

## DAFTAR PUSTAKA

- Amin, A., N. Khairi dan Allo, E. K. 2019. Sintesis dan Karakterisasi Kitosan dari Limbah Cangkang Udang Sebagai Stabilizer Terhadap Ag Nanopartikel. *Journal of Chemistry*. 4 (2): 86 – 91.
- Al-Rubaye, A. F., Hameed, I, H. Dan Kadhim, M. J. 2017. *A Review: Uses of Gas Chromatography-Mass Spectrometry (GC-MS) Technique for Analysis of Bioactive Natural Compounds of Some Plants. International Journal of Toxicological and Pharmacological Research*. 9 (1): 81 – 85.
- Anggita, D., Nuraisyah, S. dan Wiriansya, E. P. 2022. Mekanisme Kerja Antibiotik. *UMI Medical Journal*. 7 (1): 46 – 58.
- Astuti, F. P., Datu, O. S dan Tallei, T. E. 2020. Pengaruh Penambahan Asam Benzoat Terhadap Pertumbuhan Ragi Dan Kadar Alkohol Pada Fermentasi Kulit Nanas (*Ananas comosus L.*) Lokal. *Pharmakon*. 9 (3): 432 – 442.
- Balouri, M., Sadiki, M dan Ibnosuda, S. K. 2015. Methods for in vitro evaluating antimicrobial activity: A review. *Journal of Pharmaceutical Analysis*. 6 (2): 71 – 79. <https://doi.org/10.1016/j.jpha.2015.11.005>
- Amin, A., N. Khairi dan Allo, E. K. 2019. Sintesis dan Karakterisasi Kitosan dari Limbah Cangkang Udang Sebagai Stabilizer Terhadap Ag Nanopartikel. *Journal of Chemistry*. 4 (2): 86 – 91.
- Divya, K., Vijayan, S., Tijith, K.G dan Jisha, M. S. 2017. *Antimicrobial properties of chitosan nanoparticles: mode of action and factors affecting activity. Fibers Polymers*. 18 (2): 221 – 230. DOI 10.1007/s12221-017-6690-1
- Founda A.M., Abbas H.A.S., Ahmed E.H., Shati A.A., Alfaifi M.Y. and Elbehairi S.E.I., 2019. *Synthesis, In Vitro Antimicrobial and Cytotoxic Activities of Some New Pyrazolol[1,5-a]pyrimidine Derivatives. Molecules*. 24(6): 1 – 20.
- Haryono, A., S. Dewi, Harmami, S. B dan Randy, M. 2008. Sintesa Nanopartikel Perak dan Potensi Aplikasinya. *Jurnal Riset Industri*. 2 (3): 156 – 163.
- Hotmian, E., Suoth, E., Fatimawali dan Tallei, T. 2021. GC-MS (Gas Chromatography - Mass Spectrometry) Analysis Of Nut Grass Tuber (*Cyperus Rotundus L.*) Methanolic Extract. *Pharmakon*. 10 (2): 849 – 856.
- Kementerian Kelautan dan Perikanan. 2022. Buku Statistik Ekspor Produk Perikanan Tahun 2017-2021. Sekretariat Direktorat Jenderal Penguatan Daya Saing Produk Kelautan dan Perikanan. Jakarta, 764 hlm.
- Kalaivani, R., M. Maruthupandy, T. Muneeswaran, A. H. Beevi, M. Anand, C. M. Ramakritinan dan A. K. Kumaraguru. 2018. Synthesis of chitosan mediated silver nanoparticles (Ag Nps) for potential antimicrobial applications. *Journal Frontiers in Laboratory Medicine*. 30 – 35.

- Khairunnisa, S., Tandra, T. A., Sim, M dan Florenly. 2020. Efektivitas Antibakteri Campuran Nanokitosan 1% dengan Berbagai Konsentrasi Ekstrak Biji Kelengkeng Terhadap *Staphylococcus Aureus*. *Jurnal Ilmiah Kesehatan Sandi Husada*. 11 (1): 430 – 440. DOI: 10.35816/jiskh.v10i2.319
- Kumar, N., Srikumar, R., Chidambaram, R. dan Reddy, P. 2018. Phytochemical Analysis and Antifungal Activity of *Ganoderma lucidum*. *Indian Journal of Public Health Research & Development*. 9 (12): 1 – 5. DOI: 10.5958/0976-5506.2018.01820.X
- Kusumaningrum, P. D., Thessiana, L dan Financia G, N. 2015. Sistem Sterilisasi Bakteri *Vibrio harveyi* Menggunakan Radioisotop Cobalt-60 Untuk Budidaya Udang. *Jurnal Kelautan Nasional*. 10 (3): 125 – 137.
- Kusumawati, E., Supomo dan Libiyah. 2017. Uji Daya Antibakteri Pada Sediaan Hand Sanitizer Kitosan terhadap Bakteri *Staphylococcus aureus* dan *Escherichia coli*. *Jurnal Sains dan Terapan Politeknik Hasnur*. 5 (1): 1 – 8.
- Magani, A. K., Tallei, T, E dan Kolondam, B. J. 2020. Uji Antibakteri Nanopartikel Kitosan terhadap Pertumbuhan Bakteri *Staphylococcus aureus* dan *Escherichia coli*. *Jurnal bios logos*. 10 (1): 7 – 12.
- Magvira, T., Marwati dan Ardhani, F. 2019. Uji Daya Hambat Bakteri *Staphylococcus aureus* Menggunakan Ekstrak Daun Tahongai (*Kleinhovia hospita L.*). *Jurnal Peternakan Lingkungan Tropis*. 2 (2): 41 – 50.
- Mahardika, A., Umar, N., Wardhani, N. dan Suprianto. 2020. Sistem Pakar Untuk Mendiagnosa Penyakit Udang Vaname (*Litopenaeus Vannamei*) Menggunakan Metode *Dempster-Shafe*. *Jurnal IT*. 11 (3): 133 – 141.
- Mahulauw, F, R., Lamadi, A dan Mulis. 2022. Patogenitas Bakteri *Vibrio sp.* pada Udang *Vannamei* di Kabupaten Pohuwato. *Jurnal Ilmiah Perikanan dan Kelautan*. 10 (1): 31 – 39.
- Masykuroh, A dan Puspasari, H. 2022. Aktivitas Anti Bakteri Nano Partikel Perak (Npp) Hasil Biosintesis Menggunakan Ekstrak Keladi Sarawak *Alocasia macrorrhizos* terhadap *Staphylococcus Aureus* Dan *Escherichia coli*. *Jurnal Biologi Makassar*. 7 (1): 76 – 85. <https://journal.unhas.ac.id/index.php/biom>
- Ningsih, S. N. R., Tania, E., Azizah, N. N., Lutfiah, S. L. dan Gunarsi, N. S. 2022. Aktivitas Antibakteri Kitosan Dari Berbagai Jenis Bahan Baku Hewani: Review Journal. *Jurnal Buana Farma*. 2 (4): 25 – 30.
- Notriawan, D., Nesbah, Ernisa, G., Fadhila, M. A., Wibowo, R. H., Pertiwi, R dan Ilfanisari, V. 2021. Aktivitas Antibakteri Membran Nanokomposit Kitosan/Nanopartikel Perak . *Alchemy: Journal Of Chemistry*. 9 (1): 26 – 31.
- Pham, T. D. M., Ziora, Z. M. dan Blaskovich. 2019. Review: Quinolone antibiotics.

*MedChemComm.* 10: 1719 – 1739.

- Rao, J. P., dan Geckeler, K. E. 2011. Polymer nanoparticles: Preparation techniques and sizecontrol parameters. *Progress in Polymer Science.* 36 (7): 887 – 913.
- Rohaeti, E. 2019. Kimia Makromolekul Tekstil Antibakteri. UNY Press. Yogyakarta.
- Rorong, J. A. 2013. Analisis Asam Benzoat Dengan Perbedaan Preparasi Pada Kulit Dan Daun Kayu Manis (*Cinnamomun burmanni*). *Chemistry Progress.* 6 (2): 81 – 85.
- Rusdi, M., Susisuantri dan Yusuf, G., 2015. Efek Kitosan Dari Cangkang Kepiting Lunak (*Scylla olivaceae*) Terhadap Bakteri *Vibrio harveyi*. *Jurnal Farmasi UIN Alauddin Makassar.* 3 (2): 59 – 63.
- Septiani, G., Priyatno, S., da Anggoro, S. 2012. Antibacterial Activity of Jeruju (*Acanthus ilicifolius*) Extracts on The In Vitro Growth of The *Vibrio harveyi*. *J. Veteriner,* 13(3): 257 – 262.
- Satria, A. W., Darmawan, A. dan Sudarmanto, I. 2020. Analisis Senyawa Aktif Dalam Cacing Spesies Lokal Dan Antiinflamasi. *Journal Of Biological Research.* 7 (1): 1070 – 1077.
- Triono, A. A dan Purwoko, A. E. 2012. Efektifitas Antibiotik Golongan Sefalosporin dan Kuinolon terhadap Infeksi Saluran Kemih. *Mutiara Medika.* 12 (1): 6 – 11.
- Yulisman, L. 2018. Uji Efektivitas Anti Bakteri Ekstrak Daun Jambu Biji Lokal (*Psidium Guajava l.*) Terhadap Pertumbuhan *Staphylococcus aureus* Dan *Bacilus subtilis* Secara *In Vitro*. *Jurnal Pendidikan dan Biologi.* 10 (2):1 – 5.

## LAMPIRAN

**Lampiran 1.** Analisis ragam zona hambat AgNPs terhadap bakteri *V. harveyi* dengan pemberian volume yang berbeda

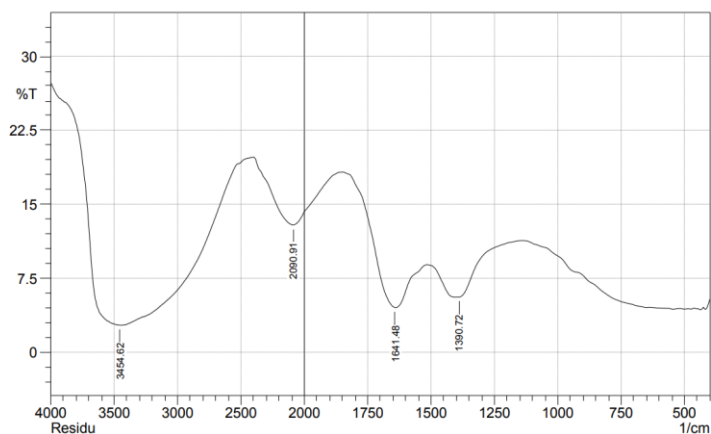
| Sumber keragaman | Sum of Squares | df | Mean Square | F       | Sig.  |
|------------------|----------------|----|-------------|---------|-------|
| Between Groups   | 444.977        | 4  | 111.244     | 123.536 | <,001 |
| Within Groups    | 9.005          | 10 | .901        |         |       |
| Total            | 453.982        | 14 |             |         |       |

**Lampiran 2.** Uji Lanjut W-Tukey zona hambat AgNPs terhadap bakteri *V. harveyi* dengan pemberian volume yang berbeda

| Perlakuan Pakan   | N | Subset for alpha = 0.05 |        |         |
|---|---|-------------------------|--------|---------|
|   |   | 1                       | 2      | 3       |
| A = Kontrol negatif 0 $\mu$ l Nanopartikel Kitosan Cangkang Tiram | 3 | .0000                   |        |         |
| B = 3,75 $\mu$ l Nanopartikel Kitosan Cangkang Tiram              | 3 |                         | 7.9667 |         |
| C = 7,50 $\mu$ l Nanopartikel Kitosan Cangkang Tiram              | 3 |                         | 9.0333 |         |
| D = 11,25 $\mu$ l Nanopartikel Kitosan Cangkang Tiram             | 3 |                         | 9.9167 |         |
| E = Kontrol positif 20 0 $\mu$ l Ampicilin                        | 3 |                         |        | 17.1000 |
| Sig.  |   | 1.000                   | .162   | 1.000   |

Keterangan: Berbeda nyata antar perlakuan pada taraf 5% ( $p < 0,05$ )

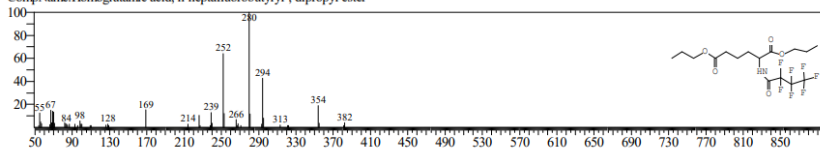
**Lampiran 3.** Uji FTIR AgNPs



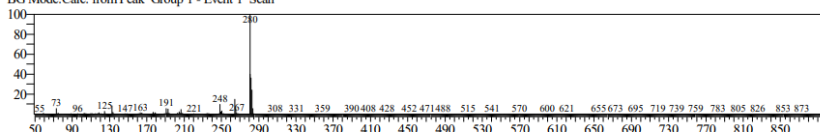
| No. | Peak    | Intensity | Corr. Intensity | Base (H) | Base (L) | Area    | Corr. Area |
|-----|---------|-----------|-----------------|----------|----------|---------|------------|
| 1   | 1390.72 | 5.593     | 0.1             | 1394.58  | 1145.75  | 257.303 | -16.156    |
| 2   | 1641.48 | 4.518     | 7.881           | 1847.87  | 1518.03  | 342.317 | 47.201     |
| 3   | 2090.91 | 12.917    | 6.018           | 2401.46  | 1847.87  | 447.165 | 48.05      |
| 4   | 3454.62 | 2.746     | 0.011           | 3470.06  | 3448.84  | 33.088  | 0.016      |

## Lampiran 4. Spektrum Massa AgNPs

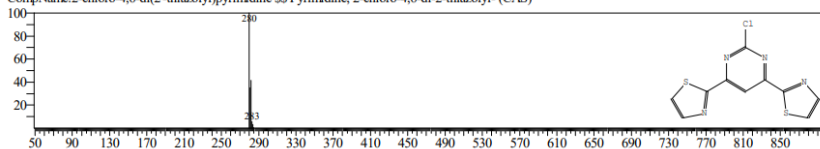
Hit#:1 Entry:282586 Library:NIST17.lib  
 SI:26 Formula:C16H22F7NO5 CAS:0-00-0 MolWeight:441 RetIndex:1839  
 CompName:Homoglutaric acid, n-heptafluorobutyl-, dipropyl ester



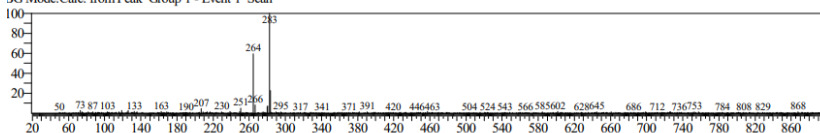
<< Target >>  
 Line#:3 R.Time:4.350(Scan#:163) MassPeaks:525  
 RawMode:Averaged 4.342-4.358(162-164) BasePeak:280.55(53129)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan



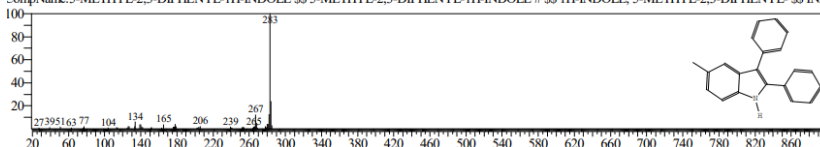
Hit#:1 Entry:327888 Library:Wiley9.lib  
 SI:77 Formula:C10H5ClN4S2 CAS:131022-69-0 MolWeight:280 RetIndex:0  
 CompName:2-chloro-4,6-di(2'-thiazolyl)pyrimidine S\$ Pyrimidine, 2-chloro-4,6-di-2-thiazolyl- (CAS)



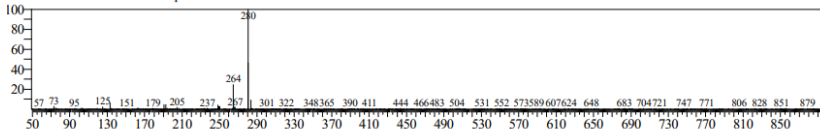
<< Target >>  
 Line#:4 R.Time:4.633(Scan#:197) MassPeaks:504  
 RawMode:Averaged 4.625-4.642(196-198) BasePeak:282.60(2301)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan



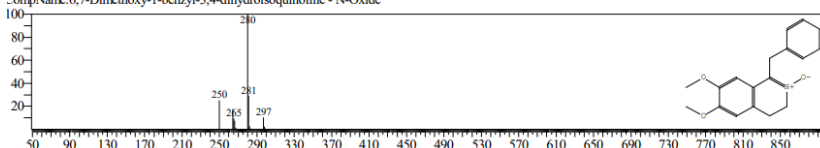
Hit#:1 Entry:337143 Library:Wiley9.lib  
 SI:64 Formula:C21H17N CAS:36804-50-9 MolWeight:283 RetIndex:0  
 CompName:5-METHYL-2,3-DIPHENYL-1H-INDOLE S\$ 5-METHYL-2,3-DIPHENYL-1H-INDOLE # S\$ 1H-INDOLE, 5-METHYL-2,3-DIPHENYL- S\$ IND



<< Target >>  
 Line#:5 R.Time:4.742(Scan#:210) MassPeaks:483  
 RawMode:Averaged 4.733-4.750(209-211) BasePeak:280.55(5475)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan

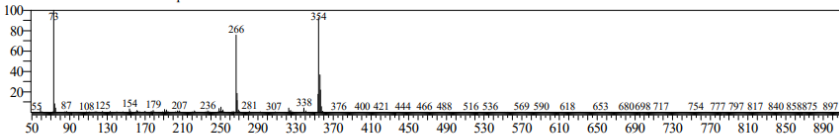


Hit#:1 Entry:367996 Library:Wiley9.lib  
 SI:75 Formula:C18H19NO3 CAS:0-00-0 MolWeight:297 RetIndex:0  
 CompName:6,7-Dimethoxy-1-benzyl-3,4-dihydroisoquinoline - N-Oxide



&lt;&lt; Target &gt;&gt;

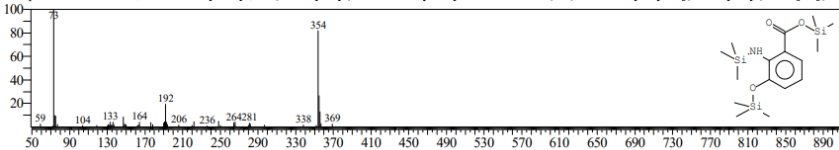
Line#:6 R.Time:6.817(Scan#:459) MassPeaks:533  
 RawMode:Averaged 6.808-6.825(458-460) BasePeak:72.95(35021)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Hit#:1 Entry:121886 Library:NIST147.LIB

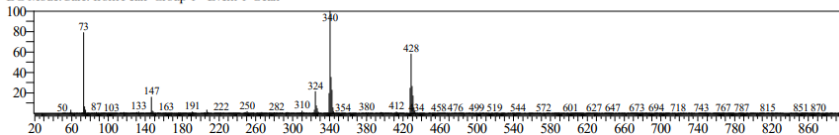
SI:73 Formula:C16H31NO3Si3 CAS:56272-78-7 MolWeight:369 RetIndex:0

CompName:Benzoic acid, 2-amino-3-hydroxy-, tris(trimethylsilyl) deriv. SS 3-Hydroxyanthranilic acid (tns) SS Trimethylsilyl 2-[(trimethylsilyl)amino]-3-[(tri



&lt;&lt; Target &gt;&gt;

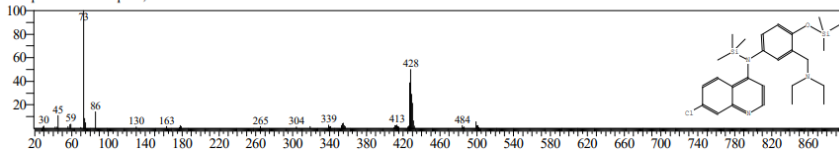
Line#:7 R.Time:9.400(Scan#:769) MassPeaks:621  
 RawMode:Averaged 9.392-9.408(768-770) BasePeak:340.45(101135)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Hit#:1 Entry:295976 Library:NIST17.lib

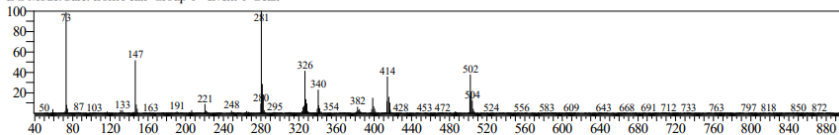
SI:67 Formula:C26H38ClN3OSi2 CAS:0-00-0 MolWeight:499 RetIndex:3207

CompName:Amodiaquine, 2TMS derivative



&lt;&lt; Target &gt;&gt;

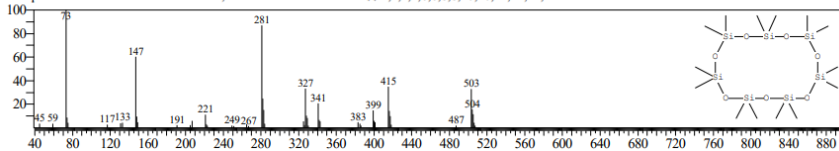
Line#:8 R.Time:11.733(Scan#:1049) MassPeaks:554  
 RawMode:Averaged 11.725-11.742(1048-1050) BasePeak:280.60(27722)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Hit#:1 Entry:379417 Library:WILEY8.LIB

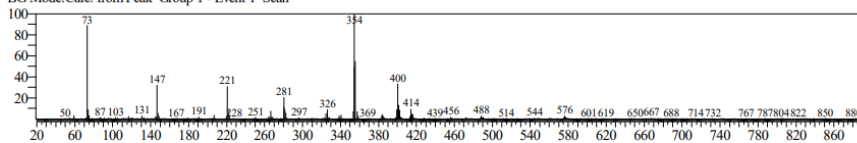
SI:77 Formula:C14H42O7Si7 CAS:107-50-6 MolWeight:518 RetIndex:0

CompName:CYCLOHEPTASILOXANE, TETRADECAMETHYL- SS 2,2,4,4,6,6,8,8,10,10,12,12,14,14-TETRADECAMETHYLCYCLOHEPTASILOXANE /

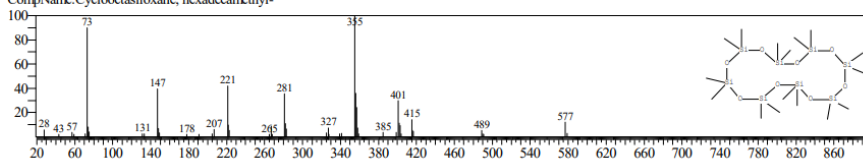


&lt;&lt; Target &gt;&gt;

Line#:9 R.Time:13.825(Scan#:1300) MassPeaks:496  
 RawMode:Averaged 13.817-13.833(1299-1301) BasePeak:354.55(5584)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan

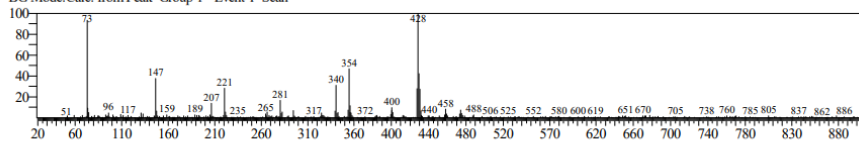


Hit#:1 Entry:302984 Library:NIST17.lib  
 SE:70 Formula:C16H48O8Si8 CAS:556-68-3 MolWeight:592 RetIndex:1654  
 CompName:Cyclooctasiloxane, hexadecamethyl-

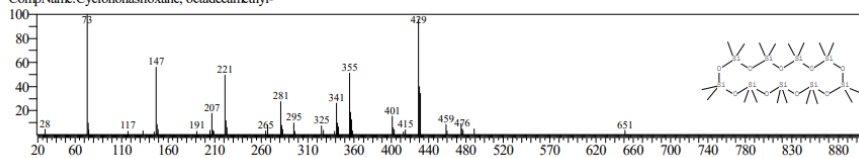


<< Target >>

Line#:10 R. Time:15.650(Scan#:1519) MassPeaks:443  
 RawMode:Averaged 15.642-15.658(1518-1520) BasePeak:428.40(1591)  
 BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Hit#:1 Entry:304928 Library:NIST17.lib  
 SE:65 Formula:C18H54O9Si9 CAS:556-71-8 MolWeight:666 RetIndex:1860  
 CompName:Cyclononasiloxane, octadecamethyl-



## Lampiran 5. Dokumentasi penelitian



Pengeringan cangkang tiram



Penepungan cangkang tiram



Deproteinisasi



Hasil deproteinisasi



demineralisasi



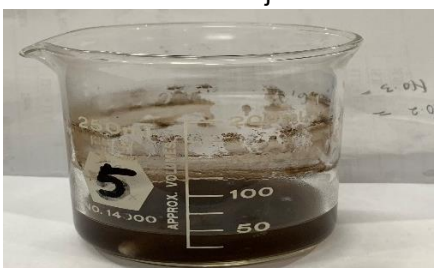
kitin



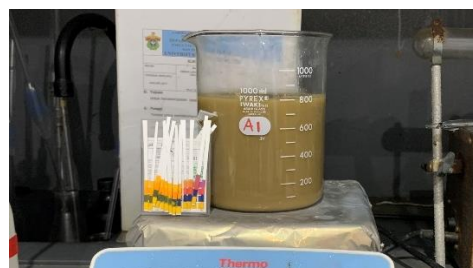
Desitilasi kitin menjadi kitosan



kitosan



Sintesis nanopartikel



Penetralan AgNPs





Peremajaan bakteri



Pemberian sampel perlakuan



Pengukuran zona hambat