

## DAFTAR PUSTAKA

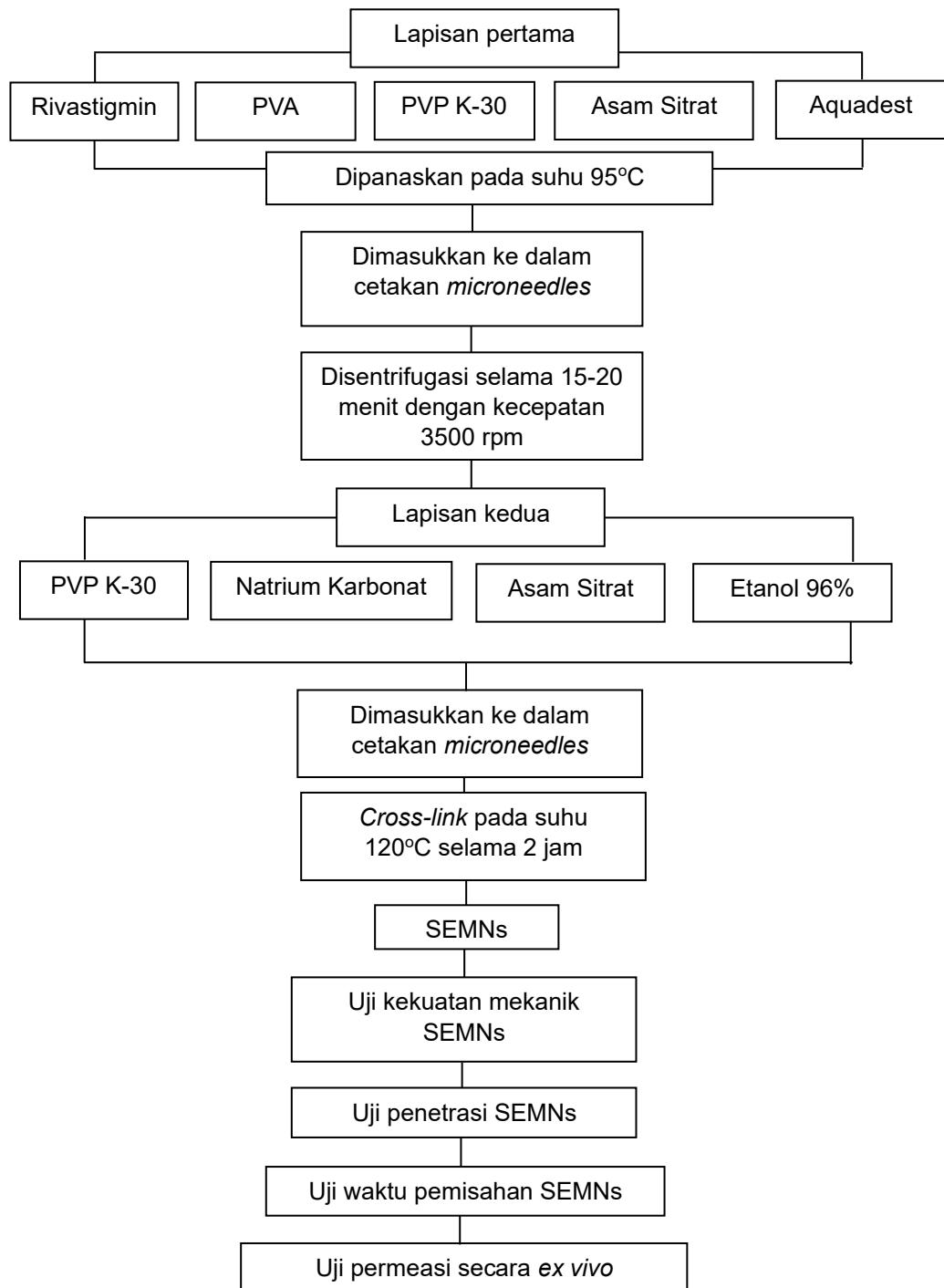
- Brodin, B., Steffansen, B., Nielsen, C.U., 2002. Passive diffusion of drug substances: the concepts of flux and permeability. *Mol. Biopharm.* 18.
- Chauhan, M.K., Sharma, P.K., 2019. Optimization and characterization of rivastigmine nanolipid carrier loaded transdermal patches for the treatment of dementia. *Chem. Phys. Lipids* 224, 104794.
- Du, G., Sun, X., 2020. Current Advances in Sustained Release Microneedles. *Pharm.*
- Dwomoh, L., Tejeda, G.S., Tobin, A.B., 2022. Targeting the M1 muscarinic acetylcholine receptor in Alzheimer's disease. *Neuronal Signal.* 6, 1–20.
- Elim, D., Fitri, A.M.N., Mahfud, M.A.S. ban, Afika, N., Sultan, N.A.F., Hijrah, Asri, R.M., Permana, A.D., 2023. Hydrogel forming microneedle-mediated transdermal delivery of sildenafil citrate from polyethylene glycol reservoir: An ex vivo proof of concept study. *Colloids Surfaces B Biointerfaces*. 222, 113018.
- Farina, N., Jacobs, R., Puspitarini, S.T., Schneider, M., Theresia, I., Turana, Y., Fitri, F.I., Albanese, E., Lorenz-Dant, K., Docrat, S., Toit, P. Du, Ferri, C.P., Govia, I., Comas-Herrera, A., Ibniidris, A., Knapp, M., Banerjee, S., 2022. Description of the cross-cultural process adopted in the STRIDE (STrengthening Responses to dementia in DEveloping countries) program: A methodological overview. *Alzheimer's Dement. Diagnosis, Assess. Dis. Monit.* 14, e12293.
- Guimaraes, T.M., Moniz, T., Nunes, C., Zaharieva, M.M., Kaleva, M., Yoncheva, K., Najdenski, H., Lima, S.A.C., Reis, S., 2022. Polymeric Microneedles for Transdermal Delivery of Rivastigmine : Design and Application in Skin Mimetic Model. *Pharmaceutics* 14, 1–22.
- Himawan, A., Anjani, Q.K., Detamornrat, U., Vora, L.K., Permana, A.D., Ghanma, R., Naser, Y., Rahmawaty, D., Scott, C.J., Donnelly, R.F., 2023. Multifunctional low temperature-cured PVA/PVP/citric acid-based hydrogel forming microarray patches: Physicochemical characteristics and hydrophilic drug interaction. *Eur. Polym. J.* 186.
- Hou, A., Quan, G., Yang, B., Lu, C., Chen, M., Yang, D., Wang, L., Liu, H., Pan, X., Wu, C., 2019. Rational Design of Rapidly Separating Dissolving Microneedles for Precise Drug Delivery by Balancing the Mechanical Performance and Disintegration Rate. *Adv. Healthc. Mater.* 8, 1–11.
- Jeong, H.I., An, D.H., Lim, J.W., Oh, T., Lee, H., Park, S.M., Jeong, J.H., Chung, J.W., 2021. Hydrogel surface-modified polyurethane copolymer film with water permeation resistance and biocompatibility for implantable biomedical devices. *Micromachines*. 12.
- Li, G., Badkar, A., Nema, S., Kolli, C.S., Banga, A.K., 2009. In vitro transdermal delivery of therapeutic antibodies using maltose microneedles. *Int. J. Pharm.* 368, 109–115.
- Li, W., Tang, J., Terry, R.N., Li, S., Brunie, A., Callahan, R.L., Noel, R.K., Rodríguez, C.A., Schwendeman, S.P., Prausnitz, M.R., 2019. Long-acting reversible contraception by effervescent microneedle patch. *Sci. Adv.* 5.
- Liu, T., Jiang, G., Song, G., Sun, Y., Zhang, X., Zeng, Z., 2021. Fabrication of Rapidly Separable Microneedles for Transdermal Delivery of Metformin on Diabetic Rats. *J. Pharm. Sci.* 3004–3010.
- Maryam, R.S., Sahar, J., Hastono, S.P., Harimurti, K., 2021. Common symptoms of alzheimer's dementia that are easily recognizable by families. *Dement. e Neuropsychol.* 15, 186–191.
- McAlister, E., Kirkby, M., Domínguez-Robles, J., Paredes, A.J., Anjani, Q.K., Moffatt,

- K., Vora, L.K., Hutton, A.R.J., McKenna, P.E., Larrañeta, E., Donnelly, R.F., 2021. The role of microneedle arrays in drug delivery and patient monitoring to prevent diabetes induced fibrosis. *Adv. Drug Deliv. Rev.* 175, 113825.,
- M.I., Vora, L.K., Ershaid, J.A., Peng, K., Tekko, I.A., Donnelly, R.F., 2022. Nanoemulsion-based dissolving microneedle arrays for enhanced intradermal and transdermal delivery. *Drug Deliv. Transl. Res.* 12, 881–896.
- Permana, A.D., McCrudden, M.T.C., Donnelly, R.F., 2019a. Enhanced intradermal delivery of nanosuspensions of antifilariasis drugs using dissolving microneedles: A proof of concept study. *Pharmaceutics.* 11, 1–22.
- Permana, A.D., Tekko, I.A., McCrudden, M.T.C., Anjani, Q.K., Ramadon, D., McCarthy, H.O., Donnelly, R.F., 2019b. Solid lipid nanoparticle-based dissolving microneedles: A promising intradermal lymph targeting drug delivery system with potential for enhanced treatment of lymphatic filariasis. *J. Control. Release* 316, 34–52.
- Pina, V.G., Dalmau, A., Devesa, F., Amigó, V., Muñoz, A.I., 2015. Tribocorrosion behavior of beta titanium biomedical alloys in phosphate buffer saline solution. *J. Mech. Behav. Biomed. Mater.* 46, 59–68.
- Putri, H.E., Utami, R.N., Aliyah, Wahyudin, E., Oktaviani, W.W., Mudjahid, M., Permana, A.D., 2022. Dissolving Microneedle Formulation of Ceftriaxone: Effect of Polymer Concentrations on Characterisation and Ex Vivo Permeation Study. *J. Pharm. Innov.* 17, 1176–1188.
- Rompicherla, S.K.L., Arumugam, K., Bojja, S.L., Kumar, N., Rao, C.M., 2021. Pharmacokinetic and pharmacodynamic evaluation of nasal liposome and nanoparticle based rivastigmine formulations in acute and chronic models of Alzheimer's disease. *Naunyn. Schmiedebergs. Arch. Pharmacol.* 394, 1737–1755.
- Shi, Y., Xiong, D., Liu, Y., Wang, N., Zhao, X., 2016. Swelling, mechanical and friction properties of PVA/PVP hydrogels after swelling in osmotic pressure solution. *Mater. Sci. Eng. C*. 65, 172–180.
- Tekko, Ismaiel A., Chen, G., Domínguez-robles, J., Raj, R., Thakur, S., Hamdan, I.M.N., Vora, L., Larrañeta, E., Mcelnay, J.C., Mccarthy, H.O., Rooney, M., Donnelly, R.F., 2020. Development and characterisation of novel poly ( vinyl alcohol )/ poly ( vinyl pyrrolidone ) -based hydrogel-forming microneedle arrays for enhanced and sustained transdermal delivery of methotrexate. *Int. J. Pharm.* 586, 119580.
- Tekko, Ismaiel A., Chen, G., Domínguez-Robles, J., Thakur, R.R.S., Hamdan, I.M.N., Vora, L., Larrañeta, E., McElnay, J.C., McCarthy, H.O., Rooney, M., Donnelly, R.F. 2020a. Development and characterisation of novel poly ( vinyl alcohol)/poly (vinyl pyrrolidone)-based hydrogel-forming microneedle arrays for enhanced and sustained transdermal delivery of methotrexate. *Int. J. Pharm.* 586.
- Tekko, Ismaiel A., Chen, G., Domínguez-Robles, J., Thakur, R.R.S., Hamdan, I.M.N., Vora, L., Larrañeta, E., McElnay, J.C., McCarthy, H.O., Rooney, M., Donnelly, R.F., 2020b. Development and characterisation of novel poly (vinyl alcohol)/poly (vinyl pyrrolidone)-based hydrogel-forming microneedle arrays for enhanced and sustained transdermal delivery of methotrexate. *Int. J. Pharm.* 586, 119580.
- Torabi, S.J., Mohebali, A., Abdouss, M., Shakiba, M., Abdouss, H., Ramakrishna, S., Teo, Y.S., Jafari, I., Rezvani Ghomi, E., 2021. Synthesis and characterization of a novel molecularly imprinted polymer for the controlled release of rivastigmine tartrate. *Mater. Sci. Eng. C*. 128.
- Wang, C., Jiang, X., Zeng, Y., Terry, R.N., Li, W., 2022. Rapidly separable

- microneedle patches for controlled release of therapeutics for long-acting therapies. *Med. Drug Discov.* 13, 100118.
- Xiu, X., Gao, G., Liu, Y., Ma, F., 2022. Drug delivery with dissolving microneedles: skin puncture, its influencing factors and improvement strategies. *J. Drug Deliv. Sci. Technol.* 76, 103653.
- Yang, L., Yang, Y., Chen, H., Mei, L., Zeng, X., 2022. Polymeric microneedle-mediated sustained release systems: Design strategies and promising applications for drug delivery. *Asian J. Pharm. Sci.* 17, 70–86.
- Zhang, S., Zhai, Y., Zhang, Z., 2011. Preparation and properties of polyvinyl alcohol (PVA) / polyvinyl pyrrolidone (PVP) hydrogel. *Appl. Mech. Mater.* 84–85, 485–488.
- Zhao, L., Vora, L.K., Kelly, S.A., Li, L., Larrañeta, E., McCarthy, H.O., Donnelly, R.F., 2023. Hydrogel-forming microarray patch mediated transdermal delivery of tetracycline hydrochloride. *J. Control. Release.* 356, 196–204.

## LAMPIRAN

### Lampiran 1. Skema Kerja Penelitian



## Lampiran 2. Perhitungan

### a. Uji kekuatan mekanik

Hasil uji kekuatan mekanik SM3 replikasi 1

$$\% \text{Kekuatan mekanik} = \frac{\text{Tinggi sebelum uji} - \text{Tinggi sesudah uji}}{\text{Tinggi sebelum uji}} \times 100\%$$

$$\% \text{Kekuatan mekanik} = \frac{784 \mu\text{m} - 732 \mu\text{m}}{784 \mu\text{m}} \times 100\% = 6,63\%$$

### b. Uji kemampuan penetrasi

Hasil uji kekuatan mekanik SM3 replikasi 1 pada lapisan ke-5

$$\% \text{Kemampuan penetrasi} = \frac{\text{Jumlah lubang yang teramat}}{\text{Jumlah lubang keseluruhan}} \times 100\%$$

$$\% \text{Kemampuan penetrasi} = \frac{34}{100} \times 100\% = 34\%$$

### c. Uji Permeasi SEMNs-RT

Permeasi:  $y = 0,0373x + 0,0363$

Keterangan:

$y$  = serapan

$x$  = konsentrasi

SM3 replikasi 1 jam ke-5 diperoleh serapan = 0,119

Untuk memperoleh konsentrasi dari nilai serapan tersebut, maka digunakan persamaan berikut:

$$0,119 = 0,0373x + 0,0363$$

$$x = \frac{0,119 - 0,0363}{0,0373}$$

$$x = 2,22 \mu\text{g/mL}$$

$$\text{Konsentrasi dalam } 1 \text{ mL} = 2,22 \mu\text{g/mL} \times 1 \text{ mL} = 2,22 \mu\text{g}$$

$$\text{Konsentrasi dalam } 28 \text{ mL} = 2,22 \mu\text{g/mL} \times 1 \times 28 \text{ mL} = 62,16 \mu\text{g}$$

$$\begin{aligned} \text{Faktor koreksi} &= \frac{\text{Konsentrasi jam sebelumnya}}{1000} + \text{Faktor koreksi jam sebelumnya} \\ &= \frac{1,65 \mu\text{g}}{1000} + 0,00294 \\ &= 0,00459 \mu\text{g} \end{aligned}$$

$$\text{Jumlah terpermeasi} = \text{Konsentrasi dalam } 28 \text{ mL} + \text{Faktor koreksi}$$

$$\begin{aligned} &= 62,16 \mu\text{g} + 0,00459 \mu\text{g} \\ &= 62,16459 \mu\text{g} \end{aligned}$$

$$\begin{aligned} \text{Konsentrasi per unit area} &= \frac{\text{Jumlah terpermeasi}}{\text{Luas area difusi}} \times \text{Faktor pengenceran} \\ &= \frac{62,1645 \mu\text{g}}{1,6119 \text{ cm}^2} \times 1 \\ &= 38,56 \mu\text{g/cm}^2 \end{aligned}$$

### Lampiran 3. Tabel Hasil Evaluasi

#### Lampiran 3.1 Tabel hasil uji kekuatan mekanik

**Tabel 3.** Hasil uji kekuatan mekanik

Formula	Penurunan tinggi jarum (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
SM1	42,88	33,42	31,97	36,09	5,92
SM2	20,16	10,61	19,26	16,68	5,27
SM3	6,63	4,89	3,03	4,85	1,80
SM4	14,90	9,11	16,05	13,36	3,72
SM5	12,92	16,12	20,74	16,60	3,93
SM6	2,92	6,77	5,55	5,08	1,97
SM7	11,59	10,97	11,00	11,19	0,35

#### Lampiran 3.2 Tabel hasil uji kemampuan penetrasi

**Tabel 4.** Hasil uji kemampuan penetrasi SM1

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0
2	56,00	32,00	45,00	44,33	12,01
3	25,00	16,00	12,00	17,67	6,66
4	0,00	0,00	0,00	0,00	0
5	0,00	0,00	0,00	0,00	0
6	0,00	0,00	0,00	0,00	0
7	0,00	0,00	0,00	0,00	0
8	0,00	0,00	0,00	0,00	0

**Tabel 5.** Hasil uji kemampuan penetrasi SM2

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0,00
2	48,00	54,00	63,00	55,00	7,55
3	26,00	31,00	29,00	28,67	2,52
4	0,00	0,00	0,00	0,00	0,00
5	0,00	0,00	0,00	0,00	0,00
6	0,00	0,00	0,00	0,00	0,00
7	0,00	0,00	0,00	0,00	0,00
8	0,00	0,00	0,00	0,00	0,00

**Tabel 6.** Hasil uji kemampuan penetrasi SM3

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0,00
2	100,00	100,00	87,00	95,67	7,51
3	94,00	95,00	78,00	89,00	9,54
4	78,00	82,00	54,00	71,33	15,14
5	34,00	27,00	32,00	31,00	3,61
6	0,00	0,00	0,00	0,00	0,00
7	0,00	0,00	0,00	0,00	0,00
8	0,00	0,00	0,00	0,00	0,00

**Tabel 7.** Hasil uji kemampuan penetrasi SM4

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0,00
2	76,00	65,00	76,00	72,33	6,35
3	65,00	32,00	41,00	46,00	17,06
4	31,00	16,00	32,00	26,33	8,96
5	0,00	0,00	0,00	0,00	0,00
6	0,00	0,00	0,00	0,00	0,00
7	0,00	0,00	0,00	0,00	0,00
8	0,00	0,00	0,00	0,00	0,00

**Tabel 8.** Hasil uji kemampuan penetrasi SM5

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0,00
2	52,00	64,00	38,00	51,33	13,01
3	28,00	19,00	21,00	22,67	4,73
4	6,00	4,00	12,00	7,33	4,16
5	0,00	0,00	0,00	0,00	0,00
6	0,00	0,00	0,00	0,00	0,00
7	0,00	0,00	0,00	0,00	0,00
8	0,00	0,00	0,00	0,00	0,00

**Tabel 9.** Hasil uji kemampuan penetrasi SM6

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0,00
2	100,00	98,00	83,00	93,67	9,29
3	89,00	87,00	81,00	85,67	4,16
4	76,00	75,00	65,00	72,00	6,08
5	31,00	32,00	26,00	29,67	3,21
6	0,00	0,00	0,00	0,00	0,00
7	0,00	0,00	0,00	0,00	0,00
8	0,00	0,00	0,00	0,00	0,00

**Tabel 10.** Hasil uji kemampuan penetrasi SM7

Lapisan Parafilm®	Total jumlah lubang yang terbentuk (%)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
1	100,00	100,00	100,00	100,00	0,00
2	84,00	76,00	65,00	75,00	9,54
3	46,00	64,00	46,00	52,00	10,39
4	24,00	31,00	24,00	26,33	4,04
5	0,00	0,00	0,00	0,00	0,00
6	0,00	0,00	0,00	0,00	0,00
7	0,00	0,00	0,00	0,00	0,00
8	0,00	0,00	0,00	0,00	0,00

**Lampiran 3.3 Tabel hasil uji waktu pemisahan****Tabel 11.** Hasil uji waktu pemisahan

Formula	Waktu pemisahan (detik)				
	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata	SD
SM1	67	59	69	65	5,29
SM2	54	58	62	58	4,00
SM3	59	63	57	60	3,06
SM4	60	63	58	60	2,52
SM5	56	64	58	59	4,16
SM6	65	58	59	61	3,79
SM7	58	64	49	57	7,55

**Lampiran 3.4 Tabel Hasil Uji Permeasi Secara *Ex Vivo***

**Tabel 12.** Hasil uji permeasi SM3

Jam	Serapan	Konsentrasi ( $\mu\text{g/mL}$ )	$\frac{1}{\text{mL}}$ ( $\mu\text{g}$ )	Faktor Pengenceran	28 mL ( $\mu\text{g}$ )	Faktor Koreksi	RT terpermeasi	Rata- rata ( $\mu\text{g}$ )	SD	Konsentrasi RT per unit area ( $\mu\text{g/cm}^2$ )	Rata-rata	SD
0,5	0,04	0,18	0,18	1,00	5,03	0,00	5,03			3,12		
	0,04	0,05	0,05	1,00	1,28	0,00	1,28	2,28	2,41	0,79	1,41	1,50
	0,04	0,02	0,02	1,00	0,53	0,00	0,53			0,33		
1	0,04	0,21	0,21	1,00	5,78	0,00	5,78			3,59		
	0,05	0,45	0,45	1,00	12,54	0,00	12,54	10,53	4,13	7,78	6,54	2,56
	0,05	0,47	0,47	1,00	13,29	0,00	13,29			8,24		
2	0,08	1,14	1,14	1,00	32,05	0,00	32,05			19,89		
	0,06	0,74	0,74	1,00	20,79	0,00	20,79	26,30	5,63	12,90	16,32	3,50
	0,07	0,93	0,93	1,00	26,05	0,00	26,05			16,16		
3	0,09	1,41	1,41	1,00	39,56	0,00	39,56			24,54		
	0,08	1,14	1,14	1,00	32,05	0,00	32,05	38,06	5,41	19,89	23,61	3,36
	0,09	1,52	1,52	1,00	42,56	0,00	42,56			26,41		
4	0,10	1,65	1,65	1,00	46,32	0,00	46,32			28,74		
	0,10	1,79	1,79	1,00	50,07	0,00	50,07	45,32	5,33	31,06	28,11	3,30
	0,09	1,41	1,41	1,00	39,56	0,00	39,56			24,54		
5	0,12	2,22	2,22	1,00	62,08	0,00	62,09			38,52		
	0,13	2,57	2,57	1,00	71,84	0,00	71,84	63,04	8,37	44,57	39,11	5,19
	0,11	1,97	1,97	1,00	55,17	0,00	55,18			34,23		
6	0,15	3,16	3,16	1,00	88,35	0,01	88,36			54,82		
	0,12	2,32	2,32	1,00	65,08	0,01	65,09	75,10	11,97	40,38	46,59	7,43

	0,13	2,57	2,57	1,00	71,84	0,01	71,85		44,57		
7	0,15	2,99	2,99	1,00	83,85	0,01	83,86		52,03		
	0,14	2,75	2,75	1,00	77,09	0,01	77,10	81,86	4,13	47,83	50,78
	0,15	3,02	3,02	1,00	84,60	0,01	84,61		52,49		2,57
8	0,16	3,29	3,29	1,00	92,11	0,01	92,12		57,15		
	0,14	2,75	2,75	1,00	77,09	0,01	77,11	91,12	13,54	48,83	56,53
	0,18	3,72	3,72	1,00	104,12	0,01	104,13		64,60		8,39

**Tabel 13.** Hasil uji permeasi SM6

Jam	Serapan	Konsentrasi ( $\mu\text{g}/\text{ml}$ )	1 mL ( $\mu\text{g}$ )	Faktor Pengenceran	28 mL ( $\mu\text{g}$ )	Faktor Koreksi	RT terpermeasi	Rata- rata ( $\mu\text{g}$ )	SD	Konsentrasi RT per unit area ( $\mu\text{g}/\text{cm}^2$ )	Rata- rata	SD
0,5	0,04	0,02	0,02	1,00	0,53	0,00	0,52			0,32		
	0,04	0,13	0,13	1,00	3,53	0,00	3,53	1,78	1,56	2,19	1,10	0,97
	0,04	0,05	0,05	1,00	1,28	0,00	1,28			0,79		
1	0,05	0,26	0,26	1,00	7,28	0,00	7,28			4,52		
	0,05	0,39	0,39	1,00	11,03	0,00	11,03	5,53	6,59	6,84	3,43	4,07
	0,03	-0,06	-0,06	1,00	-1,72	0,00	-1,72			-1,07		
2	0,05	0,31	0,31	1,00	8,78	0,00	8,78			5,45		
	0,04	0,05	0,05	1,00	1,28	0,00	1,28	10,53	10,25	0,79	6,53	6,36
	0,06	0,77	0,77	1,00	21,54	0,00	21,54			13,37		
3	0,08	1,06	1,06	1,00	29,80	0,00	29,80			18,49		
	0,06	0,58	0,58	1,00	16,29	0,00	16,29	23,30	6,80	10,11	14,45	4,20
	0,07	0,85	0,85	1,00	23,80	0,00	23,80			14,76		
4	0,08	1,12	1,12	1,00	31,30	0,00	31,30			19,42		
	0,06	0,77	0,77	1,00	21,54	0,00	21,54	25,80	4,99	13,36	16,00	3,10
	0,07	0,88	0,88	1,00	24,55	0,00	24,59			15,23		
5	0,10	1,55	1,55	1,00	43,31	0,00	43,31			26,87		
	0,09	1,36	1,36	1,00	38,06	0,00	38,06	37,56	6,02	23,61	23,30	3,73
	0,08	1,12	1,12	1,00	31,30	0,00	31,30			19,42		
6	0,10	1,68	1,68	1,00	47,07	0,00	47,07			29,20		
	0,11	1,95	1,95	1,00	54,57	0,00	54,58	53,33	5,73	33,86	33,08	3,56
	0,11	2,08	2,08	1,00	58,33	0,00	58,33			36,19		
7	0,13	2,49	2,49	1,00	69,59	0,00	69,59	62,09	7,51	43,17	38,52	4,66

	0,12	2,22	2,22	1,00	62,08	0,00	62,08		38,52		
	0,11	1,95	1,95	1,00	54,57	0,00	54,57		33,86		
	0,13	2,57	2,57	1,00	71,84	0,00	71,84		44,57		
8	0,13	2,49	2,49	1,00	69,59	0,00	69,59	74,10	5,96	43,17	45,97
	0,14	2,89	2,89	1,00	80,85	0,00	80,85		50,16		3,70

**Tabel 14.** Hasil uji permeasi *patch control*

Jam	Serapan	Konsentrasi ( $\mu\text{g}/\text{ml}$ )	1 mL ( $\mu\text{g}$ )	Faktor Pengenceran	28 mL ( $\mu\text{g}$ )	Faktor Koreksi	RT terpermeasi	Rata- rata ( $\mu\text{g}$ )	SD	Konsentrasi RT per unit area ( $\mu\text{g}/\text{cm}^2$ )	Rata-rata	SD
	0,00	0,00	0,00	1,00	0,00	0,00	0,00			0,00		
0,5	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	0,00	0,00	0,00	1,00	0,00	0,00	0,00			0,00		
	0,04	0,05	0,05	1,00	1,28	0,00	1,28			0,79		
1	0,04	0,02	0,02	1,00	0,52	0,00	0,52	1,02	0,43	0,32	0,64	0,27
	0,04	0,05	0,05	1,00	1,28	0,00	1,28			0,79		
	0,04	0,07	0,07	1,00	2,02	0,00	2,02			1,26		
2	0,04	0,21	0,21	1,00	5,78	0,00	5,78	3,78	1,89	3,58	2,34	1,17
	0,04	0,13	0,13	1,00	3,53	0,00	3,53			2,19		
	0,06	0,61	0,61	1,00	17,04	0,00	17,04			10,57		
3	0,04	0,18	0,18	1,00	5,03	0,00	5,03	7,78	8,23	3,12	4,83	5,11
	0,04	0,05	0,05	1,00	1,28	0,00	1,28			0,79		
	0,04	0,13	0,13	1,00	3,52	0,00	3,52			2,18		
4	0,04	0,23	0,23	1,00	6,53	0,00	6,53	5,53	1,73	4,05	3,43	1,07
	0,04	0,23	0,23	1,00	6,53	0,00	6,53			4,05		
	0,05	0,34	0,34	1,00	9,53	0,00	9,53			5,91		
5	0,05	0,39	0,39	1,00	11,03	0,00	11,03	8,53	3,12	6,85	5,29	1,94
	0,04	0,18	0,18	1,00	5,03	0,00	5,03			3,12		
	0,06	0,61	0,61	1,00	17,04	0,00	17,04			10,57		
6	0,05	0,47	0,47	1,00	13,29	0,00	13,29	15,79	2,17	8,24	9,79	1,34
	0,06	0,61	0,61	1,00	17,04	0,00	17,04			10,57		
7	0,07	0,88	0,88	1,00	24,54	0,00	24,54	24,55	3,00	15,23	15,23	1,86

	0,07	0,98	0,98	1,00	27,55	0,00	27,55		17,09		
	0,06	0,77	0,77	1,00	21,54	0,00	21,54		13,37		
	0,07	1,04	1,04	1,00	29,05	0,01	29,05		18,02		
8	0,08	1,20	1,20	1,00	33,55	0,01	33,55	31,55	2,29	20,82	19,58
	0,08	1,14	1,14	1,00	32,05	0,01	32,05		19,89	1,42	

#### Lampiran 4. Data Hasil Analisis Statistika

**Tabel 15.** Data analisis statistik uji kekuatan mekanik

ANOVA						
KekuatanMekanik		Sum of Squares	df	Mean Square	F	Sig.
Between Groups		5723.092	6	953.849	18.802	.000
Within Groups		710.241	14	50.732		
Total		6433.333	20			
Multiple Comparisons						
Dependent Variable: KekuatanMekanik						
Tukey HSD						
(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
BlankSEMNs	BlankSEMNs				Lower Bound	Upper Bound
SM1	SM2	37.09333*	5.81558	.000	17.2355	56.9511
	SM3	52.28667*	5.81558	.000	32.4289	72.1445
	SM4	41.86333*	5.81558	.000	22.0055	61.7211
	SM5	37.33667*	5.81558	.000	17.4789	57.1945
	SM6	52.03333*	5.81558	.000	32.1755	71.8911
	SM7	44.82000*	5.81558	.000	24.9622	64.6778
	SM2	-37.09333*	5.81558	.000	-56.9511	-17.2355
SM2	SM3	15.19333	5.81558	.194	-4.6645	35.0511
	SM4	4.77000	5.81558	.979	-15.0878	24.6278
	SM5	.24333	5.81558	1.000	-19.6145	20.1011
	SM6	14.94000	5.81558	.207	-4.9178	34.7978
	SM7	7.72667	5.81558	.828	-12.1311	27.5845
	SM3	-52.28667*	5.81558	.000	-72.1445	-32.4289
	SM2	-15.19333	5.81558	.194	-35.0511	4.6645
SM3	SM4	-10.42333	5.81558	.573	-30.2811	9.4345
	SM5	-14.95000	5.81558	.207	-34.8078	4.9078
	SM6	-.25333	5.81558	1.000	-20.1111	19.6045
	SM7	-7.46667	5.81558	.848	-27.3245	12.3911
	SM4	-41.86333*	5.81558	.000	-61.7211	-22.0055
	SM2	-4.77000	5.81558	.979	-24.6278	15.0878
	SM3	10.42333	5.81558	.573	-9.4345	30.2811
SM4	SM5	-4.52667	5.81558	.984	-24.3845	15.3311
	SM6	10.17000	5.81558	.598	-9.6878	30.0278
	SM7	2.95667	5.81558	.998	-16.9011	22.8145
	SM5	-37.33667*	5.81558	.000	-57.1945	-17.4789
	SM2	-.24333	5.81558	1.000	-20.1011	19.6145
	SM3	14.95000	5.81558	.207	-4.9078	34.8078
	SM4	4.52667	5.81558	.984	-15.3311	24.3845
SM5	SM6	14.69667	5.81558	.221	-5.1611	34.5545
	SM7	7.48333	5.81558	.847	-12.3745	27.3411
	SM6	-52.03333*	5.81558	.000	-71.8911	-32.1755
	SM2	-14.94000	5.81558	.207	-34.7978	4.9178
	SM3	-.25333	5.81558	1.000	-19.6045	20.1111
	SM4	-10.17000	5.81558	.598	-30.0278	9.6878
	SM5	-14.69667	5.81558	.221	-34.5545	5.1611
SM6	SM7	-7.21333	5.81558	.867	-27.0711	12.6445
	SM1	-44.82000*	5.81558	.000	-64.6778	-24.9622
	SM2	-7.72667	5.81558	.828	-27.5845	12.1311
	SM3	7.46667	5.81558	.848	-12.3911	27.3245
	SM4	-2.95667	5.81558	.998	-22.8145	16.9011
	SM5	-7.48333	5.81558	.847	-27.3411	12.3745
	SM6	7.21333	5.81558	.867	-12.6445	27.0711

\*. The mean difference is significant at the 0.05 level.

**Tabel 16.** Data analisis statistik uji waktu pemisahan

ANOVA						
WaktuPemisahan		Sum of Squares	df	Mean Square	F	Sig.
Between Groups		117.333	6	19.556	.923	.508
Within Groups		296.667	14	21.190		
Total		414.000	20			
Multiple Comparisons						
Dependent Variable: WaktuPemisahan						
Tukey HSD						
(I) BlankSEMNs	(J) BlankSEMNs	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
SM1	SM2	7.00000	3.75859	.532	-5.8340	19.8340
	SM3	5.33333	3.75859	.784	-7.5007	18.1674
	SM4	4.66667	3.75859	.866	-8.1674	17.5007
	SM5	5.66667	3.75859	.737	-7.1674	18.5007
	SM6	4.33333	3.75859	.900	-8.5007	17.1674
	SM7	8.00000	3.75859	.388	-4.8340	20.8340
	SM2	-7.00000	3.75859	.532	-19.8340	5.8340
SM2	SM3	-1.66667	3.75859	.999	-14.5007	11.1674
	SM4	-2.33333	3.75859	.995	-15.1674	10.5007
	SM5	-1.33333	3.75859	1.000	-14.1674	11.5007
	SM6	-2.66667	3.75859	.990	-15.5007	10.1674
	SM7	1.00000	3.75859	1.000	-11.8340	13.8340
	SM3	-5.33333	3.75859	.784	-18.1674	7.5007
	SM2	1.66667	3.75859	.999	-11.1674	14.5007
SM3	SM4	-.66667	3.75859	1.000	-13.5007	12.1674
	SM5	.33333	3.75859	1.000	-12.5007	13.1674
	SM6	-1.00000	3.75859	1.000	-13.8340	11.8340
	SM7	2.66667	3.75859	.990	-10.1674	15.5007
	SM4	-4.66667	3.75859	.866	-17.5007	8.1674
	SM2	2.33333	3.75859	.995	-10.5007	15.1674
	SM3	.66667	3.75859	1.000	-12.1674	13.5007
SM4	SM5	1.00000	3.75859	1.000	-11.8340	13.8340
	SM6	-.33333	3.75859	1.000	-13.1674	12.5007
	SM7	3.33333	3.75859	.969	-9.5007	16.1674
	SM5	-5.66667	3.75859	.737	-18.5007	7.1674
	SM2	1.33333	3.75859	1.000	-11.5007	14.1674
	SM3	-.33333	3.75859	1.000	-13.1674	12.5007
	SM4	-1.00000	3.75859	1.000	-13.8340	11.8340
SM5	SM6	-1.33333	3.75859	1.000	-14.1674	11.5007
	SM7	2.33333	3.75859	.995	-10.5007	15.1674
	SM6	-4.33333	3.75859	.900	-17.1674	8.5007
	SM2	2.66667	3.75859	.990	-10.1674	15.5007
	SM3	1.00000	3.75859	1.000	-11.8340	13.8340
	SM4	.33333	3.75859	1.000	-12.5007	13.1674
	SM5	1.33333	3.75859	1.000	-11.5007	14.1674
SM6	SM7	3.66667	3.75859	.951	-9.1674	16.5007
	SM1	-8.00000	3.75859	.388	-20.8340	4.8340
	SM2	-1.00000	3.75859	1.000	-13.8340	11.8340
	SM3	-2.66667	3.75859	.990	-15.5007	10.1674
	SM4	-3.33333	3.75859	.969	-16.1674	9.5007
	SM5	-2.33333	3.75859	.995	-15.1674	10.5007
	SM6	-3.66667	3.75859	.951	-16.5007	9.1674

**Tabel 17.** Data analisis statistik uji kemampuan penetrasi

ANOVA					
Per센Penetrasi	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.667	1	2.667	.229	.658
Within Groups	46.667	4	11.667		
Total	49.333	5			

**Tabel 18.** Data analisis statistik uji permeasi secara ex vivo

ANOVA					
Permeasi	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	943.012	2	471.506	15.816	.004
Within Groups	178.869	6	29.811		
Total	1121.881	8			

**Multiple Comparisons**

		Mean Difference (I-J)			95% Confidence Interval		
(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound	
BlankSEMNs	BlankSEMNs						
	SM3	10.56002	4.45806	.121	-3.1185	24.2386	
SM6	SM6	24.97444*	4.45806	.003	11.2959	38.6530	
	Patch	-10.56002	4.45806	.121	-24.2386	3.1185	
Patch	SM3	14.41441*	4.45806	.041	.7358	28.0930	
	Patch	-24.97444*	4.45806	.003	-38.6530	-11.2959	
	SM6	-14.41441*	4.45806	.041	-28.0930	-.7358	

\*. The mean difference is significant at the 0.05 level.

**Lampiran 5. Dokumentasi Penelitian**

**Gambar 12.** Pembuatan larutan stok dan pengukuran kurva baku



**Gambar 13.** Formulasi SEMNs-RT



**Gambar 14.** Karakterisasi fisika SEMNs-RT



**Gambar 15.** Uji permeasi secara *ex vivo*



**Gambar 16.** Pengukuran hasil uji permeasi secara *ex vivo*



**Gambar 17.** Blank SEMNs-RT yang telah dicetak