## LAMPIRAN

## PERHITUNGAN ADSORBSI CHITOSAN TERHADAP ION KROM (VI)

### I. Adsorbsi chitosan Pada pH 5

Konsentrasi $Cr_2O_7^{2-}$ awal = 4258,927 ppm ⟶ diubah dalam satuan mg/g

$$\text{Ppm} = \frac{mg}{L}$$

Volume $Cr_2O_7^{2-}$ yang digunakan 20 mL

$$4258{,}927 = \frac{mg}{20} \times 10^3$$

$$mg = 85{,}1786$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{85{,}1786}{0{,}4}\ \frac{mg}{g} = 212{,}9472 \text{ mg/g}$$

Konsentrasi $Cr_2O_7^{2-}$ awal = 212,9472 mg/g

a. Untuk waktu kontak 20 menit

Sisa = 3564,484 ppm

$$3564{,}484 = \frac{mg}{20} \times 10^3$$

$$mg = 71{,}2897$$

Chitosan yang digunakan sebanyak 0,4 g

$$\text{Sisa} = \frac{71{,}2897}{0{,}4}\ \frac{mg}{g}$$

= 178,2242 mg/g

teradsorbsi = konsentrasi awal - konsentrasi sisa

= 212,9472 mg/g - 178,2242 mg/g

$$= 34{,}7230 \text{ mg/g}$$

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{34{,}7230\ mg/g}{212{,}9472\ mg/g} \times 100\ \%$$

$$= 16{,}31\ \%$$

**b. Untuk waktu kontak 40 menit**

$$\text{Sisa} = 3465{,}278 \text{ ppm}$$

$$3465{,}278 = \frac{mg}{20} \times 10^3$$

$$\text{mg} = 69{,}3056$$

Chitosan yang digunakan sebanyak 0,4 g

$$\text{Sisa} = \frac{69{,}3056\ mg/g}{0{,}4\ g}$$

$$= 173{,}2639 \text{ mg/g}$$

$$\text{Teradsorbsi} = \text{konsentrasi awal} - \text{konsentrasi sisa}$$

$$= 212{,}9472 \text{ mg/g} - 173{,}2639 \text{ mg/g}$$

$$= 39{,}6839 \text{ mg/g}$$

$$\text{Persentase} = \frac{\textit{konsentri awal}}{\textit{konsentrasi sisa}} \times 100\ \%$$

$$= \frac{39{,}6839\ mg/g}{212{,}9472\ mg/g} \times 100\ \%$$

$$= 18{,}63\ \%$$

**c. Waktu kontak 60 menit**

$$\text{Sisa} = 3564{,}484 \text{ ppm}$$

$$3564{,}48 = \frac{mg}{20} \times 10^3$$

$$mg = 71{,}2897$$

Chitosan yang digunakan sebanyak 0,4 g

$$\text{Sisa} = \frac{71{,}2897\ mg}{0{,}4\ mg}$$

$$= 178{,}2242 \text{ mg/g}$$

Teradsorbsi = konsentrasi awal – konsentrasi sisa

$$= 212{,}9472 \text{ mg/g} - 178{,}2242 \text{ mg/g}$$

$$= 34{,}7730 \text{ mg/g}$$

$$\text{Persentase} = \frac{konsentrasi\ teradsorbsi}{konsentrasi\ awal} \times 100\ \%$$

$$= \frac{34{,}7730\ mg/g}{212{,}9472\ mg/g} \times 100\ \%$$

$$= 16{,}31\ \%$$

**d. Waktu kontak 80 menit**

Sisa = 3762,897 ppm

$$3762{,}897 = \frac{mg}{20} \times 10^3$$

$$mg = 75{,}2579$$

Chitosan yang digunakan sebanyak 0,4 g

$$\text{Sisa} = \frac{75{,}2579\ mg}{0{,}4\ g}$$

$$= 188{,}1447 \text{ mg/g}$$

Teradsorbsi = konsentrasi awal – konsentrasi sisa

$= 212,9472 \text{ mg/g} - 188,1447 \text{ mg/g}$

$= 24,8025 \text{ mg/g}$

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{24,8025\ mg/g}{212,9472\ mg/g} \times 100\ \%$$

$= 11,65\ \%$

**e. Waktu kontak 100 menit**

$\text{Sisa} = 3465,278 \text{ ppm}$

$$3465,278 = \frac{mg}{20} \times 20^3$$

$\text{mg} = 69,3056$

Chitosan yang digunakan sebanyak 0,4 g

$$\text{Sisa} = \frac{69,3056\ mg}{0,4\ g}$$

$= 173,2639 \text{ mg/g}$

Teradsorbsi = konsentrasi awal – konsentrasi sisa

$= 212,9472 \text{ mg/g} - 173,2639 \text{ mg/g}$

$= 39,6833 \text{ mg/g}$

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{39,6833\ mg/g}{212,9472\ mg/g} \times 100\ \%$$

$= 18,63\ \%$

**II. Adsorbsi chitosan pada pH 4**

Konsentrasi $Cr_2O_7^{2-}$ awal = 4655,754 ppm

$$\text{Ppm} = \frac{mg}{L}$$

Volume $Cr_2O_7^{2-}$ digunakan 20 mL

$$465{,}754 = \frac{mg}{20} \times 10^3$$

$$mg = 93{,}1151$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{93{,}1151\ mg}{0{,}4\ g} = 232{,}7872 \text{ mg/g}$$

Konsentrasi awal $Cr_2O_7^{2-}$ = 232.7872 mg/g

a. **Waktu kontak 20 menit**

Sisa = 3465,278 ppm

$$3465{,}276 = \frac{mg}{20} \times 10^3$$

$$mg = 69{,}3055$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{69{,}3055\ mg}{0{,}4\ g} = 173{,}2641 \text{ mg/g}$$

Sisa = 173,2641 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 232,7872 mg/g – 173,2640 mg/g

= 59,5237 mg/g

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{59{,}5237\ mg/g}{232{,}7872\ mg/g} \times 100\ \%$$

$$= 25{,}57\ \%$$

**b. waktu kontak 40 menit**

Sisa = 3266,865 ppm

$$3266{,}865 = \frac{mg}{20} \times 10^3$$

mg = 65,3373

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{65{,}3373\ mg}{0{,}4\ g} = 165{,}3425\ \text{mg/g}$$

Sisa = 165,3425 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 232,7872 mg/g – 163,3425 mg/g

= 69,4445 mg/gr

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{69{,}4445\ mg/g}{232{,}7872\ mg/g} \times 100\ \%$$

$$= 29{,}83\ \%$$

**c. Waktu kontak 60 menit**

Sisa = 3465,278 ppm

$$3465{,}278 = \frac{mg}{20} \times 10^3$$

$$mg = 69{,}3056$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{69{,}3065\ mg}{0{,}4\ g} = 173{,}2640\ mg/g$$

Sisa = 173,2640 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 232,7872 mg/g – 173,2640 mg/g

= 59,5237 mg/g

$$\text{Persentase} = \frac{konsentrasi\ teradsorbsi}{konsentrasi\ awal} \times 100\ \%$$

$$= \frac{59{,}5237\ mg/g}{232{,}7872\ mg/g} \times 100\ \%$$

= 25,57 %

**d. waktu kontak 80 menit**

Sisa = 3366,071 ppm

$$3366{,}071 = \frac{mg}{20} \times 10^3$$

$$mg = 67{,}3214$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{67{,}3214\ mg}{0{,}4\ g} = 168{,}3035\ mg/g$$

Sisa = 168,3035 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 232,7872 mg/g – 168,3035 mg/g

= 64,4843 mg/g

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{64{,}4843\ mg/g}{232{,}7872\ mg/g} \times 100\ \%$$

= 27,70 %

**e. Waktu kontak 100 menit**

Sisa = 3961,310 ppm

$$3961{,}310 = \frac{mg}{20} \times 10^3$$

mg = 79,2262

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{79{,}2262\ mg/g}{0{,}4\ g} = 198{,}0655\ \text{mg/g}$$

Sisa = 198,0655 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 232,7872 mg/g – 198,0655 mg/g

= 34,7223 mg/g

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{34{,}7223\ mg/g}{232{,}7872\ mg/g} \times 100\ \%$$

= 14,92 %

**II. Adsorbsi Chitosan terahadap Ion Cr (VI) pada pH 5**

Konsentrasi awal $Cr_2O_7^{2-}$ = 4378,378 ppm ⟶ diubah dalam mg/g

$$\text{ppm} = \frac{mg}{L}$$

Volume $Cr_2O_7^{2-}$ yang digunakan sebesar 20 mL

$$4378{,}378 = \frac{mg}{20} \times 10^3$$

$$mg = 87{,}5676$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{87{,}5676\ mg}{0{,}4\ g} = 218{,}9189 \text{ mg/g}$$

Konsentrasi awal $Cr_2O_7^{2-}$ = 218,9189 mg/g

**a. Waktu kontak 10 menit**

Sisa = 3648,649 ppm

$$3648{,}649 = \frac{mg}{20} \times 10^3$$

$$mg = 72{,}9730$$

Chitosan yang digunakan sebesar 0,4 g

$$\frac{72{,}9730\ mg}{0{,}4\ g} = 182{,}4324 \text{ mg/g}$$

Sisa = 182,4324 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 218,9189 mg/g – 182,4324 mg/g

= 36,4865 mg/g

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{36{,}4865\ mg/g}{218{,}9189\ mg/g} \times 100\ \%$$

$$= 16{,}69\ \%$$

**b. Waktu kontak 20 menit**

Sisa = 3378,378 ppm

$$3378{,}378 = \frac{mg}{20} \times 10^3$$

$$mg = 67{,}5676$$

Chitosan yang digunakan sebesar 0,4 g

$$\frac{67{,}5676\ mg}{0{,}4\ g} = 168{,}9189\ mg/g$$

Sisa = 168,9189 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 218,9189 mg/g – 168,9189 mg/g

= 50,0000 mg/g

$$\text{Persentase} = \frac{\textit{konsentrsi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{50{,}0000\ mg/g}{218{,}9189\ mg/g} \times 100\ \%$$

$$= 22{,}84\ \%$$

**c. Waktu kontak 30 menit**

Sisa = 3297,297 ppm

$$3297{,}297 = \frac{mg}{20} \times 10^3$$

$$mg = 65{,}9459$$

Chitosan yang digunakan sebesar 0,4 g

$$\frac{65{,}9459\ mg}{0{,}4\ g} = 164{,}8648\ mg/g$$

Sisa = 164,8648 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

= 218,9189 mg/g – 164,8648 mg/g

= 53,3783 mg/g

$$\text{Persentase} = \frac{konsentrasi\ teradsorbsi}{konsentrasi\ awal} \times 100\ \%$$

$$= \frac{53{,}3783\ mg/g}{218{,}9189} \times 100\ \%$$

= 24,69 %

**d. Waktu kontak 40 menit**

Sisa = 3310,811 ppm

$$3310{,}811 = \frac{mg}{20} \times 10^3$$

$$mg = 66{,}2162$$

Chitosan yang digunakan sebanyak 0,4 g

$$\frac{66{,}2162\ mg}{0{,}4\ g} = 165{,}5406\ mg/g$$

Sisa = 165,5406 mg/g

Teradsorbsi = konsentrasi awal – konsentrasi sisa

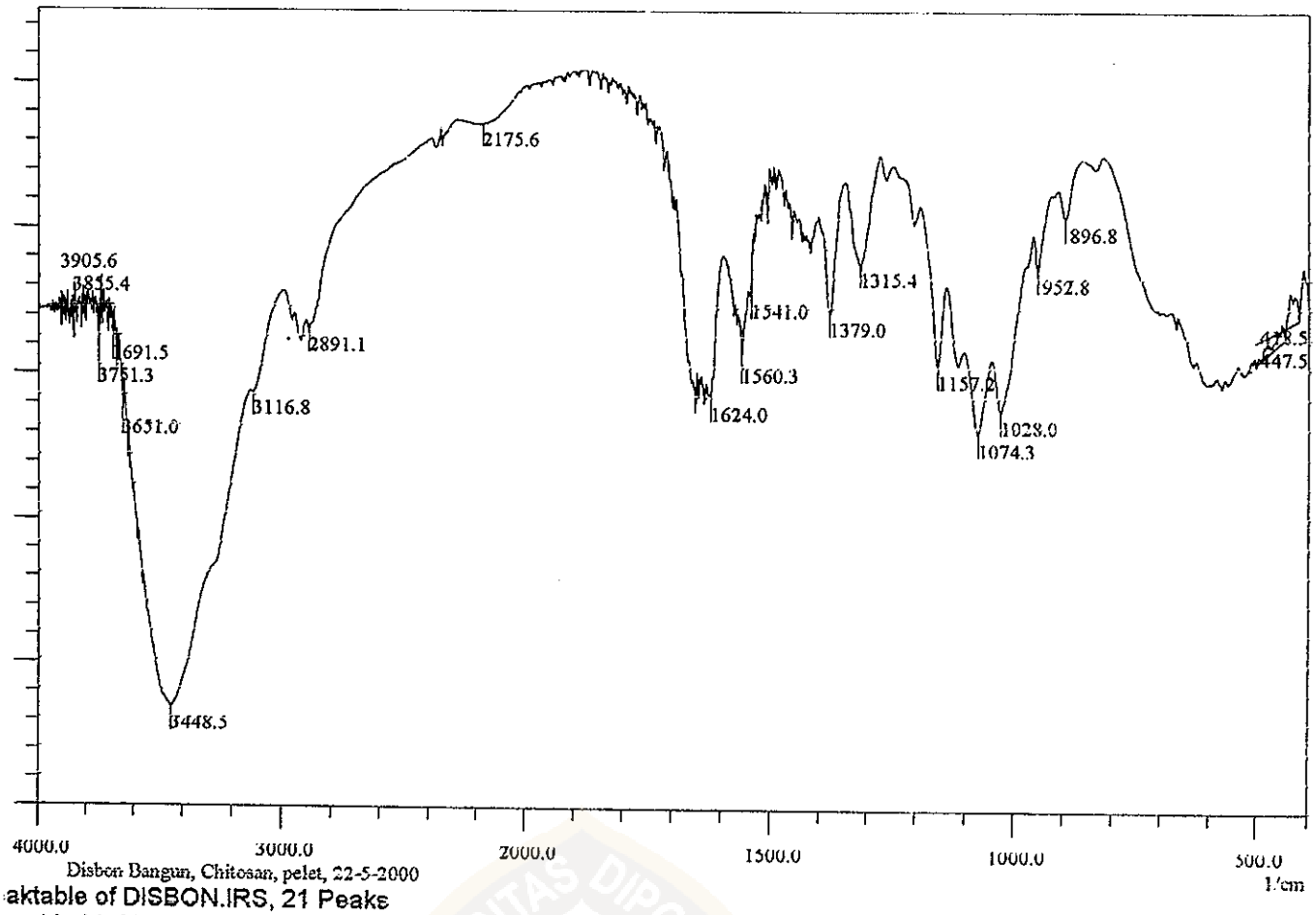
$$= 218{,}9189 \text{ mg/g} - 165{,}5406 \text{ mg/g}$$

$$= 53{,}3783 \text{ mg/g}$$

$$\text{Persentase} = \frac{\textit{konsentrasi teradsorbsi}}{\textit{konsentrasi awal}} \times 100\ \%$$

$$= \frac{53{,}3783\ mg/g}{218{,}9189\ mg/g} \times 100\ \%$$

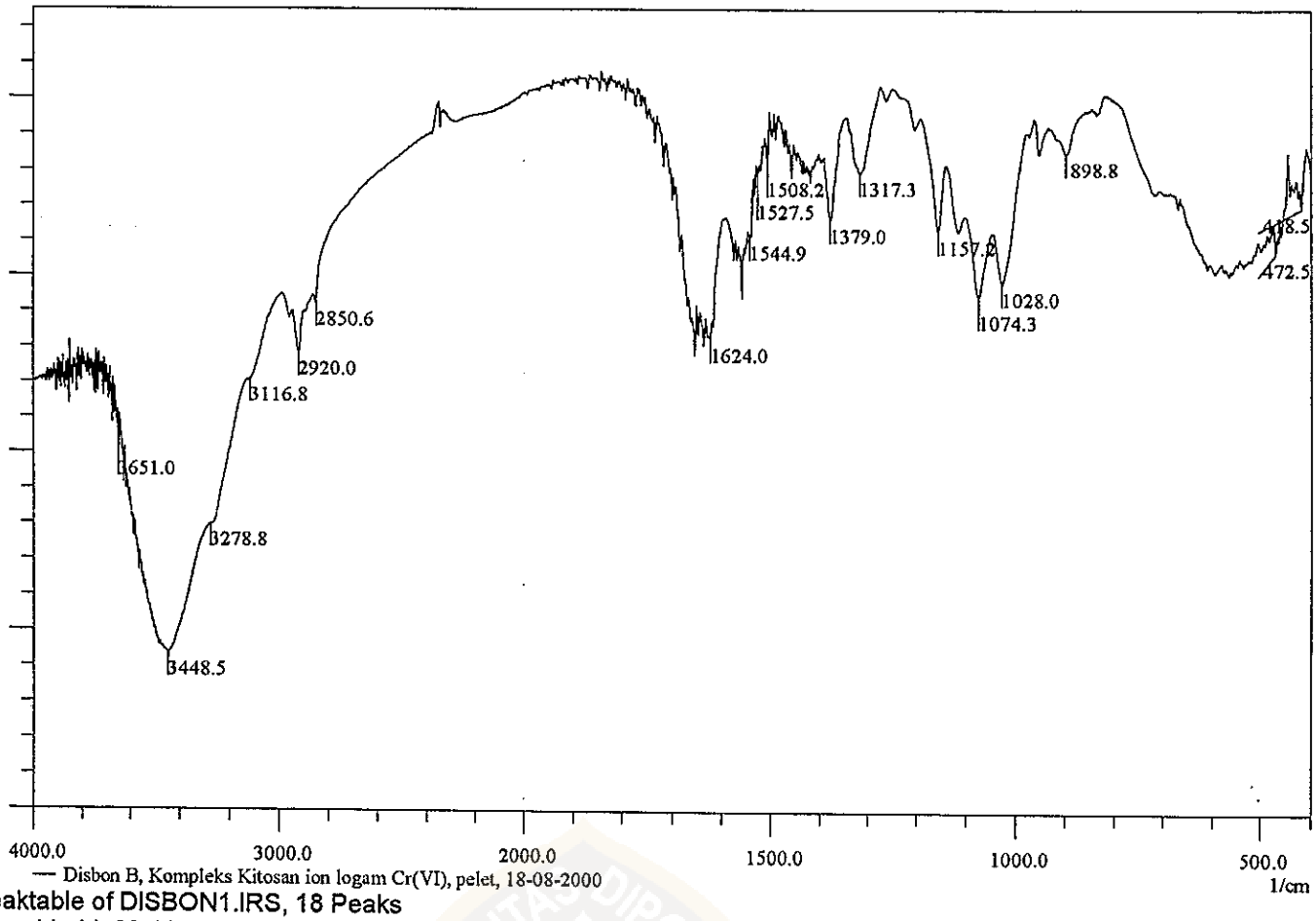
$$= 24{,}38\ \%$$




Disbon Bangun, Chitosan, pelet, 22-5-2000

aktable of DISBON.IRS, 21 Peaks
reshhold: 80, Noise: 2, Current Range Selection

| Pos. (1/cm) | Inten. (%T) |
|---|---|
| 418.5 | 53.952 |
| 447.5 | 52.702 |
| 896.8 | 60.810 |
| 952.8 | 57.279 |
| 1028.0 | 47.610 |
| 1074.3 | 46.140 |
| 1157.2 | 50.671 |
| 1315.4 | 57.683 |
| 1379.0 | 54.265 |
| 1541.0 | 55.498 |
| 1560.3 | 51.107 |
| 1624.0 | 48.493 |
| 2175.6 | 67.188 |
| 2891.1 | 53.031 |
| 3116.8 | 48.731 |
| 3448.5 | 26.871 |
| 3651.0 | 47.327 |
| 3691.5 | 52.381 |
| 3751.3 | 52.792 |
| 3855.4 | 52.394 |
| 3905.6 | 53.229 |




— Disbon B, Kompleks Kitosan ion logam Cr(VI), pelet, 18-08-2000

aktable of DISBON1.IRS, 18 Peaks

reshhold: 80, Noise: 2, No Range Selection

| Pos. (1/cm) | Inten. (%T) |
|---|---|
| 418.5 | 53.873 |
| 472.5 | 51.322 |
| 898.8 | 56.961 |
| 1028.0 | 49.617 |
| 1074.3 | 48.836 |
| 1157.2 | 52.503 |
| 1317.3 | 55.852 |
| 1379.0 | 53.184 |
| 1508.2 | 55.823 |
| 1527.5 | 55.792 |
| 1544.9 | 52.202 |
| 1624.0 | 46.453 |
| 2850.6 | 48.388 |
| 2920.0 | 45.607 |
| 3116.8 | 44.118 |
| 3278.8 | 35.941 |
| 3448.5 | 28.655 |
| 3651.0 | 39.904 |

**Laboratorium Kimia Analitik**
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Sekip Utara Kotak Pos BLS 21 Yogyakarta 55281 telp. 0274-902740 faks. 0274-513339

# *HASIL ANALISIS*

No. : 100/HA/AAS-KA/05/00
Nama pengirim : Diabon Bangun (Jl. Setya Budi No. 109 Semarang, Fax. 022-7478133)
Sampel : Air sejumlah: 18
Penentuan : Cr
Tanggal analisis : 23 Mei 2000

| No. | Parameter | Kode sampel | Hasil Pengukuran (ppm) | Metode |
|---|---|---|---|---|
| 1. | Cr | pH3 20 menit | 3266,865 | AAS |
| 2. | " | pH4 20 menit | 3465,278 | " |
| 3. | " | pH5 20 menit | 3564,484 | " |
| 4. | " | pH3 40 menit | 3465,278 | " |
| 5. | " | pH4 40 menit | 3266,865 | " |
| 6. | " | pH5 40 menit | 3465,278 | " |
| 7. | " | pH3 60 menit | 3465,278 | " |
| 8. | " | pH4 60 menit | 3465,278 | " |
| 9. | " | pH5 60 menit | 3564,484 | " |
| 10. | " | pH3 80 menit | 3564,484 | " |
| 11. | " | pH4 80 menit | 3366,071 | " |
| 12. | " | pH5 80 menit | 3762,897 | " |
| 13. | " | pH3 100 menit | 3564,484 | " |
| 14. | " | pH4 100 menit | 3961,310 | " |
| 15. | " | pH5 100 menit | 3465,278 | " |
| 16. | " | pH3 $Cr_2O_7^{2-}$ | 4358,135 | " |
| 17. | " | pH4 $Cr_2O_7^{2-}$ | 4655,754 | " |
| 18. | " | pH5 $Cr_2O_7^{2-}$ | 4258,929 | " |

Demikian, harap dapat dipergunakan sebagaimana mestinya.

Yogyakarta, 23 Mei 2000
Operator,

Pribadi Prasetyo
NIP. 130811390

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# *HASIL ANALISIS*

No. : 109/HA/AAS-KA/07/00
Nama pengirim : Diabon Bangun (Jl. Setya Budi No. 109 Semarang, Fax. 022-7478133)
Sampel : Air sejumlah: 5
Pengujian : Cr
Tanggal analisis : 11 Juli 2000

| No. | Parameter | Kode sampel | Hasil Pengukuran (ppm) | Metode |
|---|---|---|---|---|
| 1. | Cr | pH3 0 menit | 4378,378 | AAS |
| 2. | " | pH3 10 menit | 3648,649 | " |
| 3. | " | pH3 20 menit | 3378,378 | " |
| 4. | " | pH3 30 menit | 3297,297 | " |
| 5. | " | pH3 40 menit | 3310,811 | " |

Demikian, harap dapat dipergunakan sebagaimana mestinya.

Yogyakarta, 12 Juli 2000
Operator,

Pribadi Prasetyo
NIP. 130811390