اللجنة الأكاديمية للهندسة المدنية

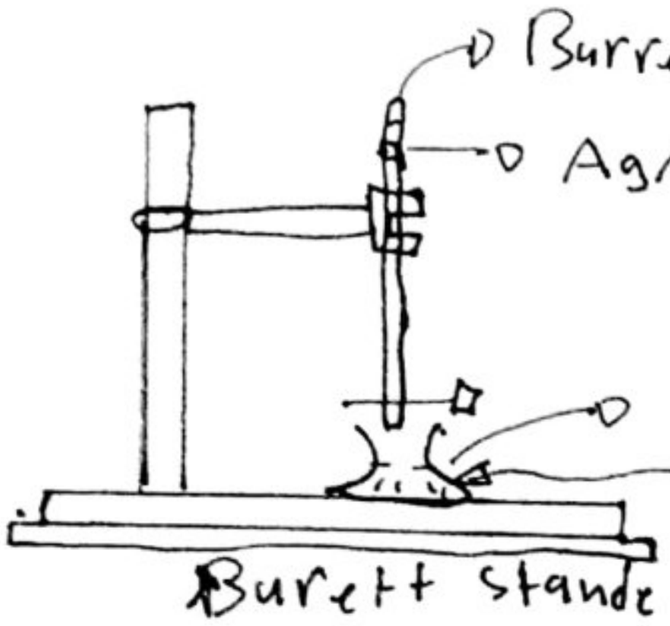
تقارير لاب البيئة

Chloride

funnel

Pipette

measuring cyliader



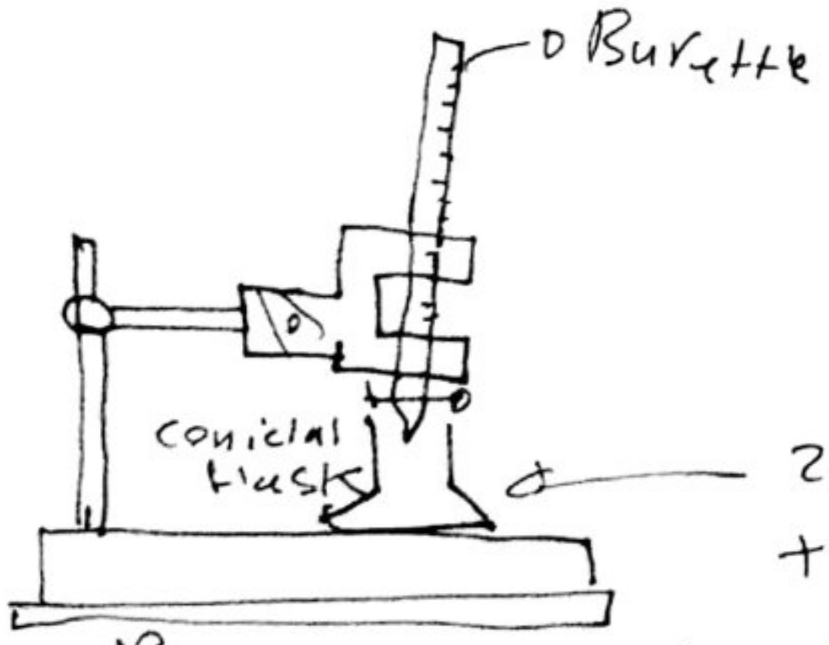
conical flask

20 ml sa mample

1 ml Potasium chromate

K_2CrO_4 indicator

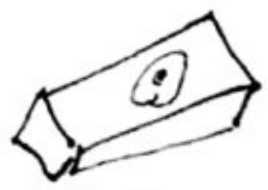
Residual chloride



Spatula

Pipette

funnel



Balance

200 ml of sample
+5ml of Acceticasid
+1 g of KI
+ 1 ml of starch indicator

Hashemite University
Factuality of Engineering- Civil Engineering Department
110401456 Environmental Laboratory

Chloride & Residual Chlorine experiments

Student Name	Eyas Hamad	Student ID	1832447
Section No.	Sunday	Date of experiment	2/28/21

Draw the titration process and named each equipment and chemical used.

Chloride	Residual Chlorine

Results:

Table 1: Determination of Chloride:

Sample No.	Volume of sample (ml)	Burette Reading (ml)		Volume of $AgNo_3$ (ml)	Chloride (mg/l)
		Initial	Final		
Blank	20	*0*	*0.1*	0.1 mL	—
1	20	*0.1*	*4.5*	4.4 mL	209.935
2	20	*4.5*	*8.7*	4.2 mL	
			Avg	4.3	

Sample of Calculations:

V of $AgNo_3$ Blank = 0.1 − 0 = 0.1 mL

V of $AgNo_3$ No.1 = 4.5 − 0.1 = 4.4 mL

V of $AgNo_3$ No.2 = 8.7 − 4.5 = 4.3 mL

Chloride = [(Vavg − VBlank) * N_{AgNO_3} × 35.45 × 10^3] / Vsample

= [(4.3 − 0.1) × 0.0282 × 35.45 × 10^3] / 20 = 209.935 mg/L

Is your water sample acceptable for human uses or not, why?

acceptable because under 250 [gm/mL]

Table 2: Determination of Calcium Residual Chloride:

Sample No.	Volume of sample (ml)	Burette Reading (ml)		Volume of $Na_2S_2O_3$ (ml)	Residual Chlorine (mg/l)
		Initial	Final		
1	200	0	2.1	2.1	3.72
2	200	2.1	4.3	2.2	3.9 ~~3.811~~ mg/L
			Avg	2.15 ml	3.811

Sample of Calculations:

V of sampl #1 = 2.1 − 0 = 2.1 / V #2 = 4.3 − 2.1 = 2.2

Vavg = [2.1 + 2.2]/2 = 2.15

Rchlorine = $\frac{2.15 \times 0.01 \times 35.45 \times 10^3}{200}$ = 3.811 mg/L

Is your water sample acceptable for human uses or not, why?

Not accepted, becuse 3.811 > 0.2 [mg/L]

1. Complete the following:

1. The chlorination in water and wastewater is used to ..destrag or deactive dise se Propusing..... The residual chlorine is maintained in water to promote the primary purpose of chlorination. In your experiment determine the residual chlorine using .Iademetric.. method.

2. Determine if sentences below are True or False, and correct the false:

1. End point of residual chlorine experiment is disappearance of blue color.....T.....
2. Concentration of chlorine available for disinfection called chlorine demand..F.....
3. Chlorine added to water as gas or solid.....T.... (total chlorine)
4. Potassium iodine used to acidify the sample.....F.....(acetic acid)
5. The liberated iodine is titrated against $AgNO_3$..... F (Na2S2O3)
6. Starch was used as indicator in residual chlorine experiment.....T
7. Chromate reacted with chloride ions..... F (react with silver ions (Ag3+)
8. Burette was using for filling the known concentration solution in it..... T

Hashemite University
Factuality of Engineering- Civil Engineering Department
110401456 Environmental Laboratory -Total Hardness and Calcium Hardness

Student Name: Eyas Hamad **Student ID:** 1838447

Define total harness: The sum of calcium and magnesium concentradion

Define calcium harness: The concentration of calcium only

Results and Calculations:

Table 1: Determination of Total Hardness:

Sample No.	Volume of sample (ml)	Burette Reading (ml)		Volume of EDTA (ml)	Total Hardness (mg/l as CaCo3)
		Initial	Final		
1	20	0	4.1	4.1	205 mg/L as $CaCo_3$
2	20	6.1	10.3	4.2	
3	20	10.3	14.3	4	
			Avg. volume	4.1	

Vof EDTA for 1 = $V_f - V_i$ = 4.1 − 0 = 4.1 ml

avg. V = $\frac{V_1+V_2+V_3}{3} = \frac{4.1+4.2+4}{3}$ = 4.1 ml

Total hardness = $\frac{V_{EDTA} \times N_{EDTA} \times 50 \times 10^3}{Vol\ sample}$

$\frac{4.1 \times 0.02 \times 50 \times 10^3}{20}$ = 205 mg/L as $CaCo_3$

Table 2: Determination of Calcium Hardness:

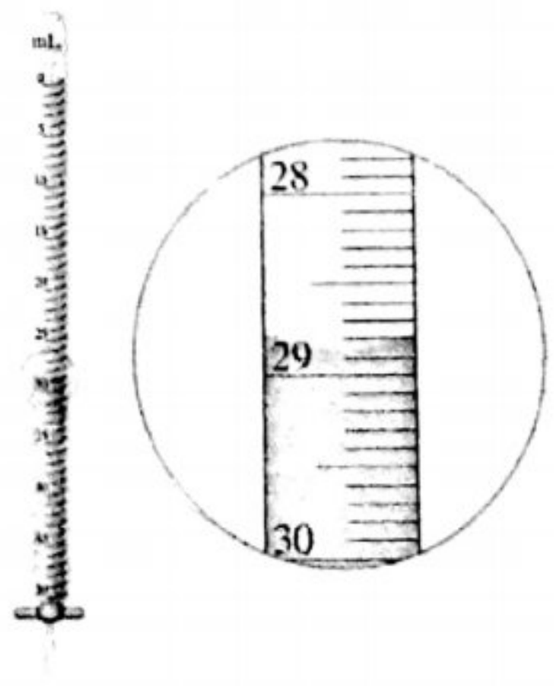
Sample No.	sample volume (ml)	Burette Reading (ml)		Volume of EDTA (ml)	Calcium Hardness (mg/l as CaCo3)	Ca+2 (mg/l)	Magnesium Hardness (mg/l as CaCo3)	Mg+2 (mg/l)
		Initial	Final					
1	20	14.3	17.1	2.8	$\frac{2.867 \times 0.02 \times 50 \times 1000}{20}$ = 143.35 mg/L	57.34 mg/L	205 − 143.35 = 61.65	14.74 mg/L
2	20	17.1	19.8	2.7				
3	20	19.8	22.9	3.1				
		Avg volume		2.867				

0.4 × 143.35

0.24 × 61.65

Depend on the figure below answer the following:

What is the name of this equipment? Burette
What is the reading in the section? 28.9 mL
What is the name of chemical filled in it? EDTA
What is the concentration of it? 0.02 N



1

Fill in the table below if the sentences is True or False:

1	2	3	4	5	6	7
T	T	T	F	F	F	F

1. Calcium hardness is not known to have any adverse health effects.
2. EDTA complexes with Mg and Ca cations
3. Calcium hardness as $CaCO_3$ can always be obtained by multiplying the Ca^{2+} concentration by a factor of (2.5).
4. Flask contain a solution of an unknown concentration and known volume
5. Adding NaOH solution to the sample in total hardness to reach pH (12-13) value.
6. Total hardness end point reached when the solution turn to wine red.
7. $T.H = Ca^{+2}+Mg^{+2}$

A sample has 150mg/L Ca^{2+}, 50mg/L Mg^{2+}. Calculate its Calcium hardness and total hardness?

Ca hardness = $150 \times 2.5 = 375$ mg/L as $CaCO_3$

Mg hardness = $50 \times \frac{100}{24} = 208.33$ mg/L as $CaCO_3$

Tot hardness = 583.33 mg/L as $CaCO_3$

Hashemite University
Factuality of Engineering- Civil Engineering Department
110401456 Environmental Laboratory –Avidity and Alkalinity

Student Name: Eyas Hamad **Student ID:** 1838447

Define Acidity: The capacity of water neutralize bases

Define Alkalinity: The capacity of water absorb H^+ ions to neutralize acid(Ac) without significant change in Ph

Results and Calculations:

1: Determination of Alkalinity:

Table 1.1: Determine with Phenolphthalein indicator:

Sample No.	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of H_2SO_4 (ml)	Phenolphthalein alkalinity (mg/l as $CaCo_3$)
1	100	6.3	6.8	0.5	9
2	100	0.1	1.4	1.3	
			Avg volume	0.9	

Palkalinity $= \frac{(0.9)(0.02)(50\times18)}{100} = 9$ mg/L as $CaCO_3$

Table 1.2: Determination with Mixed indicator

Sample No.	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of H_2SO_4 (ml)	Total alkalinity (mg/l as $CaCo_3$)
1	100	6.8	52.8	46	467
2	100	1.4	47	45.6	
			Avg volume	45.8	

Tot alkalinity $= \frac{(45.8+0.9)(0.02)(50\times18)}{100} = 467$ mg/L as $CaCO_3$

Depend on your results whats the relation between P and T alkalinity and determine what are the alkalinity forms? Named them and calculate their values.

Palkalinty $= 9 < \frac{1}{2}T$

from of alkalinty	Symbol	format	Value
Carbonate	CO_3^{-2}	2P	18
Bicrbonate	HCO_3^-	T-2P	467-18=449
Hydroxide	OH^-	—	zero

A 100 ml of a water sample required 20 ml 0.2N Sulphuric acid using methyl orange as indicator, but did not give any coloration with phenolphthalein. What is(are) type(s) of alkalinity is present?

P=0

$T = \frac{20\times0.2\times50000}{100}$ → 2000 = HCO_3^-

Total alkalinty →

2. Determination of Acidity

Table 2.1: Determine with Methyl Orange indicator:

Sample No.	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of NaOH(ml)	Mineral Acidity (mg/l as $CaCo_3$)
1	100	13	13	0	0
2	100	17.7	17.7	0	
			Avg volume	0	

Mineral Acidity = $\frac{0 \times 0.02 \times 50 \times 10^3}{100}$

= 0

Table 2.2: Determination with Phenolphthalein indicator

Sample No.	Volume of sample (ml)	Burette Reading (ml) Initial	Final	Volume of NaOH(ml)	Total Acidity (mg/l as $CaCo_3$)
1	100	13	17.7	4.7	43 mg/L
2	100	17.7	21.6	3.9	
			Avg volume	4.3	

Tot Acidity = 43 mg/L as $CaCo_3$

$\frac{(4.3+0)(0.02)(50 \times 10^3)}{100}$

Determine if the sentences are True or False:

T 1. Phenolphthalein indicator turns to colorless in acidic solutions.

F 2. Red color indicate that sample is Alkaline .

F 3. High alkalinity level are harmful for aquatic life.

T 4. Acidity and Alkalinity are expressed in term of mg/l as $CaCO_3$.

F 5. Titrant used in Alkalinity experiment is NaOH.

F 6. First end point in alkalinity neutralized all OH^- when color change from coloreless to pink.

F 7. pH increased as more acid added.

F 8. Mineral acidity is measured by titration to a pH of about 8.3 and its called Methyle orang acidity.

F 9. This apparatus  called a flask its filled with a solution of a known concentration

T 10. A burette contain a solution of a known concentration and known volume

Hashemite University
Factuality of Engineering- Civil Engineering Department
110401456 Environmental Laboratory – Jar test and Solids Experiment

Student Name	Eyas Hamad	Student ID	1832447
Section No.	1	Date of experiment	3/28/2021

Define Total Fixed Solid:

Data and Result:

Description		Weight (g)
Initial weight of Crucible(g)	W1	75.7708
Final weight of Crucible + Sample (After drying at 103°C)	W2	75.7868
Weight of residue (g)	Wr	0.016
Volume of Sample(ml)	V	25
Final weight of Crucible + Ash after ignition	W3	75.7722
Total Solid (mg/l)	**TS**	640 mg/L
Total Fixed Solid (mg/l)	**TFS**	56 mg/L
Total Volatile Solid (mg/l)	**TVS**	584 mg/L

Determine if the sentence below is True or False and correct the wrong one.
Fill your answer in the table below

	1	2	3	4	5	6	7	8	9	10
T or F	F	T	F	T	T	T	F	T	F	F
Correct										

TSS+TDS = TFS+TVS Increase Iron fluoride lowest turbidity $C_1V_1 = C_2V_2$ $C_1 \times 1000 = 10^4 \times 20$ $C_1 = 200$ mg/L FeCl3 / Ferric chloride

1. TVS+TDS=TSS+TFS
2. As Turbidity of water sample increase the TS increase also.
3. As waste strength increase the TS decrease.
4. Dessicator is a device used for cooling a heated sample to room temperature.
5. The weight lost during the ignition represents the Total Volatile solids.
6. Flocculation is a slow mixing technique which promotes agglomeration and helps the particles to settle down
7. Alum is the coagulant used in your experiment.
8. Measure the turbidity of each beaker using a turbidity meter
9. Optimum coagulant dose is considered as the amount of coagulant which produces water with highest turbidity.

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10.20 mg/l is the dosage required for phosphorus removal using a dosage of 20 ml of a 1% ferric chloride solution in a liter of wastewater.

Depending data below draw the diagram between turbidity and concentration of coagulant. Then Find the optimum dosage, which the beaker has more turbidity?

Beaker #	Vol. of coagulant(ml)	Concentration of coagulant(mg/l)	Turbidity (NTU)
1	1	10	60
2	4	40	55
3	6	60	35
4	9	90	20
5	12	120	30
6	15	150	45

$C_1 V_1 = C_2 V_2$

$C_1 \times 1000\ ml/L = 10^4\ mg/L \quad \rightarrow C_1 = 10\ mg/L$

$$TS = \frac{(W_2 - W_1)g \times 10^5\ \frac{mg}{g} \times 10^3}{V\ of\ sample} = \frac{75.786 - 75.7708 \times 10^6}{25}$$

$$= 640\ mg/L$$

$$TFS = \frac{(W_3 - W_1) \times 10^6}{V} = \frac{(75.772 - 75.7708)\ 10^6}{25} = 56\ mg/L$$

$$TVS = \frac{(W_2 - W_3) \times 10^6}{V} = \frac{(75.786 - 75.7722)\ 10^6}{25} = 584\ mg/L$$

Weight of residue (g) = 0.016

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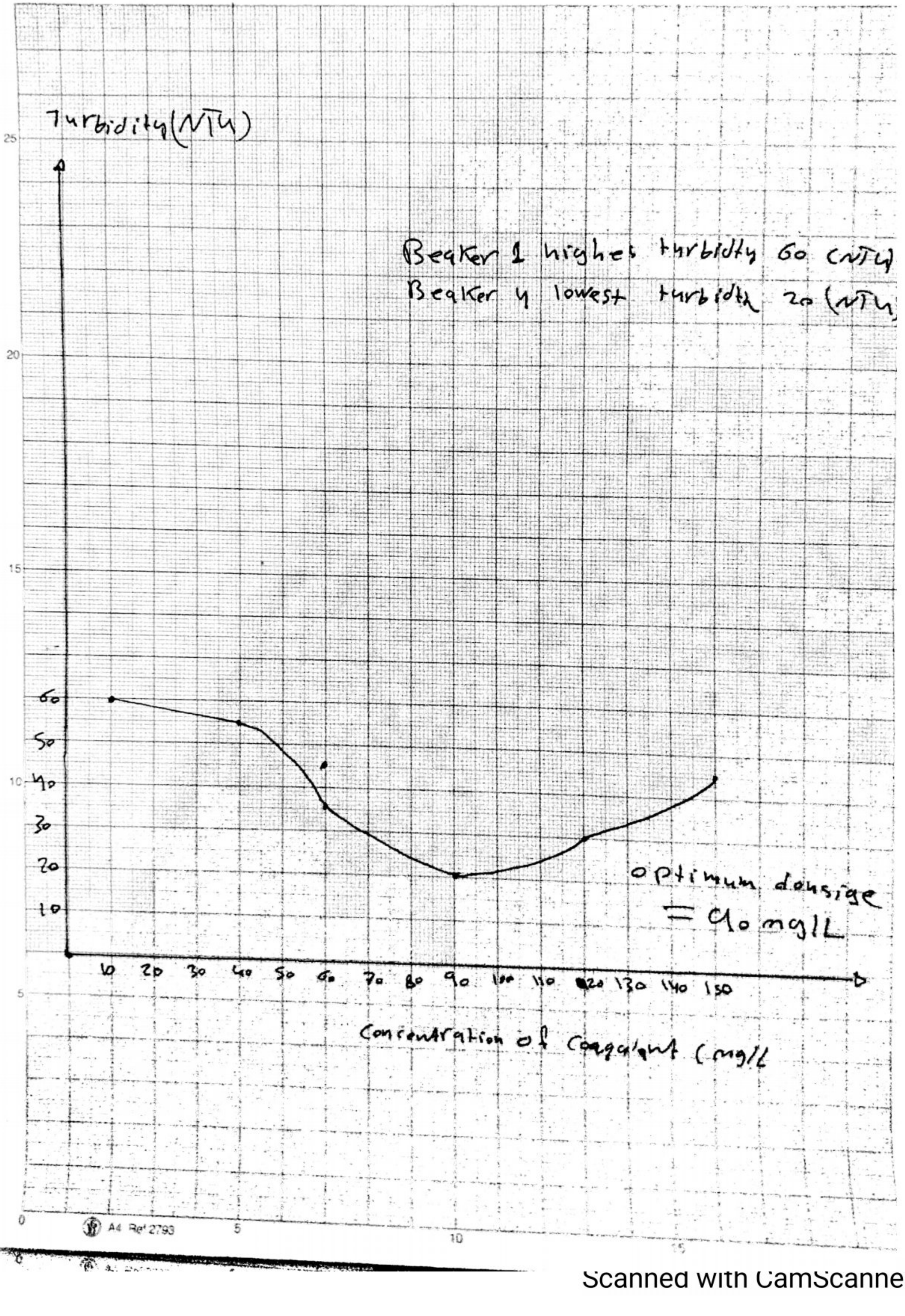
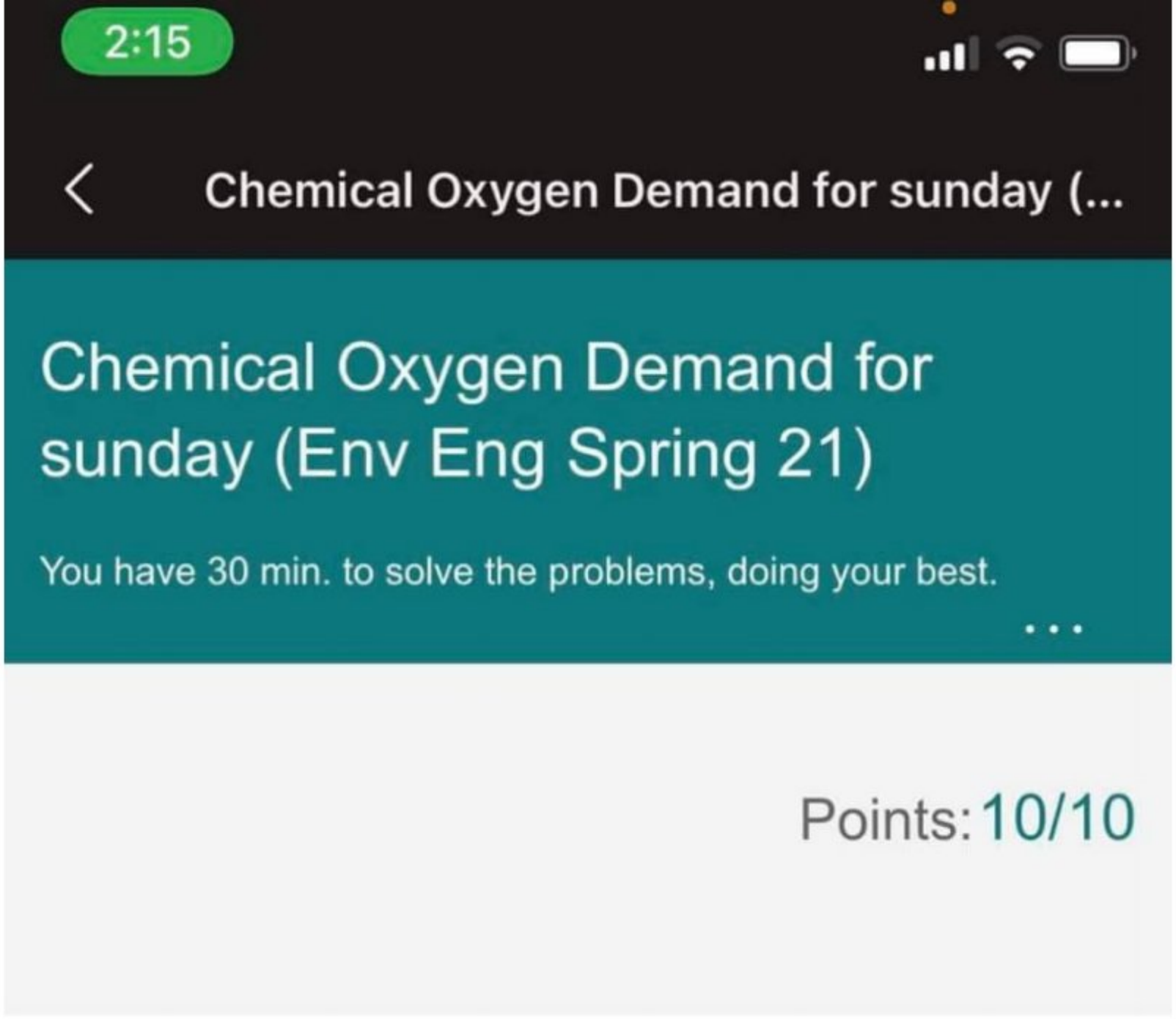
Turbidity (NTU)

Beaker 1 highest turbidity 60 (NTU)
Beaker 4 lowest turbidity 20 (NTU)





1

The volume of sample taken was: *
(1/1 Point)

- 1.5
- 2.5 ✓
- 3.5
- 7.5

2

Place the COD vials into a block

1

The volume of sample taken was: *
(1/1 Point)

- 1.5
- 2.5 ✓
- 3.5
- 7.5

2

Place the COD vials into a block digester at 150°C and heat for: *
(1/1 Point)

- 1 hour
- 2 hours ✓
- 3 hours
- 4 hours

3

The organic matter present in sample oxidized completely by: *
(1/1 Point)

- KCr2O4
- K2Cr2O7 ✓
- H2SO4
- HgSO4

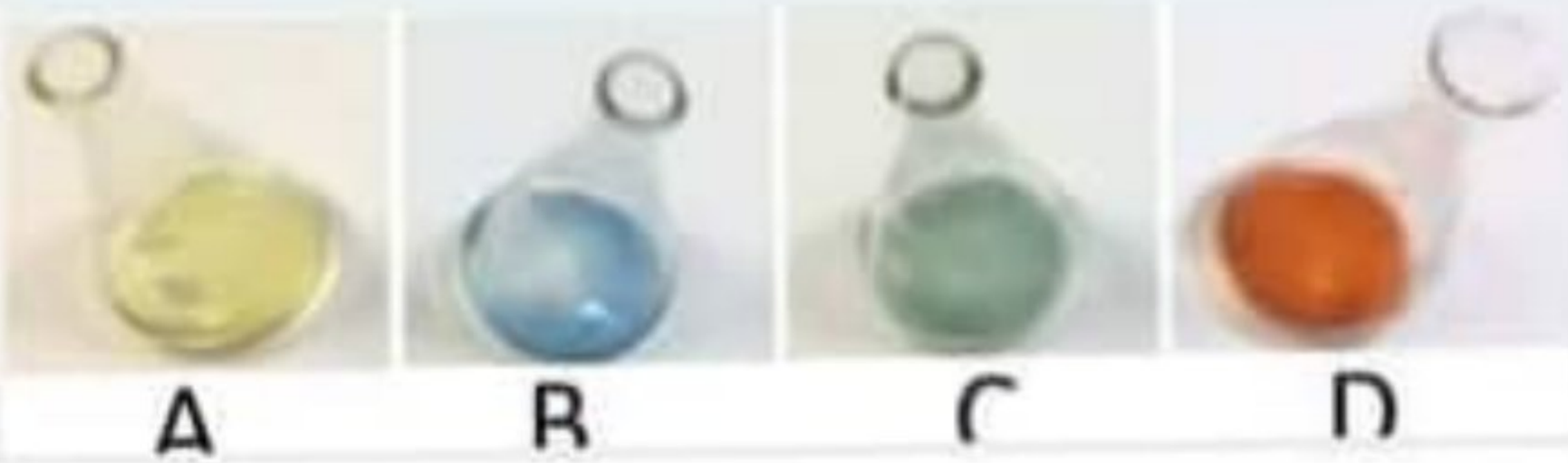
4

After COD analysis the product formed are (is): *
(1/1 Point)

- CO & H2O
- COD & CO2
- CO2 & H2O ✓
- H2O & COD

5

Arrange the procedure below: *
(1/1 Point)



A, B, C, D

A, C, B, D ✓

6

After Adding sulphuric acid reagent, the vials will be: *
(1/1 Point)

Hot ✓

Cold

Natural

Room Temperature

Find the COD concentration in the sample below. * Factor is 8 *
(1/1 Point)

Type of sample	Volume of sample (ml)	Burette Reading (ml)		Volume of 0.1N FAS (ml)	COD (mg/l)
		Initial	Final		
blank	2.5	30.5	33.5		
sample			35.5		

- 320 ✓
- 160
- 80
- 40

8

COD test used for determining amount of inorganic compounds in water. *
(1/1 Point)

- True
- False ✓

9

COD abbreviation is Chemical Operation Demand. *
(1/1 Point)

- True
- False ✓

10

The dichromate consumed by the sample is equivalent to the amount of O2 required to oxidize the organic matter. *
(1/1 Point)

- True ✓
- False

Go back to thank you page

1. 30 mL of wastewater are placed in a 300 mL BOD bottle. The sample is diluted to fill the bottle. The DO concentrations at the beginning and the end of 5-day incubation period are 7.3 mg/L and 1.8 mg/L respectively. What is the BOD? *
(1 Point)

- 0.55mg/l
- 5.5mg/l
- 55mg/l
- 11mg/l

2. The full form of BOD is: *
(1 Point)

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2. The full form of BOD is: *
(1 Point)

- ○ Biodegradable oxygen demand
- ○ Biochemical oxygen demand
- ● Biological oxygen demand
- ○ Bandwidth on demand.

3. What happens if BOD is high? *
(1 Point)

- ○ Oxygen is depleted rapidly in the stream.
- ○ Less oxygen is available to higher

3. What happens if BOD is high? *
(1 Point)

- Oxygen is depleted rapidly in the stream.
- Less oxygen is available to higher forms of aquatic life.
- **Aquatic organisms will die**
- All above

4. BOD is: *
(1 Point)

- **Test of the level of organic matter that can be biologically oxidized**
- Test of the amount of organic matter that can be chemically oxidized.
- Test of the amount of oxygen required by plant during night

5. Take waste sample in BOD bottle and then dilute bottles with diluted water. Add nutrients & micro-organisms then Measure DO over 5 days is: *
(1 Point)

- ○ Dilution factor
- ○ Diluted water
- ○ Distilled water
- ● Procedure of BOD5

6. BOD is expressed as: *
(1 Point)

- ○ mg of oxygen required per liter of wastes (mg/L)
- ● mg of oxygen required per liter of wastes (mg/L) as $CaCO_3$
- ○ ppm

7. Calcium sulphate is added as nutrients *
(1 Point)

- ◯ True
- ● False

8. The brown precipitate formed after addition of MnSO4 and Alkali Azide called Manganese oxide. *
(1 Point)

- ● True
- ◯ False

9. Temperature at which a sample is standardized to test is 20°C *

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9. Temperature at which a sample is standardized to test is 20°C *
(1 Point)

- True
- False

10. Endpoint of titration is changing the color to: *
(1 Point)

- Colorless
- Dark blue
- Blue
- Yellow

7. Calcium sulphate is added as nutrients *
(1 Point)

- ○ True
- ● False

8. The brown precipitate formed after addition of MnSO4 and Alkali Azide called Manganese oxide. *
(1 Point)

- ● True
- ○ False

9. Temperature at which a sample is standardized to test is 20°C *

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