BAB V
KESIMPULAN DAN SARAN

A. Kesimpulan

1. Kombinasi *crospovidone* sebagai *superdisintegrant* dan *cellactose*® sebagai *filler-binder* berpengaruh terhadap sifat fisik sediaan FDT metoklopramid HCl yaitu kekerasan, kerapuhan, waktu hancur, dan disolusi obat. *Crospovidone* meningkatkan kekerasan dan waktu hancur *in vitro* dan *in vivo*, sedangkan *cellactose*® meningkatkan laju alir serbuk sediaan FDT metoklopramid HCl.
2. Konsentrasi *crospovidone* 7% (10,5 mg) dan *cellactose*® 53% (79,5 mg) pada sediaan FDT metoklopramid HCl memberikan sifat fisik tablet dan pelepasan obat yang optimum.

B. Saran

1. Perlu dilakukan penelitian lebih lanjut sediaan FDT metoklopramid HCl dengan dilakukan kompleks inklusi zat aktif untuk memberikan rasa tablet lebih nyaman di mulut.
2. Perlu dilakukan penelitian lebih lanjut dengan menggunakan metode lain seperti *moulding* yang dapat memperbaiki mutu fisik tablet.

DAFTAR PUSTAKA

[KemenKes] Depatemen Kesehatan Republik Indonesia. 2014. *Farmakope Indonesia*. Ed ke-5. Jakarta : Departemen Kesehatan Republik Indonesia.

[USP]. 2009. *The United State Pharmacopeia*. Ed ke-32. Rockville: The United State Pharmacopeial Convention Inc.

Agoes G., 2012. *Sediaan Farmasi Padat (SFI-6)*. Penerbit ITB. Bandung. Hlm.280,282

Allen, L.V., Popovich N.G., Ancel, H.C. 2011. *Ansel's Pharmaceutical Dosage Forms Nd Drug Delivery Systems* Ed ke-9. Philadelphia : Lippincott Williams & Wilkins. hlm 228-233.

Allen, L.V., Popovich N.G., Ansel, H.C., 2014. *Ansel's Pharmaceutical Dosage Forms an Drug Delivery Systems 10th edition*, Lippincott William & Wilkins, Baltimore, hlm 203-206, 250-253.

Anonim. 2007. *Perbandingan Efektifitas Antara Metoklopramid dan Ondancentron Sebagai Premedikasi Anaestesi Dalam Mencegah Insiden Post Operative Nausea and Vomiting*. Bagian anestesi fakultas kedokteran UNS Surakarta, hlm 6-7.

Arora, P., & Vandana, A.S. 2013. Orodispersible tablets: a comprehensive review. *International Journal of Research and Development in Pharmacy and Life Sciences*, 2(2), hlm 270-284.

Aulton, M.E., 2007. *Aulton's Pharmaceutics The Design and Manufacture of Medicines 3rd edition*, Philadelphia, hlm 16-25.

Bhowmik D, Krishnakant, C.B., Pankaj, Chandira, R.M. 2009. Fast Dissolving Tablets: An Overview. *Journal ff Chemical and Pharmaceutical Research*, 1(1), hlm 167-177.

Bolton, S and Bon, C. 2004. *Pharmaceutical Statistics*. New York: Marcell Dekker Inc. hlm 265-281.

Bolton, S. 1997. *Pharmaceutical Statistics: Practical and Clinical Application*. 3rd Edition. New York: Marcell Dekker Inc. hlm 610-611.

British Pharmacopoeia Commission. 2011. *British Pharmacopoeia Commission 2011*. London: TSO.

Darmansjah, I., Gan, s. 2001. *Farmakologi dan Terapi*. Bagian Farmakologi Fakultas Kedokteran UI, Jakarta. hlm 48-49.

Deepak, S., Dinesh, K., Mankaram, S., Gurmeet, S., Rathore, M.S. 2012. Fast Disintegrating Tablets: *A New Era in Novel Drug Delivery System and New Market Opportunities, JDDT*, 2(3), 74-86.

Desai, P.M., Liew, C.V., and Heng, P.W.S. 2016. Review of Disintegrants and the Disintegration Phenomena. *Journal of Pharmaceutical Sciences*, 105(9), hlm 2545-2555.

FDA. 2011. *United States Pharmacopeia National Formulary, USP 35/NF 30*. United States: Twinbrook Parkway.

Food and Drug Administration. 2008. *Waiver of In Vivo Bioavailability and Bioequivalence Studies for Immediate-Release Solid Oral Dosage Forms Based on Biopharmaceutics Classification System*. Guidance for Industry. Washington, DC: U.S. Departement of Health and Human Services.

Fu, Y.R., Yang, S.C., Seong, H.J., Kimura, S., K, Park. 2004. Orally Fast Disintegrating Tablets: Developments, Technologies, Taste-Masking and Clinical Studies. Critical Reviews in *Therapeutic Drug Carrier Systems*, 21 (6), 433-476.

Fudholi, A. 2013. *Disolusi dan Pelepasan Obat In Vitro*. Yogyakarta : Pustaka Pelajar. hlm 111 – 112, 142 – 145.

Gandjar, I.G., Rohman, A. 2007. *Analisis Obat secara Kromatografi dan Spektroskopi*. Yogyakarta: Pustaka Pelajar. hlm 466-497.

Geuns, M.C. 2003. Molecules of Interest Stevioside. *Phytochemistry*. Volume 64. hlm 913-921.

Gupta, A., Mishra, A.K., Gupta, V., Bansal, P., Singh, R., Singh, A.K. 2010. Review Article Recent Trends of Fast Dissolving Tablet–An Overview of Formulation Technology. *International Journal of Pharmaceutical & Biological Archives*. 1(1), hlm 1 – 10.

Hadisoewignyo, L., Fudholi, A. 2013. *Sediaan Solid*. Pustaka Belajar: Yogyakarta

Harmita. 2004. Petunjuk Pelaksanaan Validasi Metode dan Cara Perhitungannya. *Majalah Ilmu Kefarmasian*. Vol. 1 (3). hlm 117-135.

ICH Harmonised Tripartite Guideline. 2005. Impurities: guideline for residual solvents Q3c(r3). *International conference on harmonization of technical requirements for registration of pharmaceuticals for human use*.

Khalidah, S., Yuliet, Khumaidi, A. 2014. Formulasi Tablet *Effervescent* Jahe (*Z. Officinale Roscoe*) Dengan Variasi Konsentrasi Sumber Asam dan Basa. *Online Jurnal of Natural Science*. Vol. 3 (3), hlm 216-229.

Kibbe, A.H., 2009. Crospovidone, dalam Rowe, R.C., Sheskey P.J., & Quin, M.E., (Ed.) *Handbook of Pharmaceutical Excipients*, 6th ed., Pharmaceuticals Press. Washington D.C. hlm 4850,.

Koseki, T., Onishi, H., Takahashi, Y., Uchida M, Machida, Y. 2008. Development of A Novel Fast Disintegrating Tablets by Direct Compression Using Sucrose Stearic Acid Ester as A Disintegration Accelerating Agent. *Journal Chemical Pharmaceutics*. 56 (10), hlm 1.384-1.388.

Kumar, A.K., Yadav, H.K.S. 2014. Fast Dissolving Tablet Technology: A Review. *World Journal of Pharmacy and Pharmaceutical Sciences*, 3(3), hlm 678-701

Kumare, M.M, Marathe, R.P., Kawade, R.M., Ghante, M.H., Shendarkar, G.R. 2013. Design of fast dissolving tablet of Atenolol using novel co-processed superdisintegrant. *Asian Journal of Pharmaceutical and Clinical Research*. 6(3). hlm 81-85.

Mangal, M., Thakral, S., Goswami, M., Ghai, P. 2012. Superdisintegrant: An Updated Review. *International Journal of Pharmaceutical Sciences Research*. 2(2). hlm 26-35.

Manivannan, R. 2009. Oral Disintegrating Tablets: A Future Compaction, *International Journal of Pharmaceutical Research and Development-Online*, 10, hlm 1-10.

Mantovaneli, I.C.C., Ferretti, M.R., Simoes., Ferreira, da Silva. 2004. *The Effect of Temperature and Flow Rate on The Clarification of The Aqueous Stevia Extract in A Fixed Bed Coloumn with Zeolites*. Braz. J. Chem. Eng. Sao Paulo. 21(3) hlm 449-458

Martin, A., Bustamante, P., Chun, A.H.C. 1993. *Physical Pharmacy*, 4th Ed. Philadelphia: Lea and Febiger.

Mathur, P., Saroha, K., Verma, S., Syan, N., Kumar, A. 2010. Mouth Dissolving Tablets: An Overview On Future Compaction In Oral Formulation Technologies. *Der Pharmacia Sinica*. 1(1). hlm 179-187.

Mattsson, S., 2000. Pharmaceeutical binders and their function in directly compressed tablets: mechanistic studies on the effect of dry binders on mechanical strength, pore structure and disintegration of tablets. Disertasi. Sweden: Uppsala University

McGinity, J.W., Ku C., Bodmeter, R., Harris, H.R. 1985. Dissolution and Uniformity Properties of Ordered Mixes of Micronized Griseofulfin Directly Compressible Excipient, *Drug Dev. & Ind. Pharm*.

Momin, M.M., Dev, A. 2015. Review Article Fast Dissolving Tablets: A Novel Approach. *Indian Journal of Pharmaceutical and Biological Research (IJPBR)*.

Morgan, G.E., & Mikhail, M.S. 1996. *Adjuncts to Anesthesia*. In: *Clinical Anesthesiology 2nd ed*. Los Angles: Appeleton and Lange, hlm 201-209.

Nagar, P., Singh, K., Chuhan, I., Verma, M., Yasir, M., Khan, A., Sharma, R., Gupta, N. 2011. Orally Disintegrating Tablets: Formulation, Preparation, Techniques and Evaluation. *Journal of Applied Pharmaceutical Science*, 1(4), hlm 35-45.

Nagar, P.K., Parvez, N., Sharma, P.K. 2015. Fast Dissolving Tablets: A Review. *Middle-East Journal of Scientific Research*, 23(1), hlm 142-148.

Nayak, A..K, Manna, K. 2011. Current Developments in Orally Disintegrating Tablet Technology. *J Pharm Educ Res*, 2(1), hlm 21-34.

Omoigui, S. 1997.*Obat-obatan Anestesia.* Edisi II. EGC. Jakarta. pp : 233-35 dan 269

Pabari, R.M., *and* Ramtoola, Z. 2012. Effect of a Disintegration Mechanism on Wetting, Water Absorption, and Disintegration Time of Orodispersible Tablets. *Journal of Young Pharmacists*. 4(3). hlm 157-163.

Pramono, B. *Optimasi Formulasi Fast Disintegrating Tablet Ekstrak Daun Jambu Biji (Psidium guajava L.) dengan Kombinasi Bahan Penghancur Crospovidone dan Bahan Pengisi Manitol* [Skripsi]. Surakarta: Fakultas Farmasi, Universitas Muhammadyah.

Qiu, Y., Chen, Y., Zhang, G.G.Z., Yu, L., and Mantri, R. V., 2017. *Developing Solid Oral Dosage Forms Pharmaceutical Theory & Practice*. 2nd ed. Mica Haley.

Rachmawati, H., Marbun E.J., Pamudji J,S. 2011. Pengembangan Formula Tablet Hancur Cepat dari Kompleks Inklusi Ketoprofen dalam Beta Siklodekstrin. *Majalah Farmasi Indonesia*. 22(3) hlm 229-237.

Rawat, S., Darle, D.D.V., Fukte, S.R., Shinde, P.R., Parve, B.S. 2014. Superdisintegrants: An Overview. *World journal of pharmacy and pharmaceutical sciences* Volume 3, Issue 5, hlm 263-278.

Rowe, R.C., P. J. Sheskey, M.E., Quinn. 2009. *Handbook of Pharmaceutical Excipients.* 6th ed. The Pharm hlm 129-130, 207-208, 210,221, 405, 728.

Rowe, R.C., Paul J. Sheskey, P.J. & Owen, S.C. 2006. *Handbook of Pharmaceutical Excipients* 5h ed., Pharmaceuticals Press, London.

Satpute, M.M., *and* Tour, N.S. 2013. Formulation and In Vitro Evaluation of Fast Dissolving Tablets of Metoprolol Tartrate. *Brazilian Journal of Pharmaceutical Sciences.* 49 (4). hlm 783-792.

Shalini, S. 2012. Advantages and Applications of Nature Excipients-a Review. *Asian J. Pharm*. Res, 2(1), hlm 30-39.

Sharma, D., Singh, G., Kumar, D., Singh, M. 2015. Formulation Development and Evaluation of Fast Disintegrating Tablets of Salbutamol Sulphate, Cetirizine Hydrochloride In Combined Pharmaceutical Dosage Form: A

New Era In Novel Drug Delivery for Pediatrics and Geriatrics. *Journal of drug delivery*, 2015, 640529.

Shihora, H., Panda, S. 2011. Superdisintegrants, utility in Dosage Forms: A Quick Review. *Journal of Pharmaceutical Science and Biosientipic Research*. 1(3), hlm 148-153.

Shukla, D., Chakraborty, S., Singh, S., Mishra, B. 2009. Mouth dissolving tablets I: An overview of formulation technology, *Scientia Pharmaceutica*, 77 hlm 309-326.

Siregar, C., dan Wikarsa, S., 2010. *Teknologi Farmasi Sediaan Tablet: Dasar-Dasar Praktek*. Jakarta : Penerbit Buku Kedokteran EG.

Sri, K.V., Raj, G.B., Ravishanker D., Kumar, C.A. 2012. Preparation and Evaluation of Montelukast Oral Dispersible Tablets by Direct Compression Method. *International Research Journal of Pharmacy*. 3(7). hlm 315-318.

Stoelting, R.K. 1999. *Antacids and Gastrointestinal Prokinetics*. In: *Pharmacology and Physiology in Anesthetic Practice, 3rd ed*. New York: Lippincott-Raven Publisher, hlm 444-452.

Sulaiman, T. N. S. 2007. *Teknologi dan Formulasi Sediaan Tablet*.Yogyakarta : Fakultas Farmasi Universitas Gadjah Mada.

Syamsia, Pratiwi, R.D., Susana. 2017. Sifat Fisik Tablet Dihydroaetemisinin-Piperaquin (Dhp) Sediaan Generik dan Sediaan dengan Nama Dagang yang Beredar Di Kotamadya Jayapura. *PHARMACON Jurnal Ilmiah Farmasi – UNSRAT Vol. 6 No. 3 AGUSTUS 2017* ISSN 2302 – 2493.

Vikram, Gharge V., Sharma P., Gonjari I. 2014. Application of Surface Response Methodology for Spray Dried-Fluid Bed Processed Technology of Mouth Dissolving Platform for Sildenafilcitrate in Pulmonary Hypertension. *International Journal of Pharmaceutical Sciences and Research Vol. 5(3): 928-941.*

Voigt, R. 1994. *Buku Pelajaran Teknologi Farmasi*. Penerjemah: S. Noerono, Yogyakarta: Gadjah Mada University Press.

Widana, I.W. 2000. *Efek Metoclopramide Terhadap Dosis Induksi Propofol*. Fakultas Kedokteran UGM

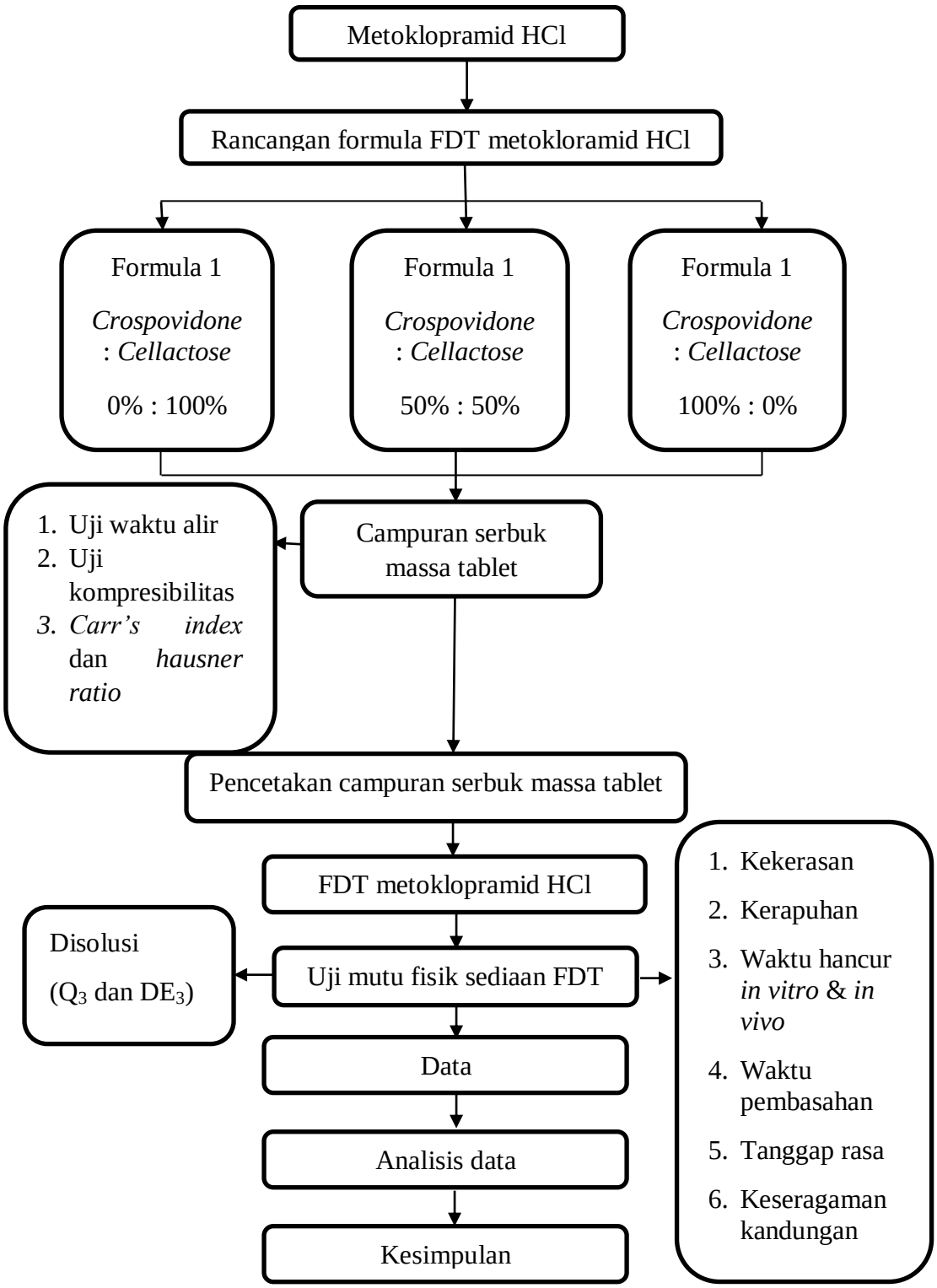
Widyaningrum, E., 2015. *Formulasi Fast Disintegrating Tablet Famotidin menggunakan kombinasi Superdisintegrant Acdisol dan Sodium Starch Glycolate* [Skripsi]. Surakarta: Fakultas Farmasi, Universitas Setia Budi.

Yidan, L. 2008. *A New Exipients for Fast Disintegrating Oral Dosage Form*. http:www.neexcipientfest.net/americas/presentations/EFA17A2YidanLan.BASF.pdf. (Accessed: Mei 27, 2019).

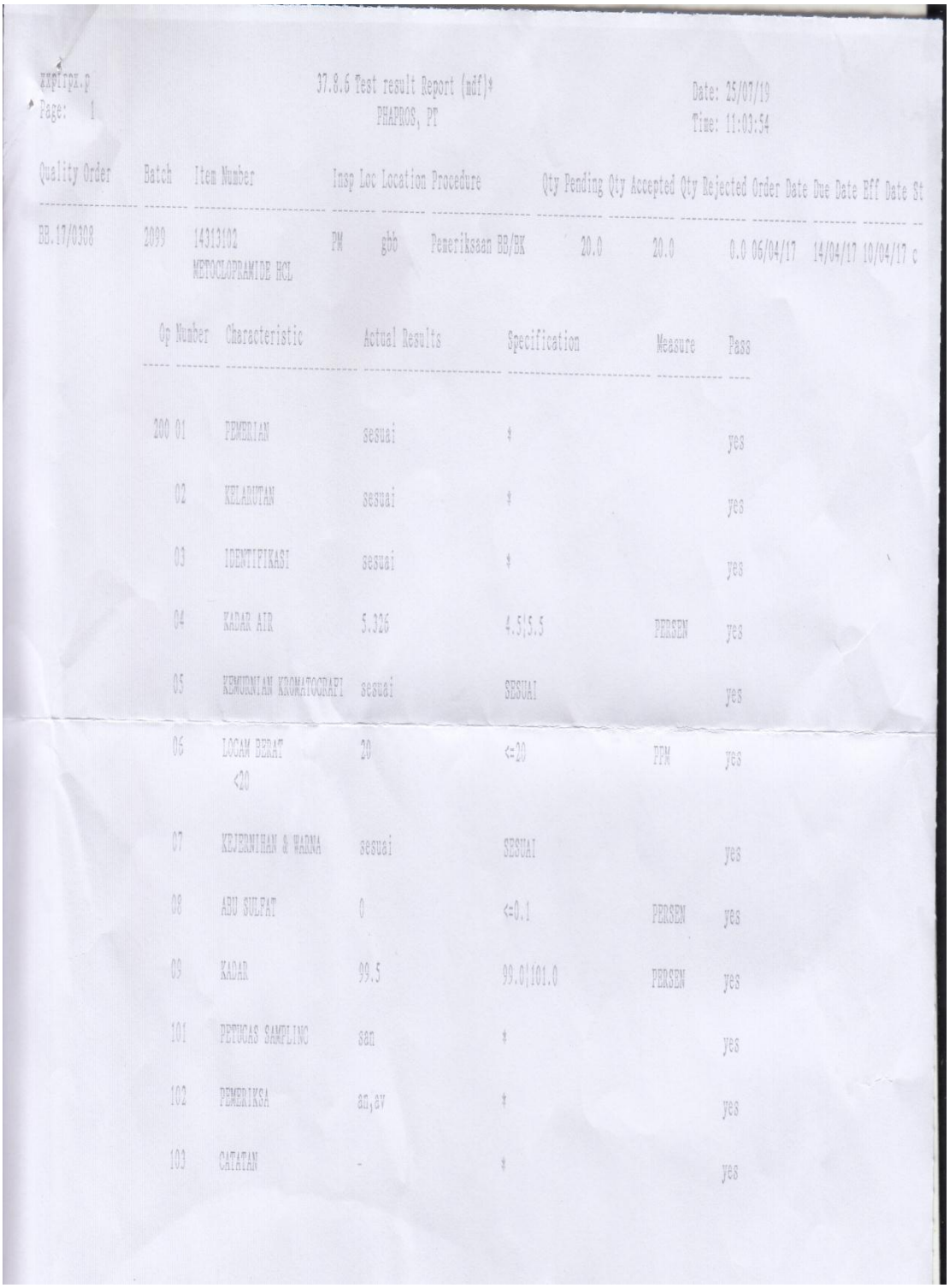
Yuwono, M., dan Indrayanto, G. 2005.Validation of Chromatographic Methods of Analysis. Journal. Vol. 32 hlm 252

L A M P I R A N

Lampiran 1. Skema penelitian sediaan FDT metoklopramid HCl



Lampiran 2. ***Certificate of Analysis*** **Metoklopramid HCl**



zapirpt.p
Page: 1

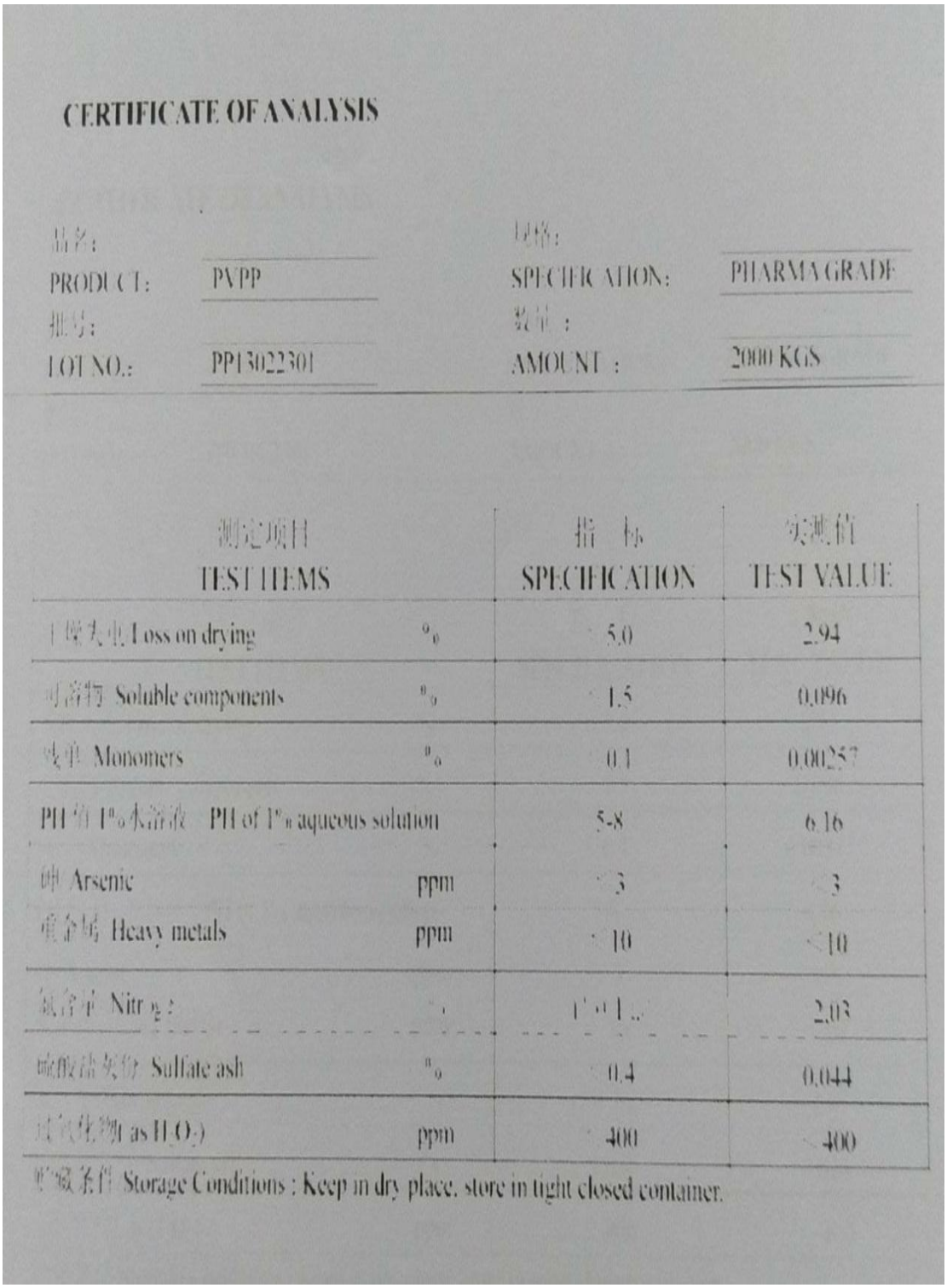
37.8.6 Test result Report (mtf)*
PHAPROS, PT

Date: 25/07/19
Time: 11:03:54

Quality Order	Batch	Item Number	Insp Loc	Location	Procedure	Qty Pending	Qty Accepted	Qty Rejected	Order Date	Due Date	Eff Date	St
BB.17/0308	2099	14313102 METOCLOPRAMIDE HCL	PM	gbb	Pemeriksaan BB/BK	20.0	20.0	0.0	06/04/17	14/04/17	10/04/17	c

Op	Number	Characteristic	Actual Results	Specification	Measure	Pass
200	01	PEMERIAN	sesuai	*		yes
	02	KELARUTAN	sesuai	*		yes
	03	IDENTIFIKASI	sesuai	*		yes
	04	KADAR AIR	5.326	4.5|5.5	PERSEN	yes
	05	KEMURNIAN KROMATOGRAFI	sesuai	SESUAI		yes
	06	LOGAM BERAT <20	20	<=20	PPM	yes
	07	KEJERNIHAN & WARNA	sesuai	SESUAI		yes
	08	ABU SULFAT	0	<=0.1	PERSEN	yes
	09	KADAR	99.5	99.0|101.0	PERSEN	yes
	101	PETUGAS SAMPLING	san	*		yes
	102	PEMERIKSA	an,dv	*		yes
	103	CATATAN	-	*		yes

Lampiran 3. ***Certificate of Analysis Crospovidone***



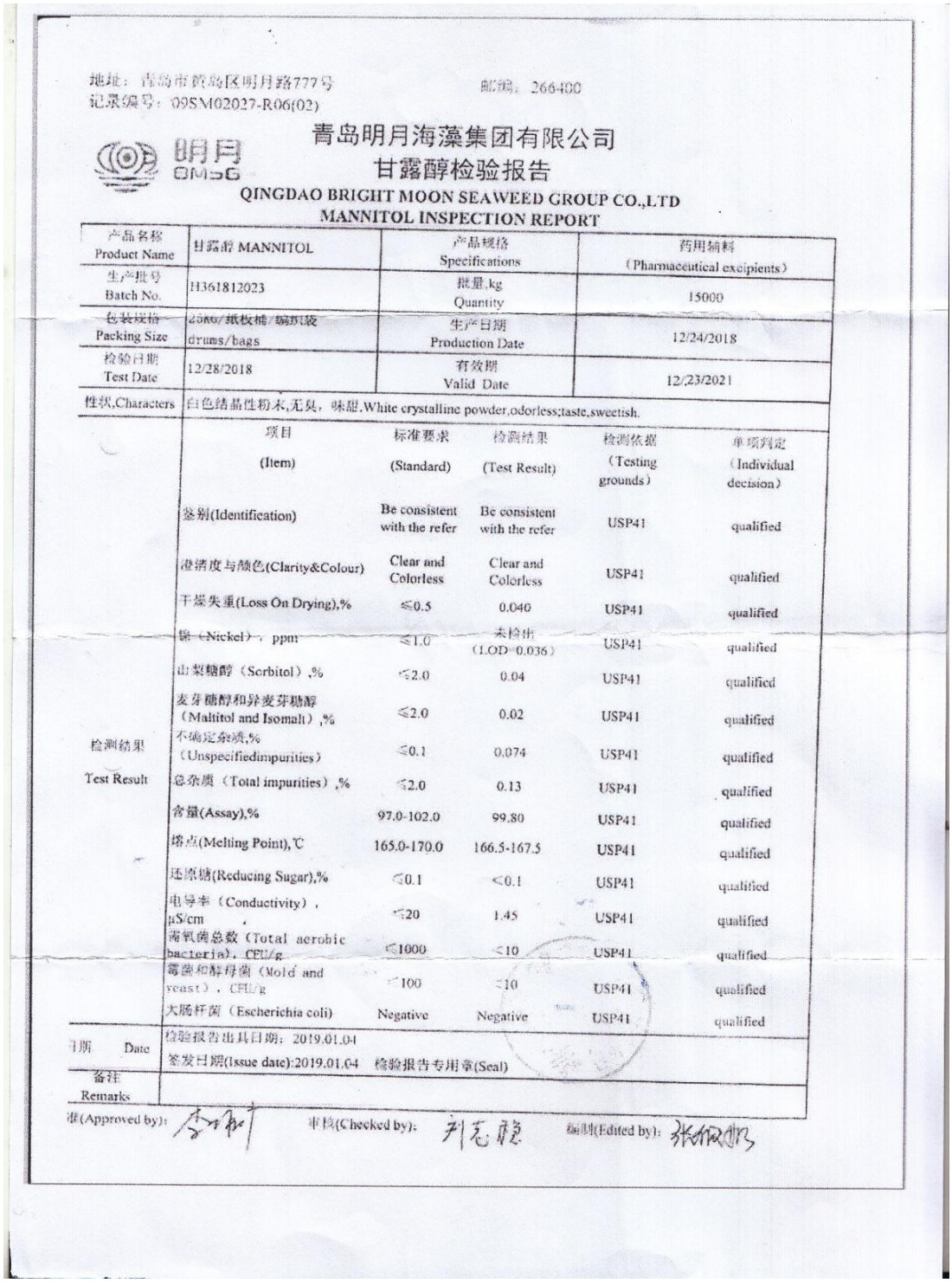
CERTIFICATE OF ANALYSIS

品名:		规格:	
PRODUCT:	PVPP	SPECIFICATION:	PHARMA GRADE
批号:		数量:	
LOT NO.:	PP1302230I	AMOUNT:	2000 KGS

测定项目 TEST ITEMS		指标 SPECIFICATION	实测值 TEST VALUE
干燥失重 Loss on drying	%	5.0	2.94
可溶物 Soluble components	%	1.5	0.096
残单 Monomers	%	0.1	0.00257
PH值 1%水溶液 PH of 1% aqueous solution		5-8	6.16
砷 Arsenic	ppm	3	3
重金属 Heavy metals	ppm	10	<10
氮含量 Nitrogen	%	[illegible]	2.03
硫酸盐灰分 Sulfate ash	%	0.4	0.044
过氧化物(as H_2O_2)	ppm	400	400

贮藏条件 Storage Conditions : Keep in dry place, store in tight closed container.

Lampiran 4. *Certificate of Analysis* manitol



地址：青岛市黄岛区明月路777号　　邮编：266400
记录编号：09SM02027-R06(02)

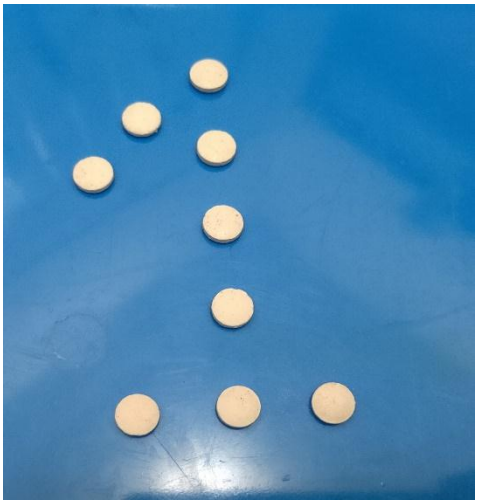
青岛明月海藻集团有限公司
甘露醇检验报告
QINGDAO BRIGHT MOON SEAWEED GROUP CO.,LTD
MANNITOL INSPECTION REPORT

产品名称 Product Name	甘露醇 MANNITOL	产品规格 Specifications	药用辅料 (Pharmaceutical excipients)
生产批号 Batch No.	H361812023	批量,kg Quantity	15000
包装规格 Packing Size	25KG/纸板桶/编织袋 drums/bags	生产日期 Production Date	12/24/2018
检验日期 Test Date	12/28/2018	有效期 Valid Date	12/23/2021
性状,Characters	白色结晶性粉末,无臭，味甜.White crystalline powder,odorless;taste,sweetish.		

	项目 (Item)	标准要求 (Standard)	检测结果 (Test Result)	检测依据 (Testing grounds)	单项判定 (Individual decision)
检测结果 Test Result	鉴别(Identification)	Be consistent with the refer	Be consistent with the refer	USP41	qualified
	澄清度与颜色(Clarity&Colour)	Clear and Colorless	Clear and Colorless	USP41	qualified
	干燥失重(Loss On Drying),%	≤0.5	0.040	USP41	qualified
	镍（Nickel），ppm	≤1.0	未检出 (LOD=0.036)	USP41	qualified
	山梨糖醇（Sorbitol）,%	≤2.0	0.04	USP41	qualified
	麦芽糖醇和异麦芽糖醇 (Maltitol and Isomalt),%	≤2.0	0.02	USP41	qualified
	不确定杂质,% (Unspecifiedimpurities)	≤0.1	0.074	USP41	qualified
	总杂质（Total impurities）,%	≤2.0	0.13	USP41	qualified
	含量(Assay),%	97.0-102.0	99.80	USP41	qualified
	熔点(Melting Point),℃	165.0-170.0	166.5-167.5	USP41	qualified
	还原糖(Reducing Sugar),%	≤0.1	≤0.1	USP41	qualified
	电导率（Conductivity），μS/cm	≤20	1.45	USP41	qualified
	需氧菌总数（Total aerobic bacteria），CFU/g	≤1000	≤10	USP41	qualified
	霉菌和酵母菌（Mold and yeast），CFU/g	≤100	≤10	USP41	qualified
	大肠杆菌（Escherichia coli）	Negative	Negative	USP41	qualified
日期 Date	检验报告出具日期：2019.01.04				
	签发日期(Issue date):2019.01.04 检验报告专用章(Seal)				
备注 Remarks					

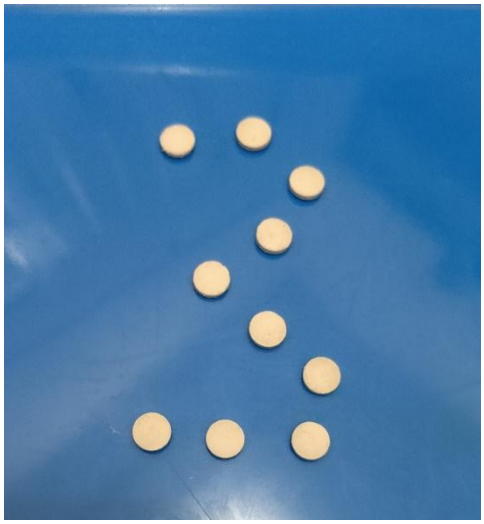
准(Approved by)：　　审核(Checked by)：　　编制(Edited by)：

Lampiran 5. Hasil sediaan FDT metoklopramid HCL



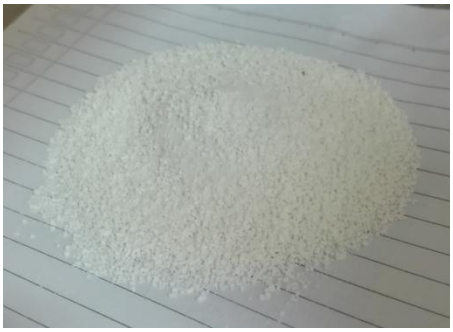
Formula 1

Formula 2

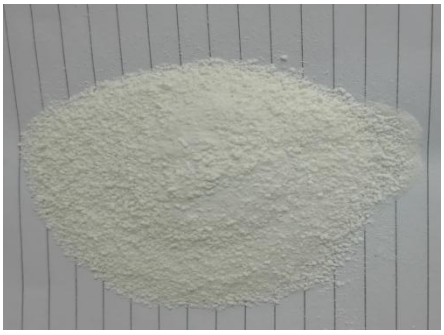


Formula 3

Lampiran 6. Hasil uji siat fisik massa serbuk sediaan FDT metoklopramid HCl



Formula 1



Formula 2

Formula 3

1. *Hausner ratio* dan *carr's index*

Formula 1				
Bobot serbuk (g)	Bulk density (g/mL)	Tapped density (g/mL)	Hausner ratio (g/mL)	Carrs's index (%)
19,521	0,65	0,67	1,031	2,99
19,523	0,65	0,67	1,031	2,99
19,521	0,64	0,66	1,031	3,03
Rata-rata	0,65	0,67	1,031	3,00
SD	0,006	0,006	0,0	0,03

Formula 2				
Bobot serbuk (g)	Bulk density (g/mL)	Tapped density (g/mL)	Hausner ratio (g/mL)	Carrs's index (%)
19,525	0,7	0,73	1,043	4,11
19,523	0,69	0,72	1,043	4,17
19,524	0,7	0,73	1,043	4,11
Rata-rata	0,7	0,73	1,043	4,13
SD	0,006	0,005	0,0	0,03

Formula 3				
Bobot serbuk (g)	Bulk density (g/mL)	Tapped density (g/mL)	Hausner ratio (g/mL)	Carrs's index (%)
19,521	0,65	0,69	1,062	5,8
19,524	0,65	0,7	1,077	7,14
19,523	0,65	0,69	1,062	5,8
Rata-rata	0,65	0,69	1,067	6,25
SD	0,0	0,005	0,009	0,78

Contoh perhitungan fofrmula 1 replikasi 1:

- Bulk density

  Pb = M / Vb

  Pb = 19,521 / 30

  Pb = 0,6507

- Hausner ratio

  Hausner ratio = $\frac{0,75}{0,65}$ = 1,031

- Tapped density

  $C = M / V_t$

  $D_t = 19.521 / 29$

  $D_t = 0,75$

- Carr's index

  Carr's index = $\frac{0,75-0,65}{0.75}$ x 100%

  = 2,99%

2. Waktu alir

Replikasi	Waktu alir (detik)		
	F1	F2	F3
1	0,7	0,61	0,69
2	0,69	0,62	0,69
3	0,7	0,6	0,68
Rata-rata	0,7	0,61	0,69
SD	0,006	0,01	0,006

3. Sudut diam

Replikasi	Sudut diam (º) F1		
	Tinggi	Diameter	Sudut diam
1	2	8,5	25,20
2	2	8,5	25,20
3	2	8,4	25,46
Rata-rata	2	8,47	25,29
SD			0,006

Replikasi	Sudut diam (º) F2		
	Tinggi	Diameter	Sudut diam
1	2	7,7	27,45
2	2	7,6	27,76
3	2	7,6	27,76
Rata-rata	2	7,63	27,66
SD			0,18

Replikasi	Sudut diam (º) F3		
	Tinggi	**Diameter**	**Sudut diam**
1	2	7,5	28,07
2	2	7,5	28,07
3	2	7,6	27,76
Rata-rata	2	7,53	27,97
SD			0,18

Contoh perhitungan F1 replikasi 1:

Tinggi = 2,0

Diameter = 8,5

Tan α = $\frac{2,0}{4,25}$ = 0,47

α = 25,20°

Lampiran 7. Pemeriksaan sifat fisik sediaan FDT metokopramid HCl

1. Kekerasan tablet

Replikasi	Kekerasan tablet (kg)		
	Formula 1	Formula 2	Formula 3
1	4,17	3,31	4,58
2	4,13	3,28	4,58
3	4,17	3,36	4,52
Rata-rata	4,16	3,32	4,56
SD	0,11	0,10	0,33

Persamaan *simplex lattice design*

- A = 1
  B = 0

  Y = a (A) + b (B) + ab (A) (B)

  4,56 = a (1) + b (0) + ab (1) (0)

  a = 4,56
- A = 0

  B = 1

  Y = a (A) + b (B) + ab (A) (B)

  4,16 = a (0) + b (1) + ab (0) (1)

  b = 4,16
- A = 0,5

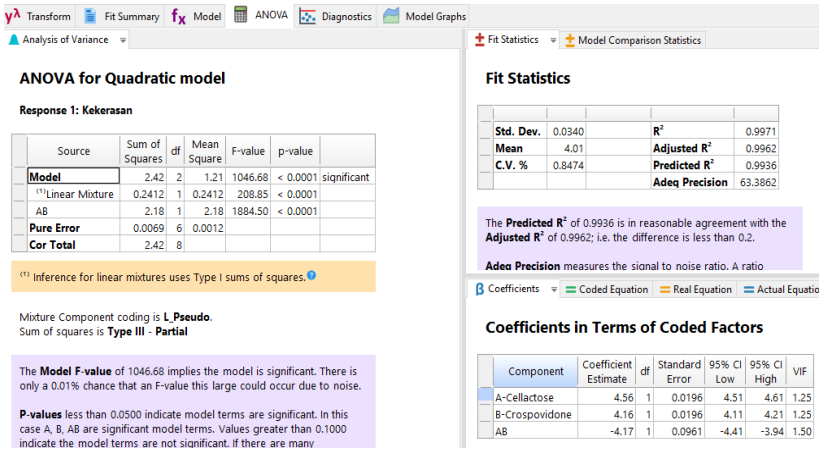
  B = 0,5

  Y = a (A) + b (B) + ab (A) (B)

  3,32 = 4,56 (0,5) + 4,16 (0,5) + ab (0,5) (0,5)

  ab = - 4,04

Hasil ANOVA *simplex lattice design*



Transform | Fit Summary | Model | ANOVA | Diagnostics | Model Graphs

Analysis of Variance

ANOVA for Quadratic model

Response 1: Kekerasan

Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	2.42	2	1.21	1046.68	< 0.0001	significant
(1) Linear Mixture	0.2412	1	0.2412	208.85	< 0.0001	
AB	2.18	1	2.18	1884.50	< 0.0001	
Pure Error	0.0069	6	0.0012			
Cor Total	2.42	8				

(1) Inference for linear mixtures uses Type I sums of squares.

Mixture Component coding is **L_Pseudo**.
Sum of squares is **Type III - Partial**

The **Model F-value** of 1046.68 implies the model is significant. There is only a 0.01% chance that an F-value this large could occur due to noise.

P-values less than 0.0500 indicate model terms are significant. In this case A, B, AB are significant model terms. Values greater than 0.1000 indicate the model terms are not significant. If there are many

Fit Statistics | Model Comparison Statistics

Fit Statistics

Std. Dev.	0.0340	R^2	0.9971
Mean	4.01	**Adjusted R^2**	0.9962
C.V. %	0.8474	**Predicted R^2**	0.9936
		Adeq Precision	63.3862

The **Predicted R^2** of 0.9936 is in reasonable agreement with the **Adjusted R^2** of 0.9962; i.e. the difference is less than 0.2.

Adeq Precision measures the signal to noise ratio. A ratio

Coefficients | Coded Equation | Real Equation | Actual Equatio

Coefficients in Terms of Coded Factors

Component	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
A-Cellactose	4.56	1	0.0196	4.51	4.61	1.25
B-Crospovidone	4.16	1	0.0196	4.11	4.21	1.25
AB	-4.17	1	0.0961	-4.41	-3.94	1.50

2. Kerapuhan tablet

Replikasi	Kerapuhan tablet		
	Formula 1	Formula 2	Formula 3
1	0,69	0,76	0,47
2	0,73	0,88	0,50
3	0,70	0,7	0,39
Rata-rata	0,71	0,810	0,46
SD	0,02	0,07	0,06

Contoh perhitungan % kerapuhan formula 1 replikasi 1

$F = \frac{(3,276)-(3,2532)}{(3,276)}$ x 100%

F = 0,69 %

Persamaan *simplex lattice design*

- A = 1
  B = 0

  Y = a (A) + b (B) + ab (A) (B)

  0,46 = a (1) + b (0) + ab (1) (0)

  a = 4,6

- A = 0

  B = 1

  Y = a (A) + b (B) + ab (A) (B)

  0,71 = a (0) + b (1) + ab (0) (1)

  b = 0,71

- A = 0,5

  B = 0,5

  Y = a (A) + b (B) + ab (A) (B)

  0,81 = 0,46 (0,5) + 0,71 (0,5) + ab (0,5) (0,5)

  ab = 0,88

Hasil ANOVA *simplex lattice design*

ANOVA for Quadratic model

Response 2: Kerapuhan

Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	0.2015	2	0.1007	35.24	0.0005	significant
(1) Linear Mixture	0.1001	1	0.1001	35.03	0.0010	
AB	0.1014	1	0.1014	35.46	0.0010	
Pure Error	0.0172	6	0.0029			
Cor Total	0.2186	8				

(1) Inference for linear mixtures uses Type I sums of squares.

Mixture Component coding is **L_Pseudo**.
Sum of squares is **Type III - Partial**

The **Model F-value** of 35.24 implies the model is significant. There is only a 0.05% chance that an F-value this large could occur due to noise.

P-values less than 0.0500 indicate model terms are significant. In this case A, B, AB are significant model terms. Values greater than 0.1000

Fit Statistics

Std. Dev.	0.0535		**R^2**	0.9216
Mean	0.6602		**Adjusted R^2**	0.8954
C.V. %	8.10		**Predicted R^2**	0.8235
			Adeq Precision	11.4776

The **Predicted R^2** of 0.8235 is in reasonable agreement with the **Adjusted R^2** of 0.8954; i.e. the difference is less than 0.2.

Adeq Precision measures the signal to noise ratio. A ratio

Coefficients | Coded Equation | Real Equation | Actual Equation

Coefficients in Terms of Coded Factors

Component	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
A-Cellactose	0.4560	1	0.0309	0.3805	0.5315	1.25
B-Crospovidone	0.7144	1	0.0309	0.6388	0.7899	1.25
AB	0.9005	1	0.1512	0.5304	1.27	1.50

3. Waktu hancur

Replikasi	Waktu hancur (detik)		
	Formula 1	Formula 2	Formula 3
1	55,02	40,05	37,16
2	55,06	40,07	36,58
3	55,03	40,04	37,14
Rata-rata	55,04	40,05	36,96
SD	0,02	0,02	0,33

Persamaan *simplex lattice design*

- A = 1
  B = 0

  Y = a (A) + b (B) + ab (A) (B)

  36,96 = a (1) + b (0) + ab (1) (0)

  a = 36,96
- A = 0

  B = 1

  Y = a (A) + b (B) + ab (A) (B)

  55,04 = a (0) + b (1) + ab (0) (1)

  b = 55,04
- A = 0,5

  B = 0,5

$$Y = a\,(A) + b\,(B) + ab\,(A)\,(B)$$

$$40{,}05 = 36{,}96\,(0{,}5) + 55{,}04\,(0{,}5) + ab\,(0{,}5)\,(0{,}5)$$

$$ab = -23{,}8$$

Hasil ANOVA *simplex lattice design*

ANOVA for Quadratic model

Response 3: Waktu hancur

Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	560.83	2	280.42	7713.19	< 0.0001	significant
(1) Linear Mixture	490.15	1	490.15	13482.09	< 0.0001	
AB	70.69	1	70.69	1944.30	< 0.0001	
Pure Error	0.2181	6	0.0364			
Cor Total	561.05	8				

(1) Inference for linear mixtures uses Type I sums of squares.

Mixture Component coding is **L_Pseudo**.
Sum of squares is **Type III - Partial**

The **Model F-value** of 7713.19 implies the model is significant. There is only a 0.01% chance that an F-value this large could occur due to noise.

P-values less than 0.0500 indicate model terms are significant. In this case A, B, AB are significant model terms. Values greater than 0.1000 indicate the model terms are not significant. If there are many

Fit Statistics

Std. Dev.	0.1907	**R^2**	0.9996
Mean	44.02	**Adjusted R^2**	0.9995
C.V. %	0.4332	**Predicted R^2**	0.9991
		Adeq Precision	164.2077

The **Predicted R^2** of 0.9991 is in reasonable agreement with the **Adjusted R^2** of 0.9995; i.e. the difference is less than 0.2.

Adeq Precision measures the signal to noise ratio. A ratio

Coefficients | Coded Equation | Real Equation | Actual Equatio

Coefficients in Terms of Coded Factors

Component	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
A-Cellactose	36.96	1	0.1101	36.69	37.23	1.25
B-Crospovidone	55.04	1	0.1101	54.77	55.31	1.25
AB	-23.78	1	0.5393	-25.10	-22.46	1.50

4. Waktu pembasahan

Replikasi	Waktu pembasahan (detik)		
	Formula 1	Formula 2	Formula 3
1	80,22	76,29	69,53
2	81,13	77,52	68,94
3	80,19	76,33	69,58
Rata-rata	80,51	76,71	69,35
SD	0,44	0,57	0,29

5. Nilai penerimaan keseragaman kandungan

Formula 1

Tablet	Bobot tablet (mg)	Absorbansi	Jumlah terukur (mg)	Persentase (%)
1	152	0,400	10,04	100,44
2	154	0,403	9,71	97,11
3	152	0,412	9,81	98,14
4	156	0,396	9,65	96,53
5	152	0,407	9,69	96,87
6	154	0,413	9,97	99,69
7	154	0,413	9,97	99,69
8	156	0,400	9,76	97,58
9	155	0,399	9,67	96,69
10	156	0,409	9,99	99,94
	Rata-rata		9,83	98,27
	SD			1,52
	NP			3,65

Contoh perhitungan Formula 1:

Volume awal = 100 ml

Faktor pengenceran = 10

X(rata-rata) = ≤101 %, maka M = $98.5 \leq X_{rata\text{-}rata} \leq 101.5\%$

NP = $[M - X_{rata\text{-}rata}] + ks$

= [98,27 – 98,27] + 2,4 x 1,52

= 3,65 %

Formula 2

Tablet	Bobot tablet (mg)	Absorbansi	Jumlah terukur (mg)	Persentase (%)
1	150	0,411	9,66	96,59
2	150	0,413	9,71	97,10
3	150	0,416	9,79	97,86
4	158	0,385	9,99	99,91
5	158	0,383	9,94	99,35
6	158	0,386	10,02	100,19
7	150	0,415	9,76	97,61
8	150	0,409	9,61	96,09
9	150	0,42	9,89	98,87
10	152	0,399	9,61	96,09
	Rata-rata		9,79	97,97
	SD			1,54
	NP			3,69

Formula 3

Tablet	Bobot tablet (mg)	Absorbansi	Jumlah terukur (mg)	Persentase (%)
1	150	0,409	9,61	96,09
2	152	0,412	9,95	99,45
3	152	0,391	9,40	94,02
4	152	0,407	9,82	98,16
5	154	0,399	9,86	98,63
6	154	0,403	9,97	99,69
7	154	0,403	9,97	97,69
8	156	0,387	9,79	97,94
9	156	0,389	9,85	98,49
10	156	0,387	9,79	97,94
		Rata-rata	9,80	98,01
		SD		1,76
		NP		4,23

6. Uji tanggap rasa

LEMBAR KUISIONER TANGGAP RASA *FAST DISINTEGRATING TABLET* METOKLOPRAMID HCl

Petunjuk pengisian :

1. Mengisi identitas diri pada tempat yang disediakan.
2. Cobalah satu formula *fast disintegrating tablet* yang sebelumnya berkumur terlebih dahulu dengan air putih, kemudian masukkan tablet ke dalam mulut dan biarkan tablet larut sendiri dan bercampur dengan saliva di dalam mulut, lalu coba formula berikutnya dengan cara yang sama.
3. Isilah penilaian anda pada kolom di bawah ini :

Identitas responden

Nama :

Usia :

Formula	**Rasa tablet**			**Waktu hancur (detik)**
	Manis	**Agak pahit**	**Pahit**	
F1				
F2				
F3				

4. Berikan penilaian dengan memberi tanda centang (√) pada form.

a. Data kuesioner

No	Responden	Respon			
		Rasa	Waktu hancur (detik)		
			F1	F2	F3
1.	Jevi	3	59,20	43,11	40,85
2.	Riza	3	58,56	42,93	39,67
3.	Afi	2	58,43	43,45	40,08
4.	Dinda	2	59,24	42,38	39,57
5.	Mila	2	57,82	43,06	39,49
6.	Winda	2	58,12	42,80	39,20
7.	Rohmah	3	58,38	42,48	40,25
8.	Ais	2	58,91	42,30	39,87
9.	Dinar	2	57,76	42,63	39,51
10.	Ludy	3	58,81	43,97	40,22
11.	Putri	2	59,16	42,71	40,31
12.	Ida	2	57,96	42,28	39,82
13.	Lindya	2	58,22	42,18	39,65
14.	Diah	2	57,38	42,73	39,43
15.	Mahda	2	57,82	43,12	39,51
16.	Bagus	2	57,59	43,54	40,49
17.	Fahmi	2	57,86	42,67	39,86
18.	Widia	2	57,91	43,51	39,59
19.	Ayen	3	58,43	42,66	39,44
20.	Adin	3	57,77	42,91	39,87
	Rata-rata	**70% agak pahit 30% pahit**	**58,27 ± 0,56**	**42,87 ± 0,48**	**40,85 ± 0,42**

Keterangan :

1 = Manis

2 = Agak pahit

3 = Pahit

Lampiran 8. Disolusi sediaan FDT metoklopramid

1. Hasil disolusi
   Formula 1 (Tablet 1)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,11	1	2,0761	1,8685	0	0	2,0761	20,7609	10,3804	
1	0,221	1	4,8728	4,3855	0,0208	0,0208	4,8935	48,9325	34,8481	71,723
2	0,307	1	7,0396	6,3356	0,0487	0,0695	7,1090	71,0905	120,026	
3	0,365	1	8,5009	7,6508	0,0704	0,1399	8,6408	86,4007	157,498	
								Total	322,752	

Contoh perhitungan Formula 1 tablet 1 (Q_3) :

- Kadar obat (ppm) : $y = a + bx$

  $0,365 = 0,0276 + 0,03969x$

  $x = 8,5009$

- Kadar obat dalam 900 mL (mg) : Kadar = kadar obat (ppm) x 0,9

  = 8,5009 x 0.9 = 7,6508 mg

- Koreksi : Koreksi = $\frac{volume\ sampling}{volume\ medium\ disolusi}$ x kadar obat dalam 900 mL pada pengambilan sampling sebelumnya (mg)

  = $\frac{10}{900}$ x 6,3356

  = 0,0704

- Total koreksi : Total koreksi = koreksi pada pengambilan sampling sebelumnya + koreksi

  = 0,0704 + 0,0695

  = 0,1399

- Q_3 (jumlah zat aktif yang terdisolusi) : Q = total koreksi menit ke-3 + kadar obat (ppm) menit ke-3

  = 0,1399 + 8,5009

  = 8,6408

- % disolusi : % $disolusi_3$ = $\frac{jumlah\ zat\ aktif\ terdisolusi\ menit\ ke{-}3}{kadar\ zat\ aktif}$ x 100 %

  = $\frac{8,6408}{10}$ x 100%

  = 86,4077 %

- AUC : AUC = (Waktu ke-n – menit pada waktu sebelumnya) x (% disolusi + % disolusi sebelumnya)

  = (3 -2) x (86,4077 + 71,0905)

  = 157,498

- DE : DE = $\frac{AUC\ Total}{bobot\ tablet\ x\ waktu\ sampling}$

  = $\frac{322,752}{150\ x\ 3}$ x 100%

  = 71,7227%

Formula 1 (Tablet 2)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,114	1	2,179	1,9592	0	0	2,1769	21,7687	10,884	
1	0,225	1	4,9735	4,4762	0,0218	0,0218	4,9953	49,9531	35,861	72,469
2	0,31	1	7,1151	6,4036	0,0497	0,0715	7,1866	71,8665	121,82	
3	0,362	1	8,4253	7,5828	0,0712	0,1427	8,5680	85,6795	157,55	
								Total	326,11	

Formula 1 (Tablet 3)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,12	1	2,3280	2,0952	0	0	2,3280	23,2804	11,6402	
1	0,23	1	5,0995	4,5896	0,0233	0,0233	5,1228	51,2280	37,2542	73,081
2	0,31	1	7,1151	6,4036	0,0510	0,0743	7,1894	71,8942	123,122	
3	0,359	1	8,3497	7,5147	0,0712	0,1454	8,4951	84,9514	156,846	
								Total	328,862	

Formula 1 (Tablet 4)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,12	1	2,3280	2,0952	0	0	2,3280	23,2804	11,6402	
1	0,221	1	4,8728	4,3855	0,0233	0,0233	4,8960	48,9604	36,1204	72,196
2	0,307	1	7,0396	6,3356	0,0487	0,0720	7,1116	71,1156	120,076	
3	0,363	1	8,4505	7,6054	0,0704	0,1424	8,5929	85,9289	157,045	
								Total	324,881	

Formula 1 (Tablet 5)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,112	1	2,1265	1,9138	0	0	2,1265	21,2648	10,6324	
1	0,225	1	4,9735	4,4762	0,0213	0,0213	4,9948	49,9481	35,6064	72,464
2	0,31	1	7,1151	6,4036	0,0497	0,0710	7,1861	71,8614	121,81	
3	0,364	1	8,4757	7,6281	0,0712	0,1422	8,6178	86,1784	158,04	
								Total	326,088	

Formula 1 (Tablet 6)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,116	1	2,2273	2,0045	0	0	2,2273	22,2726	11,1363	
1	0,23	1	5,0995	4,5896	0,0223	0,0223	5,1218	51,2179	36,7453	72,396
2	0,306	1	7,0144	6,3129	0,0510	0,0733	7,0876	70,8763	122,094	
3	0,359	1	8,3497	7,5147	0,0701	0,1434	8,4931	84,9312	155,808	
								Total	325,738	

Formula 2 (tablet 1)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,152	1	3,1343	2,8209	0	0	3,1343	31,3429	15,6715	
1	0,231	1	5,1247	4,6122	0,0313	0,0313	5,1561	51,5606	41,4518	75,762
2	0,302	1	6,9136	6,2222	0,0512	0,0826	6,9962	69,9617	121,522	
3	0,388	1	9,0804	8,1732	0,0691	0,1517	9,2321	92,3210	162,283	
								Total	340,928	

Formula 2 (tablet 2)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,156	1	3,2351	2,9116	0	0	3,2351	32,3507	16,1754	
1	0,236	1	5,2507	4,7256	0,0324	0,0324	5,2830	52,8304	42,5906	76,426
2	0,305	1	6,9892	6,2902	0,0525	0,0525	7,0740	70,7402	123,571	
3	0,382	1	8,9292	8,0363	0,0699	0,0699	9,0840	90,8395	161,58	
								Total	343,916	

Formula 2 (tablet 3)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,152	1	3,1343	2,8209	0	0	3,1343	31,3429	15,6715	
1	0,22	1	4,8476	4,3628	0,0313	0,0313	4,8789	48,7891	40,066	74,878
2	0,307	1	7,0396	6,3356	0,0485	0,0798	7,1194	71,1938	119,983	
3	0,379	1	8,8536	7,9683	0,0704	0,1502	9,0038	90,0383	161,232	
								Total	336,952	

Formula 2 (tablet 4)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,15	1	3,0839	2,7755	0	0	3,0839	30,8390	15,4195	
1	0,231	1	5,1247	4,6122	0,0308	0,0308	5,1556	51,5556	41,1973	75,533
2	0,302	1	6,9136	6,2222	0,0512	0,0821	6,9957	69,9567	121,512	
3	0,386	1	9,0300	8,1270	0,691	0,1512	9,1812	91,8120	161,769	
								Total	339,898	

Formula 2 (tablet 5)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,158	1	3,2855	2,9569	0	0	3,2855	32,8546	16,4273	
1	0,236	1	5,2507	4,7256	0,0329	0,0329	5,2835	52,8355	42,845	76,655
2	0,305	1	6,9892	6,2902	0,0525	0,0854	7,0745	70,7453	123,581	
3	0,384	1	8,9796	8,0816	0,0699	0,1553	9,1348	91,3485	162,094	
								Total	344,947	

Formula 2 (tablet 6)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,152	1	3,1343	2,8209	0	0	3,1343	31,3429	15,6715	
1	0,26	1	5,8554	5,2698	0,0313	0,0313	5,8867	58,8672	45,1051	78,923
2	0,311	1	7,1403	6,4263	0,0586	0,0899	7,2302	72,3023	131,17	
3	0,382	1	8,9292	8,0363	0,0714	0,1613	9,0905	90,9050	163,207	
								Total	355,153	

Formula 3 (tablet 1)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,165	1	3,4618	3,1156	0	0	3,4618	34,6183	17,3091	
1	0,2305	1	5,1121	4,6009	0,0346	0,0346	5,1467	51,4674	43,0428	82,914
2	0,3445	1	7,9844	7,1859	0,0511	0,0857	8,0701	80,7012	132,169	
3	0,4175	1	9,8236	8,8413	0,0798	0,1656	9,9892	99,8922	180,593	
								Total	373,114	

Formula 3 (tablet 2)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,168	1	3,5374	3,1837	0	0	3,5374	35,3741	17,6871	
1	0,2308	1	5,1197	4,6077	0,0354	0,0354	5,1551	51,5505	43,4623	83,706
2	0,35	1	8,1230	7,3107	0,0512	0,0866	8,2095	82,0952	133,646	
3	0,417	1	9,8110	8,8299	0,0812	0,1678	9,9788	99,7884	181,884	
								Total	376,679	

Formula 3 (tablet 3)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,166	1	3,4870	3,1383	0	0	3,4870	34,8702	17,4351	
1	0,2304	1	5,1096	4,5986	0,0349	0,0349	5,1445	51,4447	43,1575	84,247
2	0,356	1	8,2741	7,4467	0,0511	0,0860	8,3601	83,6009	135,046	
3	0,4173	1	9,8186	8,8367	0,0827	0,1687	9,9873	99,8730	183,474	
								Total	379,112	

Formula 3 (tablet 4)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,165	1	3,4618	3,1156	0	0	3,4618	34,6183	17,309	
1	0,2305	1	5,1121	4,6009	0,0346	0,0346	5,1467	51,4674	43,043	82,914
2	0,3445	1	7,9844	7,1859	0,0511	0,0857	8,0701	80,7012	132,17	
3	0,4175	1	9,8236	8,8413	0,0798	0,1656	9,9892	99,8922	180,59	
								Total	373,11	

Formula 3 (tablet 5)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,166	1	3,4870	3,1383	0	0	3,4870	34,8702	17,435	
1	0,2308	1	5,1197	4,6077	0,0349	0,0349	5,1545	51,5455	43,208	83,589
2	0,35	1	8,1230	7,3107	0,0512	0,0861	8,2090	82,0902	133,64	
3	0,417	1	9,8110	8,8299	0,0812	0,1673	9,9783	99,7833	181,87	
								Total	373,11	

Formula 3 (tablet 6)

Menit	Abosrbansi	fp	Kadar obat (ppm)	Kadar obat dalam 900 ml (mg)	Koreksi	Total koreksi	Q	% disolusi	AUC	DE (%)
0	0	0	0	0	0	0	0	0	0	
0,5	0,166	1	3,4870	3,1383	0	0	3,4870	34,8702	17,435	
1	0,2308	1	5,1197	4,6077	0,0349	0,0349	5,1545	51,5455	43,208	84,281
2	0,356	1	8,2741	7,4467	0,0512	0,0861	8,3602	83,6019	135,15	
3	0,4173	1	9,8186	8,8367	0,0827	0,1688	9,9874	99,8740	183,48	
								Total	379,27	

Lampiran 9. One Sample T-test

i. Verifikasi poin prediksi formula optimum

Factors

	Component	Name	Level	Low Level	High Level	Std. Dev.	Coding
	A	Crospovidone	10.50	1.50	10.50	0.0000	Actual
	B	Cellactose	79.50	79.50	88.50	0.0000	Actual
		Total =	90.00				

Point Prediction

Point Prediction

Two-sided Confidence = 95% Population = 99%

	Solution 1 of 1 Response	Predicted Mean	Predicted Median	Observed	Std Dev	SE Mean	95% CI low for Mean	95% CI high for Mean	95% TI low for 99% Pop	95% TI high for 99% Pop
	Kekerasan	4.56833	4.56833		0.0517011	0.0298496	4.49529	4.64137	4.25525	4.88142
	Kerapuhan	0.456	0.456		0.0534664	0.0308688	0.380467	0.531533	0.132223	0.779777
	Waktu hancur	37.37	37.37		0.130852	0.0755474	37.1851	37.5549	36.5776	38.1624
	Q3	99.8512	99.8512		0.685862	0.395982	98.8823	100.82	95.6978	104.005
	DE3	83.6226	83.6226		0.59689	0.344615	82.7793	84.4658	80.008	87.2372

ii. Kekerasan

One-Sample Kolmogorov-Smirnov Test

		Kekerasan tablet
N		3
Normal Parameters[a,b]	Mean	4.50900
	Std. Deviation	.128293
Most Extreme Differences	Absolute	.283
	Positive	.207
	Negative	-.283
Kolmogorov-Smirnov Z		.490
Asymp. Sig. (2-tailed)		.970

a. Test distribution is Normal.

b. Calculated from data.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Kekerasan tablet	3	4.50900	.128293	.074070

One-Sample Test

	Test Value = 4.568					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Kekerasan tablet	-.797	2	.509	-.059000	-.37770	.25970

iii. Kerapuhan

One-Sample Kolmogorov-Smirnov Test

		Kerapuhan tablet
N		3
Normal Parameters[a,b]	Mean	.47467
	Std. Deviation	.055012
Most Extreme Differences	Absolute	.178
	Positive	.178
	Negative	-.176
Kolmogorov-Smirnov Z		.308
Asymp. Sig. (2-tailed)		1.000

a. Test distribution is Normal.

b. Calculated from data.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Kerapuhan tablet	3	.47467	.055012	.031761

One-Sample Test

	Test Value = 0.456					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Kerapuhan tablet	.588	2	.616	.018667	-.11799	.15532

iv. Waktu hancur

One-Sample Kolmogorov-Smirnov Test

		Waktu hancur
N		3
Normal Parameters[a,b]	Mean	37.57667
	Std. Deviation	.359490
Most Extreme Differences	Absolute	.294
	Positive	.294
	Negative	-.213
Kolmogorov-Smirnov Z		.509
Asymp. Sig. (2-tailed)		.958

a. Test distribution is Normal.

b. Calculated from data.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Waktu hancur	3	37.57667	.359490	.207552

One-Sample Test

	Test Value = 37.37					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Waktu hancur	.996	2	.424	.206667	-.68636	1.09969

v. Q_3

One-Sample Kolmogorov-Smirnov Test

		Q3
N		3
Normal Parameters[a,b]	Mean	99.79223
	Std. Deviation	.034299
Most Extreme Differences	Absolute	.301
	Positive	.217
	Negative	-.301
Kolmogorov-Smirnov Z		.521
Asymp. Sig. (2-tailed)		.949

a. Test distribution is Normal.

b. Calculated from data.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q3	3	99.79223	.034299	.019802

One-Sample Test

	Test Value = 99.8512					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q3	-2.978	2	.097	-.058967	-.14417	.02624

vi. DE_3

One-Sample Kolmogorov-Smirnov Test

		DE3
N		3
Normal Parameters[a,b]	Mean	84.00030
	Std. Deviation	1.274109
Most Extreme Differences	Absolute	.232
	Positive	.192
	Negative	-.232
Kolmogorov-Smirnov Z		.402
Asymp. Sig. (2-tailed)		.997

a. Test distribution is Normal.

b. Calculated from data.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
DE3	3	84.00030	1.274109	.735607

One-Sample Test

	Test Value = 83.6226					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
DE3	.513	2	.659	.377700	-2.78736	3.54276

Lampiran 10. Kurva baku dan validasi metode analisis

a. Pembuatan larutan baku metoklopramid HCl

Larutan baku 113 ppm dibuat dengan menimbang sebanyak 11,3 mg dan dimasukkan dalam labu tentukur 100 mL ditambah aquadestillata sampai tanda batas.

- Perhitungan bahan :

  Kertas kosong : 0,5695 gram

  Zat aktif : 0,01 gram

  Kertas + zat aktif : 0,5814 gram

  Sisa pada kertas : 0,5701

  Zat aktif = (kertas + zat aktif) – (sisa pada kertas)

  = 0,5814 – 0,5701

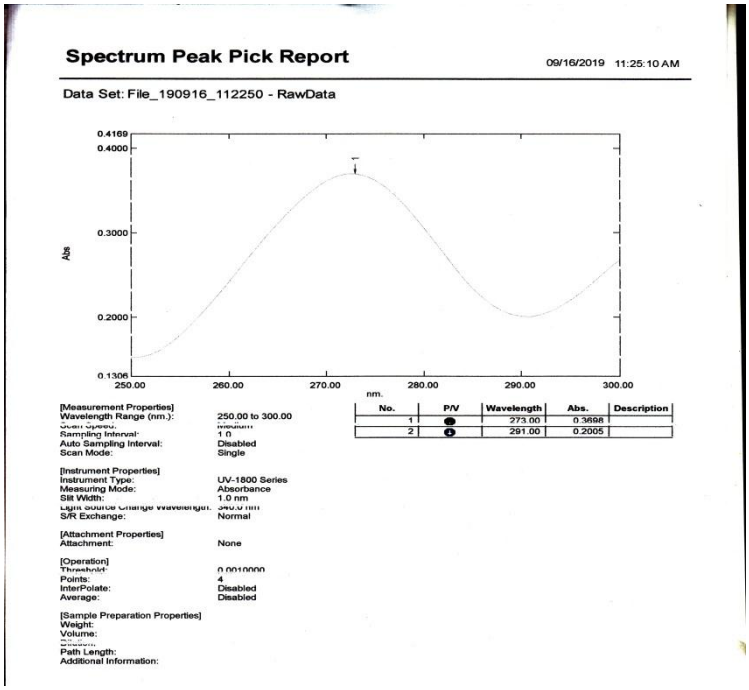
  = 0,0113 gram

  = 11,3 mg/100 mL

  = 113 ppm

b. Panjang gelombang maksimum

Panjang gelombang maksimum diperoleh dari *scanning* larutan baku metoklopramid HCl konsentrasi 113 ppm dengan panjang gelombang maksimum sebesar 273 nm absorbansi 0,3698 dalam pelarut aquadestillata.



Spectrum Peak Pick Report

09/16/2019 11:25:10 AM

Data Set: File_190916_112250 - RawData

No.	P/V	Wavelength	Abs.	Description
1	●	273.00	0.3698	
2	◆	291.00	0.2005	

[Measurement Properties]
Wavelength Range (nm.): 250.00 to 300.00
Sampling Interval: 1.0
Auto Sampling Interval: Disabled
Scan Mode: Single

[Instrument Properties]
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0 nm
S/R Exchange: Normal

[Attachment Properties]
Attachment: None

[Operation]
Points: 4
InterPolate: Disabled
Average: Disabled

[Sample Preparation Properties]
Path Length:
Additional Information:

c. *Operating time*

Scanning operating time menunjukkan bahwa larutan baku dengan konsentrasi 113 ppm stabil, nilai serapan stabil dari menit ke-0 hingga menit ke-30.

Time (Minute)	RawData ...	RawData ...
0.000	2.060	0.376
1.000	2.056	0.376
2.000	2.052	0.377
3.000	2.059	0.375
4.000	2.053	0.376
5.000	2.047	0.376
7.000	2.050	0.375
8.000	2.054	0.375
9.000	2.050	0.375
10.000	2.054	0.376
11.000	2.056	0.375
13.000	2.046	0.376
14.000	2.049	0.375
15.000	2.051	0.375
16.000	2.049	0.375
17.000	2.055	0.374
18.000	2.054	0.375
19.000	2.053	0.374
20.000	2.056	0.374
21.000	2.049	0.375
22.000	2.049	0.374
23.000	2.048	0.374
24.000	2.047	0.375
25.000	2.043	0.375
26.000	2.047	0.374
27.000	2.049	0.375
28.000	2.049	0.375
29.000	2.051	0.375
30.000	2.054	0.375

d. Kurva kalibrasi

Ambil 1 mL dari larutan baku metoklopramid HCl yang telah dibuat, dimasukkan ke dalam labu tentukur 25 mL dan tambahkan aquadestillata sampai tanda batas, ukur serapannya pada panjang gelombang maksimumnya 273 nm.

- Pengenceran

$V_1 . C_1 = V_2 . C_2$ $\qquad$ $V_1 . C_1 = V_2 . C_2$

$1 . 113 = 25 . C_2$ $\qquad$ $2 . 113 = 25 . C_2$

$C_2 = 4{,}52$ ppm $\qquad$ $C_2 = 9{,}04$ ppm

$V_1 . C_1 = V_2 . C_2$ $\qquad$ $V_1 . C_1 = V_2 . C_2$

$3 . 113 = 25 . C_2$ $\qquad$ $4 . 113 = 25 . C_2$

$C_2 = 13{,}56$ ppm $\qquad$ $C_2 = 18{,}08$ ppm

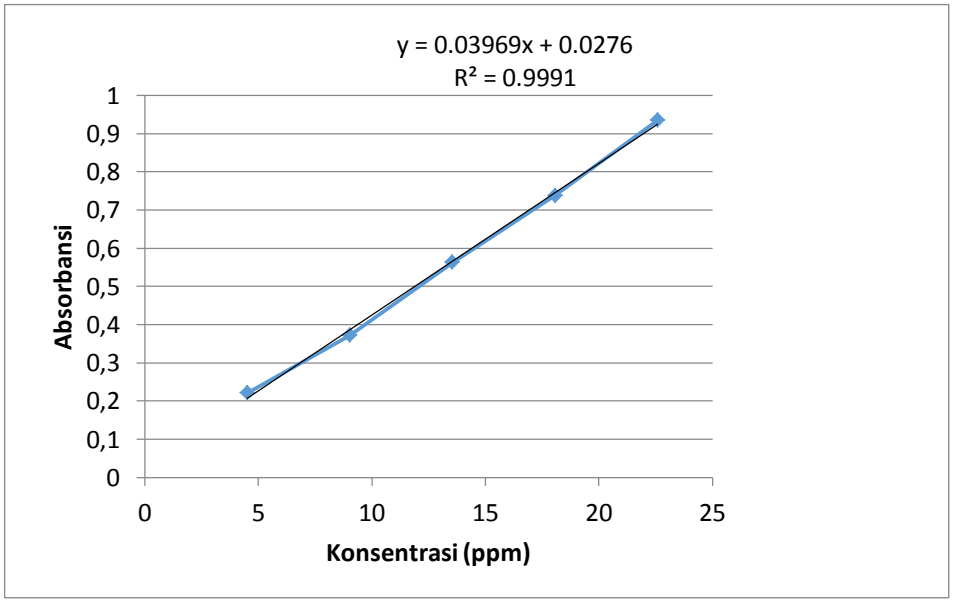
$V_1 . C_1 = V_2 . C_2$

$5 . 113 = 25 . C_2$

$C_2 = 22{,}6$ ppm

e. Persamaan regresi linier

X (ppm)	Y (abs)
4.52	0.221
9.04	0.372
13.56	0.563
18.08	0.738
22.6	0.935



Nilai a = 0.0276

b = 0.03969

r = 0.9991

f. Penentuan LOD dan LOQ

X (ppm)	Y (abs)	Y'	Y-Y'	(Y-Y')2
4.52	0.221	0.207	0.0140	0.00019600000000000
9.04	0.372	0.3864	-0.0144	0.00020736000000000
13.56	0.563	0.5658	-0.0028	0.00000784000000000
18.08	0.738	0.7452	-0.0072	0.00005184000000000
22.6	0.935	0.9246	0.0104	0.00010816000000000

	Total	0.00057
a = 0.0276	$S_{y/x}$	0.01380
b = 0.03969	LOD	1.147264
r = 0.999114	LOQ	3.476558

Nilai y' diperoleh dari substitusi konsentrasi dalam persamaan y' = 0.0276 + 0.03969x demgam x adalah konsentrasi (ppm) dan y absorbansi (y')

$S_{x/y} = \sqrt{\frac{\Sigma (y-y')^2}{(N-2)}}$

$S_{x/y}$ = simpangan baku residual

N = jumlah data

$\Sigma (y - y')^2$ = jumlah kuadrat total residual

$S_{x/y} = \sqrt{\frac{\Sigma (y-y')^2}{(N-2)}}$

$= \sqrt{\frac{0.00057}{(5-2)}} = 0.01380$

- LOD = 3,3 X $\frac{Sx/y}{b}$

  = 3,3 x $\frac{0.01380}{0.03969}$

  = 1.147264

- LOQ = 10 X $\frac{Sx/y}{b}$

  = 10 x $\frac{0.01380}{0.03969}$ = 3.476558

g. Penentuan perolehan kembali (*recovery)* akurasi

Konsentrasi	Replikasi	Serapan	Konsentrasi Terukur	Konsentrasi Sebenarnya	%	Rata-Rata
80 %	1	0,379	8,8536	9,04	98%	
(9,04 ppm)	2	0,38	8,8788	9,04	98%	98,03%
	3	0,379	8,8536	9,04	98%	
100 %	1	0,568	13,6154	13,56	100%	
(13,56 ppm)	2	0,561	13,4391	13,56	99%	99,91%
	3	0,567	13,5902	13,56	100%	
120 %	1	0,732	17,7474	18,08	98%	
(18,08 ppm)	2	0,744	18,0498	18,08	100%	99,04%
	3	0,739	17,9238	18,08	99%	
Recovery %						99,00%

h. Penentuan RSD (standar deviasi relatif)

Konsentrasi (ppm)	**Replikasi**	**Absorbansi**	**Konsentrasi (ppm)**
13.56	**1**	0.574	13.7666
	2	0.577	13.8422
	3	0.579	13.8926
	4	0.573	13.7414
	5	0.566	13.5650
	6	0.567	13.5902
		SD	0.132044
		Rata-rata	13.73301
		RSD	0.009615

$$\text{RSD} = \frac{100\% \; X \; SD}{\overline{x}}$$

$$= \frac{100\% \; X \; 0.132044}{13.73301} \quad = 0.009615$$

Lampiran 11. Alat-alat penelitian

Cube mixer

Single punch

Tapped machine

Alat uji waktu alir

Desintegration tester

Dissolution tester

Hardness tester

Friabilator

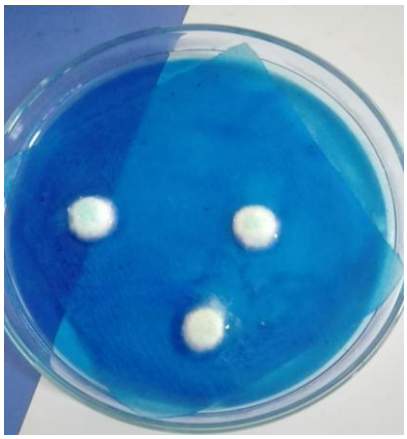
Spektrofotemeter UV-Vis

Lampiran 12. Uji waktu pembasahan

Formula 1

Formula 2

Formula 3



Perbandingan 3 formula