9	(n,p)Ta-182
1287	74	W-182	183.85	26.3	115 d	2.3 mb(14	100.1	11.9	(n,p)Ta-182
1288	74	W-183	183.85	14.3	5.0 d	2.8 mb(14	59	67	(n,p)Ta-183
1289	74	W-186	183.85	28.6	1.64 m	540 mb(1<	131.6	4	(n,2n)W-185 m+
1290	74	W-183	183.85	14.3	5.0 d	2.8 mb(14	354	11.2	(n,p)Ta-183
1291	74	W-186	183.85	28.6	10.5 m	2.3 mb	214.9	50.4	(n,p)Ta-186
1292	74	W-186	183.85	28.6	1.64 m	540 mb(1<	59	5.7	(n,2n)W-185 m+
1293	74	W-186	183.85	28.6	1.64 m	540 mb(1<	65.9	5.4	(n,2n)W-185 m+
1294	74	W-184	183.85	30.7	8.7 h	4.8 mb	111.2	23	(n,p)Ta-184
1295	74	W-184	183.85	30.7	8.7 h	4.8 mb	922	33.3	(n,p)Ta-184
1296	74	W-182	183.85	26.3	115 d	2.3 mb(14	59	23	(n,p)Ta-182
1297	75	Re-187	186.2	62.5	8.7 h	940 ub	510.6	44.7	(n,a)Ta-184
1298	75	Re-187	186.2	62.5	23.9 h	3.9 mb	285.7	32	(n,p)W-187
1299	75	Re-187	186.2	62.5	8.7 h	940 ub	737.5	34.6	(n,a)Ta-184
1300	75	Re-187	186.2	62.5	8.7 h	940 ub	197.9	59.6	(n,a)Ta-184
1301	75	Re-185	186.2	37.5	38 d	1.43 b(14	792	36	(n,2n)Re-184 g

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1302	75	Re-185	186.2	37.5	38 d	1.43 b(14	903.2	36.3	(n,2n)Re-184 g
1303	75	Re-187	186.2	62.5	8.7 h	940 ub	111.2	23	(n,a)Ta-184
1304	75	Re-187	186.2	62.5	23.9 h	3.9 mb	478.5	26.6	(n,p)W-187
1305	75	Re-187	186.2	62.5	90.6 h	1.51 b+	127.2	9.2	(n,2n)Re-186
1306	75	Re-185	186.2	37.5	165 d	260 mb(1·	216	-	(n,2n)Re-184 m+
1307	75	Re-185	186.2	37.5	165 d	260 mb(1·	384	-	(n,2n)Re-184 m+
1308	75	Re-187	186.2	62.5	90.6 h	1.51 b+	62	3	(n,2n)Re-186
1309	75	Re-185	186.2	37.5	165 d	260 mb(1·	58	-	(n,2n)Re-184 m+
1310	75	Re-185	186.2	37.5	38 d	1.43 b(14	894.7	16	(n,2n)Re-184 g
1311	75	Re-185	186.2	37.5	38 d	1.43 b(14	111.1	17.4	(n,2n)Re-184 g
1312	75	Re-187	186.2	62.5	8.7 h	940 ub	214.9	50.4	(n,a)Ta-184
1313	75	Re-187	186.2	62.5	23.9 h	3.9 mb	134.2	10.1	(n,p)W-187
1314	75	Re-187	186.2	62.5	90.6 h	1.51 b+	59	4.9	(n,2n)Re-186
1315	75	Re-187	186.2	62.5	8.7 h	940 ub	615.3	33.4	(n,a)Ta-184
1316	75	Re-185	186.2	37.5	165 d	260 mb(1·	921	-	(n,2n)Re-184 m+
1317	75	Re-185	186.2	37.5	165 d	260 mb(1·	67	-	(n,2n)Re-184 m+
1318	75	Re-187	186.2	62.5	23.9 h	3.9 mb	61	19.7	(n,p)W-187
1319	76	Os-192	190.2	41	15.3 d	1.993 b	129.4	24	(n,2n)Os-191 g(cum)
1320	76	Os-188	190.2	13.3	17.0 h	8.7 mb	70	16.7	(n,p)Re-188
1321	76	Os-188	190.2	13.3	17.0 h	8.7 mb	60.5	1.3	(n,p)Re-188
1322	76	Os-192	190.2	41	13.0 h	831 mb(1·	71	1	(n,2n)Os-191 m+
1323	76	Os-190	190.2	26.4	23.9 h	500 ub	61	19.7	(n,a)W-187
1324	76	Os-190	190.2	26.4	2.8 h	2 mb(14.1	230	0	(n,p)Re-190 m+
1325	76	Os-186	190.2	1.6	94 d	2.175 b(1·	646.1	81	(n,2n)Os-185
1326	76	Os-192	190.2	41	13.0 h	831 mb(1·	74	1	(n,2n)Os-191 m+
1327	76	Os-192	190.2	41	13.0 h	831 mb(1·	62.5	3.3	(n,2n)Os-191 m+
1328	76	Os-190	190.2	26.4	2.8 h	2 mb(14.1	190	0	(n,p)Re-190 m+
1329	76	Os-188	190.2	13.3	17.0 h	8.7 mb	63.6	21.3	(n,p)Re-188
1330	76	Os-192	190.2	41	15.3 d	1.993 b	84	40	(n,2n)Os-191 g(cum)
1331	76	Os-190	190.2	26.4	2.8 h	2 mb(14.1	820	0	(n,p)Re-190 m+
1332	76	Os-188	190.2	13.3	17.0 h	8.7 mb	92.5	5.5	(n,p)Re-188
1333	76	Os-186	190.2	1.6	94 d	2.175 b(1·	60.5	60	(n,2n)Os-185
1334	76	Os-188	190.2	13.3	17.0 h	8.7 mb	106	11.5	(n,p)Re-188
1335	76	Os-190	190.2	26.4	2.8 h	2 mb(14.1	560	0	(n,p)Re-190 m+
1336	76	Os-190	190.2	26.4	2.8 h	2 mb(14.1	120	0	(n,p)Re-190 m+
1337	76	Os-192	190.2	41	4.88 s	dau	64	40	Ir-191 m
1338	76	Os-192	190.2	41	4.88 s	dau	129.4	24	Ir-191 m
1339	76	Os-190	190.2	26.4	23.9 h	500 ub	685.7	685.7	(n,a)W-187
1340	76	Os-190	190.2	26.4	2.8 h	2 mb(14.1	380	0	(n,p)Re-190 m+
1341	76	Os-190	190.2	26.4	23.9 h	500 ub	478.5	26.6	(n,a)W-187
1342	76	Os-190	190.2	26.4	23.9 h	500 ub	134.2	10.1	(n,a)W-187
1343	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	186.7	49	(n,2n)Ir-190 m1+g+
1344	77	Ir-193	192.22	62.6	74.3	2.062 b(1·	468	51.8	(n,2n)Ir-192
1345	77	Ir-191	192.22	37.4	17.0 h	2.43 mb	155	15	(n,a)Re-188
1346	77	Ir-191	192.22	37.4	17.0 h	2.43 mb	478.1	1.1	(n,a)Re-188
1347	77	Ir-193	192.22	62.6	30.2 h	2.7 mb	139.9	4.1	(n,p)Os-193
1348	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	63	78	(n,2n)Ir-190 m1+g+
1349	77	Ir-191	192.22	37.4	3.1 h	184 mb+	71.3	21	(n,2n)Ir-191 m2+
1350	77	Ir-191	192.22	37.4	3.1 h	184 mb+	502.5	92.6	(n,2n)Ir-191 m2+
1351	77	Ir-193	192.22	62.6	74.3	2.062 b(1·	306.4	31.8	(n,2n)Ir-192
1352	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	518.4	31.3	(n,2n)Ir-190 m1+g+
1353	77	Ir-191	192.22	37.4	3.1 h	184 mb+	361.2	90.2	(n,2n)Ir-191 m2+
1354	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	557.6	27.2	(n,2n)Ir-190 m1+g+
1355	77	Ir-191	192.22	37.4	3.1 h	184 mb+	65	78	(n,2n)Ir-191 m2+
1356	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	61.5	78	(n,2n)Ir-190 m1+g+
1357	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	407.2	26.1	(n,2n)Ir-190 m1+g+
1358	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	569.3	26.1	(n,2n)Ir-190 m1+g+
1359	77	Ir-191	192.22	37.4	3.1 h	184 mb+	186.7	68.9	(n,2n)Ir-191 m2+
1360	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	605.3	38.1	(n,2n)Ir-190 m1+g+
1361	77	Ir-193	192.22	62.6	74.3	2.062 b(1·	296	30.2	(n,2n)Ir-192
1362	77	Ir-191	192.22	37.4	3.1 h	184 mb+	616.5	93.6	(n,2n)Ir-191 m2+
1363	77	Ir-191	192.22	37.4	1.2 h+12.1	1.96 b	371.1	20.7	(n,2n)Ir-190 m1+g+

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1364	77	Ir-191	192.22	37.4	17.0 h	2.43 mb	633.1	1.4	(n,a)Re-188
1365	77	Ir-193	192.22	62.6	30.2 h	2.7 mb	460.5	3.9	(n,p)Os-193
1366	77	Ir-191	192.22	37.4	3.1 h	184 mb+	61.4	78	(n,2n)Ir-191 m2+
1367	77	Ir-193	192.22	62.6	74.3	2.062 b(1·	316.5	87	(n,2n)Ir-192
1368	77	Ir-191	192.22	37.4	3.1 h	184 mb+	75.6	21	(n,2n)Ir-191 m2+
1369	77	Ir-193	192.22	62.6	30.2 h	2.7 mb	64.5	7.3	(n,p)Os-193
1370	77	Ir-191	192.22	37.4	17.0 h	2.43 mb	59	4	(n,a)Re-188
1371	78	Pt-192	195.09	0.78	2.96 d	2.035 b	409.4	7.9	(n,2n)Pt-191+
1372	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	74	78	(n,2n)Pt-189
1373	78	Pt-196	195.09	25.3	1.4 h	1.1 mb	393.5	100	(n,p)Ir-196 m
1374	78	Pt-190	195.09	0.013	13.3 d	dau	62	68	Ir-189
1375	78	Pt-192	195.09	0.78	2.96 d	2.035 b	75.5	10.5	(n,2n)Pt-191+
1376	78	Pt-192	195.09	0.78	2.96 d	2.035 b	63.3	104	(n,2n)Pt-191+
1377	78	Pt-196	195.09	25.3	30.2 h	550 ub	75.6	5.2	(n,a)Os-193+
1378	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	64.5	100	(n,2n)Pt-189
1379	78	Pt-198	195.09	7.2	81 m	1.08 b	75.7	9.5	(n,2n)Pt-197 m+
1380	78	Pt-196	195.09	25.3	41 d	460 mb+	65.1	50	(n,2n)Pt-195 m
1381	78	Pt-198	195.09	7.2	81 m	1.08 b	356.3	11	(n,2n)Pt-197 m+
1382	78	Pt-196	195.09	25.3	30.2 h	550 ub	66	7.3	(n,a)Os-193+
1383	78	Pt-196	195.09	25.3	1.4 h	1.1 mb	355.9	99	(n,p)Ir-196 m
1384	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	721.4	5.7	(n,2n)Pt-189
1385	78	Pt-196	195.09	25.3	41 d	460 mb+	98.9	11	(n,2n)Pt-195 m
1386	78	Pt-196	195.09	25.3	30.2 h	550 ub	63	7.3	(n,a)Os-193+
1387	78	Pt-198	195.09	7.2	18.3 h	1.128 b	191.3	5.7	(n,2n)Pt-197 g
1388	78	Pt-194	195.09	32.9	15.3 d	1.26 mb	64.5	40	(n,a)Os-191+
1389	78	Pt-198	195.09	7.2	7.8 s	dau	67	19	Au-197 m
1390	78	Pt-192	195.09	0.78	2.96 d	2.035 b	65	104	(n,2n)Pt-191+
1391	78	Pt-196	195.09	25.3	30.2 h	550 ub	136.9	4.1	(n,a)Os-193+
1392	78	Pt-198	195.09	7.2	81 m	1.08 b	65.1	32	(n,2n)Pt-197 m+
1393	78	Pt-198	195.09	7.2	81 m	1.08 b	68.8	32	(n,2n)Pt-197 m+
1394	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	94.3	4.6	(n,2n)Pt-189
1395	78	Pt-194	195.09	32.9	15.3 d	1.26 mb	129.4	24	(n,a)Os-191+
1396	78	Pt-196	195.09	25.3	41 d	460 mb+	66.9	50	(n,2n)Pt-195 m
1397	78	Pt-198	195.09	7.2	18.3 h	1.128 b	69	2.9	(n,2n)Pt-197 g
1398	78	Pt-196	195.09	25.3	1.4 h	1.1 mb	647.3	95	(n,p)Ir-196 m
1399	78	Pt-190	195.09	0.013	13.3 d	dau	69.5	23	Ir-189
1400	78	Pt-198	195.09	7.2	81 m	1.08 b	80.1	9.5	(n,2n)Pt-197 m+
1401	78	Pt-196	195.09	25.3	30.2 h	550 ub	73	5.2	(n,a)Os-193+
1402	78	Pt-194	195.09	32.9	19.38 h	4.2 mb	328.5	13	(n,p)Ir-194 g
1403	78	Pt-192	195.09	0.78	2.96 d	2.035 b	73.4	10.5	(n,2n)Pt-191+
1404	78	Pt-190	195.09	0.013	13.3 d	dau	208.2	16.6	Ir-189
1405	78	Pt-198	195.09	7.2	7.8 s	dau	80	5.3	Au-197 m
1406	78	Pt-196	195.09	25.3	41 d	460 mb+	75.7	14	(n,2n)Pt-195 m
1407	78	Pt-198	195.09	7.2	18.3 h	1.128 b	67	2.9	(n,2n)Pt-197 g
1408	78	Pt-198	195.09	7.2	18.3 h	1.128 b	77.4	21	(n,2n)Pt-197 g
1409	78	Pt-198	195.09	7.2	7.8 s	dau	69	19	Au-197 m
1410	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	243.5	4.3	(n,2n)Pt-189
1411	78	Pt-196	195.09	25.3	1.4 h	1.1 mb	521.4	97	(n,p)Ir-196 m
1412	78	Pt-194	195.09	32.9	19.38 h	4.2 mb	293.6	2.9	(n,p)Ir-194 g
1413	78	Pt-196	195.09	25.3	1.4 h	1.1 mb	447.1	98	(n,p)Ir-196 m
1414	78	Pt-198	195.09	7.2	18.3 h	1.128 b	80.1	21	(n,2n)Pt-197 g
1415	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	607.6	5	(n,2n)Pt-189
1416	78	Pt-196	195.09	25.3	41 d	460 mb+	77.8	14	(n,2n)Pt-195 m
1417	78	Pt-192	195.09	0.78	2.96 d	2.035 b	536.9	13.4	(n,2n)Pt-191+
1418	78	Pt-198	195.09	7.2	7.8 s	dau	78	5.3	Au-197 m
1419	78	Pt-190	195.09	0.013	13.3 d	dau	73.5	23	Ir-189
1420	78	Pt-196	195.09	25.3	30.2 h	550 ub	460.5	3.9	(n,a)Os-193+
1421	78	Pt-190	195.09	0.013	11 h	2.045 b(1·	568.9	4.3	(n,2n)Pt-189
1422	78	Pt-198	195.09	7.2	7.8 s	dau	273.9	72.5	Au-197 m
1423	79	Au-197	196.97	100	6.2 d	2.27 b	355.7	93.6	(n,2n)Au-196
1424	79	Au-197	196.97	100	9.7 h	143 mb	188.2	32.6	(n,2n)Au-196 m+
1425	79	Au-197	196.97	100	18.3 h	2.3 mb	69	2.9	(n,p)Pt-197

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1426	79	Au-197	196.97	100	19.38 h	350 ub	293.6	2.9	(n,a)Ir-194 g
1427	79	Au-197	196.97	100	9.7 h	143 mb	68	60	(n,2n)Au-196 m+
1428	79	Au-197	196.97	100	19.38 h	350 ub	328.5	13	(n,a)Ir-194 g
1429	79	Au-197	196.97	100	18.3 h	2.3 mb	191.3	5.7	(n,p)Pt-197
1430	79	Au-197	196.97	100	6.2 d	2.27 b	66	66	(n,2n)Au-196
1431	79	Au-197	196.97	100	9.7 h	143 mb	147.7	37	(n,2n)Au-196 m+
1432	79	Au-197	196.97	100	18.3 h	2.3 mb	80.1	21	(n,p)Pt-197
1433	79	Au-197	196.97	100	18.3 h	2.3 mb	77.4	21	(n,p)Pt-197
1434	79	Au-197	196.97	100	6.2 d	2.27 b	333	24	(n,2n)Au-196
1435	79	Au-197	196.97	100	18.3 h	2.3 mb	67	2.9	(n,p)Pt-197
1436	80	Hg-200	200.59	23.1	42.6 m	789 mb	82.5	14.3	(n,2n)Hg-199 m
1437	80	Hg-200	200.59	23.1	42.6 m	789 mb	68.9	49.3	(n,2n)Hg-199 m
1438	80	Hg-198	200.59	10.1	7.8 s	dau	69	19	Au-197 m
1439	80	Hg-106	200.59	0.15	40 h	1.617 b	77.9	12	(n,2n)Hg-195 m+
1440	80	Hg-200	200.59	23.1	42.6 m	789 mb	158.4	56.4	(n,2n)Hg-199 m
1441	80	Hg-198	200.59	10.1	7.8 s	dau	278.9	72.5	Au-197 m
1442	80	Hg-200	200.59	23.1	18.3 h	1.77 mb	191.3	5.7	(n,a)Pt-197
1443	80	Hg-200	200.59	23.1	18.3 h	1.77 mb	77.4	21	(n,a)Pt-197
1444	80	Hg-198	200.59	10.1	23.8 h	885 mb	133.9	30.2	(n,2n)Hg-197m+
1445	80	Hg-204	200.59	6.8	46.60 d	2.05 b	279.2	81.5	(n,2n)Hg-203
1446	80	Hg-198	200.59	10.1	23.8 h	885 mb	78	8	(n,2n)Hg-197m+
1447	80	Hg-202	200.59	29.7	3.13 d	dau	71	20.6	Au-199
1448	80	Hg-199	200.59	16.9	3.14 d	2.3 mb	158.4	76.8	(n,p)Au-199
1449	80	Hg-204	200.59	6.8	46.60 d	2.05 b	70.8	9.9	(n,2n)Hg-203
1450	80	Hg-202	200.59	29.7	3.13 d	dau	158.4	76.8	Au-199
1451	80	Hg-198	200.59	10.1	7.8 s	dau	67	19	Au-197 m
1452	80	Hg-198	200.59	10.1	64.1 h	1.125 b	191.5	0.56	(n,2n)Hg-197 g+
1453	80	Hg-204	200.59	6.8	46.60 d	2.05 b	65	2.9	(n,2n)Hg-203
1454	80	Hg-106	200.59	0.15	9.5 h	363 mb	61.4	6.8	(n,2n)Hg-195 g+
1455	80	Hg-204	200.59	6.8	46.60 d	2.05 b	82.5	2.9	(n,2n)Hg-203
1456	80	Hg-106	200.59	0.15	9.5 h	363 mb	779.8	7.7	(n,2n)Hg-195 g+
1457	80	Hg-106	200.59	0.15	40 h	1.617 b	82.5	12	(n,2n)Hg-195 m+
1458	80	Hg-202	200.59	29.7	30.8 m	1 mb	317	5.6	(n,a)Pt-199
1459	80	Hg-198	200.59	10.1	64.1 h	1.125 b	67	56	(n,2n)Hg-197 g+
1460	80	Hg-198	200.59	10.1	64.1 h	1.125 b	77.3	35.4	(n,2n)Hg-197 g+
1461	80	Hg-199	200.59	16.9	3.14 d	2.3 mb	208.2	16.6	(n,p)Au-199
1462	80	Hg-198	200.59	10.1	64.1 h	1.125 b	69	56	(n,2n)Hg-197 g+
1463	80	Hg-106	200.59	0.15	40 h	1.617 b	261.8	34.3	(n,2n)Hg-195 m+
1464	80	Hg-200	200.59	23.1	48.4 m	2.63 mb	368	24	(n,p)Au-200 g
1465	80	Hg-198	200.59	10.1	7.8 s	dau	80	5.3	Au-197 m
1466	80	Hg-198	200.59	10.1	23.8 h	885 mb	71	27.5	(n,2n)Hg-197m+
1467	80	Hg-198	200.59	10.1	64.1 h	1.125 b	80	35.4	(n,2n)Hg-197 g+
1468	80	Hg-200	200.59	23.1	42.6 m	789 mb	374.1	13.8	(n,2n)Hg-199 m
1469	80	Hg-106	200.59	0.15	9.5 h	363 mb	78	20	(n,2n)Hg-195 g+
1470	80	Hg-106	200.59	0.15	9.5 h	363 mb	69	88.5	(n,2n)Hg-195 g+
1471	80	Hg-200	200.59	23.1	18.3 h	1.77 mb	67	2.9	(n,a)Pt-197
1472	80	Hg-198	200.59	10.1	2.695 d	4.5 mb	411.8	95.5	(n,p)Au-198
1473	80	Hg-106	200.59	0.15	9.5 h	363 mb	67	88.5	(n,2n)Hg-195 g+
1474	80	Hg-199	200.59	16.9	3.14 d	2.3 mb	71	20.6	(n,p)Au-199
1475	80	Hg-198	200.59	10.1	23.8 h	885 mb	82.5	6	(n,2n)Hg-197m+
1476	80	Hg-199	200.59	16.9	3.14 d	2.3 mb	69	20.6	(n,p)Au-199
1477	80	Hg-200	200.59	23.1	42.6 m	789 mb	80.2	14.3	(n,2n)Hg-199 m
1478	80	Hg-202	200.59	29.7	3.13 d	dau	69	20.6	Au-199
1479	80	Hg-106	200.59	0.15	40 h	1.617 b	560.24	7.9	(n,2n)Hg-195 m+
1480	80	Hg-200	200.59	23.1	42.6 m	789 mb	71	49.3	(n,2n)Hg-199 m
1481	80	Hg-200	200.59	23.1	18.3 h	1.77 mb	80	21	(n,a)Pt-197
1482	80	Hg-200	200.59	23.1	18.3 h	1.77 mb	69	2.9	(n,a)Pt-197
1483	80	Hg-106	200.59	0.15	40 h	1.617 b	67	43.5	(n,2n)Hg-195 m+
1484	80	Hg-202	200.59	29.7	30.8 m	1 mb	542.7	16.5	(n,a)Pt-199
1485	80	Hg-200	200.59	23.1	48.4 m	2.63 mb	1225.9	16	(n,p)Au-200 g
1486	80	Hg-201	200.59	13.2	26 m	2.1 mb	530	5	(n,p)Au-201
1487	80	Hg-106	200.59	0.15	9.5 h	363 mb	80	20	(n,2n)Hg-195 g+

No.	Z	Isotop	BA	Kelimpahan (%)	Waktu Paroh	Tampang Lintang	Energi (KeV)	Intensitas (%)	Reaksi
1488	80	Hg-204	200.59	6.8	46.60 d	2.05 b	72.9	9.9	(n,2n)Hg-203
1489	80	Hg-198	200.59	10.1	23.8 h	885 mb	67	27.5	(n,2n)Hg-197m+
1490	80	Hg-196	200.59	10.1	7.8 s	dau	78	5.3	Au-197 m
1491	80	Hg-202	200.59	29.7	3.13 d	dau	208.2	16.6	Au-199
1492	80	Hg-196	200.59	0.15	40 h	1.617 b	71	43.5	(n,2n)Hg-195 m+
1493	81	Tl-203	204.37	29.5	48.4 m	2.2 mb	1225.9	16	(n,a)Au-200 g
1494	81	Tl-205	204.37	70.5	3.78 a	1.99 b(14	71	1.1	(n,2n)Tl-204
1495	81	Tl-203	204.37	29.5	12.2 d	1.95 b+	439.6	95	(n,2n)Tl-202
1496	81	Tl-203	204.37	29.5	12.2 d	1.95 b+	69	65	(n,2n)Tl-202
1497	81	Tl-203	204.37	29.5	48.4 m	2.2 mb	368	24	(n,a)Au-200 g
1498	81	Tl-205	204.37	70.5	28 s	750 ub(14	439.6	10	(n,a)Au-202
1499	81	Tl-205	204.37	70.5	5.2 m	3 mb	203.7	1.9	(n,p)Hg-205
1500	81	Tl-203	204.37	29.5	12.2 d	1.95 b+	71	65	(n,2n)Tl-202
1501	81	Tl-205	204.37	70.5	5.2 m	3 mb	71	1.3	(n,p)Hg-205
1502	81	Tl-205	204.37	70.5	5.2 m	3 mb	73	1.3	(n,p)Hg-205
1503	81	Tl-205	204.37	70.5	3.78 a	1.99 b(14	69	1.1	(n,2n)Tl-204
1504	82	Pb-204	207.2	1.4	6.2 s	(1.2 b)+	73	12.5	(n,2n)Pb-203 m+
1505	82	Pb-204	207.2	1.4	52.1 h	1.74 b+	85	21	(n,2n)Pb-203
1506	82	Pb-208	207.2	52.4	3.054 m	460 ub	2614.5	100	(n,p)Tl-208
1507	82	Pb-204	207.2	1.4	6.2 s	(1.2 b)+	825.2	73	(n,2n)Pb-203 m+
1508	82	Pb-208	207.2	52.4	5.2 m	1.58 mb	71	1.3	(n,a)Hg-205
1509	82	Pb-204	207.2	1.4	52.1 h	1.74 b+	275.2	81	(n,2n)Pb-203
1510	82	Pb-208	207.2	52.4	5.2 m	1.58 mb	73	1.3	(n,a)Hg-205
1511	82	Pb-208	207.2	52.4	3.054 m	460 ub	583.1	86	(n,p)Tl-208
1512	82	Pb-204	207.2	1.4	52.1 h	1.74 b+	73	73	(n,2n)Pb-203
1513	82	Pb-208	207.2	52.4	800 ms	1.63 b+	569.7	98	(n,2n)Pb-207 m
1514	82	Pb-204	207.2	1.4	6.2 s	(1.2 b)+	75	12.5	(n,2n)Pb-203 m+
1515	82	Pb-204	207.2	1.4	52.1 h	1.74 b+	82.5	21	(n,2n)Pb-203
1516	82	Pb-204	207.2	1.4	52.1 h	1.74 b+	71	73	(n,2n)Pb-203
1517	82	Pb-206	207.2	24.1	46.60 d	2.7mB(14	69	19	(n,a)Hg-203
1518	82	Pb-208	207.2	52.4	5.2 m	1.58 mb	203.7	1.9	(n,a)Hg-205
1519	82	Pb-208	207.2	52.4	800 ms	1.63 b+	1063.6	90	(n,2n)Pb-207 m
1520	82	Pb-208	207.2	52.4	3.054 m	460 ub	510.7	22.5	(n,p)Tl-208
1521	82	Pb-208	207.2	52.4	3.054 m	460 ub	860.5	12	(n,p)Tl-208
1522	82	Pb-206	207.2	24.1	46.60 d	2.7mB(14	67	19	(n,a)Hg-203
1523	90	Th-232	232.04	100	25.52 h	1.32 b+	84.2	5.1	(n,2n)Th-231
1524	92	U-238	238.03	99.2739	6.75 d	680 mb+	208	22.5	(n,2n)U-237
1525	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	547.3	0	(n,p)Pa-238
1526	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	864	0	(n,p)Pa-238
1527	92	U-238	238.03	99.2739	6.75 d	680 mb+	97.1	15	(n,2n)U-237
1528	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	1015	0	(n,p)Pa-238
1529	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	635.2	0	(n,p)Pa-238
1530	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	1061	0	(n,p)Pa-238
1531	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	687	0	(n,p)Pa-238
1532	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	448.5	0	(n,p)Pa-238
1533	92	U-235	238.03	0.7205	24.1 m	1.86 mb	320	0	(n,p)Pa-235
1534	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	1084	0	(n,p)Pa-238
1535	92	U-238	238.03	99.2739	2.3 m	1.5 mb(14	583.7	0	(n,p)Pa-238
1536	92	U-238	238.03	99.2739	6.9 m	(1.5 b)(14	1084	0	(n,a)Th-235
1537	92	U-238	238.03	99.2739	6.75 d	680 mb+	113.9	10	(n,2n)U-237
1538	92	U-238	238.03	99.2739	6.75 d	680 mb+	101.1	26	(n,2n)U-237
1539	92	U-235	238.03	0.7205	24.1 m	1.86 mb	265	0	(n,p)Pa-235
1540	92	U-235	238.03	0.7205	24.1 m	1.86 mb	115	0	(n,p)Pa-235
1541	92	U-235	238.03	0.7205	24.1 m	1.86 mb	165	0	(n,p)Pa-235

LAMPIRAN III

TABEL REAKSI HASIL PEMILIHAN

Tabel Hasil pemilihan reaksi yang akan dipakai untuk perhitungan sensitivitas dan batas deteksi .

No	Isotop	Z	BA	K Isotop %	Umur Paro	T. Lintang	Tenaga (keV)	I Gamma %	Reaksi
1	Ag-107	47	107.9	51.8	24.10 m	790.00 mB	511.6	18.00	(n,2n)Ag-06g
2	Al-27	13	27.0	100.0	9.45 m	75.00 mB	439.0	3300	(n,a)Ne-23
3	Ar-40	18	39.9	99.6	1.42 m	15.70 mB	1450.0	90.00	(n,p)Cl-40
4	As-75	33	74.9	100.0	82.80 m	20.00 mB	264.8	12.00	(n,p)Ge-75g
5	Au-179	79	197.0	100.0	9.70 h	143.00 mB	188.2	32.60	(n,2n)Au-196m
6	B-11	5	10.9	80.2	13.80 s	.25.00 mB	6790.5	4.51	(n,p)Be-11
7	Ba-138	56	137.3	71.7	9.17 h	3.60 mB	248.8	90.30	(n,a)Xe-135g
8	Br-79	35	80.9	50.7	6.40 m	932.00 mB	511.0	185.00	(n,2n)Br-78
9	Ca-44	20	40.1	2.1	22.00 m	35.50 mB	1156.8	85.00	(n,p)K-44
10	Cd-112	48	112.4	24.0	48.70 m	600.00 mB	245.4	94.00	(n,2n)Cd-111m
11	Ce-142	58	140.1	11.1	92.40 m	9.50 mB	641.2	52.50	(n,p)La-142
12	Cl-37	17	35.5	24.3	5.06 m	3300 mB	3102.4	90.00	(n,p)S-37
13	Co-59	27	58.9	100.0	10.50 m	95.00 mB	59.0	100.00	(n,g)Co-60
14	Cr-52	24	52.0	83.8	3.755 m	94.00 mB	1434.2	100.00	(n,p)V-52
15	Cs-133	55	152.9	100.0	6.47 d	1.60 B	668.0	60.00	(n,2n)Cs-132
16	Cu-63	29	63.5	69.1	9.78 m	522 mB	511	196.00	(n,2n)Cu-626g
17	Dy-164	66	162.5	28.2	2.33 h	13.3 B	48	56.00	(n,g)Dy-65m+g
18	Er-164	68	167.3	1.6	75 m	2 B	47.5	64.00	(n,2n)Er-163
19	Eu-151	63	152.0	47.8	12.6 h	540 mB	4065	2.800	(n,2n)Eu-150g
20	F-19	9	19	100	27.1 s	19 mB	197.4	97.00	(n,p)O19
21	Fe-56	26	55.8	91.7	2.582 h	103 mB	846.6	99.00	(n,p)Mn-56
22	Ga-71	31	69.7	40	21.2 m	1100 mB	176	60.00	(n,2n)Ga-70
23	Gd-158	64	157.3	24.7	45.9 m	2.60 mB	946	55.00	(n,p)Eu-158
24	Ge-76	32	72.6	7.7	48.9 s	967 mB	139.8	40.00	(n,2n)Ge-175m
25	Hf-178	72	178.5	27.2	18.7 s	630 mB	214	63.00	(n,g)Hf-179m
26	Hg-200	80	200.6	23.1	42.6 m	789 mB	158.4	58.40	(n,2n)Hg-199m
27	Ho-165	67	164.9	100	37 m	1.76 B	46	6.50	(n,2n)Ho-164m
28	I-127	53	126.9	100	25 m	37.5 mB	443	32.40	(n,g)I-128
29	In-115	49	114.8	95.7	54.2 m	805 mB	417	12.00	(n,g)In-166m
30	Ir-191	77	192.2	37.4	3.2 h	220 mB	65	78.00	(n,2n)Ir-190m
31	K-39	19	39.1	93.3	7.63 h	3.5 mB	511	200.00	(n,2n)K-38g
32	Kr-86	36	83.8	17.3	4.48 h	350 mB	151	90.00	(n,2n)Kr-85m
33	La-139	57	138.9	99.9	84.6 m	5 mB	165.8	22.60	(n,p)Ba-139
34	Lu-175	71	174.9	97.4	3.68 h	80 mB	88	70.00	(n,g)Lu-176m
35	Mg-24	12	24.3	79	15.02 h	190 mB	1369.6	100.00	(n,p)Na-24
36	Mn-55	25	54.9	100	3.56 m	41 mB	1528.2	0.04	(n,p)Cr-55
37	Mo100	42	95.9	9.6	6.02 h	1420 mB	141	85.00	(n,2n)Tc-299m
38	N-15	7	14	6.4	2.56 m	16 mB	6128	69.00	(n,p)C-15
39	Na-23	11	23	100	10 s	150 mB	1633.1	100.00	(n,a)F-20
40	Nb-93	41	92.9	100	3.19 h	5.5 mB	202.5	96.50	(n,a)Y-90m
41	Nd-142	60	144.2	27.1	62 s	610 mB	756.5	91.00	(n,2n)Nd-141m
42	Ni-60	28	58.7	26.2	10.5 m	109 mB	58.6	99.75	(n,p)Co-60m

No	Isotop	Z	BA	K Isotop	Umur Paro	T. Lintang	Tenaga (keV)	I. Gamma	ReaksiN
43	O-16	8	16.0	99.8	7.13 s	39 mB	6128	69.00	(n,p)N-16
44	Os-190	76	190.2	26.4	9.9 m	14 mB	187	72.00	(n,n')Os-90m
45	P-31	15	31.0	100	2.246 m	118 mB	1778.8	100.00	(n,a)Al-28
46	Pb-208	82	207.2	52.4	1 m	1.64 B	569.7	98.00	(n,2n)Pb-207m
47	Pd-110	46	106.4	11.8	4.69 m	498 mB	188.9	58.00	(n,2n)Pd-109m
48	Pr-141	59	140.9	100	3.39 m	1.84 B	511	95.00	(n,2n)Pr-140
49	Pt-198	78	195.1	7.2	94.4 m	910 mB	67	22.00	(n,2n)pt-197m
50	Ra-226	88	226	16	42.2 m	100 mB	300	100.00	(n,g)Ra-227
51	Rb-85	37	85.5	72.2	20.5 m	474 mB	284	80.00	(n,2n)Rb-84m
52	Re-187	75	186.2	62.5	18.6 m	5 mB	61	19.70	(n,g)W-188
53	Rh-103	45	102.9	100	4.34 m	55 mB	51	60.00	(n,g)Rh-104m
54	Ru-96	44	101.1	5.5	1.64 h	638 mB	626.8	80.00	(n,2n)Ru-195
55	S-34	16	32.1	4.2	12.4 s	75 mB	511	200.00	(n,p)P-34
56	Sb-123	51	127.8	42.8	4.2 m	731 mB	61.6	50.00	(n,2n)Sb-122m
57	Sc-45	21	45	100	3.93 h	182 mB	1157	99.80	(n,2n)Sc-44g
58	Se-82	34	79	9	57. 3 m	894 mB	103	8.00	(n,2n)Se81m
59	Si-28	14	28	92.2	2.246 m	230 mB	1778.8	100.00	(n,p)Al-28
60	Sm-154	62	150.4	22.8	1.8 m	3.5 mB	1393.4	17.00	(n,p)Pm-154m
61	Sn-124	50	118.7	5.8	1.1 m	547 mB	159.7	84.00	(n,2n)Sn-123m
62	Sr-86	38	87.6	9.9	6.77 m	347 mB	151.3	11.60	(n,2n)Sr-85m
63	Ta-181	73	180.9	100	8.12 h	2.07 B	55.7	60.00	(n,2n)Ta-180m
64	Tb-159	65	158.9	100	10.5 s	450 mB	44	9.60	(n,2n)Tb-158m
65	Te-130	90	127.6	34.5	70 m	660 mB	27.8	16.40	(n,2n)Te-129g
66	Th-232	22	232	100	18.3 m	390 mB	500	75.00	(n,f)Ba-141
67	Ti-46	22	47.9	8	18.7 s	63 mB	1157	100.0	(n,x)Sc-46m
68	Tl-203	81	204.4	29.5	48.4 m	2.2 mB	368	24.00	(n,a)Au-200g
69	Tm-169	69	168.9	100	93.1 d	2.0 B	49.1	75.00	(n,2n)Tm-168
70	U-238	92	238	99.3	12.5 m	1050 mB	312	100.00	(n,f)Te-133
71	V-51	23	50.9	99.8	5.76 m	35.5 mB	320	95.00	(n,p)Ti-51
72	W-186	74	183.9	28.6	16.67 m	660 mB	66	5.40	(n,p)W-185m
73	Xe-136	54	131.3	8.9	15.30 m	750 mB	526.8	80	(n,2n)Xe-135m
74	Y-89	39	88.9	100.0	1.018 m	910.0 uB	555.8	98	(n,a)Rb-86m
75	Yb-176	70	173.0	12.7	12.0 m	200.0 uB	395.0	30	(n,a)Er-137
76	Zn-65	30	65.4	48.9	12.74 h	185.0 mB	511.0	37	(n,p)Cu-64
77	Zr-90	40	91.2	51.4	4.18 m	120.0 mB	587.8	93	(n,2n)Zr-89m

LAMPIRAN IV

DATA EFISIENSI DETEKTOR

Data efisiensi detektor untuk jarak sumber-detektor = 5,10,15 dan 20 cm diambil dari, Fasikah,1993, Optimasi Parameter Spektroskopi Gamma dengan Detektor Germanium Kemurnian Tinggi (HPGe).

Data Efisiensi Detektor dengan jarak sumber-detektor = 5cm

No.	Energi (keV)	Cps	I.Gamma	At (Dps)	Efisiensi	Ln(Energi)	Ln(Efisiensi)
1	121.780	1620.25	0.2820	13660.407	42.0600	4.8022	3.7391
2	244.690	217.650	0.0738	13660.407	21.5893	5.500	3.0722
3	344.280	558.200	0.2640	13660.407	16.6108	5.8415	2.8101
4	778.900	93.540	0.1300	13660.407	5.2673	6.6579	1.6615
5	964.050	73.410	0.1448	13660.407	3.7113	6.8711	1.3114
6	1085.830	48.690	0.1014	13660.407	3.5151	6.9901	1.2571
7	1112.080	52.280	0.1335	13660.407	2.8668	7.0140	1.0532
8	1408.030	56.270	0.2070	13660.407	1.9900	7.2499	0.6881

Data Efisiensi Detektor dengan jarak sumber-detektor = 10 cm

No.	Energi (keV)	Cps	I.Gamma	At(Dps)	Efisiensi	Ln(Energi)	Ln(Efisiensi)
1	121.780	637.890	0.2820	13660.407	16.5590	4.8022	2.8069
2	244.690	86.550	0.0738	13660.407	8.5851	5.5000	2.1500
3	344.280	213.040	0.2640	13660.407	5.9074	5.8415	1.7762
4	778.900	43.950	0.1300	13660.407	2.4749	6.6579	0.9062
5	964.050	43.070	0.1448	13660.407	2.1774	6.8711	0.7781
6	1085.830	28.300	0.1014	13660.407	2.0431	6.9901	0.7145
7	1112.080	30.690	0.1335	13660.407	1.6580	7.0140	0.5056
8	1408.030	33.170	0.2070	13660.407	1.1730	7.2499	0.1596

Data Efisiensi Detektor dengan jarak sumber-detektor = 15 cm

No.	Energi (keV)	Cps	I.Gamma	At(Dps)	Efisiensi	Ln(Energi)	Ln(Efisiensi)
1	121.780	325.570	0.2820	13660.407	8.4515	4.8022	2.1343
2	244.690	48.040	0.0738	13660.407	4.7652	5.5000	1.5613
3	344.280	115.830	0.2640	13660.407	3.2118	5.8415	1.1668
4	778.900	23.230	0.1300	13660.407	1.3081	6.6579	0.2686
5	964.050	24.180	0.1448	13660.407	1.2224	6.8711	0.2008
6	1085.830	16.550	0.1014	13660.407	1.1948	6.9901	0.1780
7	1112.080	18.100	0.1335	13660.407	0.9779	7.0140	-0.0224
8	1408.030	23.490	0.2070	13660.407	0.8307	7.2499	-0.1855

Data Efisiensi Detektor dengan jarak sumber-detektor = 20 cm

No.	Energi (keV)	Cps	I.Gamma	At (Dps)	Efisiensi	Ln(Energi)	Ln(Efisiensi)
1	121.780	190.990	0.2820	13660.407	4.9579	4.8022	1.6010
2	244.690	31.480	0.0738	13660.407	3.1226	5.5000	1.1387
3	344.280	74.820	0.2640	13660.407	2.0747	5.8415	0.7298
4	778.900	14.540	0.1300	13660.407	0.8188	6.6579	-0.2000
5	964.050	14.830	0.1448	13660.407	0.7497	6.8711	-0.2880
6	1085.830	9.690	0.1014	13660.407	0.6996	6.9901	-0.3573
7	1112.080	11.360	0.1335	13660.407	0.6137	7.0140	-0.4882
8	1408.030	15.010	0.2070	13660.407	0.5308	7.2499	-0.6333

LAMPIRAN V

DATA TENAGA MULTI GAMMA ^{152}Eu

Tabel Data Tenaga Multi Gamma ^{152}Eu dengan $T_{(1/2)}$ = 13 tahun

Tenaga (keV)	Gamma Yield
121.780	0.2820
244.690	0.0738
344.280	0.2640
411.12	0.0221
440.00	0.0308
778.900	0.1300
964.050	0.1448
1085.830	0.1014
1112.080	0.1335
1408.030	0.2070

*Sumber : Wisnu Susetyo,1988

LAMPIRAN VI

TEORI REGRESI

REGRESI POLINOMIAL

Misal (xi,yi) dengan i = 1,2,3,…,n adalah pasangan data yang diperoleh dari suatu pengukuran. X adalah variabel bebas dan y adalah variabel tak bebas. Dengan demikian yang akan dicari adalah hubungan kedua variabel x dan y dalam bentuk y = f(x).

Dalam statistika metode mencari hubungan antara kedua variabel tersebut disebut dengan regresi.

Pada regresi polinomial satu variabel bebas pangkat dari x dapat lebih dari satu , misalnya dua, tiga, empat atau bahkan lebih tinggi lagi.

Misalkan pangkat tertinggi, atau order dari polinom adalah m, maka persamaan regresinya adalah :

$$y = a_0 + a_1 + a_2x^2 + ...+ a_mx^m$$

sehingga untuk n pasangan data dapat langsung ditulis :

$$\begin{bmatrix} y_1 \\ y_2 \\ .... \\ y_i \\ .... \\ y_n \end{bmatrix} = \begin{bmatrix} 1 & x_1 & x_1^2 & x_1^m \\ 1 & x_2 & x_2^2 & x_2^m \\ ..... & ..... & .... & .... \\ 1 & x_3 & x_i^2 & x_i^m \\ .... & .... & .... & .... \\ 1 & x_4 & x_n^2 & x_n^m \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \\ ..... \\ a_i \\ .... \\ a_m \end{bmatrix}$$

atau secara singkat :

$Y = XA$

Dimana Y adalah matriks $(n \times 1)$, x adalah matriks $n \times (m+1)$ dan A adalah matriks $((m+1) \times 1)$. Proses selanjutnya adalah $Y = XA$ dikalikan dengan transpose matriks X yaitu X^T, dari kiri sehingga diperoleh

$$X^T.Y = X^T.XA$$

dan kemudian dikalikan lagi dari kiri dengan invers dari matriks X^TX untuk memperoleh elemen-elemen matriks A :

$$A = [X^TX]^{-1}[X^TY]$$

Sebagai ukuran dari besar hubungan antara X dan Y ini dinyatakan oleh koefisien korelasi yang akan dibahas berikut ini.

$$r^2 = \frac{SST - SSE}{SST} = 1 - \frac{SSE}{SST} = \frac{SSR}{SST}$$

Dimana SST adalah jumlah kuadrat total

SSE adalah jumlah kuadrat kesalahan

SSR adalah jumlah kuadrat regresi

$$SST = \sum_{i=1}^{n} \left(yi - \bar{y}\right)^2$$

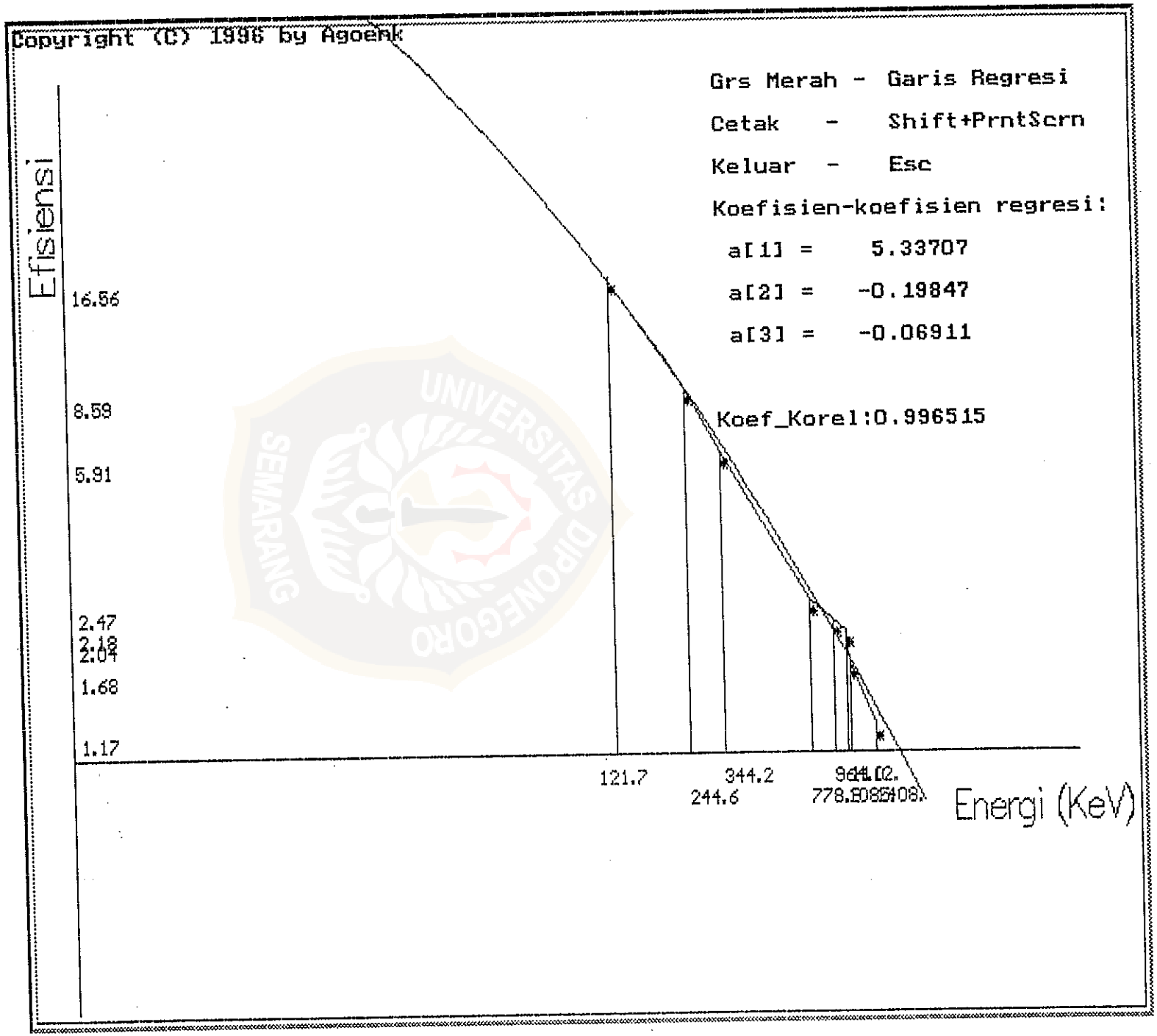
$$SSE = \sum_{i=1}^{n} \left(yi - yi\right)^2$$

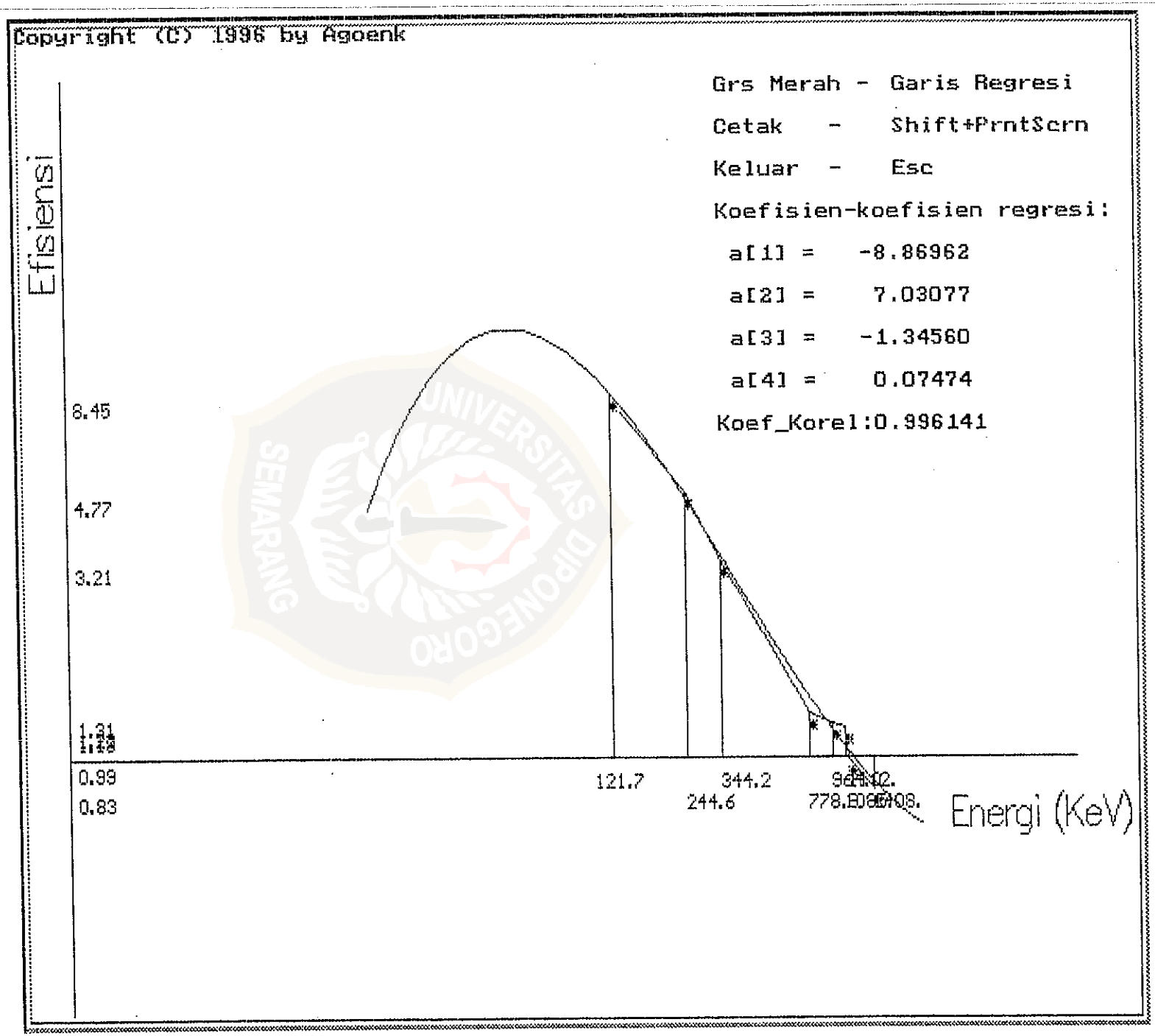
$$SSR = \sum_{i=1}^{n} \left(yi - \bar{y}\right)^2$$

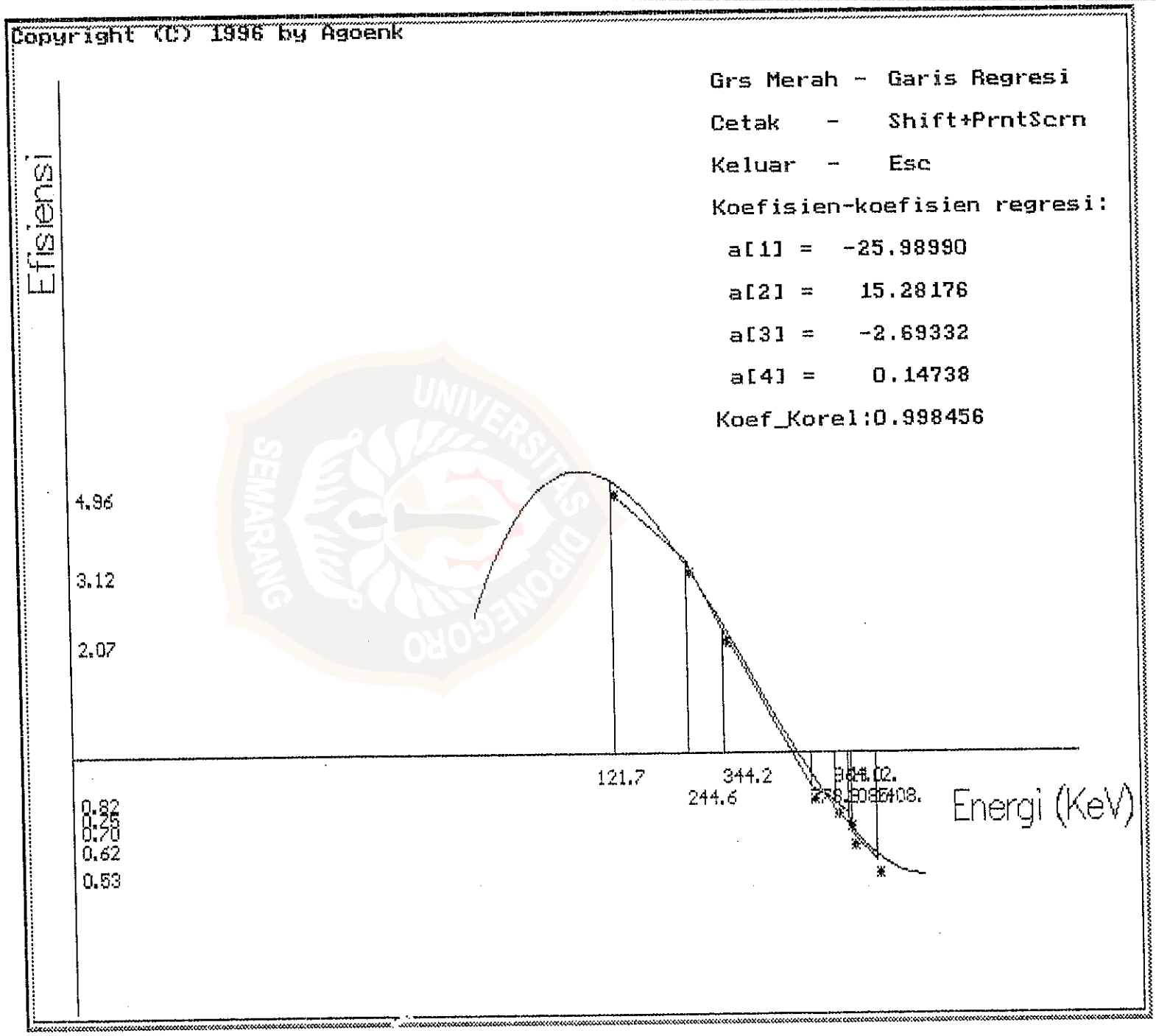
APNC

Versi 1.0

Programer : Agung Suradiyo
NIM J 401 91 0637
Jurusan Fisika FMIPA
Universitas Diponegoro
S e m a r a n g







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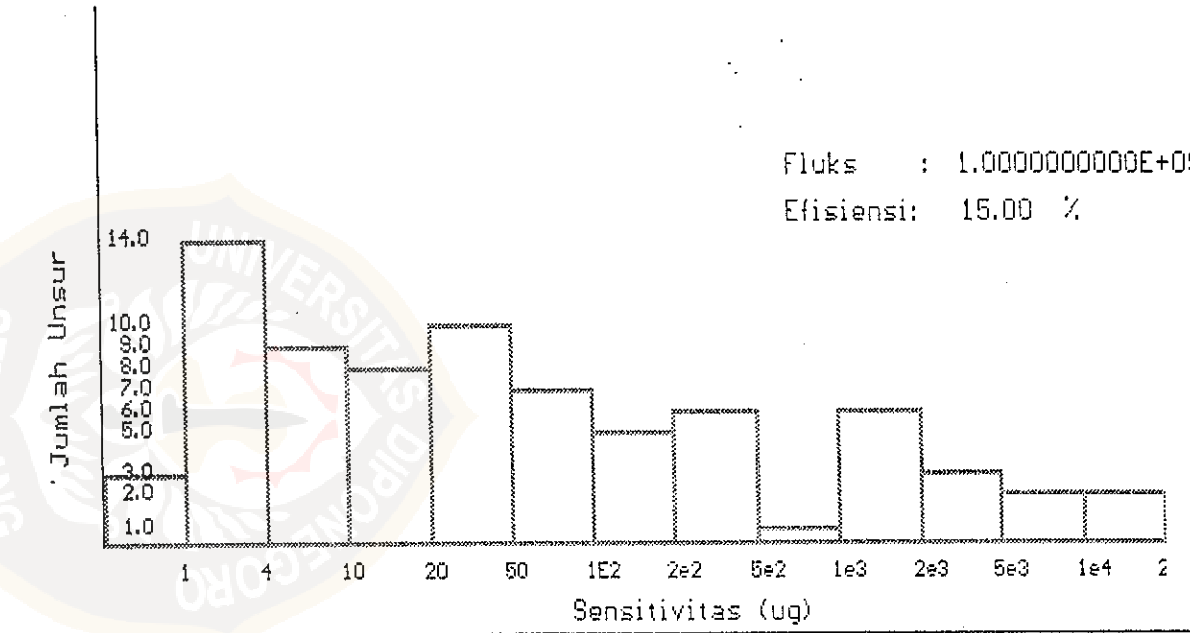
GRAFIK SENSITIVITAS



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1e-6 - 4e-6 :	Al Co Cr Dy Ga P- Pb Ra Rb Sb Si Th U- V-
4e-6 - 1e-5 :	Ag Cd Ho In Ni Sc Ta Xe Zr
1e-5 - 2e-5 :	Cl Fe Hg Mg Na Nd Pd Rh
2e-5 - 5e-5 :	Ar F- Ge I- Mo Ru Sn Sr Te Ti
5e-5 - 1e-4 :	Er Hf Ir Kr Lu Se W-
1e-4 - 2e-4 :	Cs K- O- Os Pt
2e-4 - 5e-4 :	As Au Ca Nb S- Tb
5e-4 - 1e-3 :	B-
1e-3 - 2e-3 :	Eu La N- Re Tm Y-
2e-3 - 5e-3 :	Ba Ce Gd
5e-3 - 1e-2 :	Sm Tl
1e-2 - << :	Mn Yb

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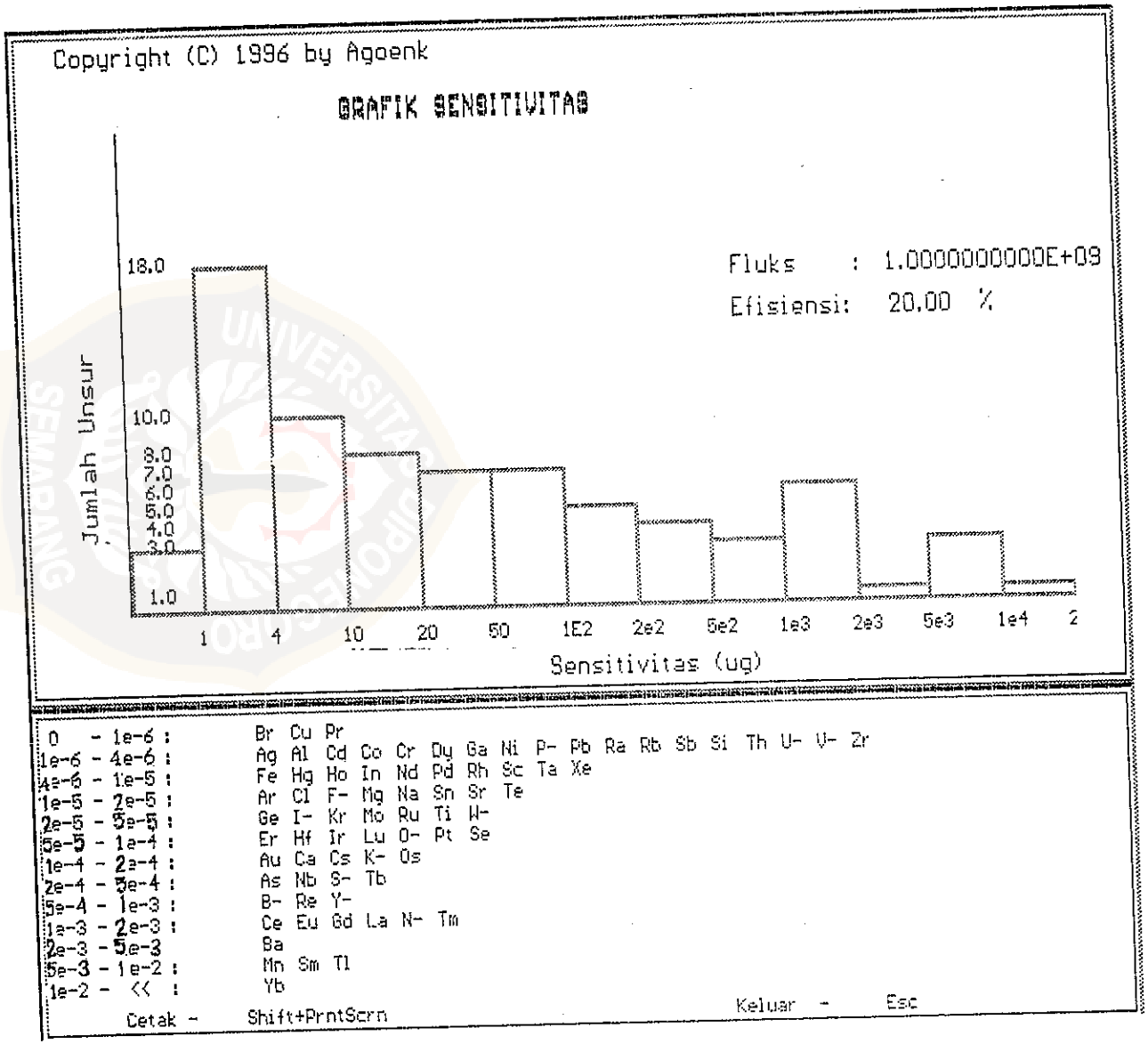
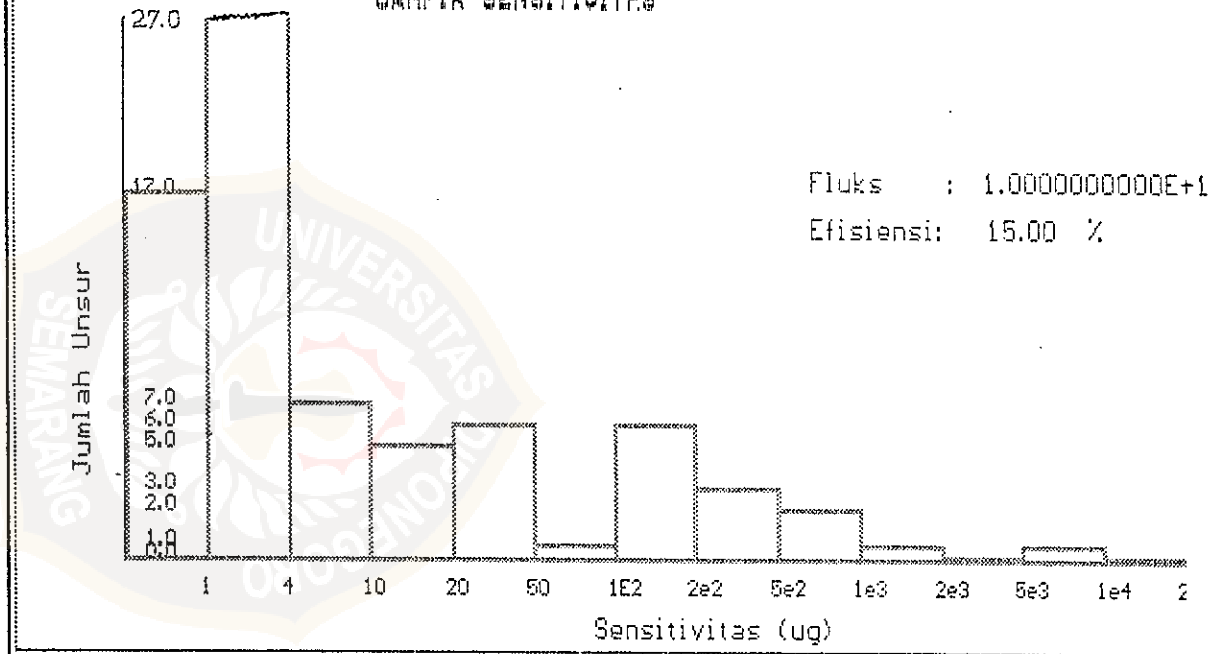


GRAFIK SENSITIVITAS



Fluks : 1.0000000000E+10

Efisiensi: 15.00 %

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1e-6 - 4e-5 :	Ag Ar Cd Cl F- Fe Ge Hg Ho I- In Mg Mo Na Nd Ni Pd Rh Ru Sc Sn Sr Ta Te Ti Xe
4e-5 - 1e-5 :	Er Hf Ir Kr Lu Se W-
1e-5 - 2e-5 :	Cs K- O- Os Pt
2e-5 - 5e-4 :	As Au Ca Nb S- Tb
5e-4 - 1e-4 :	B-
1e-4 - 2e-4 :	Eu La N- Re Tm Y-
2e-4 - 5e-3 :	Ba Ce Gd
5e-3 - 1.e-3 :	Sm Tl
1e-3 - 2e-3 :	Mn
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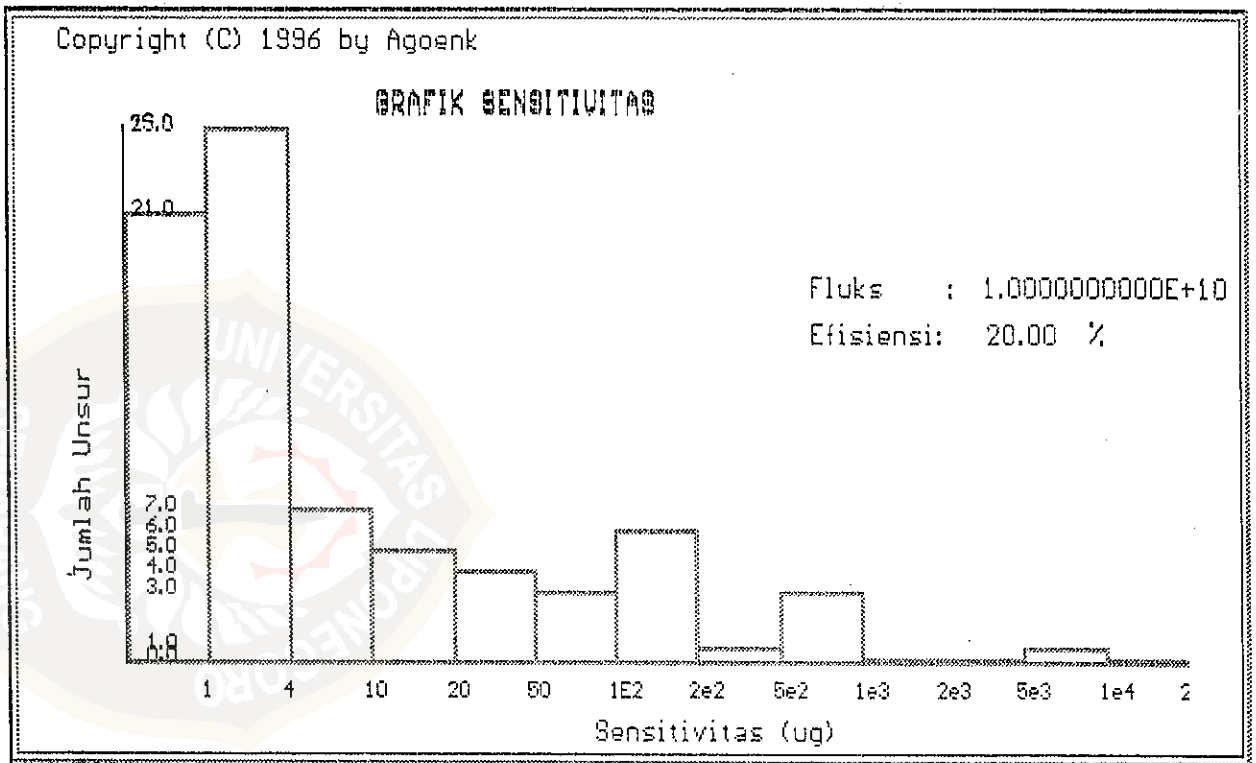

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1e-6 - 4e-6 :	Ar Cl F- Fe Ge Hg Ho I- In Kr Mg Mo Na Nd Pd Rh Ru Sc Sn Sr Ta Te Ti W- Xe
4e-6 - 1e-5 :	Er Hf Ir Lu O- Pt Se
1e-5 - 2e-5 :	Au Ca Cs K- Os
2e-5 - 5e-5 :	As Nb S- Tb
5e-5 - 1e-4 :	B- Re Y-
1e-4 - 2e-4 :	Ce Eu Gd La N- Tm
2e-4 - 5e-4 :	Ba
5e-4 - 1e-3 :	Mn Sm Tl
1e-3 - 2e-3 :	
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5e-3 - 1e-2 :	Yb
1e-2 - << :	

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