DAFTAR PUSTAKA

Aini, N., Ramadiani, dan Hatta, H.R., 2017. Sistem Pakar Pendiagnosa Penyakit Tuberkulosis. Jurnal Ilmiah Ilmu Komputer 12(1): 56-63. http://dx.doi.org/10.30872/jim.v12i1.224

Alderwick, L.J., Birch, H.L., Mishra, A.K., Eggeling, L., dan Besra, G.S., 2007. Structure, Function and Biosynthesis of The Mycobacterium Tuberculosis Cell Wall: Arabinoglactan and Lipoarabinomannan Assembly with a View to Discovering New Drug Targets. Biochemical Society Transactions 35(5): 1325-1328. https://doi.org/10.1042/bst0351325

Ariani, F., 2020. Sintesis Kompleks Cu(II) dengan Tiosemikarbazon dan Potensinya sebagai Anti Mikroba. Jurnal Ilmiah Ecosystem 20(2): 167-174.

Aulia, T., Batara, A.S., dan Amelia, A.R., 2020: Implementasi Strategi Penemuan Kasus Tuberkulosis Berbasis Masyarakat. Window of Public Health Journal 1(2): 98-110. https://doi.org/10.33096/woph.v1i2.16

Awang, N., Baba, I., dan Yamin, B.M., 2006. Sintesis dan Pencirian Sebatian sek-butilpropilditiokarbamat daripada Logam Zink(II), Kadmium(II), dan Stibium (III). The Malaysian Journal of Analytical Sciences 10(2): 251-260.

Azhar, M., 2016. Biomolekul Sel Karbohidrat, Protein dan Enzim. UNP Press, Padang.

Bernal, C., Neves, E.A., dan Cavalheiro, T.G., 2001. Differences in Thermal Decomposition of Ag(I), Mn(II), Fe(II), and Fe(III) Complexes of Cyclic Dithiocarbamate. Thermocemica Acta 370(1-2): 49-55. http://dx.doi.org/10.1016/S0040-6031(00)00768-1

Bookhari A, Hill, J.O., dan Magee, R.J., 1974. Nickel(II) and Copper(II) Complexes of Monoethanol and Diethanoldithiocarbamic Acid. Journal of Nuclear Inorganic Chemistry 36(6): 1253-1257. doi: http://dx.doi.org/10.1002/chin.197430370

Campbell, G.L., Ellis, G.D., dan Chakrabarty, M.R., 1981. The Synthesis and Characterization of Some Titanium(III) tris-N,N-dialkyldithiocarbamates. Journal of Inorganic Nuclear Chemistry 43(10): 2265-2268. https://doi.org/10.1016/0022-1902(81)80246-1

CDC, 2016. Transmission and Pathogenesis of Tuberculosis, Atlanta, Georgia: Center for Disease Control and Prevention (https://www.cdc.gov/tb/publications/slidesets/selfstudy/pdf/module1-textonly.pdf) [Diakses 17 Juni 2023].

Cotton, F.A. dan Wilkinson, G., 1988. Advanced Inorganic Chemistry. Fifth Edition. John Willey and Sons Inc, New York.

Cotton, F.A., Wilkinson, G., Murillo, C.A., dan Bochmann, M., 1999. Advanced Inorganic Chemistry. Sixth Edition. Hoboken: John Wiley and Sons, New York.

Criado, J.J., Lopez-Arias, J.A., Macias, B., Fernandez-Lago, L.R., dan Salas, J.M., 1992. Au (III) Complexes of tris-dithiocarbamate Derivatives of a-Amino Acids: Spectroscopic Studies, Thermal Behaviour and Antibacterial Activity. Inorganic Chimica Acta 193(2): 229-235.

Duwila, N.S., Muliadi, dan Amin, M., 2023. Density Functional Theory Senyawa Kompleks Ni^{2+}, Zn^{2+} dan Pt^{2+} PirolidinDitiokarbamat. Saintifik@ Jurnal Pendidikan MIPA 8(1): 23-31. https://doi.org/10.33387/saintifik.v8i1.6220

Effendy, 2007. Perspektif Baru Kimia Koordinasi Jilid 1. Bayumedia Publishing, Malang.

Eltara, I.W., Widyawati, F., Bahtiar, S., dan Hidayat, S., 2022. Sintesis Manganese Ferrite dengan Metode Mechanical Alloying dari Bijih Mangan Alam. Hexagon: Jurnal Teknik dan Sains 3(1): 29-33. https://doi.org/10.36761/hexagon.v3i1.1345

Egerton, R.F., 2005. Physical Principles of Electron Microscopy. Springer, Switzerland.

Fa'izzah, M. dan Sugiyarto, K.H., 2016. Sintesis dan Karakterisasi Senyawa Kompleks Kobalt(II) dengan Ligan 1,10-Fenantrolin dan Anion Trifluorometanasulfonat. Jurnal Elemen Kimia 5(6): 1-9.

Hanafi, A.R. dan Prasenohadi, 2010. Mekanisme dan Diagnosis Multidrug Resistant Tuberculosis (MDR Tb), Departemen Pulmonologi dan Ilmu Kedokteran Respirasi Fakultas Kedokteran Universitas Indonesia. RS Persahabatan, Jakarta.

Handayani, N.C., Shafira, P.N., dan Fadhilah, S.G., 2021. Potensi Pengembangan Agen Antibakteri dari Senyawa Kompleks Logam Transisi di Indonesia. The Indonesian Green Technology Journal 10(1): 9-20.

Hartini, E., 2012 Cascade Aerator dan Bubble Aerator dalam Menurunkan Kadar Mangan Air Sumur Gali. Jurnal Kemas 8(1): 42-50. https://doi.org/10.15294/kemas.v8i1.2258

Hendrati, D., Purnamasari, E.S., Effendi, S., dan Wyantuti, S., 2018. Pemantapan Proses Sintesis Ligan Dibutilditiokarbamat (DBDTK) sebagai Pengekstrak Logam Tanah Jarang Berdasarkan Desain Eksperimen. Alchemy 14(2): 219-235. https://doi.org/10.20961/alchemy.14.2.15006.219-235

Hermawati, E.S., Suhartana, dan Taslimah, 2016. Sintesis dan Karakterisasi Senyawa Kompleks Zn(II)-8- Hidroksikuinolin. Jurnal Kimia Sains dan Aplikasi 19(3): 94-98. https://doi.org/10.14710/jksa.19.3.94-98

Holzheimer, M., Buter, J., dan Minnaard, A.J., 2021. Chemical Synthesis of Cell Wall Constituents of Mycobacterium tuberculosis. Chemical Reviews 121(15): 9554-9643. https://doi.org/10.1021%2Facs.chemrev.1c00043

Huheey, J.E. dan Keither, R.L., 1993. Inorganic Chemistry: Principles of Structure and Reactivity. Fourth Eition. Harper Collins College Publishers, New York.

Irfandi, R., 2019. Sintesis dan Karakterisasi Senyawa Kompleks Logam-Logam Esensial seperti Mg(II), Fe(II), Cu(II), dan Zn(II) yang direaksikan dengan Sistein Ditiokarbamat dan Uji Aktivitasnya Sebagai Antikanker Payudara (MCF-7). Tesis. Universitas Hasanuddin, Makassar.

Islam, F., Hossain, M.A. Shah, N.M. Barua, H.T. Kabir, M.A. Khan, M.J. dan Mullick, R., 2015. Synthesis, Characterization, and Antimicrobial Activity Studies of Ni(II) Complex with Pyridine as a Ligand. Journal of Chemistry 2015: 1-8.

Jamaluddin, N.A., Baba, I., dan Ibrahim, N., 2014. Synthesis, Structural and Antibacterial Studies of New Dithiocarbamate Complexes of Sb(III) and Bi(III). The Malaysian Journal of Analytical Sciences 18(2): 251-259.

Jufri, H., Raya, I., dan Usman, H., 2014. Sintesis dan Karakterisasi Senyawa Kompleks Pb(II) dengan Heptilmetilditiokarbamat serta Potensinya sebagai Anti Tuberkulosis. Indonesia Chimica Acta 7(2): 1-7.

Kahn, O. dan Martinez, C.J., 1998. Spintransition Polymers: from Molecular Materials Toward Memory Devices. Science 279(5347): 44-48. https://doi.org/10.1126/science.279.5347.44

Kane, S., Lazo, P., Ylli, F., Stafilov, T., Qarri, F., dan Marku, E., 2016. Separation of Heavy Metal from Water Samples - the Study of the Synthesis of Complex Compounds of Heavy Metal with Dithiocarbamates. Journal of Environmental Science and Health 51(4): 335-340. https://doi.org/10.1080/10934529.2015.1109408

Kartina, D., 2013. Sintesis dan Karakterisasi Zn(II) dan Te(IV) Ditiokarbamat dan Potensinya sebagai Anti Tuberkulosis. Tesis. Universitas Hasanuddin, Makassar.

Manav, N., Mishra, A.K., dan Kaushik, N.K., 2005. In Vitro Antitumor and Antibacterial Studies of Some Pt(IV) Dithiocarbamate Complexes. Spectrochimica Acta Part A 65: 32-35. https://doi.org/10.1016/j.saa.2005.09.023

Morizzi, J., Hobday, M., dan Rix, C., 2001. Gallium (III) Organophosphonate Adducts With the Bidentate Amines 2, 2'-bipyridyl and 1, 10- phenantroline. Inorganica Chimica Acta 320(1-2): 67-74. https://doi.org/10.1016/S0020-1693(01)00471-6

Muntu, R. dan Mahawira, I., 2021. Kemampuan Tray Aerator Filter Zeolit dalam Menurunkan Kadar Besi (Fe) dan Mangan (Mn) pada Air Bersih. Jurnal Sulolipu 21(1): 172-181. https://doi.org/10.32382/sulolipu.v21i1.2088

Patel, K.S., Patel, J.C., Dholariya, H.R., Patel, V.K., dan Patel, K.D., 2012. Synthesis of Cu(II), Ni(II), Co(II), and Mn(II) Complexes with Ciprofloxacin and Their Evaluation of Antimicrobial, Antioxidant and Anti-Tubercular Activity. Open Journal of Metal 2(3): 49-59. http://dx.doi.org/10.4236/ojmetal.2012.23008

Pavia, D.L., Lampman, G.M. dan Kriz, G.S., 2001. Introduction to Spectroscopy. Third Edition. Thomson Learning Inc., USA.

Pearson, R.G., 1963. Hard and Soft Acid and Bases. Journal of the American Chemical Society 85(22): 3533-3538. https://doi.org/10.1021/ja00905a001

Perhimpunan Dokter Paru Indonesia (PDPI), 2006. Pedoman Diagnosis dan Penatalaksanaan Tuberkulosis di Indonesia. PDPI, Jakarta.

Prabhananda, A.M., 2007. Sintesis Asam O-(3-Klorobenzoil) Salisilat dan Uji Aktivitas Analgesik pada Mencit (*Mus musculus*). Skripsi. Universitas Airlangga, Surabaya.

Pratiwi, S.W., Anggraeni, A., dan Bahti, H., 2022. Karakterisasi Hasil Reaksi Ion Gadolinium (III) dengan Ligan Dibutilditiokarbamat Menggunakan Metode Mekanika Molekular (MM2). Chimica et Natura Acta 10(2): 66-71. https://doi.org/10.24198/cna.v10.n2.19139

Poedjiadi dan Supriyanti, 2009. Dasar-Dasar Biokimia. Edisi Revisi. UI Press, Jakarta.

Purwanti, R.D., Ws, A.H., dan Oekar, N.K., 2013. Uji Resistensi Mycobacterium Tuberculosis terhadap Kombinasi Isoniazid dan Etambutol dengan Teknik Nuklir. Jurnal Sains dan Teknologi Farmasi Indonesia 2(2): 34-48. http://dx.doi.org/10.58327/jstfi.v2i2.27

Pusat Data dan Informasi Kementerian Kesehatan RI, 2015. Tuberkulosis: Temukan Obati Sampai Sembuh. InfoDATIN Kementerian Kesehatan RI, Jakarta.

Raya, I., 2007. Sintesis dan Pencirian Senyawa Kompleks Lantanida Ditiokarbamat dan KoLigan Heterosiklik. Disertasi. Universitas Kebangsaan Malaysia, Bangi, Malaysia.

Ritmaleni dan Cahyani, W., 2006. Sintesis 4-Fenil-3,4-Tetrahidro-Indeno [2,1]-Pirimidin-2-on (LR-I0. Majalah Farmasi Indonesia 17(3): 149-155.

Ruswanto, R., Mardianingrum, R., Apriliani, A.Y., Ramdaniah, F.K., Sarwatiningsih, Y., dan Pratita, A.T.K., 2018. Karakterisasi dan Sintesis Senyawa Kompleks Fe(III) 4-Fluoro-N'-[(Pyridine-4-yl) Carbonyl] Benzohydrazide Sebagai Kandidat Anti Tuberkulosis. Journal of Pharmacopolium 1(2): 100-106.

Sahri, Jayuska, A., dan Rahmalia, W., 2019. Efek Pelarut Terhadap Spektra Absorpsi UV-Vis Kurkuminoid. Jurnal Kimia Khatulistiwa 8(1): 1-9.

Saito, T., 1996. Kimia Anorganik. Portal Pendidikan Gratis Indonesia, Jakarta.

Sancho, M.I., Almandoz, M.C., Blanco, S.E., dan Castro, E.A., 2011. Spectroscopic Study of Solvent Effects on the Electronic Absorption Spectra of Flavone and 7-Hydroxyflavone in Neat and Binary Solvent Mixtures. International Journal of Molecular Sciences 12: 8895-8912. https://doi.org/10.3390/ijms12128895

Silverstein, M.S., 1967. Spectrometric Identification of Organic Compounds. John Wiley and Sons, New York.

Simamora, A., 2015. Buku Ajar Blok 3 Biologi Sel 1: Asam Amino, Peptida, dan Protein. Fakultas Kedokteran UKRIDA, Jakarta.

Singhal, S., Sharma, C.L., Garg, A.N., dan Chandra, K., 2002. Mossbaeur Spectral, Magnetic Moment and Thermal Decomposition Studies of Unsymmetrically Substituted (-N-alkyl,N"-hydroxyethyldithiocarbamato) Iron(III) Complexes. Polyhedron 21(24): 2489-2496. http://dx.doi.org/10.1016/S0277-5387(02)01231-7

Skoog, D.A., Holler, F.J., dan Crouch, S.R., 2007. Principles of Instrumental Analysis. Sixth Edition, Thomson Brooks/Cole, Canada.

Suhartana, 2007. Kemampuan Ligan Hipoxantin dan Quanin untuk Ekstraksi Kation Perak pada Fasa Air- Kloroform. Jurnal Sains dan Matematika (JSM). 15(1): 25-32.

Taghizadeh, F., 2016. The Study of Structural and Magnetic Properties of NiO Nanoparticles. Optics and Photonics Journal 6(1): 164-169. http://dx.doi.org/10.4236/opj.2016.68B027

Wahyudiati, D., 2017, Biokimia. Lembaga Pengkajian Publikasi Islam dan Masyarakat, Mataram.

Wang, X.W.Y., Yuan, S.L.G., Lu, Y., Zhang, J., dan Wang, W., 2001. Potential Anticancer Activity of Transhinone IIA Against Human Breast Cancer. International Journal of Cancer 116(5): 799-807. https://doi.org/10.1002/ijc.20880

Warsyidah, A.A., Syarif, J., dan Abdullah, C., 2019. Analisis Kadar Mangan (Mn) pada Air Alkali dengan Menggunakan Spektrofotometer Serapan Atom (SSA). Jurnal Media Laboran 9(1): 1-5.

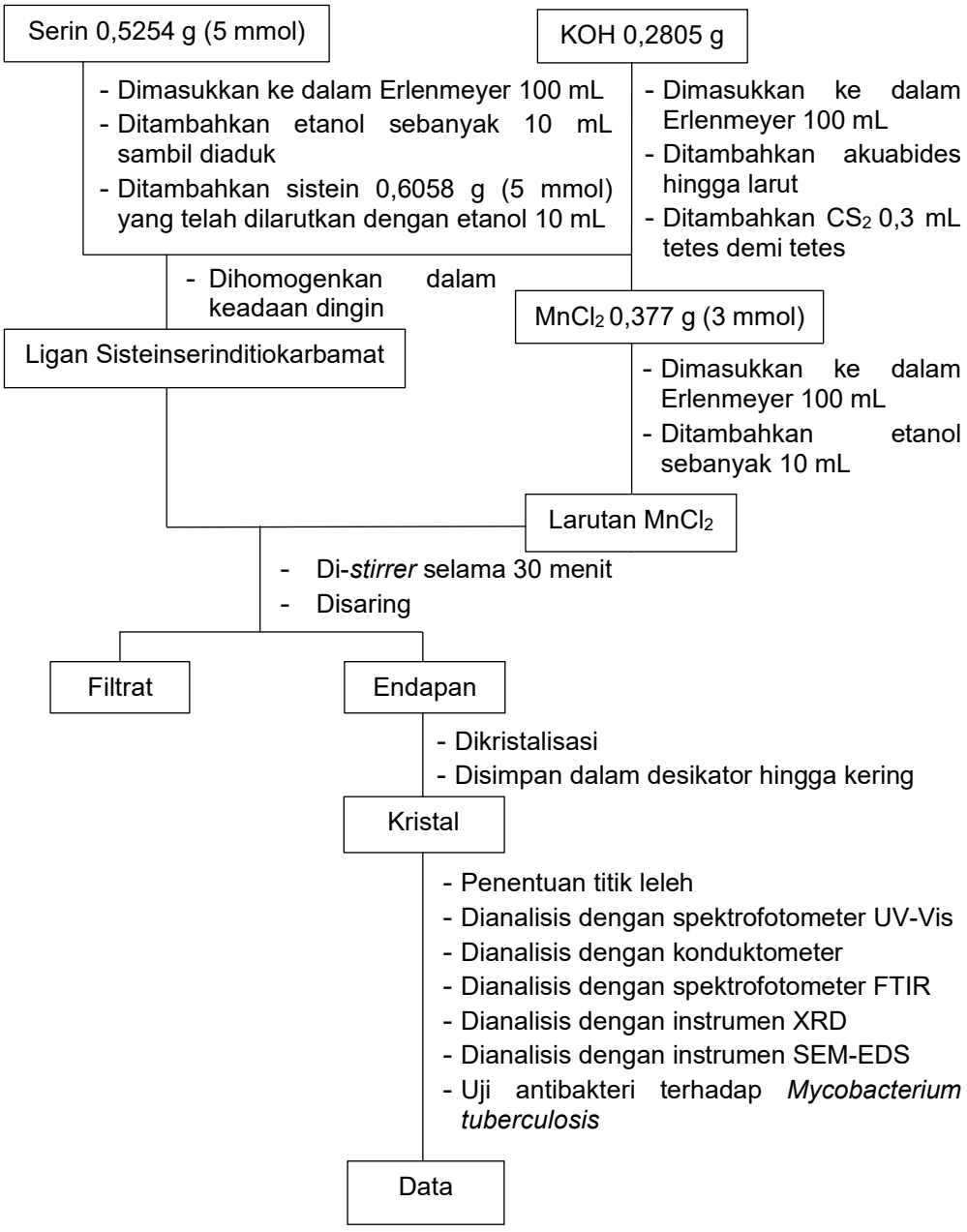
World Health Organization, 2021. WHO Global Tuberculosis Report 2021. WHO, Geneva.

World Health Organization, 2022. WHO Global Tuberculosis Report 2022. WHO, Geneva.

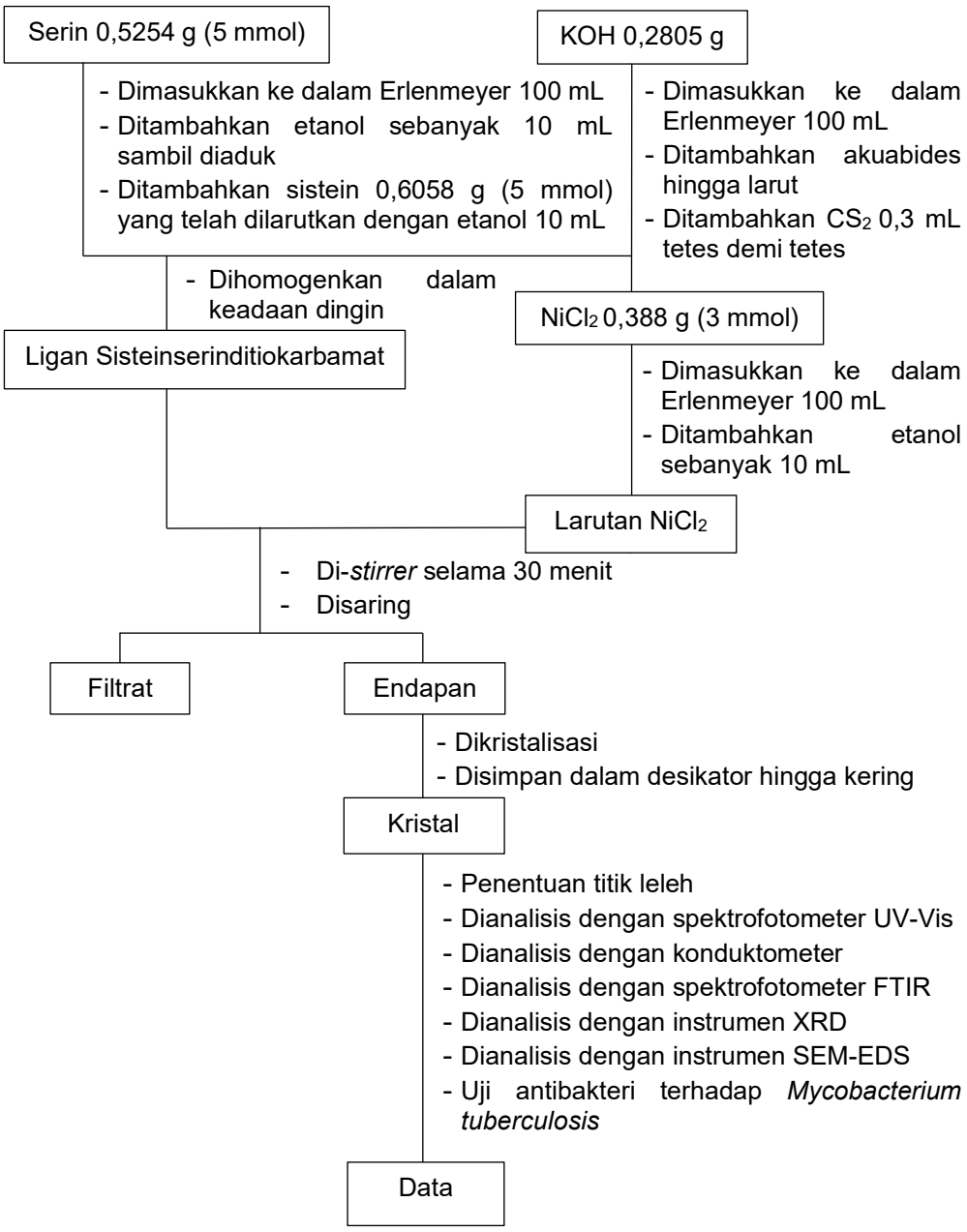
LAMPIRAN

Lampiran 1. Bagan Kerja

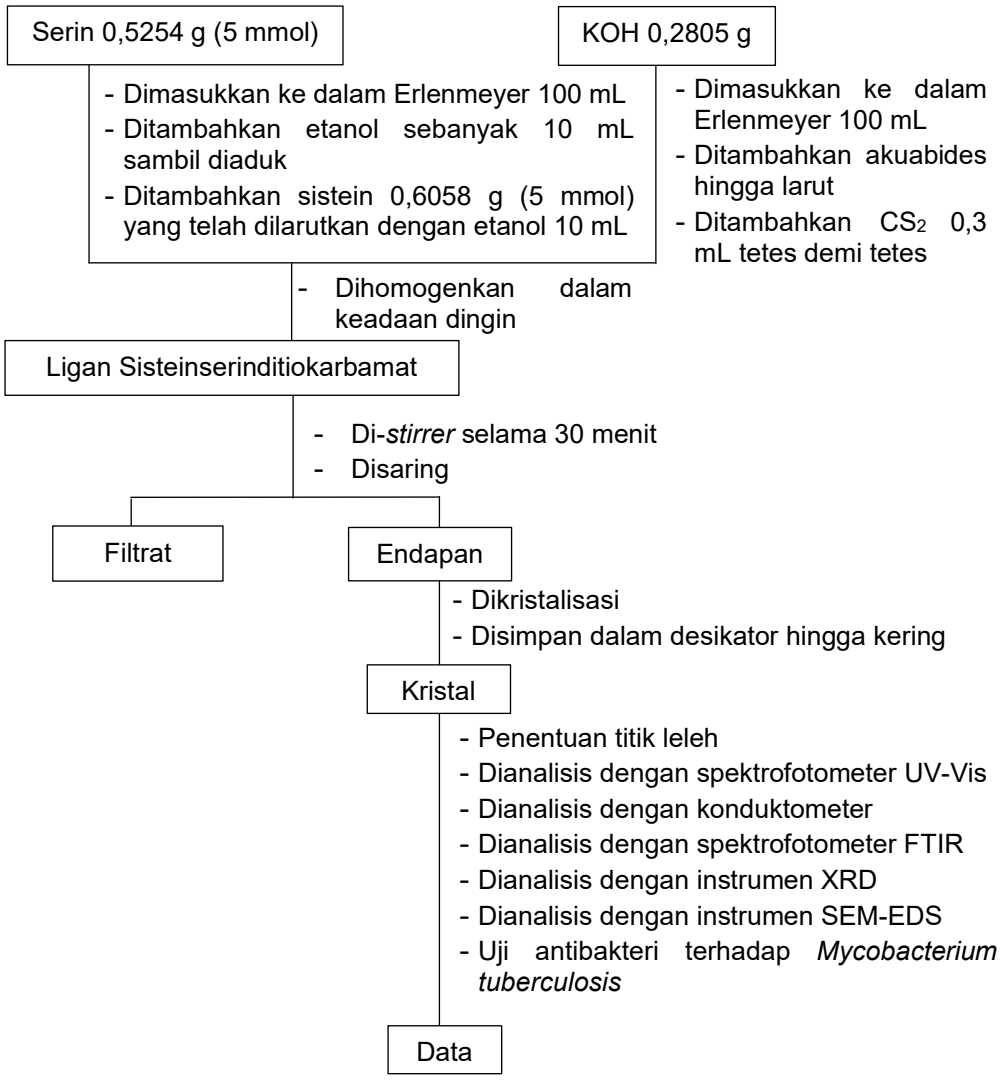
1. Bagan Kerja Sintesis, Analisis dan Uji Bioaktivitas Senyawa Kompleks Mn(II)CysSerDtc



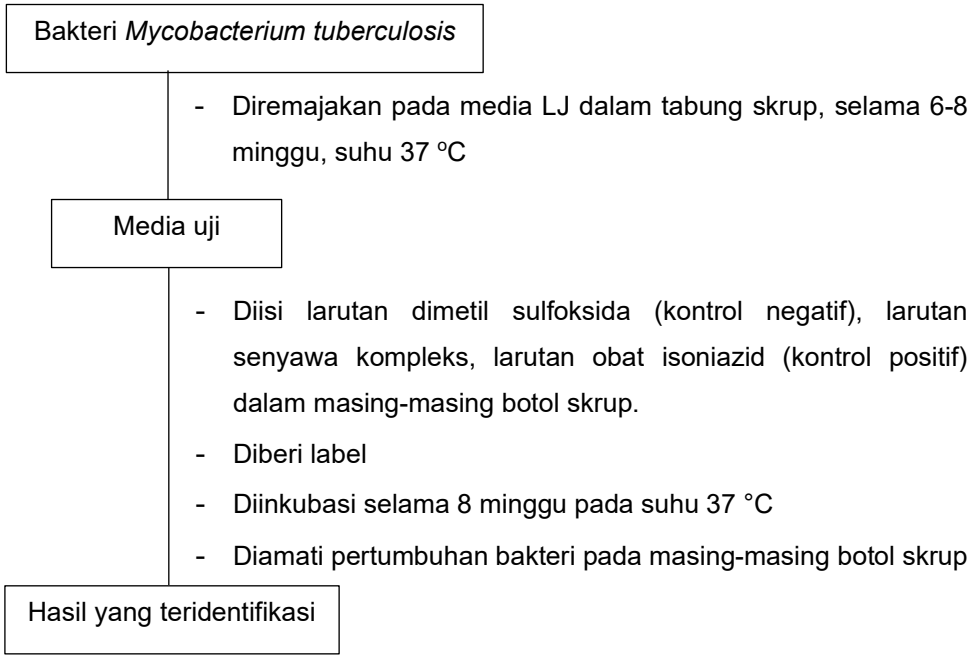
2. Bagan Kerja Sintesis, Analisis dan Uji Bioaktivitas Senyawa Kompleks Ni(II)CysSerDtc



3. Bagan Kerja Sintesis, Analisis dan Uji Bioaktivitas Ligan CysSerDtc



4. Bagan Kerja Uji Antituberkulosis



Lampiran 2. Perhitungan Pembuatan Larutan

1. Pembuatan Larutan $MnCl_2.4H_2O$ 3 mmol dalam 10 mL etanol

$$M = \frac{n}{V} = \frac{0{,}003\ mol}{0{,}01\ L} = 0{,}3\ mol/L$$

$$M = \frac{g}{Mr} \times \frac{1}{L}$$

$$0{,}3\ mol/L = \frac{g}{197\ g/mol} \times \frac{1}{0{,}01\ L}$$

$$g = 0{,}3 \times 0{,}01 \times 197\ g$$

$$g = 0{,}591\ g$$

2. Pembuatan Larutan $NiCl_2.6H_2O$ 3 mmol dalam 10 mL etanol

$$M = \frac{n}{V} = \frac{0{,}003\ mol}{0{,}01\ L} = 0{,}3\ mol/L$$

$$M = \frac{g}{Mr} \times \frac{1}{L}$$

$$0{,}3\ mol/L = \frac{g}{237\ g/mol} \times \frac{1}{0{,}01\ L}$$

$$g = 0{,}3 \times 0{,}01 \times 237\ g$$

$$g = 0{,}711\ g$$

3. Pembuatan Sistein 5 mmol dalam 10 mL etanol

$$M = \frac{n}{V} = \frac{0{,}005\ mol}{0{,}01\ L} = 0{,}5\ mol/L$$

$$M = \frac{g}{Mr} \times \frac{1}{L}$$

$$0{,}5\ mol/L = \frac{g}{121{,}1583\ g/mol} \times \frac{1}{0{,}01\ L}$$

$$g = 0{,}5 \times 0{,}01 \times 121{,}1583\ g$$

$$g = 0{,}6058\ g$$

4. Pembuatan Serin 5 mmol dalam 10 mL etanol

$$M = \frac{n}{V} = \frac{0{,}005\ mol}{0{,}01\ L} = 0{,}5\ mol/L$$

$$M = \frac{g}{Mr} \times \frac{1}{L}$$

$0{,}5\ \text{mol/L} = \frac{g}{105{,}093\ \text{g/mol}} \times \frac{1}{0{,}01\ \text{L}}$

$g = 0{,}5 \times 0{,}01 \times 105{,}093\ g$

$g = 0{,}5254\ g$

5. Pembuatan CS_2 5 mmol

$mol = \frac{g}{Mr}$

$g = mol \times Mr$

$g = 0{,}005\ mol \times 76{,}14\ g/mol$

$g = 0{,}3807\ g$

$V = \frac{m}{\rho}$

$V = \frac{0{,}3807\ g}{1{,}26\ g/mL}$

$V = 0{,}302\ mL$

6. Pembuatan KOH 5 mmol

$mol = \frac{g}{Mr}$

$g = mol \times Mr$

$g = 0{,}005\ mol \times 56{,}1\ g/mol$

$g = 0{,}2805\ g$

Lampiran 3. Perhitungan Hasil Rendemen

1. Perhitungan Hasil Rendemen senyawa kompleks Mn(II)CysSerDtc

a. Massa logam yang diperlukan:

m = n x Mr
= 0,003 mol x 197 g/mol
= 0,591 gr

b. Massa ligan yang diperlukan:

m = n x Mr
= 0,005 mol x 302,39 g/mol
= 1,512 gr

c. Rendemen:

$MnCl_2.4H_2O$ + sistein + serin + CS_2 ⟶ Mn(II)CysSerDtc

M	3 mmol	5 mmol	-
B	3 mmol	3 mmol	3 mmol
S	-	2 mmol	3 mmol

Berat teori = mmol Mn(II)CysSerDtc x Mr Mn(II)CysSerDtc
= 3 mmol x 335,21 g/mol
= 0,003 mol x 335,21 g/mol
= 1,006 gr

Berat eksperimen = 0,756 gr

$$\% \text{ Rendemen} = \frac{massa\ eksperimen}{massa\ teori}\ x\ 100\%$$

$$= \frac{0{,}756\ \text{gr}}{1{,}006\ \text{gr}}\ x\ 100\%$$

$$= 75\%$$

2. Perhitungan Hasil Rendemen senyawa kompleks Ni(II)CysSerDtc

a. Massa logam yang diperlukan:

m = n x Mr
= 0,003 mol x 237 g/mol
= 0,711 gr

b. Massa ligan yang diperlukan:

m = n x Mr
= 0,005 mol x 302,39 g/mol

= 1,512 gr

c. Rendemen:

$MnCl_2.4H_2O$ + sistein + serin + CS_2 ⟶ Ni(II)CysSerDtc

M	3 mmol	5 mmol	-
B	3 mmol	3 mmol	3 mmol
S	-	2 mmol	3 mmol

Berat teori = mmol Ni(II)CysSerDtc x Mr Ni(II)CysSerDtc
= 3 mmol x 340 g/mol
= 0,003 mol x 340 g/mol
= 1,02 gr

Berat eksperimen = 0,714 gr

% Rendemen = $\frac{massa\ eksperimen}{massa\ teori}\ x\ 100\%$

= $\frac{0{,}714\ \text{gr}}{1{,}02\ \text{gr}}\ x\ 100\%$

= 70%

3. Perhitungan Hasil Rendemen senyawa CysSerDtc

a. Massa ligan yang diperlukan:

m = n x Mr
= 0,005 mol x 302,39 g/mol
= 1,512 gr

b. Rendemen:

sistein + serin + CS_2 ⟶ CysSerDtc

m	5 mmol	-
b	5 mmol	5 mmol
s	-	5 mmol

Berat teori = mmol CysSerDtc x Mr CysSerDtc
= 5 mmol x 284,28 g/mol
= 0,005 mol x 284,28 g/mol
= 1,42 gr

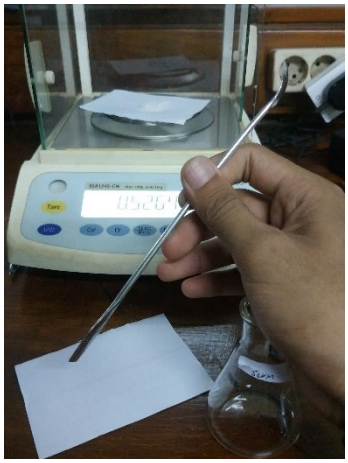
Berat eksperimen = 0,626 gr

% Rendemen = $\frac{massa\ eksperimen}{massa\ teori}\ x\ 100\%$

= $\frac{0{,}626\ \text{gr}}{1{,}42\ \text{gr}}\ x\ 100\%$

= 44%

Lampiran 4. Dokumentasi Hasil Penelitian



Penimbangan logam dan asam amino

Pemipetan CS_2

Proses sintesis senyawa kompleks

Proses pengadukkan senyawa kompleks

Penyaringan senyawa kompleks

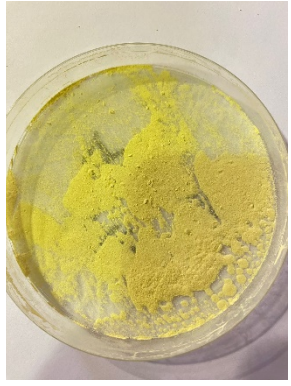
Pendiaman senyawa kompleks

Uji *melting point*

Uji Uv-Vis

Uji konduktometri

Ni(II)CysSerDtc



Mn(II)CysSerDtc

CysSerDtc

Lampiran 5. Karakterisasi XRD

1. Mn(II)CysSerDtc

*** Basic Data Process ***

Group : Standard
Data : 7#3b

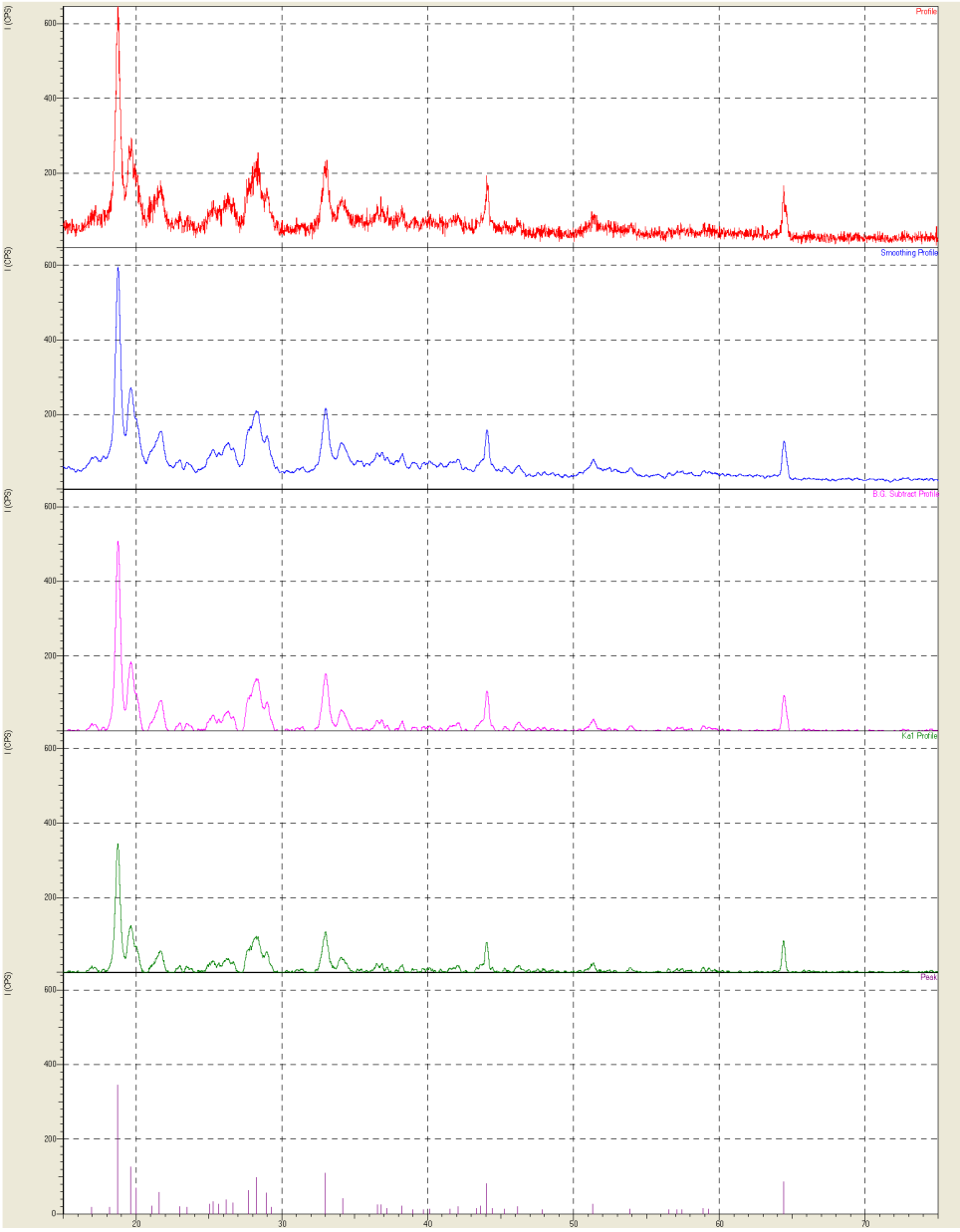
Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	3	18.7415	4.73092	100	0.37230	207	4098
2	4	19.6400	4.51647	36	0.53600	75	1869
3	19	32.9733	2.71431	31	0.46670	65	1679

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	16.9500	5.22670	5	0.26000	10	222
2	18.2000	4.87044	5	0.24000	10	326
3	18.7415	4.73092	100	0.37230	207	4098
4	19.6400	4.51647	36	0.53600	75	1869
5	20.0200	4.43159	20	0.41340	41	782
6	21.0800	4.21109	6	0.30000	12	200
7	21.5933	4.11213	16	0.57330	34	920
8	22.9700	3.86869	5	0.18000	11	151
9	23.5100	3.78104	5	0.22000	10	185
10	25.0400	3.55337	7	0.34660	15	242
11	25.2800	3.52017	9	0.38000	19	256
12	25.6800	3.46624	7	0.30000	15	193
13	26.2000	3.39861	11	0.58660	22	570
14	26.6600	3.34101	8	0.28000	17	235
15	27.7200	3.21561	18	0.48000	37	835
16	28.2600	3.15538	28	0.73000	58	1810
17	28.9600	3.08068	16	0.34000	33	569
18	29.2800	3.04774	5	0.20000	10	144
19	32.9733	2.71431	31	0.46670	65	1679
20	34.1600	2.62268	12	0.64000	24	915
21	36.5450	2.45681	7	0.31000	14	257
22	36.8266	2.43867	7	0.25330	14	162
23	37.2100	2.41442	4	0.18000	8	81
24	38.2100	2.35350	6	0.26000	12	188
25	38.9700	2.30933	3	0.14000	6	83
26	39.6966	2.26872	3	0.23330	6	105
27	40.1366	2.24486	3	0.11330	7	83
28	41.5400	2.17220	3	0.20000	7	108
29	42.0700	2.14605	5	0.28000	11	214
30	43.3600	2.08515	4	0.20000	8	76
31	43.6000	2.07422	6	0.20000	12	159
32	44.0325	2.05485	23	0.27090	48	688
33	44.4050	2.03847	4	0.17000	8	83
34	45.2950	2.00046	3	0.15000	7	74
35	46.1900	1.96376	5	0.34000	11	280
36	47.8700	1.89869	3	0.06000	6	54
37	51.3100	1.77918	7	0.36000	15	391
38	53.8800	1.70023	3	0.20000	7	123
39	56.5300	1.62665	3	0.18000	6	49
40	57.0800	1.61227	3	0.16000	6	59
41	57.4250	1.60341	3	0.23000	6	118
42	58.9050	1.56660	4	0.21000	8	88
43	59.2850	1.55746	3	0.17000	7	102
44	64.4033	1.44549	25	0.25330	51	716

< Group: Standard Data: 7#3b >



2. Ni(II)CysSerDtc

*** Basic Data Process ***

Group : Standard
Data : 7#3C

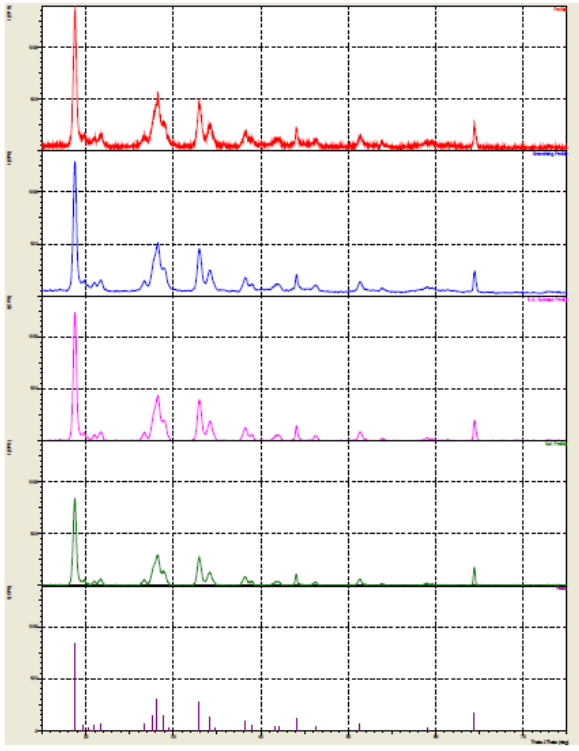
Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	1	18.7289	4.73408	100	0.42210	500	11667
2	8	28.0630	3.17708	35	0.89610	177	5430
3	11	32.9729	2.71434	33	0.54000	165	4777

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	18.7289	4.73408	100	0.42210	500	11667
2	19.7400	4.49382	6	0.48000	32	1091
3	20.2200	4.38821	3	0.26000	15	220
4	20.9500	4.23692	5	0.46000	26	577
5	21.6566	4.10025	7	0.52670	37	967
6	26.6483	3.34245	7	0.48330	34	966
7	27.5800	3.23161	16	0.35420	81	1451
8	28.0630	3.17708	35	0.89610	177	5430
9	28.8400	3.09323	16	0.78000	82	3029
10	29.4800	3.02751	3	0.20000	15	210
11	32.9729	2.71434	33	0.54000	165	4777
12	34.1400	2.62418	16	0.64000	78	2618
13	34.7200	2.58165	3	0.22000	17	298
14	38.1891	2.35474	10	0.52830	52	1507
15	38.9400	2.31104	5	0.42660	26	687
16	41.6800	2.16523	5	0.42000	24	501
17	42.0200	2.14849	5	0.50660	24	520
18	44.0514	2.05401	13	0.26290	66	1122
19	46.2400	1.96176	4	0.48000	22	632
20	51.3066	1.77929	7	0.46670	37	1154
21	59.0183	1.56386	3	0.25670	15	491
22	64.4151	1.44525	21	0.24690	104	1373

< Group: Standard Data: 7#3C >



3. CysSerDtc

*** Basic Data Process ***

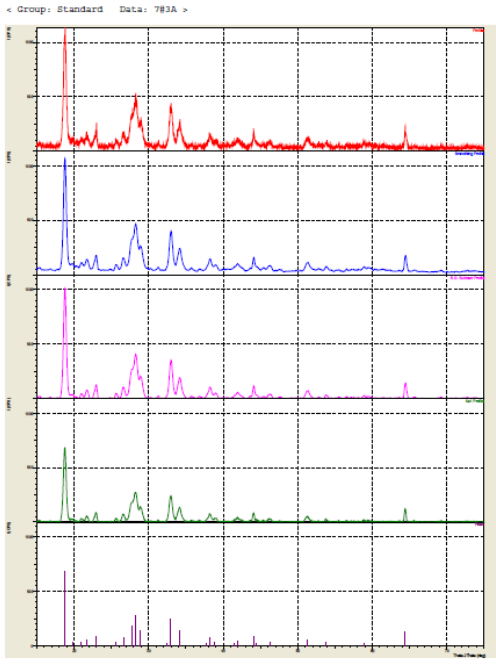
Group : Standard
Data : 7#3A

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	1	18.7460	4.72980	100	0.44340	410	9913
2	9	28.2200	3.15976	40	0.69340	164	4260
3	12	32.9678	2.71475	35	0.49560	145	3780

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	18.7460	4.72980	100	0.44340	410	9913
2	19.7600	4.48931	4	0.38000	16	585
3	20.9875	4.22944	5	0.38500	19	422
4	21.7033	4.09154	8	0.40670	33	697
5	22.8900	3.88203	13	0.40400	52	1038
6	25.6400	3.47156	5	0.36000	21	405
7	26.6000	3.34841	10	0.46000	43	1079
8	27.7200	3.21561	27	0.60000	109	3054
9	28.2200	3.15976	40	0.69340	164	4260
10	28.8800	3.08903	20	0.64000	84	2814
11	32.4400	2.75771	3	0.20000	12	226
12	32.9678	2.71475	35	0.49560	145	3780
13	34.1050	2.62679	20	0.59000	81	2777
14	37.7400	2.38172	3	0.20000	14	209
15	38.1900	2.35468	11	0.46000	45	973
16	38.8800	2.31447	5	0.68000	21	810
17	41.5400	2.17220	3	0.36000	13	296
18	41.9200	2.15338	6	0.64000	23	771
19	44.0646	2.05343	12	0.29930	50	887
20	44.5000	2.03434	3	0.30660	13	288
21	46.2433	1.96162	4	0.56670	18	786
22	51.2800	1.78015	7	0.62000	30	1123
23	53.7900	1.70286	4	0.30000	16	317
24	58.8750	1.56733	3	0.43000	12	526
25	64.4150	1.44525	18	0.27000	74	1083

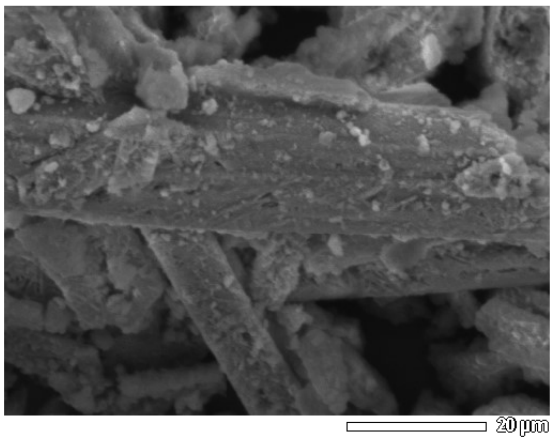


Lampiran 6. Karakterisasi SEM EDS

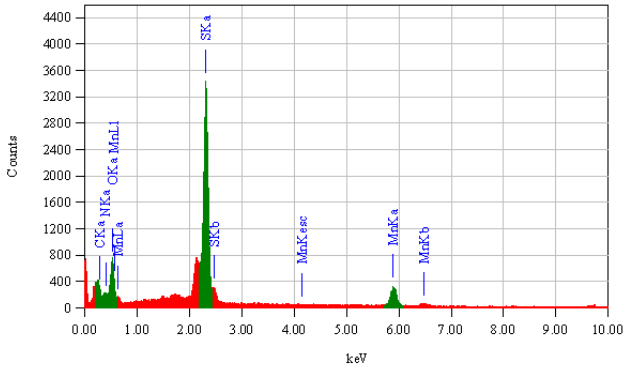
1. Mn(II)CysSerDtc

View004

JEOL 1/1



Title	: IMG1
Instrument	: JCM-6000PLUS
Volt	: 15.00 kV
Mag.	: x 1,500
Date	: 2023/05/17
Pixel	: 512 x 384



Acquisition Parameter
Instrument : JCM-6000PLUS
Acc. Voltage : 15.0 kV
Probe Current: 1.00000 nA
PHA mode : T3
Real Time : 50.86 sec
Live Time : 50.00 sec
Dead Time : 1 %
Counting Rate: 2370 cps
Energy Range : 0 - 20 keV

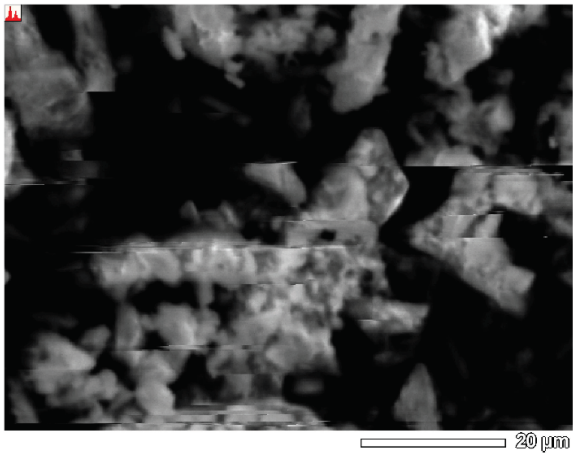
Thin Film Standardless Standardless Quantitative Analysis
Fitting Coefficient : 0.1451

Element		(keV)	Mass%	Counts	Sigma	Atom%	Compound	Mass%	Cation	K
C	K	0.277	0.85	135.03	0.06	2.27				2.5329
N	K	0.392	0.94	267.41	0.07	2.14				1.4055
O	K	0.525	7.72	3163.92	0.16	15.47				0.9800
S	K (Ref.)	2.307	65.51	26316.25	0.57	65.52				1.0000
Mn	K	5.894	24.99	3755.09	0.60	14.59				2.6733
Total			100.00			100.00				

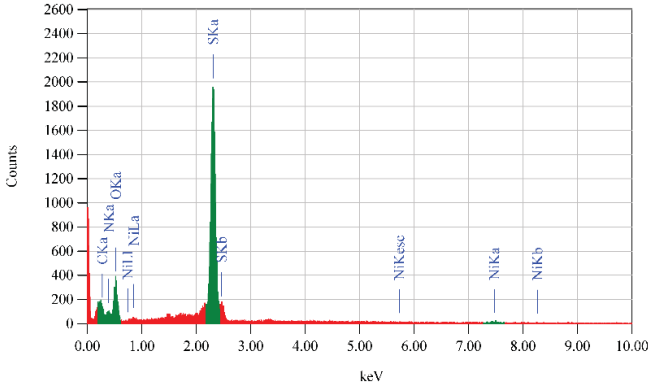
2. Ni(II)CysSerDtc

View012

JEOL 1/1



Title	: 1MG1
Instrument	: JCM-6000PLUS
Volt	: 15.00 kV
Mag.	: x 1,500
Date	: 2023/05/17
Pixel	: 512 x 384



Acquisition Parameter
Instrument : JCM-6000PLUS
Acc. Voltage : 15.0 kV
Probe Current: 1.00000 nA
PHA mode : T3
Real Time : 60.58 sec
Live Time : 50.00 sec
Dead Time : 1 %
Counting Rate: 1063 cps
Energy Range : 0 - 20 keV

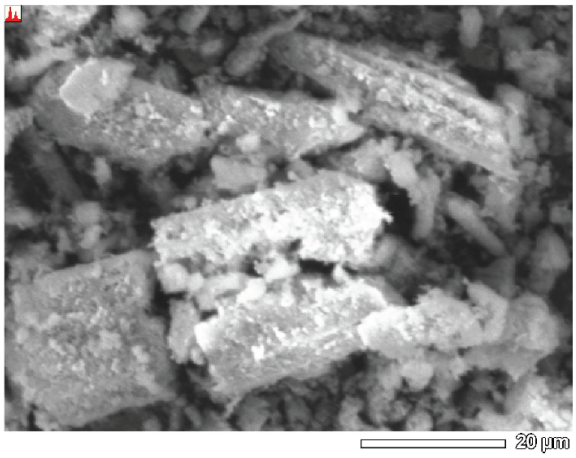
Thin Film Standardless Standardless Quantitative Analysis
Fitting Coefficient : 0.1658

Element	(keV)	Mass%	Counts	Sigma	Atom%	Compound	Mass%	Cation	K
C K	0.277	0.39	29.16	0.07	0.95				2.5329
N K	0.392	1.36	183.20	0.11	2.84				1.4055
O K	0.525	8.70	1678.13	0.24	15.87				0.9800
S K (Ref.)	2.307	86.60	16378.96	0.94	78.87				1.0000
Ni K*	7.471	2.95	129.79	0.42	1.47				4.2951
Total		100.00			100.00				

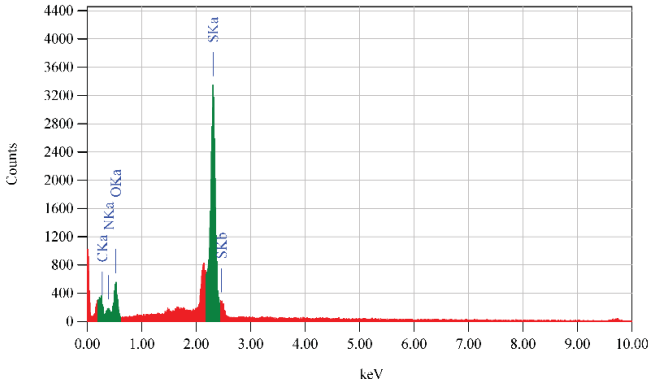
3. CysSerDtc

View013

JEOL 1/1



Title	: 1MG1
Instrument	: JCM-6000PLUS
Volt	: 15.00 kV
Mag.	: x 1,500
Date	: 2023/05/17
Pixel	: 512 x 384



Acquisition Parameter

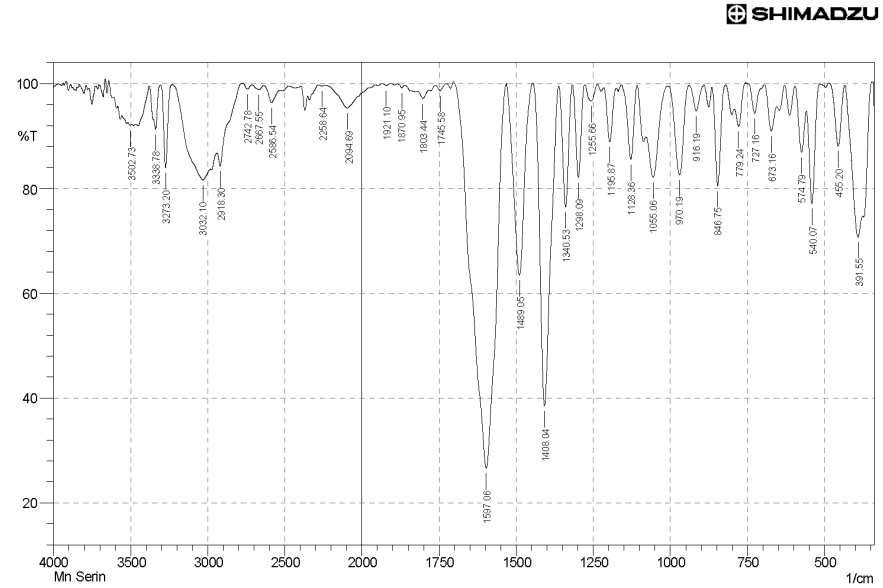
Instrument	: JCM-6000PLUS
Acc. Voltage	: 15.0 kV
Probe Current	: 1.00000 nA
PHA mode	: T3
Real Time	: 51.00 sec
Live Time	: 50.00 sec
Dead Time	: 1 %
Counting Rate	: 2161 cps
Energy Range	: 0 - 20 keV

Thin Film Standardless Standardless Quantitative Analysis
Fitting Coefficient : 0.1894

Element	(keV)	Mass%	Counts	Sigma	Atom%	Compound	Mass%	Cation	K
C K	0.277	0.40	44.77	0.06	0.96				2.5329
N K	0.392	1.89	379.03	0.10	3.87				1.4055
O K	0.525	8.53	2459.03	0.19	15.31				0.9800
S K (Ref.)	2.307	89.18	25193.86	0.79	79.86				1.0000
Total		100.00			100.00				

Lampiran 7. Karakterisasi FT-IR

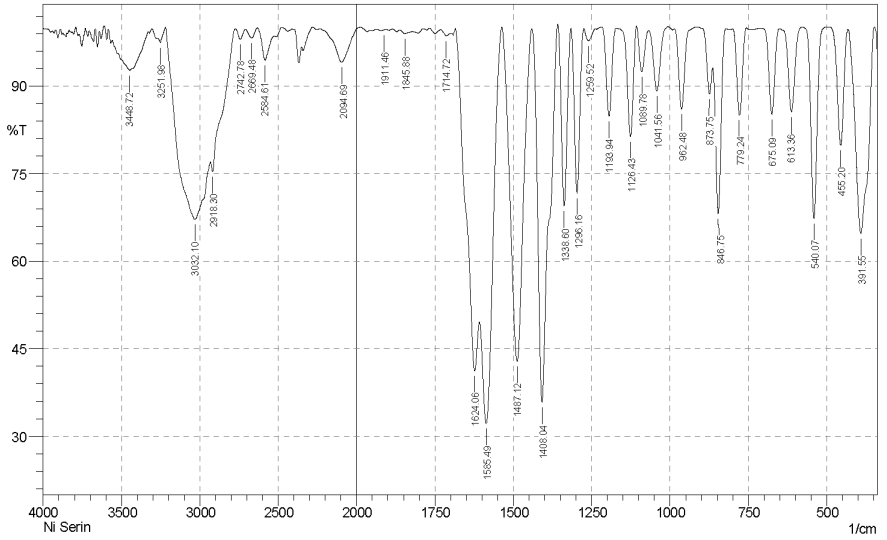
1. Mn(II)CysSerDtc



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	391.55	70.75	10.22	432.05	378.05	5.14	1.56
2	455.2	88.07	11.78	484.13	433.98	1.21	1.18
3	540.07	77.11	19.65	557.43	516.92	2.26	1.77
4	574.79	86.89	9.87	596	559.36	1.33	0.84
5	673.16	90.93	6.53	694.37	655.8	0.98	0.56
6	727.16	94.31	5.59	746.45	694.37	0.54	0.51
7	779.24	91.86	5.09	792.74	756.1	0.74	0.35
8	846.75	80.48	18.84	864.11	821.68	1.79	1.67
9	916.19	94.77	4.88	939.33	893.04	0.53	0.46
10	970.19	82.58	16.98	1008.77	941.26	2.5	2.37
11	1055.06	82.08	11.08	1078.21	1010.7	3.09	1.51
12	1128.36	85.55	14.12	1157.29	1109.07	1.49	1.43
13	1195.87	88.93	10.18	1215.15	1176.58	1	0.86
14	1255.66	96.65	3.2	1276.88	1236.37	0.36	0.34
15	1298.09	82.04	17.73	1317.38	1278.81	1.56	1.52
16	1340.53	76.45	23.12	1361.74	1319.31	2.36	2.29
17	1408.04	38.48	61.27	1444.68	1363.67	13.34	13.24
18	1489.05	63.45	36.63	1531.48	1446.61	7.13	7.16
19	1597.06	26.62	73.26	1701.22	1533.41	39.07	39.02
20	1745.58	98.66	1.17	1762.94	1728.22	0.11	0.09
21	1803.44	97.09	1.53	1822.73	1782.23	0.36	0.12
22	1870.95	99.18	0.6	1886.38	1859.38	0.05	0.03
23	1921.1	99.62	0.36	1934.6	1905.67	0.02	0.02
24	2094.69	95.31	4.38	2233.57	1957.75	2.88	2.51
25	2258.64	99.55	0.15	2281.79	2233.57	0.08	0.02
26	2586.54	96.32	2.91	2636.69	2530.61	0.96	0.59
27	2667.55	98.84	0.88	2711.92	2636.69	0.25	0.16
28	2742.78	98.94	0.97	2775.57	2711.92	0.15	0.13
29	2918.3	84.21	4.11	2937.59	2775.57	5.17	0.48
30	3032.1	81.61	5.2	3230.77	2983.88	13.84	4.22
31	3273.2	83.98	15.78	3304.06	3232.7	2.12	2.05
32	3338.78	91.31	8.34	3379.29	3305.99	1.43	1.31
33	3502.73	92.01	0.35	3518.16	3493.09	0.88	0.02

Date/Time; 5/25/2023 3:06:50 PM
No. of Scans;

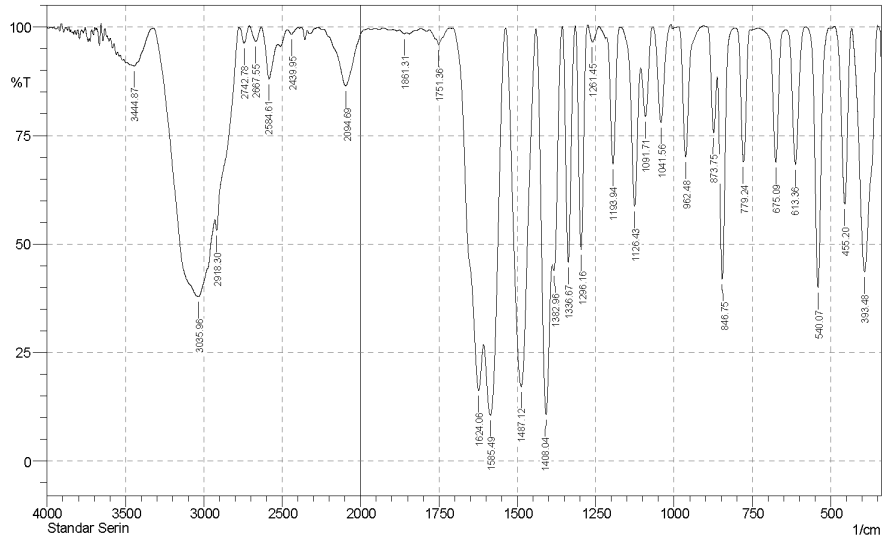
2. Ni(II)CysSerDtc



	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	391.55	64.74	35.19	432.05	349.12	7.86	7.84
2	455.2	79.89	19.96	489.92	433.98	2.15	2.12
3	540.07	67.36	32.75	576.72	505.35	3.49	3.53
4	613.36	85.61	14.37	650.01	578.64	1.54	1.53
5	675.09	85.17	14.73	709.8	651.94	1.42	1.4
6	779.24	85.1	14.76	800.46	758.02	1.31	1.29
7	846.75	68.17	27.7	864.11	821.68	3.19	2.55
8	873.75	88.66	6.36	898.83	864.11	0.92	0.38
9	962.48	86.04	13.86	985.62	916.19	1.34	1.33
10	1041.56	89.16	10.63	1068.56	1006.84	1.18	1.13
11	1089.78	92.48	7.45	1107.14	1068.56	0.64	0.62
12	1126.43	81.32	18.62	1163.08	1109.07	1.8	1.78
13	1193.94	84.89	15.15	1217.08	1170.79	1.36	1.36
14	1259.52	97.79	2.05	1274.95	1238.3	0.21	0.18
15	1296.16	71.66	28.07	1315.45	1276.88	2.61	2.57
16	1338.6	69.49	30.72	1357.89	1317.38	2.99	3.02
17	1408.04	35.86	64.21	1440.83	1359.82	14.15	14.2
18	1487.12	42.89	56.96	1535.34	1442.75	14.76	14.7
19	1585.49	32.22	32.67	1606.7	1537.27	17.82	7.65
20	1624.06	41.26	18.63	1683.86	1608.63	15.28	3.62
21	1714.72	98.62	0.74	1732.08	1697.36	0.15	0.05
22	1845.88	98.94	0.56	1863.24	1822.73	0.14	0.05
23	1911.46	99.64	0.03	1913.39	1907.6	0.01	0
24	2094.69	94.09	5.87	2233.57	1988.61	2.75	2.69
25	2584.61	94.45	4.88	2632.83	2526.75	1.36	1.01
26	2669.48	98.24	1.62	2708.06	2634.76	0.33	0.28
27	2742.78	98.02	1.74	2771.71	2708.06	0.3	0.23
28	2918.3	75.32	3.6	2931.8	2773.64	9.67	0.81
29	3032.1	67.16	17.83	3217.27	2933.73	34.62	18.46
30	3251.98	97.41	1.42	3269.34	3217.27	0.33	0.13
31	3448.72	92.71	3.24	3498.87	3331.07	3.9	1.61

Date/Time; 5/25/2023 3:00:09 PM
No. of Scans;
Resolution;
Apodization;

3. CysSerDtc

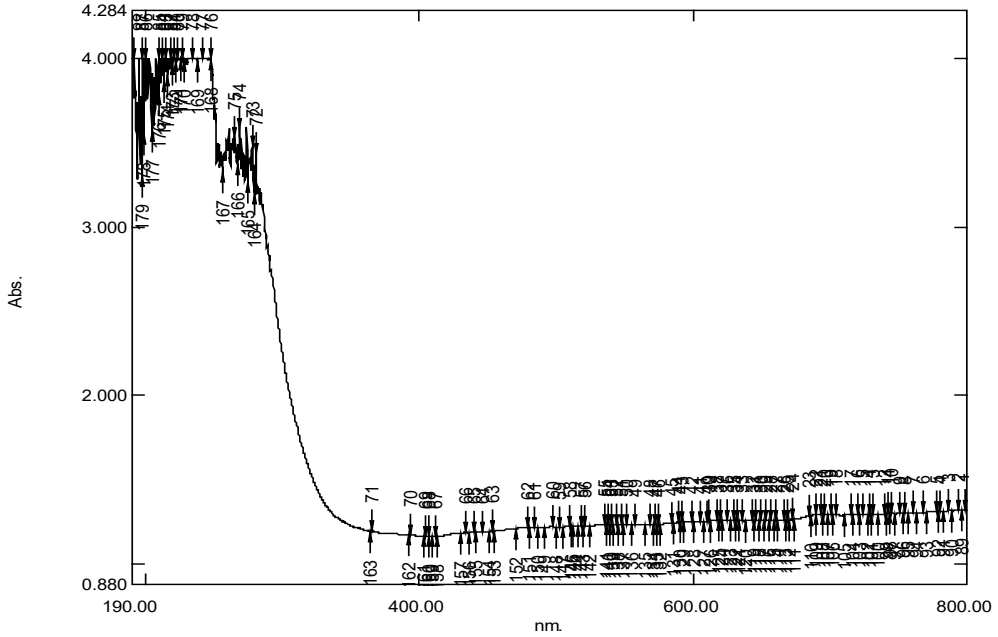


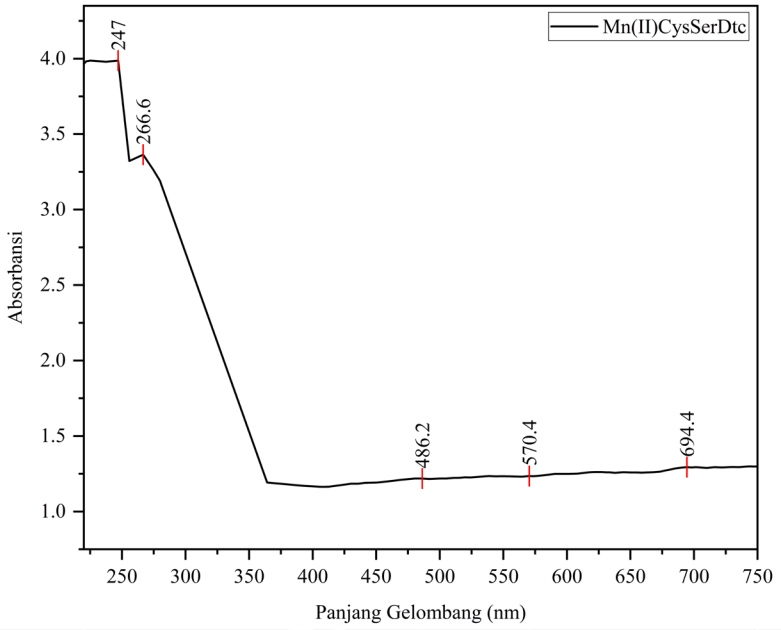
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	393.48	43.566	56.429	432.05	351.04	13.233	13.241
2	455.2	59.222	40.638	487.99	433.98	4.66	4.637
3	540.07	40.035	59.864	578.64	505.35	7.642	7.611
4	613.36	68.343	31.321	642.3	580.57	3.548	3.466
5	675.09	68.76	30.745	731.02	644.22	3.278	3.109
6	779.24	68.913	30.6	802.39	759.95	2.778	2.69
7	846.75	41.96	49.864	862.18	810.1	6.546	5.245
8	873.75	75.697	16.254	893.04	864.11	1.979	1.125
9	962.48	70.045	30.077	985.62	906.54	3.164	3.223
10	1041.56	77.975	22.253	1066.64	1010.7	2.346	2.411
11	1091.71	79.387	14.518	1105.21	1068.56	1.999	1.24
12	1126.43	58.692	34.717	1170.79	1107.14	5.124	3.737
13	1193.94	68.467	30.304	1215.15	1172.72	2.943	2.724
14	1261.45	96.529	3.809	1276.88	1240.23	0.26	0.31
15	1296.16	48.692	51.541	1313.52	1276.88	4.965	5.006
16	1336.67	45.789	54.446	1355.96	1315.45	5.753	5.796
17	1382.96	43.869	11.604	1388.75	1357.89	5.623	0.962
18	1408.04	10.688	53.723	1438.9	1390.68	22.343	13.549
19	1487.12	17.136	82.422	1535.34	1440.83	30.361	30.18
20	1585.49	10.568	38.464	1606.7	1537.27	34.338	15.377
21	1624.06	16.248	22.157	1705.07	1608.63	31.922	6.398
22	1751.36	95.848	3.683	1780.3	1714.72	0.579	0.453
23	1861.31	98.428	0.485	1876.74	1853.59	0.125	0.025
24	2094.69	86.432	13.128	2235.5	1975.11	7.21	6.708
25	2439.95	98.357	1.253	2470.81	2401.38	0.288	0.179
26	2584.61	88.042	10.122	2632.83	2528.68	3.086	2.152
27	2667.55	96.681	3.485	2709.99	2634.76	0.555	0.614
28	2742.78	96.288	3.803	2777.5	2709.99	0.489	0.514
29	2918.3	53.207	5.125	2927.94	2779.42	20.499	1.722
30	3113.11	37.83	29.791	3319.49	2929.87	100.688	50.651
31	3444.87	91.069	0.812	3454.51	3332.99	2.855	0.411

Date/Time; 5/25/2023 2:53:37 PM
No. of Scans;
Resolution;
Apodization;

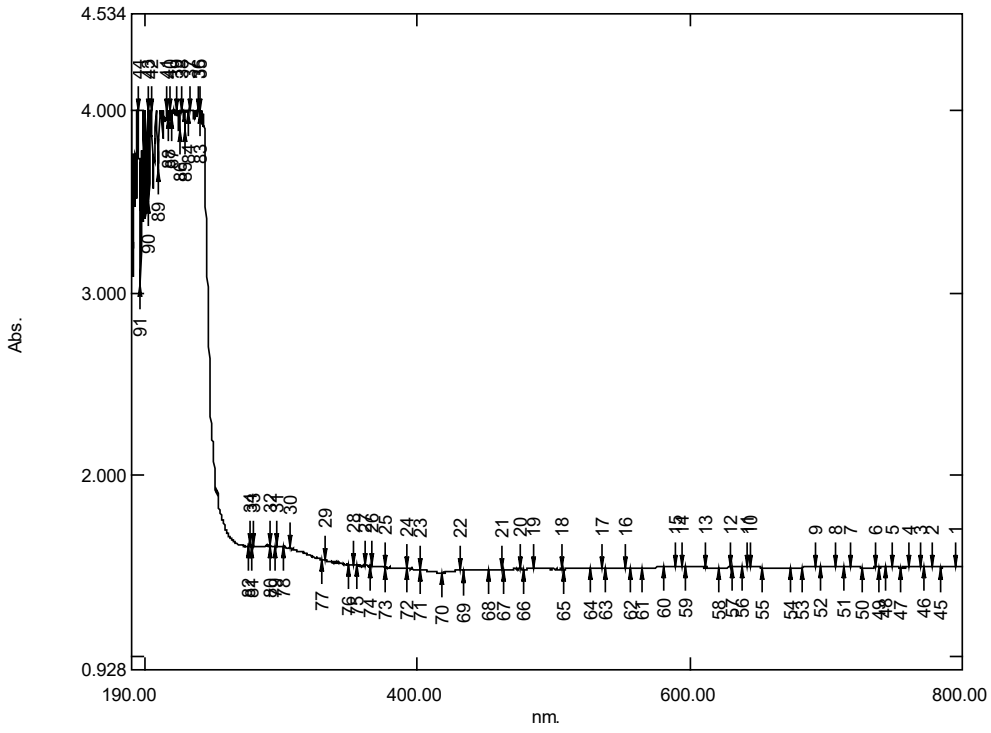
Lampiran 8. Karakterisasi UV-Vis

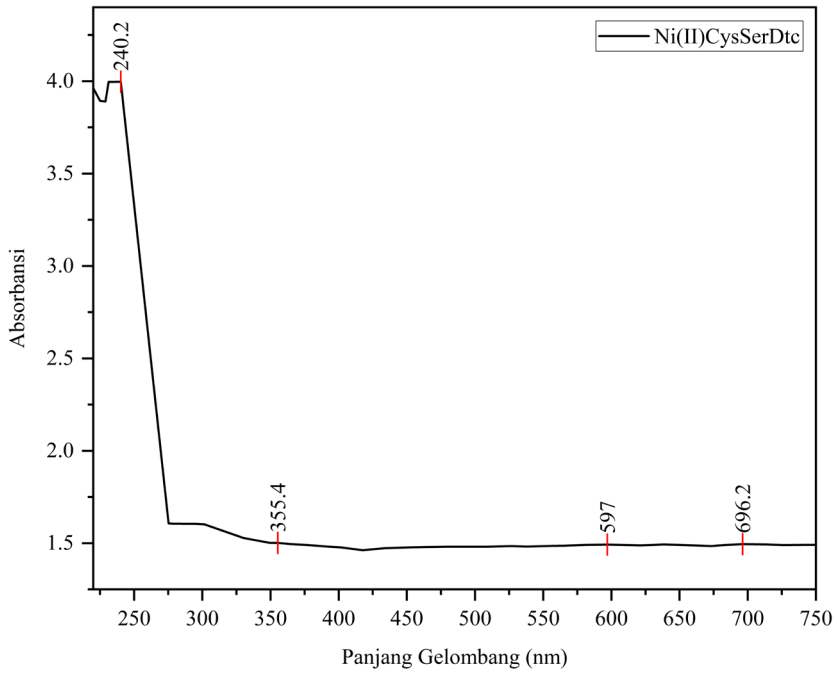
1. Mn(II)CysSerDtc



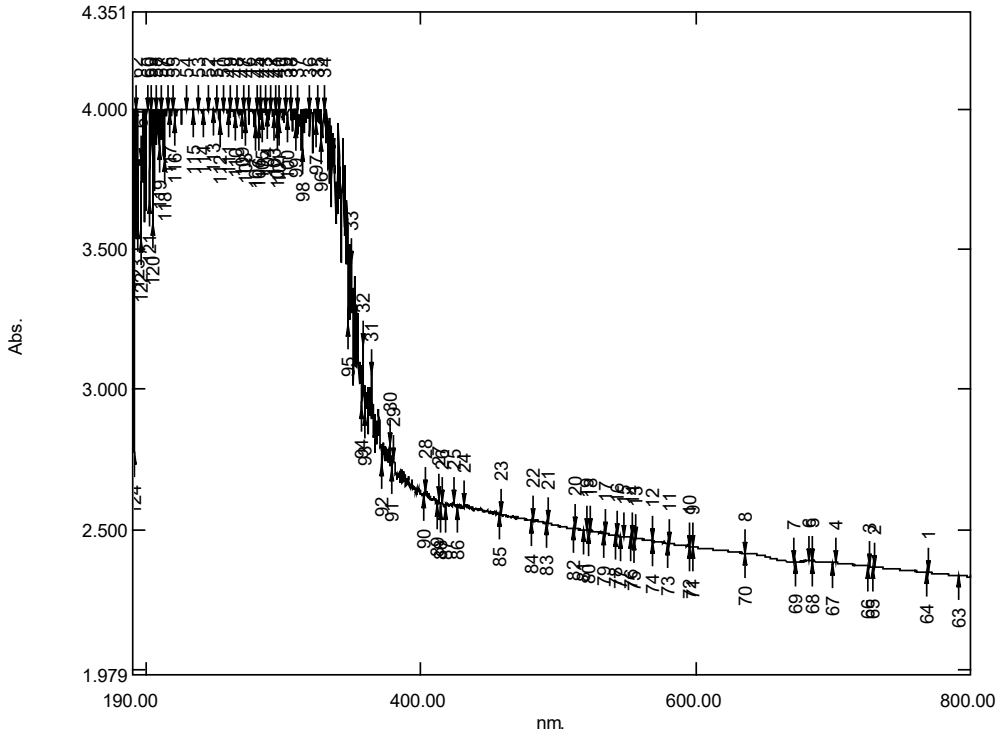


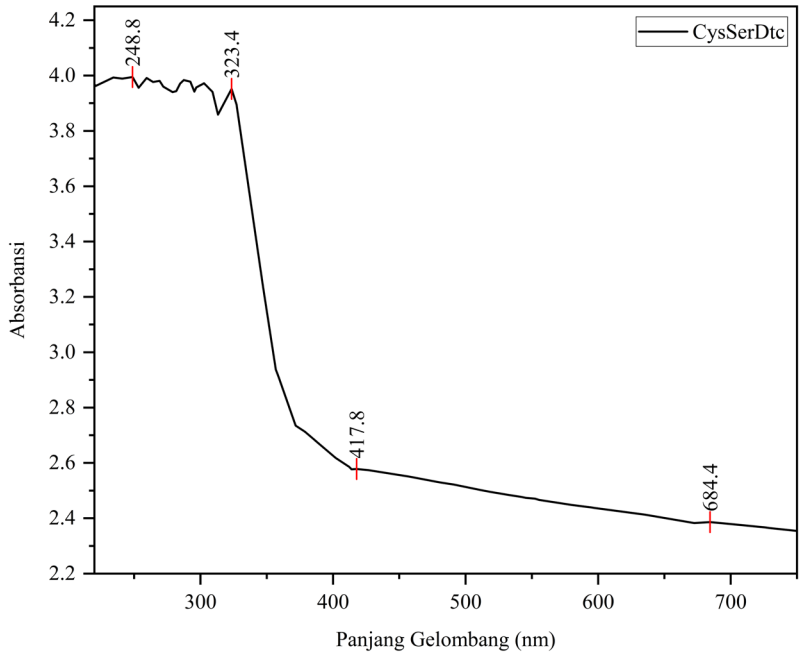
2. Ni(II)CysSerDtc





3. CysSerDtc


Abs.
nm.
4.351
4.000
3.500
3.000
2.500
1.979
190.00
400.00
600.00
800.00


CysSerDtc
248.8
323.4
417.8
684.4
Absorbansi
Panjang Gelombang (nm)
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
300
400
500
600
700