

## V. KESIMPULAN DAN SARAN

### A. KESIMPULAN

1. Natrium alginat dapat diekstraksi dari rumput laut jenis *Sargassum crasifolium* J.G.Ag. dan *Turbinaria murrayana* Bort. dengan hasil rendemen dan viskositas semakin kecil dengan waktu perendaman yang semakin lama.
2. Waktu perendaman dan konsentrasi zat pemutih optimum terdapat pada perlakuan  $H_2O_2$  1% dan kaporit 0,5% dalam waktu 1 jam untuk menghasilkan rendemen dan viskositas natrium alginat yang optimal.
3. Warna visual dari natrium alginat yang baik terjadi pada waktu perendaman rumput laut dan konsentrasi zat pemutih yang optimum yaitu pada perlakuan  $H_2O_2$  1% dan kaporit 0,5% pada waktu perendaman 1,5 jam sampai 2 jam.

### B. SARAN

Diharapkan pada waktu mengadakan pemutihan pada Natrium alginat apabila digunakan zat oxidator atau zat pemutih agar jangan dilakukan kontak yang lama antara bahan baku dan zat oxidator atau zat pemutih tersebut karena akan memberikan hasil yang tidak baik. Dan juga diharapkan waktu yang akan datang ada penelitian lanjutan mengenai pemutihan alginat sehingga didapatkan hasil alginat yang benar-benar berwarna putih bersih seperti alginat standard.

## DAFTAR PUSTAKA

- Anonim, 1984, *Alginate Products for Scientific Water Control*, Kelco Co, third edition, California.
- Aslan, L. M., 1991, *Budidaya Rumput Laut*, Penerbit Kanisius, Yogyakarta.
- Afrianto, E dan E. Liviawaty., 1989, *Budidaya Rumput Laut dan Cara Pengolahannya*, Jakarta.
- Duma, N., Latief, S., 1985, *Penelitian Isolasi Asam Alginat Dari Rumput Laut di Sekitar Pantai Ujung Pandang*, Departemen Perindustrian, Balai Penelitian dan Pengembangan Industri, Ujung Pandang.
- Duma, N., Pereng, I., 1991, *Penelitian Pemutihan Alginat Bubuk dari Rumput Laut Jenis Sargassum*, Departemen Perindustrian, Balai Penelitian dan Pengembangan Industri, Ujung Pandang.
- Harper, K. A., and Hepworth, A., 1981, *Texture Modifying Agents*, Dept. of Food Studies Queensland Agricultural College, Lawes, Queensland.
- Horwitz, W., 1970, *Official Methods of Analysis the Association of Official Analytical Chemists*, PO. BOX 540 Washington DC 20044.
- Kartika, B., 1992, *Petunjuk Evaluasi Produk Industri Hasil Pertanian*, PAU Pangan dan Gizi, UGM, Yogyakarta.
- Kirk., 1971, *Encyclopedia of Chemical Technology*, Vol 1 St, Ed, *The International Encyclopedia*, Inc. New York.
- Muljohardjo, M., 1988, *Analisis Pati dan Produk Pati*, PAU Pangan Dan Gizi, UGM, Yogyakarta.
- Ronn, W., D., 1985, *Uses of Marine Algae Biotechnology and Industry*, National Academy Press, Washington.
- Soegiarto, A., 1978, *Rumput Laut ( Algae ) Manfaat Potensi dan Usaha Budidayanya*, Lembaga Oceanologi Nasional, LIPI, Jakarta.

Soegiartono, O., 1977, *Laporan Penelitian Pembuatan Natrium Alginat dari Sargassum sp Yang Tumbuh di Pantai Selatan*, Lembaga Penelitian UGM, Yogyakarta.

Sudarmanto., Suparmo., 1988, *Laporan Penelitian Pengaruh Cara dan Suhu Pengeringan Rumput Laut Terhadap Rendemen dan Sifat Ekstraknya*, Pangan Dan Gizi, UGM, Yogyakarta.

Sudjadi, 1988, *Metode Pemisahan*, Penerbit Kanisius, Yogyakarta.

Tim Penulis, PS., 1974, *Budidaya, Pengolahan dan Pemasaran Rumput Laut*, Penerbit Penebar Swadaya, Jakarta.

Winarno, F., G., 1990, *Teknologi Pengolahan Rumput Laut*, Penerbit Pustaka Sinar Harapan, Jakarta.



**LAMPIRAN**



$$2 \text{ jam} = \text{ulangan I } 2,30 / 10 \times 100\% = 23,0\%$$

$$\text{II } 2,28 / 10 \times 100\% = 22,8\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,33 / 10 \times 100\% = 23,3\%$$

$$\text{II } 2,30 / 10 \times 100\% = 23,0\%$$

$$4. \text{ Perlakuan } \text{H}_2\text{O}_2 \text{ 0,5\% } 1 \text{ jam} = \text{ulangan I } 2,82 / 10 \times 100\% = 28,2\%$$

$$\text{II } 2,80 / 10 \times 100\% = 28,0\%$$

$$1,5 \text{ jam} = \text{ulangan I } 2,64 / 10 \times 100\% = 26,4\%$$

$$\text{II } 2,60 / 10 \times 100\% = 26,0\%$$

$$2 \text{ jam} = \text{ulangan I } 2,55 / 10 \times 100\% = 25,5\%$$

$$\text{II } 2,53 / 10 \times 100\% = 25,3\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,25 / 10 \times 100\% = 22,5\%$$

$$\text{II } 2,23 / 10 \times 100\% = 22,3\%$$

$$5. \text{ Perlakuan } \text{H}_2\text{O}_2 \text{ 1\% } 1 \text{ jam} = \text{ulangan I } 2,93 / 10 \times 100\% = 29,3\%$$

$$\text{II } 2,90 / 10 \times 100\% = 29,0\%$$

$$1,5 \text{ jam} = \text{ulangan I } 2,85 / 10 \times 100\% = 28,5\%$$

$$\text{II } 2,81 / 10 \times 100\% = 28,1\%$$

$$2 \text{ jam} = \text{ulangan I } 2,62 / 10 \times 100\% = 26,2\%$$

$$\text{II } 2,60 / 10 \times 100\% = 26,0\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,40 / 10 \times 100\% = 24,0\%$$

$$\text{II } 2,30 / 10 \times 100\% = 23,0\%$$

$$6. \text{ Perlakuan } \text{H}_2\text{O}_2 \text{ 1,5\% } 1 \text{ jam} = \text{ulangan I } 2,67 / 10 \times 100\% = 26,7\%$$

$$\text{II } 2,63 / 10 \times 100\% = 26,3\%$$

$$1,5 \text{ jam} = \text{ulangan I } 2,46 / 10 \times 100\% = 24,6\%$$

$$\text{II } 2,46 / 10 \times 100\% = 24,6\%$$

$$2 \text{ jam} = \text{ulangan I } 2,41 / 10 \times 100\% = 24,1\%$$

$$\text{II } 2,40 / 10 \times 100\% = 24,0\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,26 / 10 \times 100\% = 22,6\%$$

$$\text{II } 2,27 / 10 \times 100\% = 22,7\%$$



$$2 \text{ jam} = \text{ulangan I } 2,37 / 10 \times 100\% = 23,7\%$$

$$\text{II } 2,35 / 10 \times 100\% = 23,5\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,13 / 10 \times 100\% = 21,3\%$$

$$\text{II } 2,10 / 10 \times 100\% = 21,0\%$$

$$5. \text{ Perlakuan } \text{H}_2\text{O}_2 \text{ 1\% } 1 \text{ jam} = \text{ulangan I } 2,94 / 10 \times 100\% = 29,4\%$$

$$\text{II } 2,91 / 10 \times 100\% = 29,1\%$$

$$1,5 \text{ jam} = \text{ulangan I } 2,80 / 10 \times 100\% = 28,0\%$$

$$\text{II } 2,78 / 10 \times 100\% = 27,8\%$$

$$2 \text{ jam} = \text{ulangan I } 2,69 / 10 \times 100\% = 26,9\%$$

$$\text{II } 2,67 / 10 \times 100\% = 26,7\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,42 / 10 \times 100\% = 24,2\%$$

$$\text{II } 2,40 / 10 \times 100\% = 24,0\%$$

$$6. \text{ Perlakuan } \text{H}_2\text{O}_2 \text{ 1,5\% } 1 \text{ jam} = \text{ulangan I } 2,79 / 10 \times 100\% = 27,9\%$$

$$\text{II } 2,78 / 10 \times 100\% = 27,8\%$$

$$1,5 \text{ jam} = \text{ulangan I } 2,62 / 10 \times 100\% = 26,2\%$$

$$\text{II } 2,60 / 10 \times 100\% = 26,0\%$$

$$2 \text{ jam} = \text{ulangan I } 2,48 / 10 \times 100\% = 24,8\%$$

$$\text{II } 2,46 / 10 \times 100\% = 24,6\%$$

$$2,5 \text{ jam} = \text{ulangan I } 2,31 / 10 \times 100\% = 23,1\%$$

$$\text{II } 2,30 / 10 \times 100\% = 23,0\%$$

## II. Viskositas dengan Viskosimeter Oswald

$\rho$  ( berat jenis ) Natrium alginat hasil isolasi , cara mencarinya :

$$\text{Berat gelas ukur kosong} = 77,043 \text{ gr}$$

$$\text{Berat gelas ukur + aquades} = 124,486 \text{ gr}$$

$$\text{Berat air} = 124,486 - 77,043 = 47,443 \text{ gr}$$



$$\rho = \frac{\text{Berat sampel}}{\text{Berat air}} \text{ gr / cm}^3$$

$$\text{Rumus Viskositas} = \frac{\rho \cdot t(\text{ waktu ) larutan}}{t(\text{ waktu ) air}} \text{ poise}$$

### A. Rumput laut jenis *Sargassum crasifolium* J.G.Ag.

#### 1. Perlakuan H<sub>2</sub>O<sub>2</sub> 0,5 %

$$\text{1 jam ulangan I } \rho = \frac{2,82}{47,443} = 0,059 \quad V = \frac{0,059 \times 78}{54} = 0,085 \text{ p}$$

$$\text{II } \rho = \frac{2,80}{47,443} = 0,059 \quad V = \frac{0,059 \times 75}{54} = 0,082 \text{ p}$$

$$\text{1,5 jam ulangan I } \rho = \frac{2,64}{47,443} = 0,055 \quad V = \frac{0,055 \times 70}{54} = 0,070 \text{ p}$$

$$\text{II } \rho = \frac{2,60}{47,443} = 0,055 \quad V = \frac{0,055 \times 67}{54} = 0,066 \text{ p}$$

$$\text{2 jam ulangan I } \rho = \frac{2,55}{47,443} = 0,054 \quad V = \frac{0,054 \times 59}{54} = 0,060 \text{ p}$$

$$\text{II } \rho = \frac{2,53}{47,443} = 0,053 \quad V = \frac{0,053 \times 56}{54} = 0,057 \text{ p}$$

$$\text{2,5 jam ulangan I } \rho = \frac{2,25}{47,443} = 0,047 \quad V = \frac{0,047 \times 53}{54} = 0,046 \text{ p}$$

$$\text{II } \rho = \frac{2,23}{47,443} = 0,047 \quad V = \frac{0,047 \times 51}{54} = 0,044 \text{ p}$$

#### 2. Perlakuan H<sub>2</sub>O<sub>2</sub> 1 %

$$\text{1 jam ulangan I } \rho = \frac{2,93}{47,443} = 0,062 \quad V = \frac{0,062 \times 83}{54} = 0,095 \text{ p}$$

$$\text{II } \rho = \frac{2,90}{47,443} = 0,061$$

47,443

$$V = \frac{0,061 \times 81}{54} = 0,091 \text{ p}$$

54

$$1,5 \text{ jam ulangan I } \rho = \frac{2,85}{47,443} = 0,060$$

47,443

$$V = \frac{0,060 \times 74}{54} = 0,082 \text{ p}$$

54

$$\text{II } \rho = \frac{2,81}{47,443} = 0,059$$

47,443

$$V = \frac{0,059 \times 70}{54} = 0,076 \text{ p}$$

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$$2 \text{ jam ulangan I } \rho = \frac{2,62}{47,443} = 0,055$$

47,443

$$V = \frac{0,055 \times 68}{54} = 0,069 \text{ p}$$

54

$$\text{II } \rho = \frac{2,60}{47,443} = 0,055$$

47,443

$$V = \frac{0,055 \times 63}{54} = 0,064 \text{ p}$$

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$$2,5 \text{ jam ulangan I } \rho = \frac{2,40}{47,443} = 0,051$$

47,443

$$V = \frac{0,051 \times 55}{54} = 0,052 \text{ p}$$

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$$\text{II } \rho = \frac{2,30}{47,443} = 0,048$$

47,443

$$V = \frac{0,048 \times 52}{54} = 0,046 \text{ p}$$

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### 3. Perlakuan $\text{H}_2\text{O}_2$ 1,5%

$$1 \text{ jam ulangan I } \rho = \frac{2,67}{47,443} = 0,056$$

47,443

$$V = \frac{0,056 \times 80}{54} = 0,082 \text{ p}$$

54

$$\text{II } \rho = \frac{2,63}{47,443} = 0,055$$

47,443

$$V = \frac{0,055 \times 78}{54} = 0,079 \text{ p}$$

54

$$1,5 \text{ jam ulangan I } \rho = \frac{2,46}{47,443} = 0,052$$

47,443

$$V = \frac{0,052 \times 75}{54} = 0,072 \text{ p}$$

54

$$\text{II } \rho = \frac{2,46}{47,443} = 0,052$$

47,443

$$V = \frac{0,052 \times 75}{54} = 0,072 \text{ p}$$

54

$$2 \text{ jam ulangan I } \rho = \frac{2,41}{47,443} = 0,051$$

47,443

$$V = \frac{0,051 \times 65}{54} = 0,061 \text{ p}$$

54

$$\text{II } \rho = \frac{2,40}{47,443} = 0,050$$

47,443

$$V = \frac{0,050 \times 62}{54} = 0,057 \text{ p}$$

54

$$2,5 \text{ jam ulangan I } \rho = \frac{2,26}{47,443} = 0,048$$

$$V = \frac{0,048 \times 57}{54} = 0,051 \text{ p}$$

$$\text{II } \rho = \frac{2,27}{47,443} = 0,048$$

$$V = \frac{0,048 \times 54}{54} = 0,048 \text{ p}$$

#### 4. Perlakuan Kaporit 0%

$$1 \text{ jam ulangan I } \rho = \frac{2,78}{47,443} = 0,058$$

$$V = \frac{0,058 \times 95}{54} = 0,102 \text{ p}$$

$$\text{II } \rho = \frac{2,75}{47,443} = 0,057$$

$$V = \frac{0,057 \times 93}{54} = 0,098 \text{ p}$$

$$1,5 \text{ jam ulangan I } \rho = \frac{2,63}{47,443} = 0,055$$

$$V = \frac{0,055 \times 88}{54} = 0,090 \text{ p}$$

$$\text{II } \rho = \frac{2,60}{47,443} = 0,055$$

$$V = \frac{0,055 \times 85}{54} = 0,087 \text{ p}$$

$$2 \text{ jam ulangan I } \rho = \frac{2,35}{47,443} = 0,049$$

$$V = \frac{0,049 \times 78}{54} = 0,071 \text{ p}$$

$$\text{II } \rho = \frac{2,34}{47,443} = 0,049$$

$$V = \frac{0,049 \times 73}{54} = 0,066 \text{ p}$$

$$2,5 \text{ jam ulangan I } \rho = \frac{2,25}{47,443} = 0,047$$

$$V = \frac{0,047 \times 72}{54} = 0,063 \text{ p}$$

$$\text{II } \rho = \frac{2,23}{47,443} = 0,047$$

$$V = \frac{0,047 \times 69}{54} = 0,060 \text{ p}$$

#### 5. Perlakuan Kaporit 0,5%

$$1 \text{ jam ulangan I } \rho = \frac{2,99}{47,443} = 0,063$$

$$V = \frac{0,063 \times 105}{54} = 0,123 \text{ p}$$

$$\text{II } \rho = \frac{2,94}{47,443} = 0,062$$

$$V = \frac{0,062 \times 100}{54} = 0,115 \text{ p}$$

|  |  |
|--|--|
| 1,5 jam ulangan I $\rho = \frac{2,82}{47,443} = 0,059$ | $V = \frac{0,059 \times 95}{54} = 0,104$ p |
| II $\rho = \frac{2,80}{47,443} = 0,059$                | $V = \frac{0,059 \times 90}{54} = 0,098$ p |
| 2 jam ulangan I $\rho = \frac{2,57}{47,443} = 0,054$   | $V = \frac{0,054 \times 86}{54} = 0,086$ p |
| II $\rho = \frac{2,56}{47,443} = 0,054$                | $V = \frac{0,054 \times 82}{54} = 0,082$ p |
| 2,5 jam ulangan I $\rho = \frac{2,37}{47,443} = 0,050$ | $V = \frac{0,050 \times 74}{54} = 0,069$ p |
| II $\rho = \frac{2,33}{47,443} = 0,049$                | $V = \frac{0,049 \times 70}{54} = 0,064$ p |
| 6. Perlakuan Kaporit 1%                                |  |
| 1 jam ulangan I $\rho = \frac{2,81}{47,443} = 0,059$   | $V = \frac{0,059 \times 93}{54} = 0,102$ p |
| II $\rho = \frac{2,80}{47,443} = 0,059$                | $V = \frac{0,059 \times 91}{54} = 0,099$ p |
| 1,5 jam ulangan I $\rho = \frac{2,64}{47,443} = 0,056$ | $V = \frac{0,056 \times 81}{54} = 0,084$ p |
| II $\rho = \frac{2,60}{47,443} = 0,055$                | $V = \frac{0,055 \times 85}{54} = 0,087$ p |
| 2 jam ulangan I $\rho = \frac{2,30}{47,443} = 0,049$   | $V = \frac{0,049 \times 80}{54} = 0,073$ p |
| II $\rho = \frac{2,28}{47,443} = 0,048$                | $V = \frac{0,048 \times 78}{54} = 0,069$ p |
| 2,5 jam ulangan I $\rho = \frac{2,33}{47,443} = 0,049$ | $V = \frac{0,049 \times 73}{54} = 0,066$ p |
| II $\rho = \frac{2,30}{47,443} = 0,048$                | $V = \frac{0,048 \times 70}{54} = 0,062$ p |

## B. Rumput laut jenis *Turbinaria murrayana* Bort.

### 1. Perlakuan H<sub>2</sub>O<sub>2</sub> 0,5%

|  |  |
|--|--|
| 1 jam ulangan I $\rho = \frac{2,78}{47,443} = 0,059$   | $V = \frac{0,059 \times 97}{54} = 0,106 \text{ p}$ |
| II $\rho = \frac{2,75}{47,443} = 0,058$                | $V = \frac{0,058 \times 95}{54} = 0,102 \text{ p}$ |
| 1,5 jam ulangan I $\rho = \frac{2,53}{47,443} = 0,053$ | $V = \frac{0,053 \times 80}{54} = 0,079 \text{ p}$ |
| II $\rho = \frac{2,51}{47,443} = 0,053$                | $V = \frac{0,053 \times 76}{54} = 0,075 \text{ p}$ |
| 2 jam ulangan I $\rho = \frac{2,37}{47,443} = 0,050$   | $V = \frac{0,050 \times 70}{54} = 0,065 \text{ p}$ |
| II $\rho = \frac{2,35}{47,443} = 0,050$                | $V = \frac{0,050 \times 68}{54} = 0,063 \text{ p}$ |
| 2,5 jam ulangan I $\rho = \frac{2,13}{47,443} = 0,045$ | $V = \frac{0,045 \times 60}{54} = 0,050 \text{ p}$ |
| II $\rho = \frac{2,10}{47,443} = 0,044$                | $V = \frac{0,044 \times 54}{54} = 0,044 \text{ p}$ |

### 2. Perlakuan H<sub>2</sub>O<sub>2</sub> 1%

|  |   |
|--|---|
| 1 jam ulangan I $\rho = \frac{2,94}{47,443} = 0,062$   | $V = \frac{0,062 \times 108}{54} = 0,124 \text{ p}$ |
| II $\rho = \frac{2,91}{47,443} = 0,061$                | $V = \frac{0,061 \times 105}{54} = 0,119 \text{ p}$ |
| 1,5 jam ulangan I $\rho = \frac{2,80}{47,443} = 0,059$ | $V = \frac{0,059 \times 100}{54} = 0,109 \text{ p}$ |
| II $\rho = \frac{2,78}{47,443} = 0,059$                | $V = \frac{0,059 \times 102}{54} = 0,111 \text{ p}$ |

$$2 \text{ jam ulangan I } \rho = \frac{2,69}{47,443} = 0,057 \quad V = \frac{0,057 \times 93}{54} = 0,098 \text{ p}$$

$$\text{II } \rho = \frac{2,67}{47,443} = 0,056 \quad V = \frac{0,056 \times 90}{54} = 0,093 \text{ p}$$

$$2,5 \text{ jam ulangan I } \rho = \frac{2,42}{47,443} = 0,051 \quad V = \frac{0,051 \times 84}{54} = 0,079 \text{ p}$$

$$\text{II } \rho = \frac{2,40}{47,443} = 0,050 \quad V = \frac{0,050 \times 80}{54} = 0,074 \text{ p}$$

### 3. Perlakuan H<sub>2</sub>O<sub>2</sub> 1,5%

$$1 \text{ jam ulangan I } \rho = \frac{2,79}{47,443} = 0,059 \quad V = \frac{0,059 \times 95}{54} = 0,104 \text{ p}$$

$$\text{II } \rho = \frac{2,78}{47,443} = 0,059 \quad V = \frac{0,059 \times 98}{54} = 0,107 \text{ p}$$

$$1,5 \text{ jam ulangan I } \rho = \frac{2,62}{47,443} = 0,055 \quad V = \frac{0,055 \times 85}{54} = 0,087 \text{ p}$$

$$\text{II } \rho = \frac{2,60}{47,443} = 0,055 \quad V = \frac{0,055 \times 81}{54} = 0,083 \text{ p}$$

$$2 \text{ jam ulangan I } \rho = \frac{2,48}{47,443} = 0,052 \quad V = \frac{0,052 \times 77}{54} = 0,074 \text{ p}$$

$$\text{II } \rho = \frac{2,46}{47,443} = 0,052 \quad V = \frac{0,052 \times 74}{54} = 0,071 \text{ p}$$

$$2,5 \text{ jam ulangan I } \rho = \frac{2,31}{47,443} = 0,049 \quad V = \frac{0,049 \times 65}{54} = 0,059 \text{ p}$$

$$\text{II } \rho = \frac{2,30}{47,443} = 0,048 \quad V = \frac{0,048 \times 60}{54} = 0,053 \text{ p}$$

## 4. Perlakuan Kaporit 0%

|  |  |
|--|--|
| 1 jam ulangan I $\rho = \frac{2,65}{47,443} = 0,056$   | $V = \frac{0,056 \times 89}{54} = 0,092$ p |
| II $\rho = \frac{2,64}{47,443} = 0,056$                | $V = \frac{0,056 \times 87}{54} = 0,090$ p |
| 1,5 jam ulangan I $\rho = \frac{2,56}{47,443} = 0,054$ | $V = \frac{0,054 \times 82}{54} = 0,082$ p |
| II $\rho = \frac{2,55}{47,443} = 0,054$                | $V = \frac{0,054 \times 79}{54} = 0,079$ p |
| 2 jam ulangan I $\rho = \frac{2,43}{47,443} = 0,051$   | $V = \frac{0,051 \times 73}{54} = 0,069$ p |
| II $\rho = \frac{2,40}{47,443} = 0,051$                | $V = \frac{0,051 \times 70}{54} = 0,066$ p |
| 2,5 jam ulangan I $\rho = \frac{2,27}{47,443} = 0,048$ | $V = \frac{0,048 \times 63}{54} = 0,056$ p |
| II $\rho = \frac{2,25}{47,443} = 0,047$                | $V = \frac{0,047 \times 60}{54} = 0,052$ p |

## 5. Perlakuan Kaporit 0,5%

|  |   |
|--|---|
| 1 jam ulangan I $\rho = \frac{3,10}{47,443} = 0,065$   | $V = \frac{0,065 \times 102}{54} = 0,123$ p |
| II $\rho = \frac{3,04}{47,443} = 0,064$                | $V = \frac{0,064 \times 105}{54} = 0,124$ p |
| 1,5 jam ulangan I $\rho = \frac{2,93}{47,443} = 0,062$ | $V = \frac{0,062 \times 93}{54} = 0,107$ p  |
| II $\rho = \frac{2,91}{47,443} = 0,061$                | $V = \frac{0,061 \times 91}{54} = 0,103$ p  |
| 2 jam ulangan I $\rho = \frac{2,85}{47,443} = 0,060$   | $V = \frac{0,060 \times 86}{54} = 0,095$ p  |

$$\text{II } \rho = \frac{2,83}{47,443} = 0,060$$

47,443

$$V = \frac{0,060 \times 81}{54} = 0,090 \text{ p}$$

54

$$\text{2,5 jam ulangan I } \rho = \frac{2,43}{47,443} = 0,051$$

47,443

$$V = \frac{0,051 \times 75}{54} = 0,071 \text{ p}$$

54

$$\text{II } \rho = \frac{2,40}{47,443} = 0,051$$

47,443

$$V = \frac{0,051 \times 71}{54} = 0,067 \text{ p}$$

54

#### 6. Perlakuan Kaporit 1%

$$\text{I jam ulangan I } \rho = \frac{2,74}{47,443} = 0,058$$

47,443

$$V = \frac{0,058 \times 115}{54} = 0,124 \text{ p}$$

54

$$\text{II } \rho = \frac{2,72}{47,443} = 0,057$$

47,443

$$V = \frac{0,057 \times 111}{54} = 0,117 \text{ p}$$

54

$$\text{1,5 jam ulangan I } \rho = \frac{2,64}{47,443} = 0,056$$

47,443

$$V = \frac{0,056 \times 103}{54} = 0,107 \text{ p}$$

54

$$\text{II } \rho = \frac{2,63}{47,443} = 0,055$$

47,443

$$V = \frac{0,055 \times 100}{54} = 0,102 \text{ p}$$

54

$$\text{2 jam ulangan I } \rho = \frac{2,39}{47,443} = 0,050$$

47,443

$$V = \frac{0,050 \times 94}{54} = 0,087 \text{ p}$$

54

$$\text{II } \rho = \frac{2,35}{47,443} = 0,049$$

47,443

$$V = \frac{0,049 \times 90}{54} = 0,082 \text{ p}$$

54

$$\text{2,5 jam ulangan I } \rho = \frac{2,33}{47,443} = 0,049$$

47,443

$$V = \frac{0,049 \times 85}{54} = 0,077 \text{ p}$$

54

$$\text{II } \rho = \frac{2,31}{47,443} = 0,049$$

47,443

$$V = \frac{0,049 \times 80}{54} = 0,073 \text{ p}$$

54



## Lampiran II

Tabel Lampiran 2a. Hasil rendemen alginat dari rumput laut jenis *Sargassum crasifolium* J.G.Ag. yang direndam ke dalam zat pemutih berupa kaporit.

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| Kaporit 0%                         | 27,8                     | 26,3  | 23,5  | 22,5  |       |
|                                    | 27,5                     | 26,0  | 23,4  | 22,3  |       |
| Sub total rata-rata                | 55,3                     | 52,3  | 46,9  | 44,8  | 199,3 |
|                                    | 27,7                     | 26,2  | 23,5  | 22,4  |       |
| Kaporit 0,5%                       | 29,9                     | 28,2  | 25,7  | 23,7  |       |
|                                    | 29,4                     | 28,0  | 25,6  | 23,3  |       |
| Sub total rata-rata                | 59,3                     | 56,2  | 51,3  | 47,0  | 213,8 |
|                                    | 29,7                     | 28,1  | 25,7  | 23,5  |       |
| Kaporit 1%                         | 28,1                     | 26,4  | 23,0  | 22,3  |       |
|                                    | 28,0                     | 26,0  | 22,8  | 23,0  |       |
| Sub total rata-rata                | 56,1                     | 52,4  | 45,8  | 45,3  | 199,6 |
|                                    | 28,1                     | 26,2  | 22,9  | 22,7  |       |
| Total                              | 170,7                    | 160,9 | 144,0 | 137,1 | 612,7 |

Tabel Analisis

| Sumber Keragaman | DB | JK      | KT      | F hit  | F tabel 5% |
|------------------|----|---------|---------|--------|------------|
| Perlakuan        | 11 | 137,455 | -       | -      | -          |
| P                | 2  | 17,18   | 8,59    | 146,2* | 3,88       |
| T                | 3  | 118,23  | 39,41   | 670,8* | 3,49       |
| PT               | 6  | 2,045   | 0,34083 | 5,8*   | 3,00       |
| Galat            | 12 | 0,705   | 0,05875 | -      | -          |
| Total            | 23 | 138,16  | -       | -      | -          |

\* beda nyata pada taraf 5%

Uji LSD

$$\text{LSD}\alpha = t_{\alpha} ( 2s^2 / r )^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} \{ 2s^2 / r \}^{1/2}$$

$$= 2,179 \{ 2 ( 0,05875 ) / 2 \}^{1/2} = 2,179 ( 0,24238 ) = 0,528$$

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 28,5 <sup>d</sup> | 26,8 <sup>c</sup> | 24,0 <sup>b</sup> | 22,8 <sup>a</sup> |
| 22,8 <sup>a</sup> | 5,7*              | 4,0*              | 1,2*              | 0                 |
| 24,0 <sup>b</sup> | 4,5*              | 2,8*              | 0                 |                   |
| 26,8 <sup>c</sup> | 1,7*              | 0                 |                   |                   |
| 28,5 <sup>d</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 26,8 <sup>n</sup> | 25,5 <sup>m</sup> | 25,0 <sup>l</sup> | 24,9 <sup>k</sup> |
| 24,9 <sup>k</sup> | 1,9*              | 0,6*              | 0,1               | 0                 |
| 25,0 <sup>l</sup> | 1,8*              | 0,5               | 0                 |                   |
| 25,5 <sup>m</sup> | 1,3*              | 0                 |                   |                   |
| 26,8 <sup>n</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%

Tabel Lampiran 2b. Hasil rendemen alginat dari rumput laut jenis *Sargassum crasifolium* J.G.Ag. yang direndam ke dalam zat pemutih berupa  $H_2O_2$ .

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| $H_2O_2$ 0,5 %                     | 28,2                     | 26,4  | 25,5  | 22,5  |       |
|                                    | 28,0                     | 26,0  | 25,3  | 22,3  |       |
| Sub total rata-rata                | 56,2                     | 52,4  | 50,8  | 44,8  | 204,2 |
|                                    | 28,1                     | 26,2  | 25,4  | 22,4  |       |
| $H_2O_2$ 1%                        | 29,3                     | 28,5  | 26,2  | 24,0  |       |
|                                    | 29,0                     | 28,1  | 26,0  | 23,0  |       |
| Sub total rata-rata                | 58,3                     | 56,6  | 52,2  | 47,0  | 214,1 |
|                                    | 29,2                     | 28,3  | 26,1  | 23,5  |       |
| $H_2O_2$ 1,5%                      | 26,7                     | 24,6  | 24,1  | 22,6  |       |
|                                    | 26,3                     | 24,6  | 24,0  | 22,7  |       |
| Sub total rata-rata                | 53,0                     | 49,2  | 48,1  | 45,3  | 195,6 |
|                                    | 26,5                     | 24,6  | 24,1  | 22,7  |       |
| Total                              | 167,5                    | 158,2 | 151,1 | 137,1 | 613,9 |

Tabel Anova

| Sumber Keragaman | DB | JK      | KT       | F hit   | F tabel 5% |
|------------------|----|---------|----------|---------|------------|
| Perlakuan        | 11 | 108,705 | -        | -       | -          |
| P                | 2  | 21,43   | 10,715   | 146,95* | 3,88       |
| T                | 3  | 82,135  | 27,38    | 375,5*  | 3,49       |
| PT               | 6  | 5,14    | 0,856    | 11,74*  | 3,00       |
| Galat            | 12 | 0,875   | 0,072916 | -       | -          |
| Total            | 23 | 109,58  | -        | -       | -          |

\* beda nyata pada taraf 5%

## Uji LSD

$$\text{LSD}\alpha = t \alpha (2s^2 / r)^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} \{ 2s^2 / r \}^{1/2}$$

$$= 2,179 \{ 2 (0,156875) / 2 \}^{1/2}$$

$$= 2,179 (0,39607) = 0,86$$

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 27,9 <sup>d</sup> | 26,4 <sup>c</sup> | 25,2 <sup>b</sup> | 22,8 <sup>a</sup> |
| 22,8 <sup>a</sup> | 5,1*              | 3,6*              | 2,4*              | 0                 |
| 25,2 <sup>b</sup> | 2,7*              | 1,2*              | 0                 |                   |
| 26,4 <sup>c</sup> | 1,5*              | 0                 |                   |                   |
| 27,9 <sup>d</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 26,8 <sup>j</sup> | 25,6 <sup>i</sup> | 25,5 <sup>h</sup> | 24,5 <sup>g</sup> |
| 24,5 <sup>g</sup> | 2,4*              | 1,1*              | 1*                | 0                 |
| 25,5 <sup>h</sup> | 1,3*              | 0,1               | 0                 |                   |
| 25,6 <sup>i</sup> | 1,2*              | 0                 |                   |                   |
| 26,8 <sup>j</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%

Tabel Lampiran 2c. Hasil rendemen alginat dari rumput laut jenis *Turbinaria murrayana* Bort. yang direndam ke dalam zat pemutih berupa kaporit.

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| Kaporit 0%                         | 26,5                     | 25,6  | 24,3  | 22,7  | 197,5 |
|                                    | 26,4                     | 25,5  | 24,0  | 22,5  |       |
| Sub total rata-rata                | 52,9                     | 51,1  | 48,3  | 45,2  | 197,5 |
|                                    | 26,5                     | 25,6  | 24,2  | 22,6  |       |
| Kaporit 0,5%                       | 31,0                     | 29,3  | 28,5  | 24,3  | 224,9 |
|                                    | 30,4                     | 29,1  | 28,3  | 24,0  |       |
| Sub total rata-rata                | 61,4                     | 58,4  | 56,8  | 48,3  | 224,9 |
|                                    | 30,7                     | 29,2  | 28,4  | 24,2  |       |
| Kaporit 1%                         | 27,4                     | 26,4  | 23,9  | 23,3  | 201,1 |
|                                    | 27,2                     | 26,3  | 23,5  | 23,1  |       |
| Sub total rata-rata                | 54,6                     | 52,7  | 47,4  | 46,4  | 201,1 |
|                                    | 27,3                     | 26,4  | 23,7  | 23,2  |       |
| Total                              | 168,9                    | 162,2 | 152,5 | 139,9 | 623,5 |

Tabel Anova

| Sumber Keragaman | DB | JK      | KT      | F hit  | F tabel 5% |
|------------------|----|---------|---------|--------|------------|
| Perlakuan        | 11 | 143,675 | -       | -      | -          |
| ( P )            | 2  | 55,42   | 27,71   | 715,1* | 3,88       |
| ( T )            | 3  | 79,375  | 26,458  | 682,8* | 3,49       |
| ( PT )           | 6  | 8,88    | 1,48    | 38,2*  | 3,00       |
| Galat            | 12 | 0,465   | 0,03875 | -      | -          |
| Total            | 23 | 144,14  | -       | -      | -          |

\*beda nyata pada taraf 5%

## Uji LSD

$$\text{LSD}\alpha = t\alpha (2s^2 / r)^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} (2s^2 / r)^{1/2}$$

$$= 2,179 \{ 2 (0,03875) / 2 \}^{1/2}$$

$$= 2,179 (0,19685) = 0,43$$

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 28,2 <sup>d</sup> | 27,1 <sup>c</sup> | 25,4 <sup>b</sup> | 23,3 <sup>a</sup> |
| 23,3 <sup>a</sup> | 4,9*              | 3,8*              | 2,1*              | 0                 |
| 25,4 <sup>b</sup> | 2,8*              | 1,7*              | 0                 |                   |
| 27,1 <sup>c</sup> | 1,1*              | 0                 |                   |                   |
| 28,2 <sup>d</sup> | 0                 |                   |                   |                   |

\*beda nyata pada taraf 5%

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 28,1 <sup>i</sup> | 26,0 <sup>h</sup> | 25,2 <sup>g</sup> | 24,7 <sup>f</sup> |
| 24,7 <sup>f</sup> | 3,4*              | 1,3*              | 0,5*              | 0                 |
| 25,2 <sup>g</sup> | 2,9*              | 0,8*              | 0                 |                   |
| 26,0 <sup>h</sup> | 2,1*              | 0                 |                   |                   |
| 28,1 <sup>i</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%

Tabel Lampiran 2d. Hasil rendemen alginat dari rumput laut jenis *Turbinaria murrayana* Bort. yang direndam ke dalam zat pemutih berupa  $H_2O_2$ .

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| $H_2O_2$ 0,5 %                     | 27,8                     | 25,3  | 23,7  | 21,3  |       |
|                                    | 27,5                     | 25,1  | 23,5  | 21,0  |       |
| Sub total rata-rata                | 55,3                     | 50,4  | 47,2  | 42,3  | 195,2 |
|                                    | 27,7                     | 25,2  | 23,6  | 21,2  |       |
| $H_2O_2$ 1%                        | 29,4                     | 28,0  | 26,9  | 24,2  |       |
|                                    | 29,1                     | 27,8  | 26,7  | 24,0  |       |
| Sub total rata-rata                | 58,5                     | 55,8  | 53,6  | 48,2  | 216,1 |
|                                    | 29,3                     | 27,9  | 26,8  | 24,1  |       |
| $H_2O_2$ 1,5%                      | 27,8                     | 26,2  | 24,8  | 23,1  |       |
|                                    | 27,8                     | 26,0  | 24,6  | 23,0  |       |
| Sub total rata-rata                | 55,6                     | 52,2  | 49,4  | 46,1  | 203,3 |
|                                    | 27,8                     | 26,1  | 24,7  | 23,1  |       |
| Total                              | 169,4                    | 158,4 | 150,2 | 136,6 | 614,6 |

Tabel Anova

| Sumber Keragaman | DB | JK     | KT     | F hit   | F tabel 5% |
|------------------|----|--------|--------|---------|------------|
| Perlakuan        | 11 | 125,74 | -      | -       | -          |
| ( P )            | 2  | 27,76  | 13,88  | 603,5*  | 3,88       |
| ( T )            | 3  | 95,54  | 31,847 | 1384,6* | 3,49       |
| ( PT )           | 6  | 2,44   | 0,406  | 17,65*  | 3,00       |
| Galat            | 12 | 0,28   | 0,023  | -       | -          |
| Total            | 23 | 126,02 | -      | -       | -          |

\* beda nyata pada taraf 5%

## Uji LSD

$$\text{LSD}\alpha = t_{\alpha} (2s^2 / r)^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} (2s^2 / r)^{1/2}$$

$$= 2,179 \{ 2 (0,023) / 2 \}^{1/2}$$

$$= 2,179 (0,151657) = 0,33$$

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 28,3 <sup>d</sup> | 26,4 <sup>c</sup> | 25,0 <sup>b</sup> | 22,8 <sup>a</sup> |
| 22,8 <sup>a</sup> | 5,5*              | 3,6*              | 2,2*              | 0                 |
| 25,0 <sup>b</sup> | 3,3*              | 1,4*              | 0                 |                   |
| 26,4 <sup>c</sup> | 1,9*              | 0                 |                   |                   |
| 28,3 <sup>d</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
|                   | 27,0 <sup>r</sup> | 25,6 <sup>q</sup> | 25,4 <sup>p</sup> | 24,4 <sup>o</sup> |
| 24,4 <sup>o</sup> | 2,6*              | 1,2*              | 1*                | 0                 |
| 25,4 <sup>p</sup> | 1,6*              | 0,2               | 0                 |                   |
| 25,6 <sup>q</sup> | 1,4*              | 0                 |                   |                   |
| 27,0 <sup>r</sup> | 0                 |                   |                   |                   |

\* beda nyata pada taraf 5%



### Lampiran III

Tabel Lampiran 3a. Hasil viskositas alginat dari rumput laut jenis *Sargassum crasifolium* J.G.Ag. yang direndam ke dalam zat pemutih berupa kaporit.

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| Kaporit 0%                         | 0,102                    | 0,090 | 0,071 | 0,063 |       |
|                                    | 0,098                    | 0,087 | 0,066 | 0,060 |       |
| Sub total rata-rata                | 0,200                    | 0,177 | 0,137 | 0,123 | 0,637 |
|                                    | 0,100                    | 0,089 | 0,069 | 0,062 |       |
| Kaporit 0,5%                       | 0,123                    | 0,104 | 0,086 | 0,069 |       |
|                                    | 0,115                    | 0,098 | 0,082 | 0,064 |       |
| Sub total rata-rata                | 0,238                    | 0,202 | 0,168 | 0,133 | 0,741 |
|                                    | 0,119                    | 0,101 | 0,084 | 0,067 |       |
| Kaporit 1%                         | 0,102                    | 0,084 | 0,073 | 0,066 |       |
|                                    | 0,099                    | 0,087 | 0,069 | 0,062 |       |
| Sub total rata-rata                | 0,201                    | 0,171 | 0,142 | 0,128 | 0,642 |
|                                    | 0,101                    | 0,086 | 0,071 | 0,064 |       |
| Total                              | 0,639                    | 0,55  | 0,447 | 0,384 | 2,02  |

Tabel Anova

| Sumber Keragaman | DB | JK       | KT        | F hit  | F tabel 5% |
|------------------|----|----------|-----------|--------|------------|
| Perlakuan        | 11 | 0,007369 | -         | -      | -          |
| ( P )            | 2  | 0,000857 | 0,000429  | 41,25* | 3,88       |
| ( T )            | 3  | 0,006328 | 0,00211   | 202,9* | 3,49       |
| ( PT )           | 6  | 0,000184 | 0,0000307 | 2,95   | 3,00       |
| Galat            | 12 | 0,000125 | 0,0000104 | -      | -          |
| Total            | 23 | 0,007494 | -         | -      | -          |

\*beda nyata pada taraf 5%

## Uji LSD

$$\text{LSD}\alpha = t \alpha ( 2s^2 / r )^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} ( 2s^2 / r )^{1/2}$$

$$= 2,179 \{ 2 ( 0,0000104 ) / 2 \}^{1/2}$$

$$= 2,179 ( 0,003225 ) = 0,00703$$

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,107 <sup>d</sup> | 0,092 <sup>c</sup> | 0,075 <sup>b</sup> | 0,064 <sup>a</sup> |
| 0,064 <sup>a</sup> | 0,043*             | 0,028*             | 0,011*             | 0                  |
| 0,075 <sup>b</sup> | 0,032*             | 0,017*             | 0                  |                    |
| 0,092 <sup>c</sup> | 0,015*             | 0                  |                    |                    |
| 0,107 <sup>d</sup> | 0                  |                    |                    |                    |

\*beda nyata pada taraf 5%

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,093 <sup>z</sup> | 0,085 <sup>y</sup> | 0,081 <sup>x</sup> | 0,080 <sup>w</sup> |
| 0,080 <sup>w</sup> | 0,013*             | 0,005              | 0,001              | 0                  |
| 0,081 <sup>x</sup> | 0,012*             | 0,004              | 0                  |                    |
| 0,085 <sup>y</sup> | 0,008*             | 0                  |                    |                    |
| 0,093 <sup>z</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

Tabel Lampiran 3b. Hasil viskositas alginat dari rumput laut jenis *Sargassum crassifolium* J.G.Ag. yang direndam ke dalam zat pemutih berupa  $H_2O_2$ .

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| $H_2O_2$ 0,5 %                     | 0,085                    | 0,070 | 0,060 | 0,046 |       |
|                                    | 0,083                    | 0,066 | 0,057 | 0,044 |       |
| Sub total rata-rata                | 0,167                    | 0,136 | 0,117 | 0,090 | 0,51  |
|                                    | 0,084                    | 0,068 | 0,059 | 0,045 |       |
| $H_2O_2$ 1%                        | 0,095                    | 0,082 | 0,069 | 0,052 |       |
|                                    | 0,091                    | 0,076 | 0,064 | 0,046 |       |
| Sub total rata-rata                | 0,186                    | 0,158 | 0,133 | 0,098 | 0,575 |
|                                    | 0,093                    | 0,079 | 0,067 | 0,049 |       |
| $H_2O_2$ 1,5%                      | 0,083                    | 0,072 | 0,061 | 0,051 |       |
|                                    | 0,079                    | 0,072 | 0,057 | 0,048 |       |
| Sub total rata-rata                | 0,162                    | 0,144 | 0,118 | 0,099 | 0,523 |
|                                    | 0,081                    | 0,072 | 0,059 | 0,050 |       |
| Total                              | 0,515                    | 0,438 | 1,368 | 0,287 | 1,608 |

Tabel Anova

| Sumber Keragaman | DB | JK       | KT        | F hit  | F tabel 5% |
|------------------|----|----------|-----------|--------|------------|
| Perlakuan        | 11 | 0,005126 | -         | -      | -          |
| (P)              | 2  | 0,000292 | 0,000146  | 18,25* | 3,88       |
| (T)              | 3  | 0,004737 | 0,00158   | 197,5* | 3,49       |
| (PT)             | 6  | 0,000097 | 0,0000162 | 2,03   | 3,00       |
| Galat            | 12 | 0,000096 | 0,000008  | -      | -          |
| Total            | 23 | 0,005222 | -         | -      | -          |

\* beda nyata pada taraf 5%

## Uji LSD

$$\text{LSD}\alpha = t_{\alpha} (2s^2 / r)^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} (2s^2 / r)^{1/2}$$

$$= 2,179 \{ 2 (0,000008) / 2 \}^{1/2}$$

$$= 2,179 (0,00283) = 0,00617$$

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,086 <sup>d</sup> | 0,073 <sup>c</sup> | 0,062 <sup>b</sup> | 0,048 <sup>a</sup> |
| 0,048 <sup>a</sup> | 0,038*             | 0,025*             | 0,014*             | 0                  |
| 0,062 <sup>b</sup> | 0,024*             | 0,011*             | 0                  |                    |
| 0,073 <sup>c</sup> | 0,013*             | 0                  |                    |                    |
| 0,086 <sup>d</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,072 <sup>n</sup> | 0,067 <sup>m</sup> | 0,066 <sup>l</sup> | 0,064 <sup>k</sup> |
| 0,064 <sup>k</sup> | 0,008*             | 0,003              | 0,002              | 0                  |
| 0,066 <sup>l</sup> | 0,006              | 0,001              | 0                  |                    |
| 0,067 <sup>m</sup> | 0,005              | 0                  |                    |                    |
| 0,072 <sup>n</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

Tabel Lampiran 3c. Hasil viskositas alginat dari rumput laut jenis *Turbinaria murrayana* Bort. yang direndam ke dalam zat pemutih berupa kaporit.

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| Kaporit 0%                         | 0,092                    | 0,082 | 0,069 | 0,056 |       |
|                                    | 0,090                    | 0,079 | 0,066 | 0,052 |       |
| Sub total rata-rata                | 0,182                    | 0,161 | 0,135 | 0,108 | 0,586 |
|                                    | 0,091                    | 0,081 | 0,068 | 0,054 |       |
| Kaporit 0,5%                       | 0,123                    | 0,107 | 0,095 | 0,071 |       |
|                                    | 0,124                    | 0,103 | 0,090 | 0,067 |       |
| Sub total rata-rata                | 0,247                    | 0,210 | 0,185 | 0,138 | 0,780 |
|                                    | 0,124                    | 0,105 | 0,093 | 0,069 |       |
| Kaporit 1%                         | 0,124                    | 0,107 | 0,087 | 0,077 |       |
|                                    | 0,117                    | 0,102 | 0,082 | 0,073 |       |
| Sub total rata-rata                | 0,241                    | 0,209 | 0,169 | 0,150 | 0,769 |
|                                    | 0,121                    | 0,105 | 0,085 | 0,075 |       |
| Total                              | 0,670                    | 0,580 | 0,489 | 0,396 | 2,135 |

Tabel Anova

| Sumber Keragaman | DB | JK        | KT         | F hit   | F tabel 5% |
|------------------|----|-----------|------------|---------|------------|
| Perlakuan        | 11 | 0,0101415 | -          | -       | -          |
| (P)              | 2  | 0,0029686 | 0,0014843  | 168,86* | 3,88       |
| (T)              | 3  | 0,0069468 | 0,0023156  | 263,4*  | 3,49       |
| (PT)             | 6  | 0,0002261 | 0,00003768 | 4,28*   | 3,00       |
| Galat            | 12 | 0,0001055 | 0,00000879 | -       | -          |
| Total            | 23 | 0,010247  | -          | -       | -          |

\* beda nyata pada taraf 5%

## Uji LSD

$$LSD\alpha = t \alpha (2s^2 / r)^{1/2}$$

$$LSD_{0,05} = t_{0,05} (2s^2 / r)^{1/2}$$

$$= 2,179 \{ 2 (0,00000879) / 2 \}^{1/2}$$

$$= 2,179 (0,00296479) = 0,00646$$

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,112 <sup>d</sup> | 0,097 <sup>c</sup> | 0,082 <sup>b</sup> | 0,066 <sup>a</sup> |
| 0,066 <sup>a</sup> | 0,046*             | 0,031*             | 0,016*             | 0                  |
| 0,082 <sup>b</sup> | 0,03*              | 0,015*             | 0                  |                    |
| 0,097 <sup>c</sup> | 0,015*             | 0                  |                    |                    |
| 0,112 <sup>d</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,098 <sup>k</sup> | 0,097 <sup>j</sup> | 0,089 <sup>i</sup> | 0,074 <sup>h</sup> |
| 0,074 <sup>h</sup> | 0,024*             | 0,023*             | 0,015*             | 0                  |
| 0,089 <sup>i</sup> | 0,009*             | 0,008*             | 0                  |                    |
| 0,097 <sup>j</sup> | 0,001              | 0                  |                    |                    |
| 0,098 <sup>k</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

Tabel Lampiran 3d. Hasil viskositas alginat dari rumput laut jenis *Turbinaria murrayana* Bort. yang direndam ke dalam zat pemutih berupa  $H_2O_2$ .

| Persentase Konsentrasi Zat Pemutih | Waktu Perendaman ( jam ) |       |       |       | Total |
|------------------------------------|--------------------------|-------|-------|-------|-------|
|                                    | 1                        | 1,5   | 2     | 2,5   |       |
| $H_2O_2$ 0,5 %                     | 0,106                    | 0,079 | 0,065 | 0,050 |       |
|                                    | 0,102                    | 0,075 | 0,063 | 0,044 |       |
| Sub total rata-rata                | 0,208                    | 0,154 | 0,128 | 0,094 | 0,584 |
|                                    | 0,104                    | 0,077 | 0,064 | 0,047 |       |
| $H_2O_2$ 1%                        | 0,124                    | 0,109 | 0,098 | 0,079 |       |
|                                    | 0,119                    | 0,111 | 0,093 | 0,074 |       |
| Sub total rata-rata                | 0,243                    | 0,220 | 0,191 | 0,153 | 0,807 |
|                                    | 0,122                    | 0,110 | 0,096 | 0,077 |       |
| $H_2O_2$ 1,5%                      | 0,104                    | 0,087 | 0,074 | 0,059 |       |
|                                    | 0,107                    | 0,083 | 0,071 | 0,053 |       |
| Sub total rata-rata                | 0,211                    | 0,170 | 0,145 | 0,112 | 0,638 |
|                                    | 0,106                    | 0,085 | 0,073 | 0,056 |       |
| Total                              | 0,662                    | 0,544 | 0,464 | 0,359 | 2,029 |

Tabel Anova

| Sumber Keragaman | DB | JK        | KT         | F hit   | F tabel 5% |
|------------------|----|-----------|------------|---------|------------|
| Perlakuan        | 11 | 0,0117345 | -          | -       | -          |
| (P)              | 2  | 0,00339   | 0,001695   | 184,08* | 3,88       |
| (T)              | 3  | 0,008196  | 0,002732   | 296,7*  | 3,49       |
| (PT)             | 6  | 0,105759  | 0,0176265  | 1914,2* | 3,00       |
| Galat            | 12 | 0,0001105 | 0,00000921 | -       | -          |
| Total            | 23 | 0,011845  | -          | -       | -          |

\* beda nyata pada taraf 5%

## Uji LSD

$$\text{LSD}\alpha = t \alpha (2s^2 / r)^{1/2}$$

$$\text{LSD}_{0,05} = t_{0,05} (2s^2 / r)^{1/2}$$

$$= 2,179 \{ 2 (0,0000921) / 2 \}^{1/2}$$

$$= 2,179 (0,00303) = 0,0066$$

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,110 <sup>d</sup> | 0,091 <sup>c</sup> | 0,078 <sup>b</sup> | 0,060 <sup>a</sup> |
| 0,060 <sup>a</sup> | 0,050*             | 0,031*             | 0,018*             | 0                  |
| 0,078 <sup>b</sup> | 0,032*             | 0,013*             | 0                  |                    |
| 0,091 <sup>c</sup> | 0,019*             | 0                  |                    |                    |
| 0,110 <sup>d</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

|                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | 0,101 <sup>s</sup> | 0,086 <sup>r</sup> | 0,080 <sup>q</sup> | 0,077 <sup>p</sup> |
| 0,077 <sup>p</sup> | 0,024*             | 0,009*             | 0,003              | 0                  |
| 0,080 <sup>q</sup> | 0,021*             | 0,006              | 0                  |                    |
| 0,086 <sup>r</sup> | 0,015*             | 0                  |                    |                    |
| 0,101 <sup>s</sup> | 0                  |                    |                    |                    |

\* beda nyata pada taraf 5%

$\rho$  Na-alginat standard :

Berat gelas ukur kosong = 76,971 gr

Berat gelas ukur + aquades = 124,541 gr

Berat gelas ukur + sampel = 124,595 gr

Berat sampel = 124,595 - 76,971 = 47,624 gr

Berat air = 124,541 - 76,971 = 47,57 gr

$$\rho = \frac{47,624}{47,57} = 1,0011 \text{ gr/cm}^3$$

47,57



$$\text{Viskositas : ul I} = \frac{1,0011 \times 3,54}{1,41} = 2,513 \text{ poise}$$

1,41

$$\text{II} = \frac{1,0011 \times 4}{1,41} = 2,84 \text{ poise}$$

1,41

$$\text{III} = \frac{1,0011 \times 4}{1,41} = 2,84 \text{ poise}$$

1,41

$$\text{Rata-rata viskositas} = 2,731 \text{ poise}$$

