

DAFTAR PUSTAKA

- Akkarachaneeyakorn, S, and S. Tinrat. 2015. Effects of types and amounts of stabilizers on physical and sensory characteristics of cloudy ready-to-drink mulberry fruit juice. *Journal of Food Science & Nutrition*, 3(3) : 213-220.
- Anggraini, A dan Yunianta. 2015. Pengaruh Suhu dan Hidrolisis Enzim Papain Terhadap Sifat Kimia, Fisik, dan Organoleptik dari Sari *Edamame*. *Jurnal Pangan dan Agroindustri*, 3 (3) : 1015-1025.
- Arsyad, L. 2010. *Ekonomi Pembangunan*. Yogyakarta: UPP STIM YKPN. 84 hal.
- Badan Standardisasi Nasional. 2013. Standar Nasional Indonesia (SNI) Minyak Goreng. Badan Standarisasi Nasional (BSN). Jakarta. SNI 01-3741-2013. 11 hal.
- Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan (BBRP2BKP), 2010. *Manfaat dan Kandungan Kimia Caulerpa*.
- Baltes W and C. Song. 1994. New Aroma Compounds in Wheat Bread, in *Thermally Generated Flavors: Maillard, Microwave, and Extrusion Processes*, edited by T.H. Parliment, M.J. Morello, and R.J. McGorrin, ACS Symposium Series 543, American Chemical Society, Washington D.C, pp. 192-205.
- Cha Y J, Baik HH, Hsieh TCY. 1992. Volatile Components in Flavour Concentrates from Crayfish Processing Waste. *Journal of the Science of Food and Agriculture*, 58 : 239-248.
- Chung, H.Y., Yung IKS, Ma WCJ, Kim J. 2002. Analysis of volatile components in frozen and dried scallops (*Patinopecten yessoensis*) by gas chromatography/ mass spectrometry. *Food Research Intenational*, 35 : 43-53.
- Dahlia, iis., Sri R dan Titik S. 2015. Pengaruh Dosis Pupuk dan Substrat yang Berbeda Terhadap Pertumbuhan *Caulerpa lentilifera*. *Journal of Aquacultur Management And Technology*, 4 (4) : 28-34.
- Deng Y, Luo Y, Wang Y, Zhao Y. 2014. Effect of different drying methods on the myosin structure, amino acid composition, protein digestibility and volatile profile of squid fillets. *Food Chemistry*, 171 : 168-176.
- Dewi, R.S. 2014. Pengaruh Suhu Pemasakan Nira dan Kecepatan Pengadukkan Terhadap Kualitas Gula Merah Tebu. Jurusan Keteknikan Pertanian. Fakultas Pertanian. Universitas Brawijaya. Malang, 15(3) : 149-158.

- Drumm, T. D., and Spanier, A. M. (1991). Changes in the content of lipid autoxidation and sulfur-containing compounds in cooked beef during fermentation. *Journal of Agricultural and Food Chemistry*, 39(2), 336–343.
- Elliason, A.C. 2004. *Starch in Food : Effect of Carboxyl Methyl Cellulose (CMC) on Organoleptic, Color, pH, Viskosity and Turbidity of Honey Drink*. England : Woodhead Publishing Limited.
- Guillen M, Errecalde M. 2002. Volatile components of raw and smoked black bream (*Brama raii*) and rainbow trout (*Onchorhynchus mykiss*) studied by means of solid phase microextraction and gas chromatography/mass spectrometry. *Journal of the Science of Food and Agriculture*, 82 : 945-952.
- Guillen, M.D, Errecalde MC, Salmeron J, Casas C. 2006. Headspace volatile components of smoked swordfish (*Xiphias gladius*) and cod (*Gadus morhua*) detected by means of solid phase microextraction and gas chromatography–mass spectrometry. *Food Chemistry*, 94 : 151-156.
- Gultom A,H., Netti H., Evy R., 2018. Penambahan Kelopak Bunga Rosella dalam Penambahan Selai Jambu Biji Merah. 5 (2) : 4-10.
- Hayuningtyas, C.R. 2015., *Formulasi Karakterisasi saus Berbahan Baku Hasil Hidrolisat Enzimatik Dari Ikan Inferior*. Skripsi. Universitas Jember. 49 hal.
- Hermana F.M. 2017. *Pembuatan Carboxymethyl Cellulose (CMC) Dari Selulosa Kulit Ari Biji Alpukat Dan Pemanfaatannya Sebagai Bahan Pengental Pada Saus Tomat*. Skripsi. Universitas Sumatra Utara.
- Histifarina, D., D. Musaddad, dan E. Murtiningsih. 2004. Teknik Pengeringan dalam Oven untuk Irisan Wortel Kering Bermutu. *Balai Penelitian Tanaman Sayuran. Jurnal Hortikultura* 14(2) : 107-112.
- Huda, R. 2014. *Kimia Fisik II : Viskositas Cairan*. Universitas Negeri Syarif Hidayatullah : Jakarta. 10 hal.
- Isran., La K., Syukri S. 2016. Analisis Kandungan Zat Pengawet Natrium Benzoat Pada Saus Tomat di Pasar Tradisional Andounohu Kota Kendari. *Jurnal Sains dan Teknologi Pangan* 1(2) : 131-135.
- Kamal, N. 2010. The Influence Of Additive CMC (Carboxyl Methyl Cellulose) To Some Of TheParameters In The Aqueous Solution Of Sucrose. *Journal Of Technology*. 1 (2): 123-129.
- Kumar, M., Vishal G, Puja, Reddy, C.R.K. and Jha, B. 2011. Assessment of nutrient composition and antioxidant potential of Caulerpaceae seaweeds. *Journal of food composition and analysis*. 24. pp. 270-278.

- Kusnandar, F. 2010. *Kimia pangan : Komponen Makro*. Jakarta: Dian Rakyat. Hal 20.
- Kusuma, AH. 2012. Proses Hidrolisis Senyawa Polosakarida Rumput Laut *Caulerpa racemosa*, *Sargassum crassifolium*, dan *Gracillaria salicornia*. Skripsi. IPB : Bogor. 67 hal.
- Lakshmi, C. 2014. Food Coloring: The Natural Way. *Research Journal of Chemical Sciences* 4(2): 87-96.
- Laohakunjit, N., Selamassakul, O, and Kerdchoechuen, O. (2014). Seafood-like flavour obtained from the enzymatic hydrolysis of the protein by-products of seaweed (*Gracilaria* sp.) *Food Chemistry*, 158 : 162-170.
- Lazo O, Guerrero L, Alexi N, Grigorakis K, Claret A, Perez Z A, Bou R. 2017. Sensory characterization, physico-chemical properties and somatic yields of five emerging fish species. *Food Research International*, 100 : 396-406.
- Linder M, Ackman RG. 2002. Volatile compounds recovered by solid-phase microextraction from fresh adductor muscle and total lipids of sea scallop (*Placopecten magellanicus*) from Georges Bank (Nova Scotia). *Journal of Food Science*, 67 : 2032-2037.
- Liu JK, Zhao SM, Xiong SB. 2009. Influence of re-cooking on volatile and nonvolatile compounds found in silver carp *Hypophthalmichthys molitrix*. *Fisheries Science*, 75 : 1067-1075.
- Ma'ruf, WF., Ratna I, Eko NDi, Eko S dan Ulfah A. 2013. *Caulerpa racemosa* and *Gracilaria verrucosa* Profile as Edible Foods. *Jurnal Sains dan Teknologi Perikanan* 9(1) : 68-74.
- Mawardani, H. 2019. Pengaruh Rasio Enzim Bromelin dan Waktu Hidrolisis pada Produksi Hidrolisat Protein dari Rumput Laut. Skripsi. 60 hal.
- Milama, B. 2014. *Panduan Praktikum Kimia Fisika II*. Jakarta : FTIK Press. 9 hal.
- Morita K, Kubota K, Aishima T. 2003. Comparison of aroma characteristics of 16 fish species by sensory evaluation and gas chromatographic analysis. *Journal of the Science of Food and Agriculture*, 83 : 289-297.
- Neksidin. 2013. Studi kualitas air untuk budidaya rumput laut (*Kappaphycus alvarezii*) di Perairan Teluk Kolono Kabupaten Konawe Selatan. *Jurnal mina laut Indonesia*, 3(12) : 147-155.
- Nilasari, OW., Wahono HS., Jaya MM. 2017. The Effect of Temperature and Length of Cooking to Pumpkin Lempok Characteristic. *Jurnal Pangan dan Agroindustri*, 5(3) : 15-26.

- Nur, S., Surati dan Ryan R. 2017. Aktivitas Enzim Bromelin terhadap Peningkatan Protein Tepung Ampas Kelapa. *Jurnal Biologi Sains*, 6(1) : 84-98.
- Ozden O. 2005. Changes in amino acid and fatty acid composition during shelf-life of marinated fish. *Journal of the Science of Food and Agriculture*, 85 : 2015-2020.
- Pastoriza, S. J Quesada, and JA Ru fi a'n-Henares. 2018. Laktosa dan Oligosakarida: Maillard Reaksi. *Universidad de Granada, Granada, Spanyol* : 21.
- Peinado I, Miles W, Koutsidis G. 2016. Odour Characteristics Of Seafood Flavour Formulations Produced with Fish By Products Incorporating EPA, DHA and fish oil. *Food Chemistry*, 212 : 612-619.
- Persuric, Z., Saftic, L., Masek, T., and Kraljevic Pavelic, S. (2018). Comparison of triacylglycerol analysis by MALDI-TOF/MS, fatty acid analysis by GC-MS and non-selective analysis by NIRS in combination with chemometrics for determination of extra virgin olive oil geographical origin. A case study. *LWT-Food Science and Technology*, 95, 326–332.
- Pratama RI, Rostini I, Awaluddin MY. 2013. Komposisi kandungan senyawa flavor ikan mas (*Cyprinus carpio*) segar dan hasil pengukusannya. *Jurnal Akuatika*. 4(1) : 55-67.
- Pratama RI, Rostini I., Rochima E. 2017. Amino Acid Profile and Volatile Components of Fresh and Steamed Vaname Shrimp (*Litopenaeus vannamei*). *Prosiding 1st International Conference on Food Security Innovation (ICFSI), Le Dian Hotel, October 18 – 20. Serang* : 57-68
- Pratama RI, Rostini I, Rochima E. 2018. Amino Acid Profile and Volatile Flavour Compounds of Raw and Steamed Patin Catfish (*Pangasius hypophthalmus*) and Narrow-barred Spanish Mackerel (*Scomberomorus commerson*). *IOP Conference Series: Earth and Environmental Science*, 116: 1-17
- Ritthiruangdej. P and Thongchai S. 2006. Sensory Properties of Thai Fish Sauces and Their Categorization. *Jurnal Kasetsart*, 40 : 181-191.
- Robi'a dan Aji S. 2015. Karakteristik Sirup Glukosa dari Tepung Ubi Ungu (Kajian Likuifikasi dan Konsentrasi α -Amilase): Kajian Pustaka. *Jurnal Pangan dan Agroindustri*, 3(4) : 1531-1537.**
- Sakakibara H, Ide J, Yanai T, Yajima I, Hayashi K. 1990. Volatile flavor compounds of some kinds of dried and smoked fish. *Agricultural and Biological Chemistry*, 54 : 9-16.

- Saptasari, M. 2010. Variasi Ciri Morfologi dan Potensi Makroalgae Jenis *Caulerpa* di Pantai Kondang Merak Kabupaten Malang. *Jurnal El-Hayah*, 1(2) : 19 - 22
- Sofiah, B. D and Achyar, T. S. 2008. *Penilaian Indera*. Bandung: Jurusan Teknologi Industri Pangan Unpad. 11 hal.
- Takano, T., Shozen, K., M. Satomi., Taira. W., H. Abe., Y. Funatsu. 2012. Quality Of Fish Sauce Products From Recycled By-Products From Fish Gel And *Kamaboko* Processing. *Journal of Food Quality*. 35: 217-227.
- Vaclavik, V dan Christian, E.W. 2007. *Essentials of Food Science*. Springer. New York.
- Witono, Y., Wiwik S.W., Iwan T., Asmak A and Ahib A. 2014. Characteristic and Sensory Analysis of Ketchup and Sauce Products from “Bibisan” Fish Hydrolyzate. *American Journal of Food Science and Technology*. 2(6): 203-208.
- Witono, Y., Wiwik S.W., Asmak A., Citra R.H. 2015. The Formulation And Characterization Of Hydrolyzate Base Sauce Produce By Enzymatic Hydrolysis From Inferior Fish. *International Journal of Pharm Technology Research*, 8(1) : 144-122.
- Yang, X. Hong., Weiling Z. 2007. *Viscosity Properties of sodium carboxymethylcellulose*. Department of Chemistry and Environmental Engineering, Wuhan Polytechnic University, Hankou. Springer. 14: 409–417.
- Yudasmara, G.A. 2014. Budidaya Anggur Laut (*Caulerpa racemosa*) Melalui Media Tanam *Rigid Quadrant Nets* Berbahan Bambu. *Jurnal Sains dan Teknologi*. 3(2): 468-473.
- Zakaria, N.A dan N.M Sarbon. 2018. Physicochemical Properties and Oxidative Stability of Fish Emulsion Sausage as Influenced By Snakehead (*Channa Striata*) Protein Hydrolysate. *Food Science an Technology*, 94:13-19.
- Zhu W, H. Luan, Y. Bu, X. Li, J. Li, G. Ji. 2019. Flavor characteristics of shrimp sauces with different fermentation and storage time. *LWT*, 110 : 142-151.

LAMPIRAN

Lampiran 1. Hasil pengujian viskositas

No	Nama Sampel	massa larutan (g)	volume larutan (ml)	ρ (g/ml)	tx (s)	η (poise)	Rata-rata	Standar deviasi
1	P1U1	6,02	5	1,204	16,2	0,20	0,20	0,002
2		6,02	5	1,204	16,32	0,20		
3		6,02	5	1,204	16,22	0,20		
4		6,02	5	1,204	15,96	0,19		
5		6,02	5	1,204	16,35	0,20		
6	P1U2	6,02	5	1,204	33,01	0,40	0,39	0,005
7		6,02	5	1,204	32,16	0,39		
8		6,02	5	1,204	32,63	0,39		
9		6,02	5	1,204	33,07	0,40		
10		6,02	5	1,204	32,19	0,39		
11	P1U3	6,02	5	1,204	41,53	0,50	0,50	0,003
12		6,02	5	1,204	41,03	0,50		
13		6,02	5	1,204	41,59	0,50		
14		6,02	5	1,204	41,51	0,50		
15		6,02	5	1,204	41,01	0,49		
16	P2U1	6,02	5	1,204	60,24	0,73	0,62	0,10236
17		6,02	5	1,204	61,31	0,74		
18		6,02	5	1,204	44,14	0,53		
19		6,02	5	1,204	45,78	0,55		
20		6,02	5	1,204	46,17	0,56		
21	P2U2	6,02	5	1,204	82,62	1,00	1,00	0,010
22		6,02	5	1,204	82,4	0,99		
23		6,02	5	1,204	84,02	1,01		
24		6,02	5	1,204	81,7	0,99		
25		6,02	5	1,204	82,37	0,99		
26	P2U3	6,02	5	1,204	99,81	1,20	1,18	0,025
27		6,02	5	1,204	95,62	1,15		
28		6,02	5	1,204	97,57	1,18		
29		6,02	5	1,204	95,66	1,15		
30		6,02	5	1,204	99,82	1,20		
31	P3U1	6,02	5	1,204	131,2	1,58	1,73	0,127
32		6,02	5	1,204	133	1,60		

IR – PERPUSTAKAAN UNIVERSITAS AIRLANGGA

33		6,02	5	1,204	149,4	1,80		
34		6,02	5	1,204	150	1,81		
35		6,02	5	1,204	153,9	1,86		
36	P3U2	6,02	5	1,204	153,5	1,85	1,91	0,115
37		6,02	5	1,204	150,3	1,81		
38		6,02	5	1,204	151	1,82		
39		6,02	5	1,204	170,4	2,06		
40		6,02	5	1,204	167,3	2,02		
41	P3U3	6,02	5	1,204	170,4	2,06	2,11	0,043
42		6,02	5	1,204	171,3	2,07		
43		6,02	5	1,204	176,3	2,13		
44		6,02	5	1,204	177,7	2,14		
45		6,02	5	1,204	177,6	2,14		

Lampiran 2. Hasil pengujian warna

Perlakuan	Nilai Indeks Warna								
	L*	Rata-rata	Standar deviasi	a*	Rata-rata	Standar deviasi	b*	Rata-rata	Standar deviasi
P1U1	18,4	18,41	0,026	6,8	6,77	0,058	17,02	17,11	0,081
	18,39			6,7			17,18		
	18,44			6,8			17,12		
P1U2	18,59	18,61	0,032	6,6	6,63	0,058	17,34	17,33	0,046
	18,6			6,7			17,28		
	18,65			6,6			17,37		
P1U3	18,75	18,74	0,036	6,5	6,47	0,058	17,62	17,58	0,061
	18,7			6,5			17,61		
	18,77			6,4			17,51		
P2U1	23,71	23,71	0,025	7,7	7,67	0,058	18,54	18,59	0,046
	23,69			7,6			18,6		
	23,74			7,7			18,63		
P2U2	23,06	23,58	0,453	7,5	7,47	0,058	19,6	19,60	0,075
	23,86			7,4			19,52		
	23,83			7,5			19,67		
P2U3	23,06	23,06	0,025	7,3	7,40	0,100	20,62	20,64	0,072
	23,09			7,5			20,72		
	23,04			7,4			20,58		
P3U1	23,26	23,30	0,189	8,9	8,87	0,058	19,31	19,31	0,115
	23,14			8,8			19,43		
	23,51			8,9			19,2		
P3U2	23,77	23,75	0,141	8,4	8,43	0,058	19,4	19,41	0,040
	23,88			8,5			19,45		
	23,6			8,4			19,37		
P3U3	24,34	24,34	0,070	8,3	8,27	0,058	20,93	20,92	0,051
	24,41			8,2			20,96		
	24,27			8,3			20,86		

Lampiran 3. Hasil pengujian hedonik

Perlakuan	Parameter Uji Hedonik				
	Warna \pm SD	Aroma \pm SD	Rasa \pm SD	Kekentalan \pm SD	Keseluruhan \pm SD
P1U1	3,43 \pm 0,50	3,33 \pm 0,57	2,95 \pm 0,71	3,33 \pm 0,73	3,35 \pm 0,48
P1U2	3,43 \pm 0,50	3,10 \pm 0,59	3,05 \pm 0,78	3,08 \pm 0,73	3,28 \pm 0,45
P1U3	3,43 \pm 0,50	3,00 \pm 0,68	2,98 \pm 0,77	3,53 \pm 0,55	3,45 \pm 0,50
P2U1	3,40 \pm 0,50	3,30, \pm 0,65	3,33 \pm 0,62	2,98 \pm 0,66	3,48 \pm 0,51
P2U2	3,65 \pm 0,48	3,38 \pm 0,49	3,45 \pm 0,68	3,83 \pm 0,59	3,73 \pm 0,45
P2U3	3,38 \pm 0,49	3,25 \pm 0,49	3,08 \pm 0,73	3,45 \pm 0,50	3,35 \pm 0,48
P3U1	3,50 \pm 0,78	3,35 \pm 0,48	3,35 \pm 0,66	3,05 \pm 0,78	3,50 \pm 0,51
P3U2	3,63 \pm 0,63	3,60 \pm 0,50	3,15 \pm 0,62	3,55 \pm 0,55	3,45 \pm 0,50
P3U3	3,58 \pm 0,55	3,48 \pm 0,51	3,28 \pm 0,64	3,63 \pm 0,49	3,50 \pm 0,55

Lampiran 4. Hasil pengujian GC-MC

KEMENTERIAN PERTANIAN
BADAN PENELITIAN DAN PENGEMBANGAN PERTANIAN
BALAI BESAR PENELITIAN TANAMAN PADI
LABORATORIUM ANALISIS FLAVOR

Jl. Raya 9 Sukamandi - Subang 41256, Telp. 0260 520157, Fax. 0260 520158

Sample	RT (min)	Compound	CAS	Area
sauce	3.2684	Hexanal	66-25-1	6496424
	3.6668	Isoamyl acetate	123-92-2	1825881
	4.5349	D-Limonene	5989-27-5	14406843
	4.9927	Eucalyptol	470-82-6	3084553
	5.0938	1,3-Cyclohexadiene, 5-ethyl-	40085-08-3	3314085
	5.5219	2-Heptanone, 6-methyl-	928-68-7	4871330
	5.8073	Styrene	100-42-5	6604858
	6.4733	Octanal	124-13-0	10906047
	6.7765	3-Ethyl-2-pentanol	609-27-8	4151441
	7.0441	2-Propanone, 1-hydroxy-	116-09-6	1310935
	7.3116	2-Heptenal, (Z)-	57266-86-1	8787905
	8.1203	1-Hexanol	111-27-3	1305829
	8.7565	Nonanal	124-19-6	16810361
	9.6246	2-Octenal, (E)-	2548-87-0	4112965
	10.249	Acetic acid	64-19-7	27961994
	10.4333	Furfural	98-01-1	5938297
	11.1884	Naphthalene	91-20-3	1528063
	11.6225	Acridine, 9-methyl-	611-64-3	6517349
	12.2409	Phenol, 2-ethyl-	90-00-6	2460741
	12.7819	1-Octanol	111-87-5	4825763
	13.3052	2,3-Butanediol	513-85-9	40061120
	13.4241	2,3-Butanediol, [R-(R*),R*]-	24347-58-8	8755687
	14.096	2-Octanol, 3-methyl-	27644-49-1	862904
	14.4528	Benzeneacetaldehyde	122-78-1	3570022
	14.5479	2-Decenal, (E)-	3913-81-3	9094016
	14.9938	Silanediol, dimethyl-	1066-42-8	33263024
	17.5803	Oxime-, methoxy-phenyl-	1000222-86-6	48254444
	18.3533	Felbamate	25451-15-4	879508
	23.5441	Octanoic acid	124-07-2	1452734
	25.542	Nonanoic acid	112-05-0	5035295
	27.7242	2,4-Di-tert-butylphenol	96-76-4	3822425
	29.8469	Benzophenone	119-61-9	4208046
	30.1798	5-Hydroxymethylfurfural	67-47-0	4448580
38.2426	n-Hexadecanoic acid	57-10-3	4020739	