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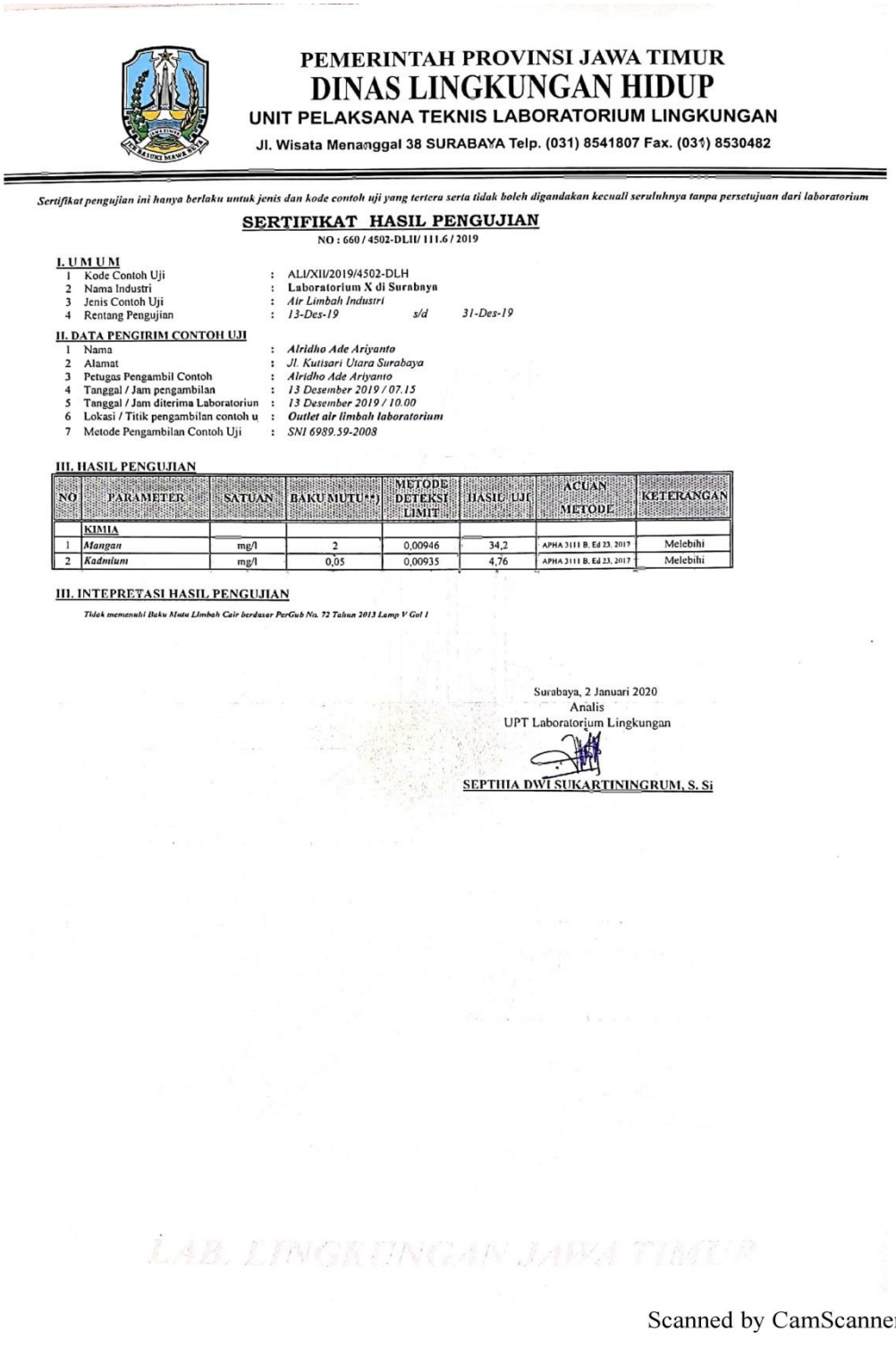
LAMPIRAN A

SERTIFIKAT HASIL UJI PENDAHULUAN



PEMERINTAH PROVINSI JAWA TIMUR
DINAS LINGKUNGAN HIDUP
UNIT PELAKSANA TEKNIS LABORATORIUM LINGKUNGAN
Jl. Wisata Menanggal 38 SURABAYA Telp. (031) 8541807 Fax. (031) 8530482

Sertifikat pengujian ini hanya berlaku untuk jenis dan kode contoh uji yang tertera serta tidak boleh digandakan kecuali seluruhnya tanpa persetujuan dari laboratorium

SERTIFIKAT HASIL PENGUJIAN

NO : 660 / 4502-DLII/ 111.6 / 2019

I. U M U M

1	Kode Contoh Uji	:	ALI/XII/2019/4502-DLH		
2	Nama Industri	:	**Laboratorium X di Surabaya**		
3	Jenis Contoh Uji	:	*Air Limbah Industri*		
4	Rentang Pengujian	:	*13-Des-19*	*s/d*	*31-Des-19*

II. DATA PENGIRIM CONTOH UJI

1	Nama	:	*Alridho Ade Ariyanto*
2	Alamat	:	*Jl. Kutisari Utara Surabaya*
3	Petugas Pengambil Contoh	:	*Alridho Ade Ariyanto*
4	Tanggal / Jam pengambilan	:	*13 Desember 2019 / 07.15*
5	Tanggal / Jam diterima Laboratorium	:	*13 Desember 2019 / 10.00*
6	Lokasi / Titik pengambilan contoh u	:	*Outlet air limbah laboratorium*
7	Metode Pengambilan Contoh Uji	:	*SNI 6989.59-2008*

III. HASIL PENGUJIAN

NO	PARAMETER	SATUAN	BAKU MUTU**)	METODE DETEKSI LIMIT	HASIL UJI	ACUAN METODE	KETERANGAN
	KIMIA						
1	*Mangan*	mg/l	2	0,00946	34,2	APHA 3111 B, Ed 23, 2017	Melebihi
2	*Kadmium*	mg/l	0,05	0,00935	4,76	APHA 3111 B, Ed 23, 2017	Melebihi

III. INTEPRETASI HASIL PENGUJIAN

Tidak memenuhi Baku Mutu Limbah Cair berdasar PerGub No. 72 Tahun 2013 Lamp V Gol I

Surabaya, 2 Januari 2020
Analis
UPT Laboratorium Lingkungan

SEPTHIA DWI SUKARTININGRUM, S. Si

LAB. LINGKUNGAN JAWA TIMUR

LAMPIRAN B

PROSEDUR ANALISA LOGAM MANGAN DAN KADMIUM APHA 3111 B, Ed 23

TABLE 3111:III. SINGLE-OPERATOR PRECISION AND RECOMMENDED CONTROL RANGES FOR ATOMIC ABSORPTION METHODS—DIRECT ASPIRATION AND EXTRACTED METALS

Metal	Conc. *mg/L*	SD *mg/L*	Relative SD %	No. of Participants	QC Std. *mg/L*	Acceptable Range *mg/L*
Direct determination:						
Aluminum[1]	4.50	0.23	5.1	15	5.00	4.3–5.7
Beryllium[1]	0.46	0.012	2.6	10	0.50	0.46–0.54
Calcium[1]	5.00	0.05	1.0	8	5.00	4.8–5.2
Chromium[1]	7.00	0.69	9.9	9	5.00	3.3–6.7
Cobalt[1]	4.00	0.21	5.3	14	4.00	3.4–4.6
Copper[1]	4.00	0.115	2.9	15	4.00	3.7–4.3
Iron[1]	5.00	0.19	3.8	16	5.00	4.4–5.6
Magnesium[1]	1.00	0.009	0.9	8	1.00	0.97–1.03
Nickel[1]	5.00	0.04	0.8	—	5.00	4.9–5.1
Silver[1]	2.00	0.25	12.5	10	2.00	1.2–2.8
Sodium[1]	8.2	0.1	1.2	—	5.00	4.8–5.2
Strontium[1]	1.00	0.04	4.0	12	1.00	0.87–1.13
Potassium[1]	1.6	0.2	12.5	—	1.6	1.0–2.2
Molybdenum[1]	7.5	0.07	0.9	—	10.0	9.7–10.3
Tin[1]	20.0	0.5	2.5	—	20.0	18.5–21.5
Titanium[1]	50.0	0.4	0.8	—	50.0	48.8–51.2
Vanadium	50.0	0.2	0.4	—	50.0	49.4–50.6
Extracted determination:						
Aluminum[1]	300	12	4.0	15	300	264–336
Cobalt[1]	300	20	6.7	6	300	220–380
Copper[1]	100	21	21	8	100	22–178
Iron[1]	250	12	4.8	4	250	180–320
Manganese[1]	21.5	202	10.2	8	25	17–23
Molybdenum[1]	9.5	1.0	10.5	5	10	5.5–14.5
Nickel[1]	56.8	9.2	16.2	14	50	22–78
Silver[1]	5.2	1.2	23.1	7	5.0	0.5–9.5

Source: AMERICAN SOCIETY FOR TESTING AND MATERIALS. 1986. Annual Book of ASTM Standards. Volume 11.01. Water and Environmental Technology. American Soc. Testing & Materials, Philadelphia, Pa. Copyright ASTM. Reprinted with permission.

3111 B. Direct Air-Acetylene Flame Method

1. General Discussion

This method is applicable to the determination of antimony, bismuth, cadmium, calcium, cesium, chromium, cobalt, copper, gold, iridium, iron, lead, lithium, magnesium, manganese, nickel, palladium, platinum, potassium, rhodium, ruthenium, silver, sodium, strontium, thallium, tin, and zinc.

2. Apparatus

Atomic absorption spectrometer and associated equipment: See Section 3111A.6. Use burner head recommended by the manufacturer.

3. Reagents

a. Air, cleaned and dried through a suitable filter to remove oil, water, and other foreign substances. The source may be a compressor or commercially bottled gas.

b. Acetylene, standard commercial grade. Acetone, which always is present in acetylene cylinders, can be prevented from entering and damaging the burner head by replacing a cylinder when its pressure has fallen to 689 kPa (100 psi) acetylene.

c. Metal-free water: Use metal-free water for preparing all reagents and calibration standards and as dilution water. Prepare metal-free water by deionizing tap water and/or by using one of the following processes, depending on the metal concentration in the sample: single distillation, redistillation, or sub-boiling. Always check deionized or distilled water to determine whether the element of interest is present in trace amounts. (NOTE: *If the source water contains Hg or other volatile metals, single- or redistilled water may not be suitable for trace analysis because these metals distill over with the distilled water. In such cases, use sub-boiling to prepare metal-free water).*

d. Calcium solution: Dissolve 630 mg calcium carbonate, $CaCO_3$, in 50 mL of 1 + 5 HCl. If necessary, boil gently to obtain complete solution. Cool and dilute to 1000 mL with water.

e. Hydrochloric acid, HCl, 1%, 10%, 20%, 1 + 5, 1 + 1, and conc.

f. Lanthanum solution: Dissolve 58.65 g lanthanum oxide, La_2O_3, in 250 mL conc HCl. Add acid slowly until the material is dissolved and dilute to 1000 mL with water.

g. Hydrogen peroxide, 30%.

h. Nitric acid, HNO_3, 2%, 1 + 1, and conc.

i. Aqua regia: Add 3 volumes conc HCl to 1 volume conc HNO_3.

j. Standard metal solutions: Prepare a series of standard metal solutions in the optimum concentration range by appropriate dilution of the following stock metal solutions with water containing 1.5 mL conc HNO_3/L. Thoroughly dry reagents before use. In general, use reagents of the highest purity. For hydrates, use fresh reagents.

1) *Antimony:* Dissolve 0.2669 g $K(SbO)C_4H_4O_6$ in water, add 10 mL 1 + 1 HCl and dilute to 1000 mL with water; 1.00 mL = 100 µg Sb.

2) *Bismuth:* Dissolve 0.100 g bismuth metal in a minimum volume of 1 + 1 HNO_3. Dilute to 1000 mL with 2% (v/v) HNO_3; 1.00 mL = 100 µg Bi.

3) *Cadmium:* Dissolve 0.100 g cadmium metal in 4 mL conc HNO_3. Add 8.0 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Cd.

4) *Calcium:* Suspend 0.2497 g $CaCO_3$ (dried at 180° for 1 h before weighing) in water and dissolve cautiously with a minimum amount of 1 + 1 HNO_3. Add 10.0 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Ca.

5) *Cesium:* Dissolve 0.1267 g cesium chloride, CsCl, in 1000 mL water; 1.00 mL = 100 µg Cs.

6) *Chromium:* Dissolve 0.1923 g CrO_3 in water. When solution is complete, acidify with 10 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Cr.

7) *Cobalt:* Dissolve 0.1000 g cobalt metal in a minimum amount of 1 + 1 HNO_3. Add 10.0 mL 1 + 1 HCl and dilute to 1000 mL with water; 1.00 mL = 100 µg Co.

8) *Copper:* Dissolve 0.100 g copper metal in 2 mL conc HNO_3, add 10.0 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Cu.

9) *Gold:* Dissolve 0.100 g gold metal in a minimum volume of aqua regia. Evaporate to dryness, dissolve residue in 5 mL conc HCl, cool, and dilute to 1000 mL with water; 1.00 mL = 100 µg Au.

10) *Iridium:* Dissolve 0.1147 g ammonium chloroiridate, $(NH_4)_2IrCl_6$, in a minimum volume of 1% (v/v) HCl and dilute to 100 mL with 1% (v/v) HCl; 1.00 mL = 500 µg Ir.

11) *Iron:* Dissolve 0.100 g iron wire in a mixture of 10 mL 1 + 1 HCl and 3 mL conc HNO_3. Add 5 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Fe.

12) *Lead:* Dissolve 0.1598 g lead nitrate, $Pb(NO_3)_2$, in a minimum amount of 1 + 1 HNO_3, add 10 mL conc HNO_3, and dilute to 1000 mL with water; 1.00 mL = 100 µg Pb.

13) *Lithium:* Dissolve 0.5323 g lithium carbonate, Li_2CO_3, in a minimum volume of 1 + 1 HNO_3. Add 10.0 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Li.

14) *Magnesium:* Dissolve 0.1658 g MgO in a minimum amount of 1 + 1 HNO_3. Add 10.0 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Mg.

15) *Manganese:* Dissolve 0.1000 g manganese metal in 10 mL conc HCl mixed with 1 mL conc HNO_3. Dilute to 1000 mL with water; 1.00 mL = 100 µg Mn.

16) *Nickel:* Dissolve 0.1000 g nickel metal in 10 mL hot conc HNO_3, cool, and dilute to 1000 mL with water; 1.00 mL = 100 µg Ni.

17) *Palladium:* Dissolve 0.100 g palladium wire in a minimum volume of aqua regia and evaporate just to dryness. Add 5 mL conc HCl and 25 mL water and warm until dissolution is complete. Dilute to 1000 mL with water; 1.00 mL = 100 µg Pd.

18) *Platinum:* Dissolve 0.100 g platinum metal in a minimum volume of aqua regia and evaporate just to dryness. Add 5 mL conc HCl and 0.1 g NaCl and again evaporate just to dryness. Dissolve residue in 20 mL of 1 + 1 HCl and dilute to 1000 mL with water; 1.00 mL = 100 µg Pt.

19) *Potassium:* Dissolve 0.1907 g potassium chloride, KCl, (dried at 110°C) in water and make up to 1000 mL; 1.00 mL = 100 µg K.

20) *Rhodium:* Dissolve 0.386 g ammonium hexachlororhodate, $(NH_4)_3RhCl_6 \cdot 1.5H_2O$, in a minimum volume of 10% (v/v) HCl and dilute to 1000 mL with 10% (v/v) HCl; 1.00 mL = 100 µg Rh.

21) *Ruthenium:* Dissolve 0.205 g ruthenium chloride, $RuCl_3$, in a minimum volume of 20% (v/v) HCl and dilute to 1000 mL with 20% (v/v) HCl; 1.00 mL = 100 µg Ru.

22) *Silver:* Dissolve 0.1575 g silver nitrate, $AgNO_3$, in 100 mL water, add 10 mL conc HNO_3, and make up to 1000 mL; 1.00 mL = 100 µg Ag.

23) *Sodium:* Dissolve 0.2542 g sodium chloride, NaCl, dried at 140°C, in water, add 10 mL conc HNO_3 and make up to 1000 mL; 1.00 mL = 100 µg Na.

24) *Strontium:* Suspend 0.1685 g $SrCO_3$ in water and dissolve cautiously with a minimum amount of 1 + 1 HNO_3. Add 10.0 mL conc HNO_3 and dilute to 1000 mL with water; 1 mL = 100 µg Sr.

25) *Thallium:* Dissolve 0.1303 g thallium nitrate, $TlNO_3$, in water. Add 10 mL conc HNO_3 and dilute to 1000 mL with water; 1.00 mL = 100 µg Tl.

26) *Tin:* Dissolve 1.000 g tin metal in 100 mL conc HCl and dilute to 1000 mL with water; 1.00 mL = 1.00 mg Sn.

27) *Zinc:* Dissolve 0.100 g zinc metal in 20 mL 1 + 1 HCl and dilute to 1000 mL with water; 1.00 mL = 100 µg Zn.

4. Procedure

a. Sample preparation: Required sample preparation depends on need to measure dissolved metals only or total metals.

If dissolved metals are to be determined, see Section 3030B for sample preparation. If total or acid-extractable metals are to be determined, see Sections 3030C through K. For all samples, make certain that the concentrations of acid and matrix modifiers are the same in both samples and standards.

When determining Ca or Mg, dilute and mix 100 mL sample or standard with 10 mL lanthanum solution (¶ 3*f*) before atomization. When determining Fe or Mn, mix 100 mL with 25 mL of Ca solution (¶ 3*d*) before aspirating. When determining Cr, mix 1 mL 30% H_2O_2 with each 100 mL before aspirating. Alternatively use proportionally smaller volumes.

b. Instrument operation: Because of differences between makes and models of atomic absorption spectrometers, it is not possible to formulate instructions applicable to every instrument. See manufacturer's operating manual. In general, proceed according to the following: Install a hollow-cathode lamp for the desired

metal in the instrument and roughly set the wavelength dial according to Table 3111:I. Set slit width according to manufacturer's suggested setting for the element being measured. Turn on instrument, apply to the hollow-cathode lamp the current suggested by the manufacturer, and let instrument warm up until energy source stabilizes, generally about 10 to 20 min. Readjust current as necessary after warmup. Optimize wavelength by adjusting wavelength dial until optimum energy gain is obtained. Align lamp in accordance with manufacturer's instructions.

Install suitable burner head and adjust burner head position. Turn on air and adjust flow rate to that specified by manufacturer to give maximum sensitivity for the metal being measured. Turn on acetylene, adjust flow rate to value specified, and ignite flame. Let flame stabilize for a few minutes. Aspirate a blank consisting of either deionized water or an acid solution containing the same concentration of acid in standards and samples. Zero the instrument. Aspirate a standard solution and adjust aspiration rate of the nebulizer to obtain maximum sensitivity. Adjust burner both vertically and horizontally to obtain maximum response. Aspirate blank again and rezero the instrument. Aspirate a standard near the middle of the linear range. Record absorbance of this standard when freshly prepared and with a new hollow-cathode lamp. Refer to these data on subsequent determinations of the same element to check consistency of instrument setup and aging of hollow-cathode lamp and standard.

The instrument now is ready to operate. When analyses are finished, extinguish flame by turning off first acetylene and then air.

c. Standardization: Select at least three concentrations of each standard metal solution (prepared as in ¶ 3*j* above) to bracket the expected metal concentration of a sample. Aspirate blank and zero the instrument. Then aspirate each standard in turn into flame and record absorbance.

Prepare a calibration curve by plotting on linear graph paper absorbance of standards versus their concentrations. For instruments equipped with direct concentration readout, this step is unnecessary. With some instruments it may be necessary to convert percent absorption to absorbance by using a table generally provided by the manufacturer. Plot calibration curves for Ca and Mg based on original concentration of standards before dilution with lanthanum solution. Plot calibration curves for Fe and Mn based on original concentration of standards before dilution with Ca solution. Plot calibration curve for Cr based on original concentration of standard before addition of H_2O_2.

d. Analysis of samples: Rinse nebulizer by aspirating water containing 1.5 mL conc HNO_3/L. Atomize blank and zero instrument. Atomize sample and determine its absorbance.

5. Calculations

Calculate concentration of each metal ion, in micrograms per liter for trace elements, and in milligrams per liter for more common metals, by referring to the appropriate calibration curve prepared according to ¶ 4*c*. Alternatively, read concentration directly from the instrument readout if the instrument is so equipped. If the sample has been diluted, multiply by the appropriate dilution factor.

6. Bibliography

WILLIS, J.B. 1962. Determination of lead and other heavy metals in urine by atomic absorption spectrophotometry. *Anal. Chem.* 34:614.

Also see Section 3111A.8 and 9.

3111 C. Extraction/Air-Acetylene Flame Method

1. General Discussion

This method is suitable for the determination of low concentrations of cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, silver, and zinc. The method consists of chelation with ammonium pyrrolidine dithiocarbamate (APDC) and extraction into methyl isobutyl ketone (MIBK), followed by aspiration into an air-acetylene flame.

2. Apparatus

a. Atomic absorption spectrometer and associated equipment: See Section 3111A.6.

b. Burner head, conventional. Consult manufacturer's operating manual for suggested burner head.

3. Reagents

a. Air: See 3111B.3*a*.

b. Acetylene: See 3111B.3*b*.

c. Metal-free water: See 3111B.3*c*.

d. Methyl isobutyl ketone (MIBK), reagent grade. For trace analysis, purify MIBK by redistillation or by sub-boiling distillation.

e. Ammonium pyrrolidine dithiocarbamate (APDC) solution: Dissolve 4 g APDC in 100 mL water. If necessary, purify APDC with an equal volume of MIBK. Shake 30 s in a separatory funnel, let separate, and withdraw lower portion. Discard MIBK layer.

f. Nitric acid, HNO_3, conc, ultrapure.

g. Standard metal solutions: See 3111B.3*j*.

h. Potassium permanganate solution, $KMnO_4$, 5% aqueous.

i. Sodium sulfate, Na_2SO_4, anhydrous.

j. Water-saturated MIBK: Mix one part purified MIBK with one part water in a separatory funnel. Shake 30 s and let separate. Discard aqueous layer. Save MIBK layer.

k. Hydroxylamine hydrochloride solution, 10%.

4. Procedure

a. Instrument operation: See Section 3111B.4*b*. After final adjusting of burner position, aspirate water-saturated MIBK into flame and gradually reduce fuel flow until flame is similar to that

LAMPIRAN C

BERITA ACARA BIMBINGAN PROPOSAL TUGAS AKHIR

UNIVERSITAS PGRI ADI BUANA SURABAYA
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
Program Studi : Teknik Lingkungan – Perencanaan Wilayah dan Kota
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BERITA ACARA BIMBINGAN PROPOSAL TUGAS AKHIR Form Prop-03

Nama	: ALRIDHO ADE ARIYANTO
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Program Studi	: TEKNIK LINGKUNGAN
Pembimbing	: Dr. Rhenny Ratnawati, ST., MT.
Periode Bimbingan	: Gasal/~~Genap~~*) Tahun 20 19 / 20 20
Judul Proposal Tugas Akhir	ADSORPSI KONSENTRASI LOGAM MANGAN DAN KADMIUM PADA AIR LIMBAH LABORATORIUM

KEGIATAN KONSULTASI / BIMBINGAN

No	Tanggal	Materi pembimbingan	Keterangan	Paraf
1	1 Oktober 2019	Pengajuan Judul dan Konsep	Rev	
2	15 Oktober 2019	Revisi Judul dan Konsep	Acc	
3	6 November 2019	Pengajuan Bab 1	Rev	
4	13 November 2019	Revisi Bab 1	Acc	
5	20 Desember 2019	Pengajuan Bab 2 dan 3	Rev	
6	31 Desember 2019	Revisi Bab 2 dan 3	Rev	
7	10 Januari 2020	Pengajuan rancangan penelitian	Rev	
8	14 Januari 2020	Revisi analisis data	Rev	

Dinyatakan selesai tanggal : 14 Januari 20 20

Surabaya, 14 Januari 2020

Mengetahui,
Ketua Program Studi,

.....

Pembimbing,

Dr. Rhenny Ratnawati, ST, MT

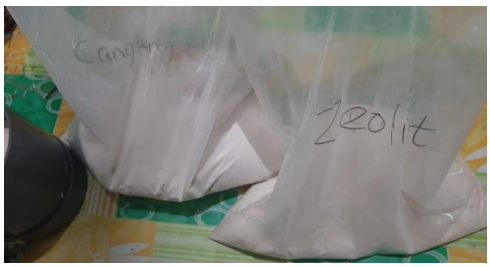
Mahasiswa,

Alridho Ade Ariyanto

LAMPIRAN D

FOTO PENELITIAN

NO	FOTO PENELITIAN	KETERANGAN
1	 	Menumbuk atau menghaluskan cangkang telur dan zeolit
2	 	Adsorben cangkang telur dan zeolit disaring pada saringan 50 mesh untuk mendapatkan volume media yang sama
3		Menyiapkan larutan HCl untuk aktivasi media adsorben

4	   	Melakukan aktivasi adsorben dengan perendaman cangkang telur dan zeolit, pembilasan dengan aquades, dan pemanasan di oven
5	  	Setelah aktivasi, masukkan adsorben cangkang telur pada 2 reaktor dan zeolit pada 2 reaktor. Penggunaan 2 reaktor pada masing-masing adsorben untuk digunakan saat duplo penelitian

6	 	Melakukan pengambilan sampel pada bak outlet limbah laboratorium
7	 	Mengisi seluruh reaktor dengan air limbah laboratorium

8	 	Melakukan pengambilan sampel pada awal sebelum proses, setelah perendaman 30 menit, 60 menit, 90 menit, dan 120 menit pada masing-masing outlet reaktor
9		Melakukan analisa pembacaan konsentrasi logam mangan dan kadmium dengan AAS

LAMPIRAN E

LAPORAN HASIL PENGUJIAN

PEMERINTAH PROVINSI JAWA TIMUR
DINAS LINGKUNGAN HIDUP
UPT LABORATORIUM LINGKUNGAN
Jl. Wisata Menanggal No. 38 Telp. (031) 8541807 Fax. (031) 8530482
SURABAYA, 60234

LAPORAN HASIL PENGUJIAN

I. UMUM

1	Nama Pelanggan	:	**ALRIDHO ADE ARIYANTO**
2	Alamat	:	*Jln. Soekarno Hatta no 52e Madiun*
3	Telp / Fax	:	*8977904385*
4	Jenis Industri/kegiatan Usaha	:	-
5	Jenis Contoh Uji	:	*Air Limbah Laboratorium*
6	Rentang Pengujian	:	*1-May-20 s/d 9-May-20*

II. DATA PENGIRIM CONTOH UJI

1	Nama / Instansi	:	**ALRIDHO ADE ARIYANTO**
2	Alamat	:	*Jln. Soekarno Hatta no 52e Madiun*
3	Petugas Pengambil Contoh	:	**ALRIDHO ADE ARIYANTO**
4	Tanggal / Jam pengambilan	:	*30 April 2020 / 09:00*
5	Tanggal / Jam diterima Laboratorium	:	*01 Mei 2020 / 08:00*
6	Lokasi / Titik pengambilan contoh uji	:	*Jalan Wisata Menanggal no 38 Madiun*
7	Metode Pengambilan Contoh Uji	:	*SNI 6989.59-2008*
8	Koordinat	:	*S : 07° 20'46" E : 111° 44'1"*
9	Suhu	:	*28 °C*

III. HASIL PENGUJIAN

NO	KODE CONTOH	SATUAN	STANDAR MUTU	HASIL UJI	METODE UJI	KETERANGAN
*)	**Parameter Mangan**			-	-	
1	**Limbah**	mg/L	2,0	9,144	APHA 3111 B. Ed 23 tahun 2017	
2	**1 CK 30**	mg/L		7,804		
3	**1 CK 60**	mg/L		6,032		
4	**1 CK 90**	mg/L		5,284		
5	**1 CK 120**	mg/L		4,801		
6	**1 Z 30**	mg/L		7,252		
7	**1 Z 60**	mg/L		5,434		
8	**1 Z 90**	mg/L		4,565		
9	**1 Z 120**	mg/L		4,180		
10	**1 CK 30**	mg/L		8,068		
11	**2 CK 60**	mg/L		6,222		
12	**2 CK 90**	mg/L		4,945		
13	**2 CK 120**	mg/L		4,790		
14	**2 Z 30**	mg/L		7,073		
15	**2 Z 60**	mg/L		5,675		
16	**2 Z 90**	mg/L		4,433		
17	**2 Z 120**	mg/L		4,111		

*)	Parameter Cadmium					
1	Limbah	mg/L	0,05	4,475	APHA 3111 B. Ed 23 tahun 2017	
2	1 CK 30	mg/L		4,273		
3	1 CK 60	mg/L		3,706		
4	1 CK 90	mg/L		3,458		
5	1 CK 120	mg/L		2,776		
6	1 Z 30	mg/L		3,806		
7	1 Z 60	mg/L		3,372		
8	1 Z 90	mg/L		2,701		
9	1 Z 120	mg/L		1,931		
10	1 CK 30	mg/L		4,072		
11	2 CK 60	mg/L		3,608		
12	2 CK 90	mg/L		3,409		
13	2 CK 120	mg/L		2,740		
14	2 Z 30	mg/L		3,608		
15	2 Z 60	mg/L		3,357		
16	2 Z 90	mg/L		2,742		
17	2 Z 120	mg/L		1,944		

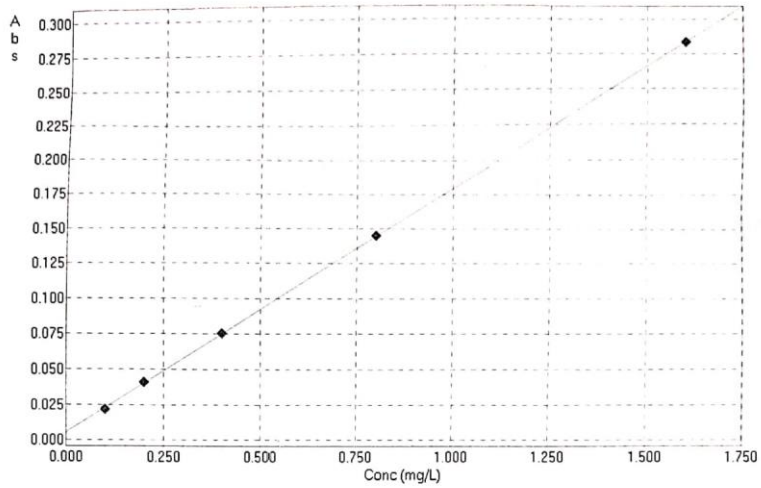
Catatan :

Surabaya, 9 Mei 2020
Analis Laboratorium

DIMAS AGENG SUTRISNO, S.Si

Friday, May 01, 2020

Calibration Curve(Element:Mn:FlameCont C#:01)



Abs=0.17384Conc+0.0055375 r=1.0000

CONC	ABS
0.1000	0.0219
0.2000	0.0409
0.4000	0.0754
0.8000	0.1450
1.6000	0.2834

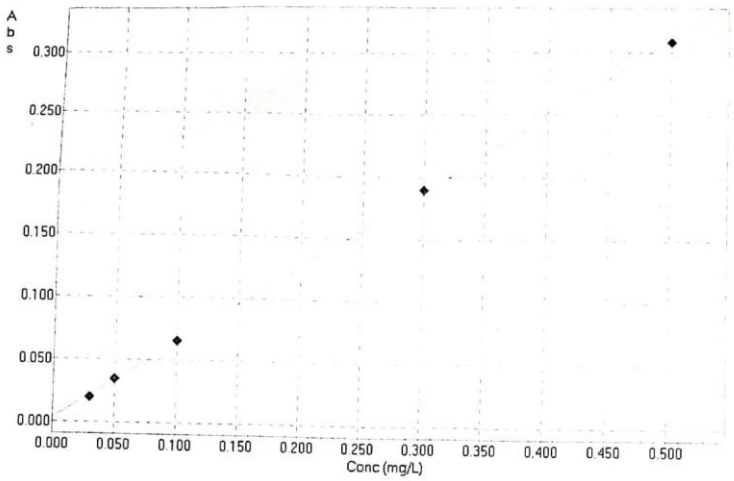
	Action	Sample ID	X	Conc. (mg/L)	Abs.	%RSD	SD	RPD	%R
1	AUTOZERO								
2	*BLK-1*				*0.0013*				
3	BLK-2				0.0019				
4	BLK-3				0.0023				
5	**BLK-AV**				**0.0021**	**13.47**	**0.0003**		
6	STD-1			0.0941	0.0219				
7	STD-2			0.0941	0.0219				
8	**STD-AV**			**0.0941**	**0.0219**	**0.00**	**0.0000**		**90.0**
9	STD-1			0.2028	0.0408				
10	STD-2			0.2040	0.0410				
11	**STD-AV**			**0.2034**	**0.0409**	**0.35**	**0.0001**		**100.0**
12	STD-1			0.4001	0.0751				
13	STD-2			0.4042	0.0758				
14	**STD-AV**			**0.4019**	**0.0754**	**0.66**	**0.0005**		**100.0**
15	STD-1			0.8034	0.1452				
16	STD-2			0.8011	0.1448				
17	**STD-AV**			**0.8022**	**0.1450**	**0.20**	**0.0003**		**100.0**
18	STD-1			1.5966	0.2831				
19	STD-2			1.6007	0.2838				
20	**STD-AV**			**1.5984**	**0.2834**	**0.17**	**0.0005**		**100.0**
21	*BLK-1*				*0.0016*				
22	BLK-2				0.0028				
23	BLK-3				0.0024				
24	**BLK-AV**				**0.0026**	**10.88**	**0.0003**		
25	UNK1-1	blk		-0.0307	0.0002				
26	*UNK1-2*	*blk*		*-0.0313*	*0.0001*				
27	UNK1-3	blk		-0.0296	0.0004				
28	**UNK1-AV**	**blk**		**-0.0301**	**0.0003**	**47.14**	**0.0001**		
29	UNK2-1	smpl		-0.0359	-0.0007				
30	*UNK2-2*	*smpl*		*-0.0336*	*-0.0003*				
31	UNK2-3	smpl		-0.0353	-0.0006				
32	**UNK2-AV**	**smpl**		**-0.0353**	**-0.0006**	**10.88**	**0.0001**		
33	UNK3-1	smpl+Mn 0.4		0.3846	0.0724				
34	UNK3-2	smpl+Mn 0.4		0.3932	0.0739				
35	**UNK3-AV**	**smpl+Mn 0.4**		**0.3892**	**0.0732**	**1.45**	**0.0011**		
36	UNK4-1	smpl+Mn 0.4		0.3961	0.0744				
37	UNK4-2	smpl+Mn 0.4		0.3978	0.0747				
38	**UNK4-AV**	**smpl+Mn 0.4**		**0.3973**	**0.0746**	**0.28**	**0.0002**		
39	UNK5-1	LIMBAH 10X		0.9150	0.1646				
40	UNK5-2	LIMBAH 10X		0.9138	0.1644				
41	**UNK5-AV**	**LIMBAH 10X**		**0.9144**	**0.1645**	**0.09**	**0.0001**		
42	UNK6-1	CK30 10X		0.7810	0.1413				
43	UNK6-2	CK30 10X		0.7792	0.1410				
44	**UNK6-AV**	**CK30 10X**		**0.7804**	**0.1412**	**0.15**	**0.0002**		
45	UNK7-1	CK60 10X		0.6032	0.1104				
46	*UNK7-2*	*CK60 10X*		*0.5952*	*0.1090*				
47	**UNK7-AV**	**CK60 10X**		**0.6032**	**0.1104**				
48	*UNK8-1*	*CK90 10X*		*0.4433*	*0.0826*				
49	UNK8-2	CK90 10X		0.5261	0.0970				
50	UNK8-3	CK90 10X		0.5307	0.0978				
51	**UNK8-AV**	**CK90 10X**		**0.5284**	**0.0974**	**0.58**	**0.0006**		
52	UNK9-1	CK120		0.4801	0.0890				
53	UNK9-2	CK120		0.4795	0.0889				
54	**UNK9-AV**	**CK120**		**0.4801**	**0.0890**	**0.08**	**0.0001**		
55	*UNK10-1*	*Z30*		*0.7631*	*0.1382*				
56	*UNK10-2*	*Z30*		*0.6797*	*0.1237*				

D:\AA-7000\Hasil Analisa 2020\RD010520.aa Page 1

	Action	Sample ID	X	Conc. (mg/L)	Abs.	%RSD	SD	RPD	%R
57	*UNK10-3*	*Z30*		*0.7505*	*0.1360*				
58	***UNK10-AV***	***Z30***							
59	UNK11-1	Z30 10X		0.7252	0.1316				
60	*UNK11-2*	*Z30 10X*		*0.7378*	*0.1338*				
61	**UNK11-AV**	**Z30 10X**		**0.7252**	**0.1316**				
62	UNK12-1	Z60 10X		0.5445	0.1002				
63	UNK12-2	Z60 10X		0.5428	0.0999				
64	**UNK12-AV**	**Z60 10X**		**0.5434**	**0.1000**	**0.21**	**0.0002**		
65	UNK13-1	Z90 10X		0.4548	0.0846				
66	UNK13-2	Z90 10X		0.4582	0.0852				
67	**UNK13-AV**	**Z90 10X**		**0.4565**	**0.0849**	**0.50**	**0.0004**		
68	*UNK14-1*	*Z120*		*0.4559*	*0.0848*				
69	*UNK14-2*	*Z120*		*0.3328*	*0.0634*				
70	*UNK14-3*	*Z120*		*0.3766*	*0.0710*				
71	***UNK14-AV***	***Z120***							
72	UNK15-1	Z120 10X		0.4191	0.0784				
73	UNK15-2	Z120 10X		0.4174	0.0781				
74	**UNK15-AV**	**Z120 10X**		**0.4180**	**0.0782**	**0.27**	**0.0002**		
75	UNK16-1	CT30 10X		0.8080	0.1460				
76	UNK16-2	CT30 10X		0.8063	0.1457				
77	**UNK16-AV**	**CT30 10X**		**0.8068**	**0.1458**	**0.15**	**0.0002**		
78	UNK17-1	CT60 10X		0.6205	0.1134				
79	UNK17-2	CT60 10X		0.6239	0.1140				
80	**UNK17-AV**	**CT60 10X**		**0.6222**	**0.1137**	**0.37**	**0.0004**		
81	UNK18-1	CT90 10X		0.4974	0.0920				
82	UNK18-2	CT90 10X		0.4916	0.0910				
83	**UNK18-AV**	**CT90 10X**		**0.4945**	**0.0915**	**0.77**	**0.0007**		
84	UNK19-1	CT120 10X		0.4772	0.0885				
85	UNK19-2	CT120 10X		0.4813	0.0892				
86	**UNK19-AV**	**CT120 10X**		**0.4790**	**0.0888**	**0.56**	**0.0005**		
87	*UNK20-1*	*ZT30 10X*		*0.7752*	*0.1403*				
88	*UNK20-2*	*ZT30 10X*		*0.7729*	*0.1399*				
89	***UNK20-AV***	***ZT30 10X***							
90	UNK21-1	ZT30 10X		0.7085	0.1287				
91	UNK21-2	ZT30 10X		0.7062	0.1283				
92	**UNK21-AV**	**ZT30 10X**		**0.7073**	**0.1285**	**0.22**	**0.0003**		
93	UNK22-1	ZT60 10X		0.5675	0.1042				
94	*UNK22-2*	*ZT60 10X*		*0.5054*	*0.0934*				
95	*UNK22-3*	*ZT60 10X*		*0.0820*	*0.0198*				
96	**UNK22-AV**	**ZT60 10X**		**0.5675**	**0.1042**				
97	UNK23-1	ZT90 10X		0.4404	0.0821				
98	UNK23-2	ZT90 10X		0.4456	0.0830				
99	**UNK23-AV**	**ZT90 10X**		**0.4433**	**0.0826**	**0.77**	**0.0006**		
100	UNK24-1	ZT120 10X		0.4099	0.0768				
101	UNK24-2	ZT120 10X		0.4122	0.0772				
102	**UNK24-AV**	**ZT120 10X**		**0.4111**	**0.0770**	**0.37**	**0.0003**		

Friday, May 01, 2020

Calibration Curve(Element:Cd:FlameCont C#:01)



Abs=0.61284Conc+0.0034631 r=0.9999

CONC	ABS
0.0300	0.0199
0.0500	0.0345
0.1000	0.0654
0.3000	0.1897
0.5000	0.3084

	Action	Sample ID	X	Conc. (mg/L)	Abs.	%RSD	SD	RPD	%R
1	AUTOZERO								
2	BLK-1				0.0041				
3	BLK-2				0.0027				
4	*BLK-3*				*0.0230*				
5	**BLK-AV**				**0.0034**	**29.12**	**0.0010**		
6	STD-1			0.0268	0.0199				
7	STD-2			0.0268	0.0199				
8	**STD-AV**			**0.0268**	**0.0199**	**0.00**	**0.0000**		
9	STD-1			0.0519	0.0353				
10	STD-2			0.0493	0.0337				
11	**STD-AV**			**0.0506**	**0.0345**	**3.28**	**0.0011**		
12	STD-1			0.0998	0.0646				
13	STD-2			0.1022	0.0661				
14	**STD-AV**			**0.1011**	**0.0654**	**1.62**	**0.0011**		**100.0**
15	STD-1			0.3032	0.1893				
16	STD-2			0.3045	0.1901				
17	**STD-AV**			**0.3039**	**0.1897**	**0.30**	**0.0006**		**100.0**
18	STD-1			0.4956	0.3072				
19	STD-2			0.4997	0.3097				
20	**STD-AV**			**0.4976**	**0.3084**	**0.57**	**0.0018**		**100.0**
21	*BLK-1*				*0.0062*				
22	BLK-2				0.0042				
23	BLK-3				0.0049				
24	**BLK-AV**				**0.0046**	**10.88**	**0.0005**		
25	UNK1-1	blk		-0.0055	0.0001				
26	UNK1-2	blk		-0.0029	0.0017				
27	*UNK1-3*	*blk*		*-0.0071*	*-0.0009*				
28	**UNK1-AV**	**blk**		**-0.0042**	**0.0009**	**125.71**	**0.0011**		
29	UNK2-1	smpl		-0.0071	-0.0009				
30	UNK2-2	smpl		-0.0060	-0.0002				
31	*UNK2-3*	*smpl*		*-0.0042*	*0.0009*				
32	**UNK2-AV**	**smpl**		**-0.0066**	**-0.0006**	**90.00**	**0.0005**		
33	UNK3-1	smpl+Cd 0.1		0.0976	0.0633				
34	UNK3-2	smpl+Cd 0.1		0.0962	0.0624				
35	**UNK3-AV**	**smpl+Cd 0.1**		**0.0968**	**0.0628**	**1.01**	**0.0006**		
36	UNK4-1	smpl+Cd 0.1		0.0976	0.0633				
37	UNK4-2	smpl+Cd 0.1		0.0954	0.0619				
38	**UNK4-AV**	**smpl+Cd 0.1**		**0.0965**	**0.0626**	**1.58**	**0.0010**		
39	*UNK5-1*	*LIMBAH*		*0.0247*	*0.0186*				
40	*UNK5-2*	*LIMBAH*		*0.0242*	*0.0183*				
41	***UNK5-AV***	***LIMBAH***							
42	UNK6-1	LIMBAH 10X		0.4465	0.2771				
43	UNK6-2	LIMBAH 10X		0.4485	0.2783				
44	**UNK6-AV**	**LIMBAH 10X**		**0.4475**	**0.2777**	**0.31**	**0.0008**		
45	UNK7-1	CK30 10X		0.4276	0.2655				
46	UNK7-2	CK30 10X		0.4269	0.2651				
47	**UNK7-AV**	**CK30 10X**		**0.4273**	**0.2653**	**0.11**	**0.0003**		
48	UNK8-1	CK60 10X		0.3718	0.2313				
49	UNK8-2	CK60 10X		0.3697	0.2300				
50	**UNK8-AV**	**CK60 10X**		**0.3706**	**0.2306**	**0.40**	**0.0009**		
51	UNK9-1	CK90 10X		0.3458	0.2154				
52	UNK9-2	CK90 10X		0.3460	0.2155				
53	**UNK9-AV**	**CK90 10X**		**0.3458**	**0.2154**	**0.03**	**0.0001**		
54	*UNK10-1*	*CK120 10X*		*0.3018*	*0.1884*				
55	*UNK10-2*	*CK120 10X*		*0.2737*	*0.1712*				
56	***UNK10-AV***	***CK120 10X***							

	Action	Sample ID	X	Conc. (mg/L)	Abs.	%RSD	SD	RPD	%R
57	UNK11-1	CK120 10X		0.2779	0.1738				
58	UNK11-2	CK120 10X		0.2775	0.1735				
59	**UNK11-AV**	**CK120 10X**		**0.2776**	**0.1736**	**0.12**	**0.0002**		
60	UNK12-1	Z30 10X		0.3806	0.2367				
61	*UNK12-2*	*Z30 10X*		*0.3778*	*0.2350*				
62	**UNK12-AV**	**Z30 10X**		**0.3806**	**0.2367**				
63	UNK13-1	Z60 10X		0.3390	0.2112				
64	UNK13-2	Z60 10X		0.3354	0.2090				
65	**UNK13-AV**	**Z60 10X**		**0.3372**	**0.2101**	**0.74**	**0.0016**		
66	UNK14-1	Z90 10X		0.2698	0.1688				
67	UNK14-2	Z90 10X		0.2703	0.1691				
68	**UNK14-AV**	**Z90 10X**		**0.2701**	**0.1690**	**0.13**	**0.0002**		
69	*UNK15-1*	*Z120 10X*		*0.1541*	*0.0979*				
70	UNK15-2	Z120 10X		0.1929	0.1217				
71	UNK15-3	Z120 10X		0.1931	0.1218				
72	**UNK15-AV**	**Z120 10X**		**0.1931**	**0.1218**	**0.06**	**0.0001**		
73	UNK16-1	CT30 10X		0.4010	0.2492				
74	UNK16-2	CT30 10X		0.4135	0.2569				
75	**UNK16-AV**	**CT30 10X**		**0.4072**	**0.2530**	**2.15**	**0.0054**		
76	*UNK17-1*	*CT60 10X*		*0.2732*	*0.1709*				
77	UNK17-2	CT60 10X		0.3592	0.2236				
78	UNK17-3	CT60 10X		0.3626	0.2257				
79	**UNK17-AV**	**CT60 10X**		**0.3608**	**0.2246**	**0.66**	**0.0015**		
80	UNK18-1	CT90 10X		0.3414	0.2127				
81	UNK18-2	CT90 10X		0.3403	0.2120				
82	**UNK18-AV**	**CT90 10X**		**0.3409**	**0.2124**	**0.23**	**0.0005**		
83	UNK19-1	CT120 10X		0.2708	0.1694				
84	UNK19-2	CT120 10X		0.2771	0.1733				
85	**UNK19-AV**	**CT120 10X**		**0.2740**	**0.1714**	**1.61**	**0.0028**		
86	UNK20-1	ZT30 10X		0.3586	0.2232				
87	UNK20-2	ZT30 10X		0.3630	0.2259				
88	**UNK20-AV**	**ZT30 10X**		**0.3608**	**0.2246**	**0.85**	**0.0019**		
89	UNK21-1	ZT60 10X		0.3349	0.2087				
90	UNK21-2	ZT60 10X		0.3364	0.2096				
91	**UNK21-AV**	**ZT60 10X**		**0.3357**	**0.2092**	**0.30**	**0.0006**		
92	UNK22-1	ZT90 10X		0.2732	0.1709				
93	UNK22-2	ZT90 10X		0.2752	0.1721				
94	**UNK22-AV**	**ZT90 10X**		**0.2742**	**0.1715**	**0.49**	**0.0008**		
95	UNK23-1	ZT120 10X		0.1916	0.1209				
96	UNK23-2	ZT120 10X		0.1970	0.1242				
97	**UNK23-AV**	**ZT120 10X**		**0.1944**	**0.1226**	**1.90**	**0.0023**		

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Program Studi : Teknik Lingkungan – Perencanaan Wilayah dan Kota
KAMPUS II: Jl. Dukuh Menanggal XII/4 ☎ (031) 8281181 Surabaya 60234

BERITA ACARA BIMBINGAN PROPOSAL TUGAS AKHIR

Form Prop-03

Nama	: ALRIDHO ADE ARIYANTO
NIM	: 163800049
Program Studi	: TEKNIK LINGKUNGAN
Pembimbing	: Dr. Rhenny Ratnawati, ST., MT.
Periode Bimbingan	: Gasal/~~Genap~~*) Tahun 2019 / 2020
Judul Proposal Tugas Akhir	ADSORPSI KONSENTRASI LOGAM MANGAN DAN KADMIUM PADA AIR LIMBAH LABORATORIUM

KEGIATAN KONSULTASI / BIMBINGAN

No	Tanggal	Materi pembimbingan	Keterangan	Paraf
1	1 Oktober 2019	Pengajuan Judul dan konsep	Rev	
2	15 Oktober 2019	Revisi Judul dan konsep	Acc	
3	6 November 2019	Pengajuan Bab 1	Rev	
4	13 November 2019	Revisi Bab 1	Acc	
5	20 Desember 2019	Pengajuan Bab 2 dan 3	Rev	
6	31 Desember 2019	Revisi Bab 2 dan 3	Rev	
7	10 Januari 2020	Pengajuan rancangan penelitian	Rev	
8	14 Januari 2020	Revisi analisis data	Rev	

Dinyatakan selesai tanggal : 14 Januari 2020

Surabaya, 14 Januari 2020

Mengetahui,
Ketua Program Studi,

.....

Pembimbing,

Dr. Rhenny Ratnawati, ST, MT

Mahasiswa,

Alridho Ade Ariyanto

UNIVERSITAS PGRI ADI BUANA SURABAYA
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FORM REVISI TUGAS AKHIR

Nama Mahasiswa : ALFIDHO ADE ARIYANTO
NIM : 16380009 9
Fakultas / Progdi : TEKNIK / TEKNIK LINGKUNGAN
Judul Tugas Akhir : PENGGUNAAN CANGKANG TELUR DAN ZEOLIT SEBAGAI ADSORBEN LOGAM MANGAN DAN KADMIUM PADA AIR LIMBAH LABORATORIUM

Ujian Tanggal : 21 JULI 2020

No Bab.	Tanggal	Materi Konsultasi	Keterangan Catatan	Tanda Tangan Penguji
I	28-7-2020	Teori adsorpsi	acc	
II	28-7-2020	Saran		
III	31-7-2020	Interpretasi data	acc	
IV	31-7-2020	Data analisis		
V				

Disetujui Dosen Penguji
Pada Tanggal, 4 AGUSTUS 2020

Penguji I,

( )

Penguji II,

( )

1. a. Penyelesaian Revisi paling lambat 2 minggu dari pelaksanaan Ujian Tugas Akhir.
   b. Pengetikan, penjilidan, penandatangani Tugas Akhir dan mengumpulkan Tugas Akhir paling lambat 2 minggu dari revisi.
2. Apabila sampai batas waktu tersebut (point 1,a dan b) mahasiswa belum menyelesaikan revisi dan tanda tangan, maka **Ujian dinyatakan Gugur**.
3. a. Foto copy Form Revisi diserahkan ke Program Studi.
   b. Tugas Akhir yang sudah direvisi diserahkan ke Fakultas tiga eksemplar untuk dijilid.