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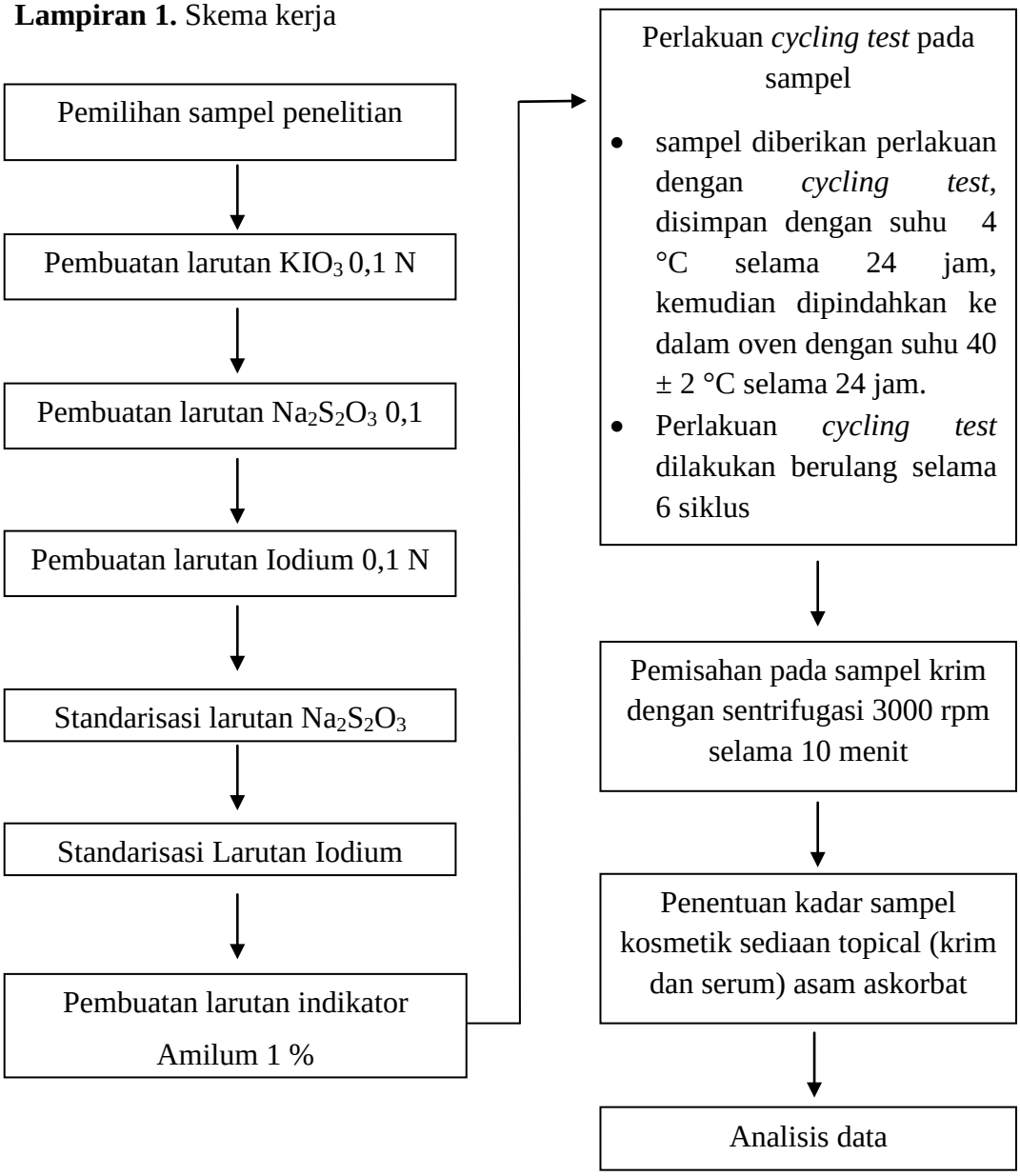
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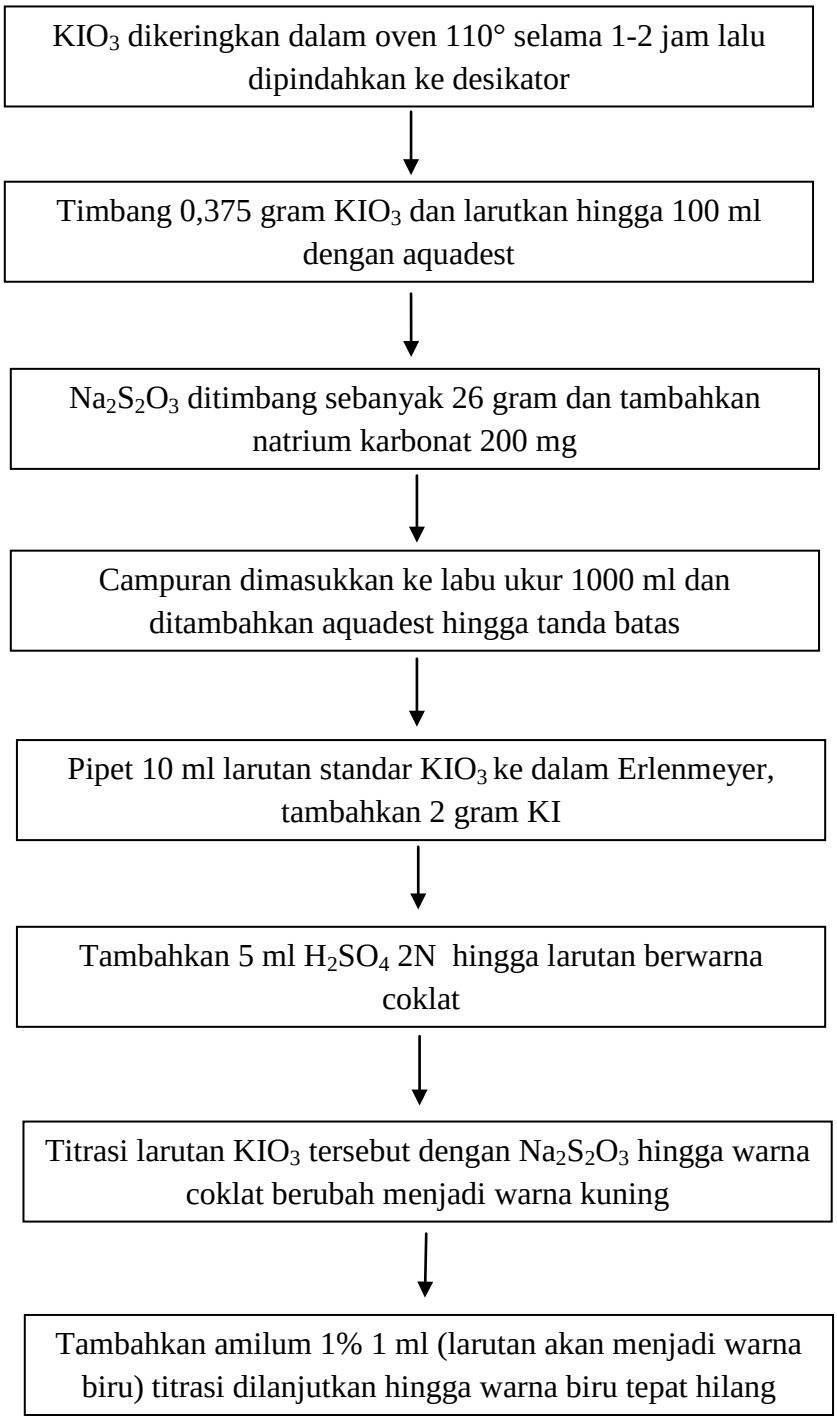
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# LAMPIRAN

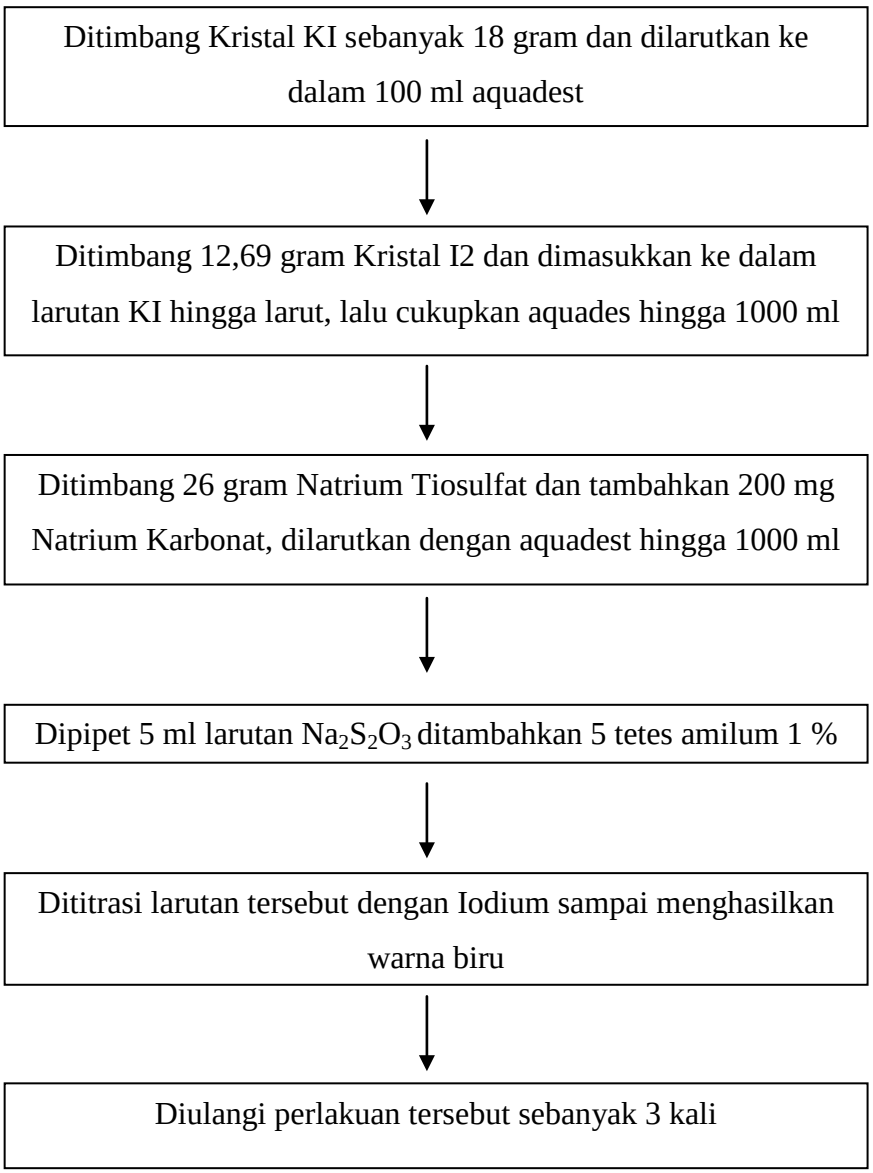
**Lampiran 1.** Skema kerja



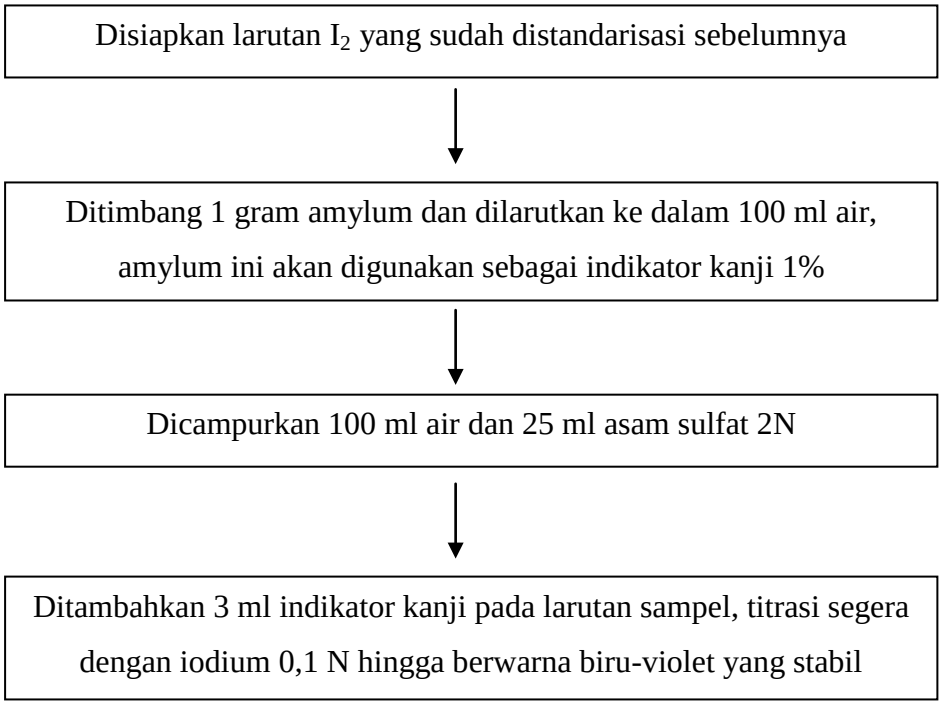
**Lampiran 2.** Standarisasi Larutan $Na_2S_2O_3$ dengan $KIO_3$



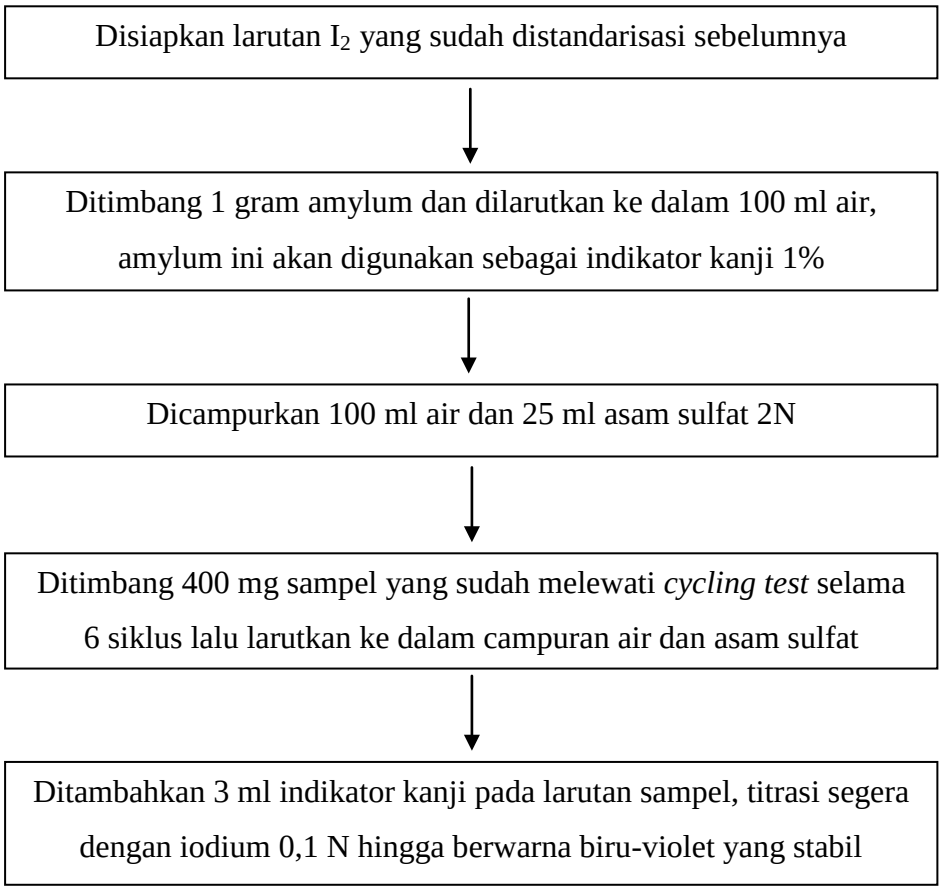
**Lampiran 3.** Skema Kerja Standarisasi Iodium



**Lampiran 4.** Penetapan blangko




**Lampiran 5.** Skema kerja penetapan kadar vitamin c



**Lampiran 6.** Surat Keterangan Kode Etik Penelitian

YAYASAN HARAPAN BUNDA BATAM
**INSTITUT KESEHATAN MITRA BUNDA**
**KOMITE ETIK PENELITIAN**
Jl. Seraya No 1 KOTA BATAM Telp/Fax (0778) 429431, website : http:\\ikmb.ac.id
SURAT KEPUTUSAN MENTERI PENDIDIKAN DAN KEBUDAYAAN REPUBLIK INDONESIA No. 284 M 2020

**KOMITE ETIK PENELITIAN**
**INSTITUT KESEHATAN MITRA BUNDA**
*THE RESEARCH ETHICAL COMMITTEE INSTITUT KESEHATAN MITRA BUNDA*

SURAT KETERANGAN
*ETHICAL APPROVAL*
No. 070/K/KEP/IKMB/V/2026

Komite Etik Penelitian Institut Kesehatan Mitra Bunda, menyatakan dengan ini bahwa penelitian dengan judul :
*The Research Ethical Committee of Institut Kesehatan Mitra Bunda states hereby that the following proposal :*

"Analisis Kadar Vitamin C (Ascorbic acid) Pada Kosmetik Sediaan Krim Dan Serum Dengan Metode Iodimetri"
*"Analysis of Vitamin C (Ascorbic acid) Content in Cosmetic Cream and Serum Preparations Using the Iodimetric Method"*

Peneliti Utama : Mayshita Putri
*Principal Investigato*

Lokasi Penelitian : Laboratorium Kimia Farmasi Institut Kesehatan Mitra Bunda
*Research Location*

Waktu Penelitian : Mei - Juli 2026
*Time Schedule*

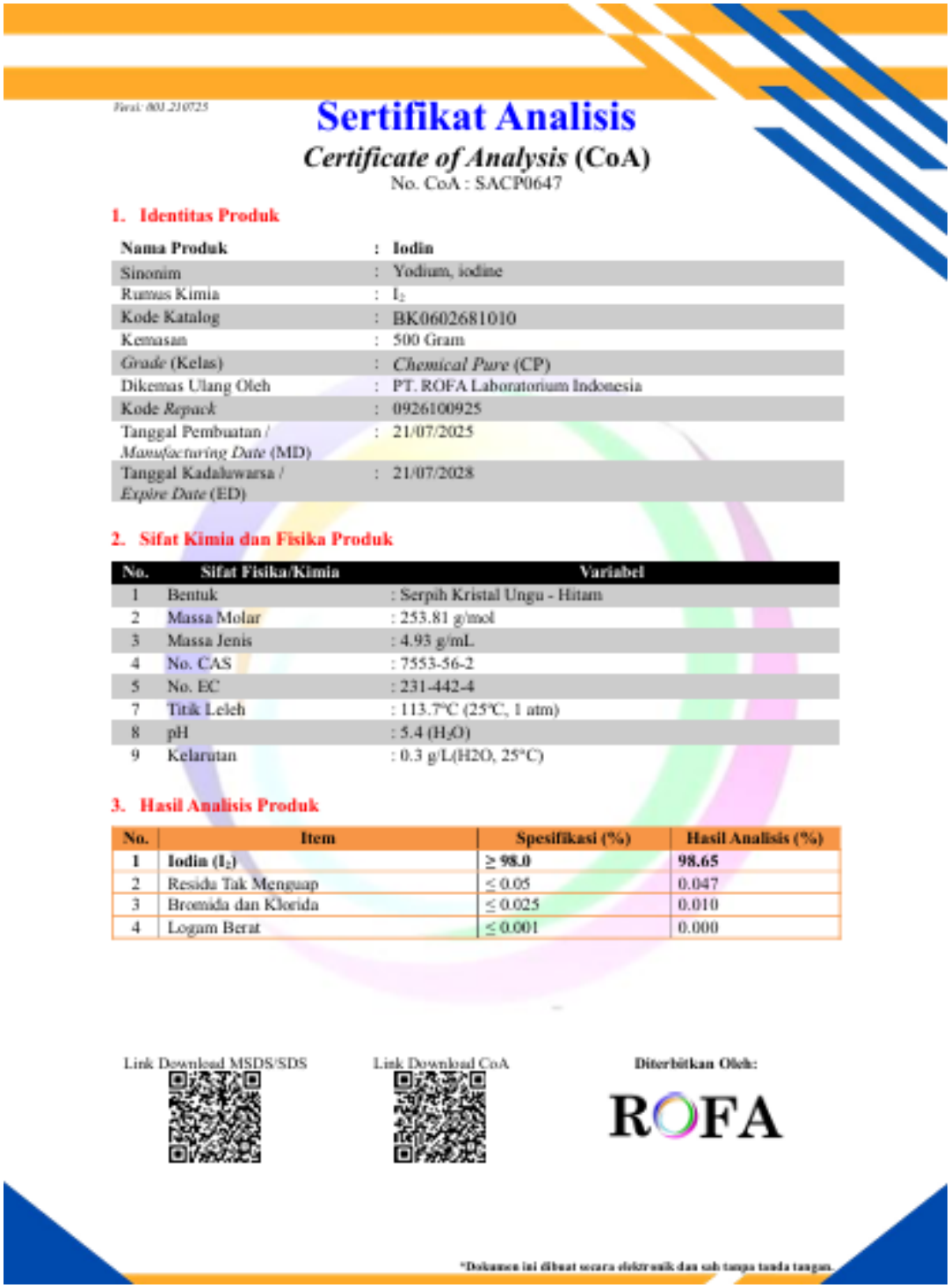
Responden/Subjek Penelitian : 6 Sampel Kosmetik Vitamin C
*Respondent/Research Subject*

Telah melalui prosedur kaji etik dan dinyatakan layak untuk dilaksanakan
*Has proceeded the ethichal assessment procedure and been approved fot implementation*

**Batam, 18 Mei 2026**
**Ketua / *Chairman*,**

**dr. Ibnu Rushd, M.K.M**

**Lampiran 7.** Sertifikat Analisis Iodium



Versi: 003.210725

# Sertifikat Analisis

## *Certificate of Analysis* (CoA)

No. CoA : SACP0647

### 1. Identitas Produk

| | | |
|---|---|---|
| **Nama Produk** | : | **Iodin** |
| Sinonim | : | Yodium, iodine |
| Rumus Kimia | : | $I_2$ |
| Kode Katalog | : | BK0602681010 |
| Kemasan | : | 500 Gram |
| *Grade* (Kelas) | : | *Chemical Pure* (CP) |
| Dikemas Ulang Oleh | : | PT. ROFA Laboratorium Indonesia |
| Kode *Repack* | : | 0926100925 |
| Tanggal Pembuatan / *Manufacturing Date* (MD) | : | 21/07/2025 |
| Tanggal Kadaluwarsa / *Expire Date* (ED) | : | 21/07/2028 |

### 2. Sifat Kimia dan Fisika Produk

| No. | Sifat Fisika/Kimia | Variabel |
|---|---|---|
| 1 | Bentuk | : Serpih Kristal Ungu - Hitam |
| 2 | Massa Molar | : 253.81 g/mol |
| 3 | Massa Jenis | : 4.93 g/mL |
| 4 | No. CAS | : 7553-56-2 |
| 5 | No. EC | : 231-442-4 |
| 7 | Titik Leleh | : 113.7°C (25°C, 1 atm) |
| 8 | pH | : 5.4 ($H_2O$) |
| 9 | Kelarutan | : 0.3 g/L(H2O, 25°C) |

### 3. Hasil Analisis Produk

| No. | Item | Spesifikasi (%) | Hasil Analisis (%) |
|---|---|---|---|
| **1** | **Iodin ($I_2$)** | **≥ 98.0** | **98.65** |
| 2 | Residu Tak Menguap | ≤ 0.05 | 0.047 |
| 3 | Bromida dan Klorida | ≤ 0.025 | 0.010 |
| 4 | Logam Berat | ≤ 0.001 | 0.000 |

Link Download MSDS/SDS

Link Download CoA

**Diterbitkan Oleh:**

ROFA

*Dokumen ini dibuat secara elektronik dan sah tanpa tanda tangan.

**Lampiran 8.** Sertifikat Analisis Natrium Tiosulfat

# Specification

1.06516.0500 Sodium thiosulfate pentahydrate for analysis EMSURE® ACS,ISO, Reag. Ph Eur

| | Spec. Values | |
|---|---|---|
| Assay (iodometric) | 99.5 - 101.0 | % |
| Identity | passes test | |
| Appearance of solution | passes test | |
| Insoluble matter | ≤ 0.005 | % |
| pH-value (5 %; water, 25 °C) | 6.0 - 7.5 | |
| pH-value (10 %; water) | 6.0 - 7.5 | |
| Chloride (Cl) | ≤ 0.008 | % |
| Sulfate and sulphite (as $SO_4$) | ≤ 0.1 | % |
| Sulfide (S) | passes test | |
| Heavy metals (as Pb) | ≤ 0.001 | % |
| Total nitrogen (N) | ≤ 0.002 | % |
| Ca (Calcium) | ≤ 0.002 | % |
| Cu (Copper) | ≤ 0.0005 | % |
| Fe (Iron) | ≤ 0.0005 | % |
| K (Potassium) | ≤ 0.001 | % |
| Mg (Magnesium) | ≤ 0.001 | % |
| Pb (Lead) | ≤ 0.0005 | % |

Corresponds to ACS, ISO, Reag. Ph Eur

Kristin Haufschildt
Responsible laboratory manager quality control

This document has been produced electronically and is valid without a signature.

**Lampiran 9.** Sertifikat Analisis Kalium Iodida

# Certificate of Analysis

1.05043.0000 Potassium iodide for analysis EMSURE® ISO,Reag. Ph Eur
Batch B1549943

| | Spec. Values | | Batch Values | |
|---|---|---|---|---|
| Assay (argentometric) | ≥ 99.5 | % | 100.1 | % |
| Assay (argentometric; calculated on dried substance) | 99.5 - 100.5 | % | 100.2 | % |
| Identity | passes test | | passes test | |
| Appearance of solution | passes test | | passes test | |
| Alkaline impurities | passes test | | passes test | |
| pH-value (5 %; water) | 6 - 8 | | 6 | |
| Chloride and Bromide (as Cl) | ≤ 0.01 | % | ≤ 0.01 | % |
| Iodate ($IO_3$) | ≤ 0.0003 | % | ≤ 0.0003 | % |
| Phosphate ($PO_4$) | ≤ 0.001 | % | ≤ 0.001 | % |
| Sulfate ($SO_4$) | ≤ 0.001 | % | ≤ 0.001 | % |
| Thiosulfate ($S_2O_3$) | passes test | | passes test | |
| Total nitrogen (N) | ≤ 0.001 | % | ≤ 0.001 | % |
| Heavy metals (as Pb) | ≤ 0.0005 | % | ≤ 0.0005 | % |
| As (Arsenic) | ≤ 0.00001 | % | ≤ 0.00001 | % |
| Ba (Barium) | ≤ 0.002 | % | ≤ 0.002 | % |
| Ca (Calcium) | ≤ 0.001 | % | ≤ 0.001 | % |
| Cu (Copper) | ≤ 0.0002 | % | ≤ 0.0002 | % |
| Fe (Iron) | ≤ 0.0002 | % | ≤ 0.0002 | % |
| Mg (Magnesium) | ≤ 0.001 | % | ≤ 0.001 | % |
| Na (Sodium) | ≤ 0.03 | % | 0.01 | % |
| Pb (Lead) | ≤ 0.0002 | % | ≤ 0.0002 | % |
| Reducing substances | passes test | | passes test | |
| Loss on Drying (105°C) | ≤ 0.1 | % | ≤ 0.1 | % |

Date of release (DD.MM.YYYY) 15.03.2018
Minimum shelf life (DD.MM.YYYY) 31.03.2023

Dr. Manuel Schaffroth
Responsible laboratory manager quality control

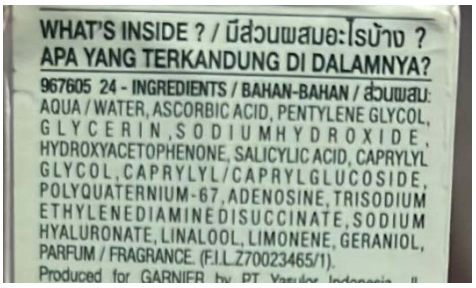
This document has been produced electronically and is valid without a signature.

Merck KGaA, Frankfurter Straße 250, 64293 Darmstadt (Germany): +49 6151 72-0
EMD Millipore Corporation - a subsidiary of Merck KGaA, Darmstadt, Germany
400 Summit Drive, Burlington, MA 01803, USA, Phone +1 (781) 533-6000

**Lampiran 10.** Uji pH sediaan kosmetik (krim dan serum) vitamin c



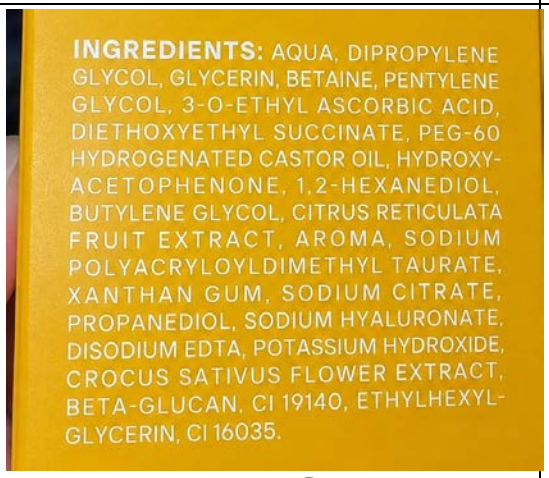
**Lampiran 11. Komposisi pada kemasan sampel**



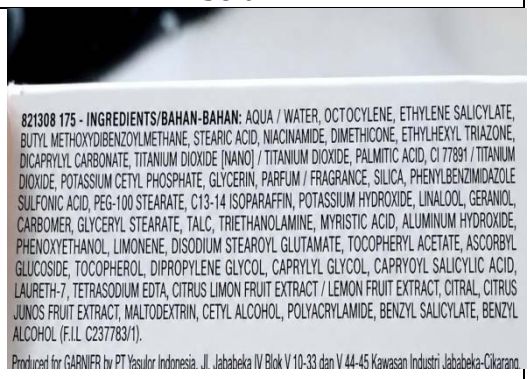

Serum A



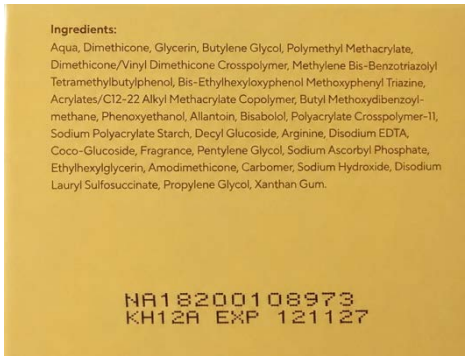

Serum B



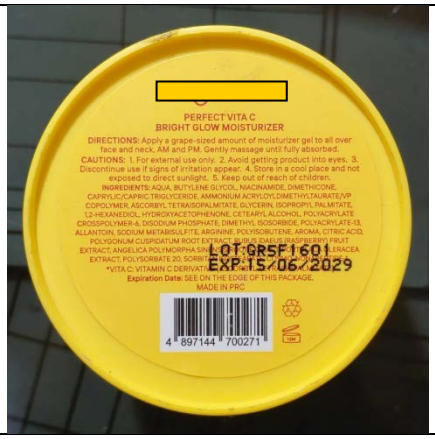

serum C



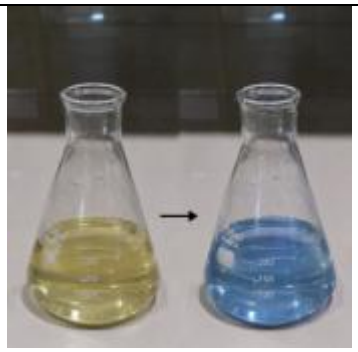

Krim D




Krim E



**Lampiran 12.** Standarisasi $Na_2S_2O_3$ dengan $KIO_3$

| | |
|---|---|
| <br>Pengeringan $KIO_3$ dengan suhu 110°C | <br>penimbangan $KIO_3$ yang sudah dikeringkan |
| <br>Pembuatan larutan $KIO_3$ | <br>Penambahan $H_2SO_4$ 2N |
| <br>Titrasi larutan $KIO_3$+ $H_2SO_4$ dengan $Na_2S_2O_3$ | <br>Hasil dari titrasi $Na_2S_2O_3$ : kuning, yang ketika ditambahkan indikator amilum menjadi biru |

**Lampiran 13.** Standarisasi $I_2$ dengan $Na_2S_2O_3$

| | |
|---|---|
| <br>Penimbangan bahan | <br>Pembuatan amylum 1% |
| <br>Larutan iodium | <br>Larutan Iodium + KI |
| <br>Titrasi Standarisasi $I_2$ dengan $Na_2S_2O_3$ | <br>Hasil akhir standarisasi $I_2$ |

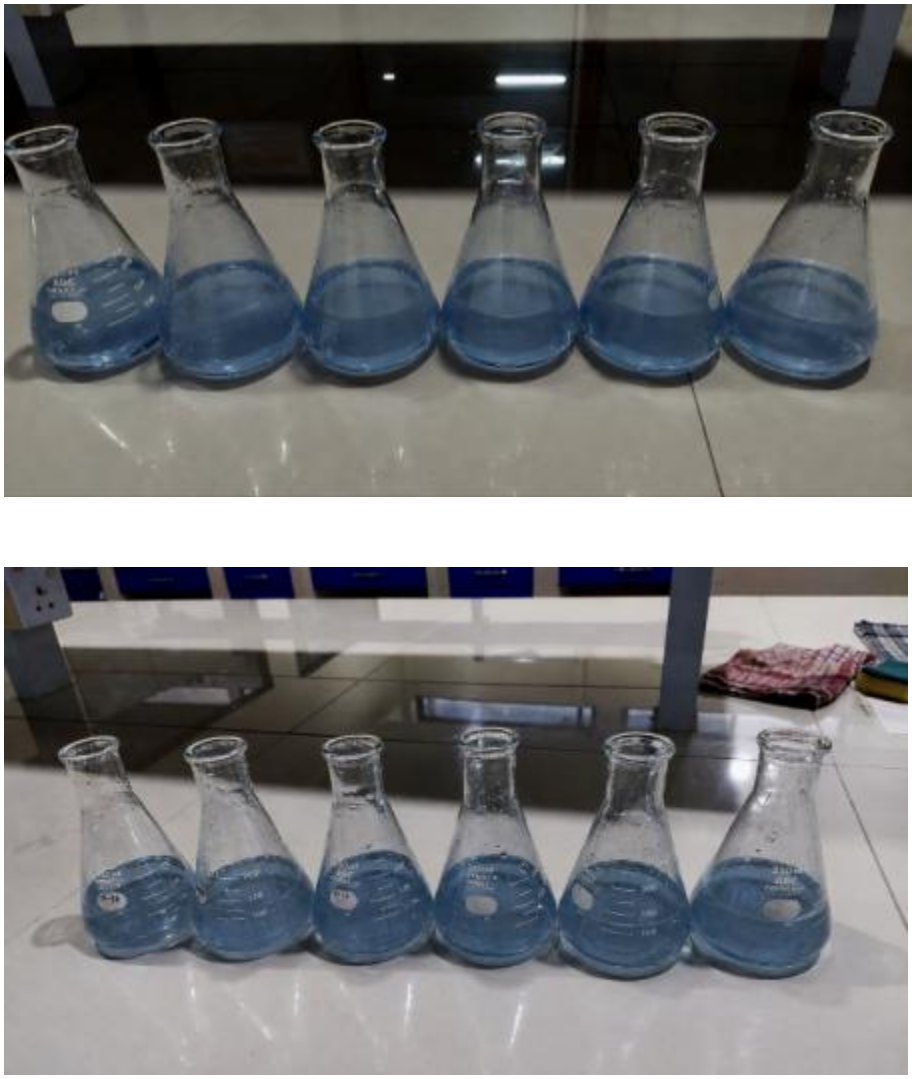
**Lampiran 14.** Uji *Cycling* sediaan kosmetik (krim dan serum) vitamin c








**Lampiran 15.** Hasil Titrasi Pada Siklus Pertama dan Siklus Terakhir



Hasil titrasi pada siklus H-0 dan H-6

**Lampiran 16.** Perhitungan $Na_2S_2O_3$

**Perhitungan $Na_2S_2O_3$**

- Mr $Na_2S_2O_3.5H_2O$ (pentahidrat)

  Mr = (2 × Ar Na) + (2 × Ar S) + (3 × Ar O) + (5 × Mr $H_2O$)

  Mr = (2 × 23) + (2 × 32) + (3 × 16) + (5 × 18)

  Mr = 46 + 64 + 48 + 90 = 248 g/mol

- mol $Na_2S_2O_3$

  mol = $\frac{Massa}{Mr}$ = $\frac{26\ gram}{248 g/mol}$ = 0,1048 mol

- Molaritas (M)

  M = $\frac{mol}{Volume(L)}$ = $\frac{0{,}10484}{1L}$ = 0,1048 M

- Normalitas

  N = M x Ekivalensi

  N = 0,1048 M x 1

  N = 0,1048 N

**Lampiran 17.** Perhitungan Konsentrasi $I_2$

- Mr $I_2$ = 253,8 g/mol
- mol $I_2$ = $\frac{Massa}{Mr}$ = $\frac{12{,}69\ gram}{253{,}8\ g/mol}$ = 0,05 mol
- Molaritas (M)

  M = $\frac{mol}{Volume(L)}$ = $\frac{0{,}05\ mol}{1L}$ = 0,05 M

- Normalitas (N)

  N = M x Ekivalensi

  N = 0,05 M x 2

  N = 0,1 N

**Lampiran 18.** Standarisasi $Na_2S_2O_3$

| Titrasi | Volume Titrasi | | |
|---|---|---|---|
| | Awal (ml) | Akhir (ml) | Volume (ml) |
| I | 0 | 5 | 9,5 |
| II | 9,5 | 19,2 | 9,9 |
| III | 19,2 | 29,1 | 9,7 |
| | Rata-rata | | 9,7 |

- Normalitas Aktual $Na_2S_2O_3$

  $N\ Na_2S_2O_3 = \frac{N\ KIO_3 \times V\ KIO_3}{V\ Na_2S_2O_3} = \frac{0,1 \times 10}{9,7\ ml} = 0,1031\ N$

- Molaritas aktual $Na_2S_2O_3$

  $M\ Na_2S_2O_3 = \frac{N\ Na_2S_2O_3}{valensi} = \frac{0,1031}{1} = 0,1031\ M$

**Lampiran 19.** Standarisasi $I_2$

| Titrasi | Volume titrasi | | |
|---|---|---|---|
| | awal | Akhir | volume |
| I | 0 | 5 | 5 ml |
| II | 5 | 10,2 | 5,2 ml |
| III | 10,2 | 15,4 | 5,2 ml |
| | Rata-rata | | 5,13 ml |

- Normalitas aktual $I_2$

  $N\ I_2 = \frac{N\ Na2S2O3 \times V\ Na2S2O3}{VI2} = \frac{0,1031 \times 5}{5,13} = \frac{0,5155}{5,13} = 0,100\ N$

- Molaritas aktual $I_2$

  $M\ I_2 = \frac{N\ I2}{valensi} = \frac{0,100}{2} = 0,050\ M$

**Lampiran 20.** Perhitungan kadar sampel pada H-0

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,7 | $\frac{(4{,}7 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 10,35 |
| Serum B | 4,5 | $\frac{(4{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,69 |
| Serum C | 1,9 | $\frac{(1{,}9 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 3,96 |
| Krim D | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim E | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim F | 0,6 | $\frac{(0{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,10 |

- Replikasi II

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,8 | $\frac{(4{,}8 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 10,35 |
| Serum B | 4,6 | $\frac{(4{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,91 |
| Serum C | 2,0 | $\frac{(2{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 4,18 |
| Krim D | 1,1 | $\frac{(1{,}1 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 2,20 |
| Krim E | 1,1 | $\frac{(1{,}1 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 2,20 |
| Krim F | 0,7 | $\frac{(0{,}7 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,32 |

- Replikasi III

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,9 | $\frac{(4,9-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 10,57 |
| Serum B | 4,7 | $\frac{(4,7-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 10,13 |
| Serum C | 2,1 | $\frac{(2,1-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 4,40 |
| Krim D | 1,2 | $\frac{(1,2-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,42 |
| Krim E | 1,2 | $\frac{(1,2-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,42 |
| Krim F | 0,8 | $\frac{(0,8-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,54 |

- Rata-rata

| Sampel | Rata-Rata | Hasil (%) |
|---|---|---|
| Serum A | $\frac{10,13 + 10,35 + 10,57}{3}$ | 10,35 |
| Serum B | $\frac{9,69 + 9,91 + 10,13}{3}$ | 9,91 |
| Serum C | $\frac{3,96 + 4,18 + 4,40}{3}$ | 4,18 |
| Krim D | $\frac{1,98 + 2,20 + 2,42}{3}$ | 2,20 |
| Krim E | $\frac{1,98 + 2,20 + 2,42}{3}$ | 2,20 |
| Krim F | $\frac{1,10 + 1,32 + 1,54}{3}$ | 1,32 |

**Lampiran 21.** Perhitungan kadar sampel pada H-1

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,6 | $\frac{(4{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,91 |
| Serum B | 4,5 | $\frac{(4{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,69 |
| Serum C | 1,9 | $\frac{(1{,}9 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 3,96 |
| Krim D | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim E | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim F | 0,5 | $\frac{(0{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 0,88 |

- Replikasi II

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,7 | $\frac{(4{,}7 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 10.13 |
| Serum B | 4,6 | $\frac{(4{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,91 |
| Serum C | 2,0 | $\frac{(2{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 4,18 |
| Krim D | 1,1 | $\frac{(1{,}1 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 2,20 |
| Krim E | 1,1 | $\frac{(1{,}1 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 2,20 |
| Krim F | 0,6 | $\frac{(0{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,10 |

- Replikasi III

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,8 | $\frac{(4,8-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 10,35 |
| Serum B | 4,7 | $\frac{(4,7-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 10,13 |
| Serum C | 2,1 | $\frac{(2,1-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 4,40 |
| Krim D | 1,2 | $\frac{(1,2-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,42 |
| Krim E | 1,2 | $\frac{(1,2-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,42 |
| Krim F | 0,7 | $\frac{(0,7-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,32 |

- Rata-rata

| Sampel | Rata-Rata | Hasil |
|---|---|---|
| Serum A | $\frac{9,91+10,13+10,35}{3}$ | 10,13 |
| Serum B | $\frac{9,69+9,91+10,13}{3}$ | 9,91 |
| Serum C | $\frac{3,96+4,18+4,40}{3}$ | 4,18 |
| Krim D | $\frac{1,98+2,20+2,42}{3}$ | 2,20 |
| Krim E | $\frac{1,98+2,20+2,42}{3}$ | 2,20 |
| Krim F | $\frac{0,88+1,10+1,32}{3}$ | 1,10 |

**Lampiran 22.** Perhitungan Kadar Sampel Pada H-2

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,4 | $\frac{(4{,}4 - 0{,}1)\text{X } 0{,}1 \text{ X } 88{,}06}{400} \text{ X } 100$ | 9,47 |
| Serum B | 4,4 | $\frac{(4{,}4 - 0{,}1)\text{X } 0{,}1 \text{ X } 88{,}06}{400} \text{ X } 100$ | 9,47 |
| Serum C | 1,7 | $\frac{(1{,}7 - 0{,}1)\text{X } 0{,}1 \text{ X } 88{,}06}{400} \text{ X } 100$ | 3,52 |
| Krim D | 0,9 | $\frac{(0{,}9 - 0{,}1)\text{X } 0{,}1 \text{ X } 88{,}06}{400} \text{ X } 100$ | 1,74 |
| Krim E | 0,9 | $\frac{(0{,}9 - 0{,}1)\text{X } 0{,}1 \text{ X } 88{,}06}{400} \text{ X } 100$ | 1,76 |
| Krim F | 0,5 | $\frac{(0{,}5 - 0{,}1)\text{X } 0{,}1 \text{ X } 88{,}06}{400} \text{ X } 100$ | 0,88 |

- Replikasi II

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,5 | $\frac{(4{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,69 |
| Serum B | 4,5 | $\frac{(4{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,69 |
| Serum C | 1,8 | $\frac{(1{,}8 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 3,74 |
| Krim D | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim E | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim F | 0,6 | $\frac{(0{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,10 |

- Replikasi III

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,6 | $\frac{(4{,}6-0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400}$ x 100 | 9,91 |
| Serum B | 4,6 | $\frac{(4{,}6-0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400}$ x 100 | 9,91 |
| Serum C | 1,9 | $\frac{(1{,}9-0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400}$ x 100 | 3,96 |
| Krim D | 1,1 | $\frac{(1{,}1-0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400}$ x 100 | 2,20 |
| Krim E | 1,1 | $\frac{(1{,}1-0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400}$ x 100 | 2,20 |
| Krim F | 0,7 | $\frac{(0{,}7-0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400}$ x 100 | 1,32 |

- Rata-rata

| **Sampel** | **Rata-rata** | **Hasil (%)** |
|---|---|---|
| Serum A | $\frac{9{,}47+9{,}69+9{,}91}{3}$ | 9,69 |
| Serum B | $\frac{9{,}47+9{,}69+9{,}91}{3}$ | 9,69 |
| Serum C | $\frac{3{,}52+3{,}74+3{,}96}{3}$ | 3, 74 |
| Krim D | $\frac{1{,}76+1{,}98+2{,}20}{3}$ | 1,98 |
| Krim E | $\frac{1{,}76+1{,}98+2{,}20}{3}$ | 1,98 |
| Krim F | $\frac{0{,}88+1{,}10+1{,}32}{3}$ | 1,10 |

**Lampiran 23.** Perhitungan Kadar Sampel Pada H-3

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,2 | $\frac{(4{,}2 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,03 |
| Serum B | 4,4 | $\frac{(4{,}4 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,47 |
| Serum C | 1,4 | $\frac{(1{,}4 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 3,08 |
| Krim D | 0,8 | $\frac{(0{,}8 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,76 |
| Krim E | 0,9 | $\frac{(0{,}9 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim F | 0,5 | $\frac{(0{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,10 |

- Replikasi II

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,3 | $\frac{(4{,}3 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,25 |
| Serum B | 4,5 | $\frac{(4{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 9,69 |
| Serum C | 1,5 | $\frac{(1{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 3,08 |
| Krim D | 0,9 | $\frac{(0{,}9 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,76 |
| Krim E | 1,0 | $\frac{(1{,}0 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,98 |
| Krim F | 0,6 | $\frac{(0{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,10 |

- Replikasi III

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,4 | $\frac{(4,4-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,47 |
| Serum B | 4,6 | $\frac{(4,6-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,91 |
| Serum C | 1,6 | $\frac{(1,6-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 3,30 |
| Krim D | 1,0 | $\frac{(1,0-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,98 |
| Krim E | 1,1 | $\frac{(1,1-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,20 |
| Krim F | 0,7 | $\frac{(0,7-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,32 |

- Rata-rata

| Sampel | Rata-Rata | Hasil (%) |
|---|---|---|
| Serum A | $\frac{9,03+9,25+9,47}{3}$ | 9,25 |
| Serum B | $\frac{9,47+9,69+9,91}{3}$ | 9,69 |
| Serum C | $\frac{2,86+3,08+3,30}{3}$ | 3,08 |
| Krim D | $\frac{1,54+1,76+9,98}{3}$ | 1,76 |
| Krim E | $\frac{1,76+1,98+2,20}{3}$ | 1,98 |
| Krim F | $\frac{0,88+1,10+1,32}{3}$ | 1,10 |

**Lampiran 24.** Perhitungan Kadar Sampel Pada H-4

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,1 | $\frac{(4,1 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,81 |
| Serum B | 4,2 | $\frac{(4,2 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,03 |
| Serum C | 1,2 | $\frac{(1,2 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,42 |
| Krim D | 0,8 | $\frac{(0,8 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,54 |
| Krim E | 0,8 | $\frac{(0,8 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,54 |
| Krim F | 0,5 | $\frac{(0,5 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 0,88 |

- Replikasi II

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,2 | $\frac{(4,2 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,03 |
| Serum B | 4,3 | $\frac{(4,3 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,25 |
| Serum C | 1,3 | $\frac{(1,3 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,64 |
| Krim D | 0,9 | $\frac{(0,9 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,76 |
| Krim E | 0,9 | $\frac{(0,9 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,76 |
| Krim F | 0,6 | $\frac{(0,6 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,10 |

- Replikasi III

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,3 | $\frac{(4,3-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,25 |
| Serum B | 4,4 | $\frac{(4,4-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 9,47 |
| Serum C | 1,4 | $\frac{(1,4-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,86 |
| Krim D | 1,0 | $\frac{(1,0-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,98 |
| Krim E | 1,0 | $\frac{(1,0-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,98 |
| Krim F | 0,7 | $\frac{(0,7-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,32 |

- Rata-rata

| Sampel | Rata-rata | Hasil (%) |
|---|---|---|
| Serum A | $\frac{8,81+9,03+9,25}{3}$ | 9,03 |
| Serum B | $\frac{9,03+9,25+9,47}{3}$ | 9,25 |
| Serum C | $\frac{2,42+2,64+2,86}{3}$ | 2,64 |
| Krim D | $\frac{1,54+1,76+1,98}{3}$ | 1,76 |
| Krim E | $\frac{1,54+1,76+1,98}{3}$ | 1,76 |
| Krim F | $\frac{0,88+1,10+1,32}{3}$ | 1,10 |

**Lampiran 25.** Perhitungan Kadar Sampel Pada H-5

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 3,9 | $\frac{(3,9 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,37 |
| Serum B | 3,8 | $\frac{(3,8 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,15 |
| Serum C | 0,9 | $\frac{(0,9 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,76 |
| Krim D | 0,7 | $\frac{(0,7 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,32 |
| Krim E | 0,7 | $\frac{(0,7 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,32 |
| Krim F | 0,3 | $\frac{(0,3 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 0,44 |

- Replikasi II

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 4,0 | $\frac{(4,0 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,59 |
| Serum B | 3,9 | $\frac{(3,9 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,37 |
| Serum C | 1,0 | $\frac{(1,0 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,98 |
| Krim D | 0,8 | $\frac{(0,8 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,54 |
| Krim E | 0,8 | $\frac{(0,8 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,54 |
| Krim F | 0,4 | $\frac{(0,4 - 0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 0,66 |

- Replikasi III

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 4,1 | $\frac{(4,1-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,81 |
| Serum B | 4,0 | $\frac{(4,0-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,59 |
| Serum C | 1,1 | $\frac{(1,1-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 2,20 |
| Krim D | 0,9 | $\frac{(0,9-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,76 |
| Krim E | 0,9 | $\frac{(0,9-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,76 |
| Krim F | 0,5 | $\frac{(0,5-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 0,88 |

- Rata-rata

| Sampel | Rata-rata | Hasil (%) |
|---|---|---|
| Serum A | $\frac{8,37+8,59+8,81}{3}$ | 8,59 |
| Serum B | $\frac{8,15+8,37+8,59}{3}$ | 8,37 |
| Serum C | $\frac{1,76+1,98+2,20}{3}$ | 1,98 |
| Krim D | $\frac{1,32+1,54+1,76}{3}$ | 1,54 |
| Krim E | $\frac{1,32+1,54+1,76}{3}$ | 1,54 |
| Krim F | $\frac{0,44+0,66+0,88}{3}$ | 0,66 |

**Lampiran 26.** Perhitungan Kadar Sampel Pada H-6

$$\frac{(Vs - Vb)\text{x } N \text{ x } F}{w} \text{ x } 100$$

- Replikasi I

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 3,7 | $\frac{(3{,}7 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 7,93 |
| Serum B | 3,7 | $\frac{(3{,}7 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 7,93 |
| Serum C | 0,8 | $\frac{(0{,}8 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,54 |
| Krim D | 0,4 | $\frac{(0{,}4 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 0,66 |
| Krim E | 0,5 | $\frac{(0{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 0,88 |
| Krim F | 0,2 | $\frac{(0{,}2 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 0,22 |

- Replikasi II

| **Sampel** | **Volume (ml)** | **Perhitungan** | **Hasil (%)** |
|---|---|---|---|
| Serum A | 3,8 | $\frac{(3{,}8 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 8,15 |
| Serum B | 3,8 | $\frac{(3{,}8 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 8,15 |
| Serum C | 0,9 | $\frac{(0{,}9 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,76 |
| Krim D | 0,5 | $\frac{(0{,}5 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 0,88 |
| Krim E | 0,6 | $\frac{(0{,}6 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 1,10 |
| Krim F | 0,3 | $\frac{(0{,}3 - 0{,}1)\text{x } 0{,}1 \text{ x } 88{,}06}{400} \text{ x } 100$ | 0,44 |

- Replikasi III

| Sampel | Volume (ml) | Perhitungan | Hasil (%) |
|---|---|---|---|
| Serum A | 3,9 | $\frac{(3,9-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,37 |
| Serum B | 3,9 | $\frac{(3,9-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 8,37 |
| Serum C | 1,0 | $\frac{(1,0-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,98 |
| Krim D | 0,6 | $\frac{(0,6-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,10 |
| Krim E | 0,7 | $\frac{(0,7-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 1,32 |
| Krim F | 0,4 | $\frac{(0,4-0,1)\text{x } 0,1 \text{ x } 88,06}{400} \text{ x } 100$ | 0,66 |

- Rata-rata

| Sampel | Rata-rata | Hasil (%) |
|---|---|---|
| Serum A | $\frac{7,93+8,15+8,37}{3}$ | 8,15 |
| Serum B | $\frac{7,93+8,15+8,37}{3}$ | 8,15 |
| Serum C | $\frac{1,54+1,76+1,98}{3}$ | 1,76 |
| Krim D | $\frac{0,66+0,88+1,10}{3}$ | 0,88 |
| Krim E | $\frac{0,88+1,10+1,32}{3}$ | 1,10 |
| Krim F | $\frac{0,22+0,44+0,66}{3}$ | 0,44 |