Lab 1

Introduction

Alkalinity is a primarily way of measuring the acid neutralizing capacity of water, in other words it's the ability to maintain a relatively constant PH.

The possibility to maintain constant PH is due to the hydroxyl, carbonate and bicarbonate ion present in water.
The ability of natural water to act as a buffer is controlled in part by the amount of calcium and carbonates ions in solution.

Carbonate ion and calcium ion both come from calcium carbonate or limestone.
So water that come in contact with limestone will contain high levels of both Ca^{++} and CO_3^{-2} ions and have elevated hardness and alkalinity .

Objective

-To determined the Alkalinity of specific volume liquid quantity.
- Calculate the total Alkalinity

Theory

Alkalinity is a measure of the capability of water to absorb H^+ ions without significant change of pH. In other words, alkalinity is a measure of the acid buffering capacity of water.
The determination of alkalinity of water is necessary for controlling the corrosion.

- We can calculate Alkalinity using the following equation

$$\text{as } CaCO_3 \text{ mg/L} = \frac{A * N * EW_{CaCO3} * 10^3}{V}$$

Where …
A = The volume of titration solution (H_2SO_4)

N = Normality of titration solution H_2SO_4 (0.02).
EW_{CaCO3} = 50g
V = The volume of the sample (ml)

- Also the total Alkalinity can be calculated using the following equation

$$\text{Total Alkalinity} = \text{Ph.Ph alkalinity} + \text{M.O Alkalinity}$$

Tools and reagents

1- Burette (100ml)
2- pipette
3-conical flask
4- beakers
5-H_2SO_4 (N = 0.02)
6- Phenolphthalein (Ph.Ph)
7- Methyl orange (M.O)
8- samples of water

Procedures

1- fill the burette titration solution H_2So4 (0.02 N) using the funnel.
2- Take a specific volume for the water sample (50 ml.)
3- Add a little quantity of phenolphthalein (ph.ph) , if the color changed to Pink then there exist strong alkalinity in the sample ($8.3 < PH < 10$).
4-Start titration until back to color less water then calculates the value of ph.ph alkalinity.
5- Add methyl orange (M.O) we will observant the color change again to orange or to red the change in the color depended on PH value.
6- Do titration again and find the methyl orange alkalinity .
7- Finally calculate the total alkalinity by adding the results (ph.ph + M.O).

Calculations and Results

$$\text{as } CaCO_3 \text{ mg/L} = \frac{A * N * EW_{CaCO3} * 10^3}{V}$$

Total Alkalinity = Ph.Ph alkalinity + M.O Alkalinity

-For the first sample…

A_{H2SO4} = 8ml N = 0.02 V_{sample} = 50ml EW_{CaCO3}= 50g

Ph.Ph Alkalinity = 0

$$\text{Carbonate Alkalinity} = \frac{8 * 0.02 * 50 * 10^3}{50}$$

= 160 mg/L as $CaCO_3$

Total Alkalinity = 0 + 160

160 mg/L as $CaCO_3$

Sample's number	Sample's volume (ml)	Ph.Ph alkalinity A_{H2SO4} (ml)	M.O alkalinity A_{H2SO4} (ml)	Total A_{H2SO4} (ml)	Ph.ph Alkalinity (Mg/L) as $CaCo_3$	M.O Alkalinity (Mg/L) as $CaCo_3$	Total Alkalinity (mg/L) as $CaCo_3$
1	50	0	8	8	0	160	160
2	50	21	6	27	420	120	540
3	50	0	0	0	0	0	0
4	50	4	7	11	80	140	220

5	50	8	9	17	160	180	340

Conclusion

The amount of Alkalinity Allowed to be in water is **80-200 mg/L** for typical drinking water. Alkalinity is basically dissolved minerals in the water that help neutralize the water we drink.

Sample's number	The Total Alkalinity as $CaCO_3$ (mg/L)	comment
1	160	Drinkable ☑
2	540	Undrinkable ☒
3	0	Undrinkable ☒ (Acidic Sample)
4	220	Undrinkable ☒
5	340	Undrinkable ☒

Lab 2

Determination chloride ion in water

Introduction

Chloride in the form of chloride (Cl^-) ion is one of the major inorganic anions in water and wastewater. The chloride concentration is higher in wastewater than in raw water because sodium chloride is a common article of diet and passes unchanged through the digestive system (Average estimate of excretion: 6 g of chlorides/person/day; additional chloride burden due to human consumption on wastewater: 15 mg/L).

Objective

Determine chloride ion concentration in a water's samples.

Theory

$$\text{Chloride } Cl^- \text{ mg/L} = \frac{(A-B) * N * EW_{Cl^-} * 10^3}{V_{sample}}$$

Where …

A = volume of titration solution ($AgNO_3$) for the sample.
B = ml of titration for the blank.
N = Normality for titration solution ($AgNO_3$).
EW = Equivalent weight for Cl^- (35.5 g/mole).
V = the volume of the sample (ml).

Tools and reagents

1- Pipette.
2- Burette.
3- Indicator solution K_2CrO_4.
4-water's samples.
5-standard Flask.
6-beaker.
7- Funnel.
8- $AgNO_3$ (0.014 N)

Procedures

1- Take a sample (volume=100 ml).
2- Fill the burette by titration solution $AgNO_3$[0.014 N] using the funnel.
3- Add 1 ml of Indicator solution K_2CrO_4 to the sample, the color will change to yellow.
5- Start titrates until the color change to red.
6-recored the volume of $AgNO_3$ from titration then calculates Cl^- concentration.

Calculations

For the first sample …

$A_{AgNO3} = 13ml$ B=1ml $EW_{Cl^-} = 35.5g/mole$
$N_{AgNO3} = 0.014$

$$Cl^- = \frac{(13-1) * 0.014 * 35.5 * 10^3}{100}$$

$$= 59.64 \text{ mg/L}$$

Sample's number	Sample's volume (ml)	A_{AgNO3} (ml)	B_{blank} (ml)	Cl^- Mg/L	Comment
1	100	13	1	59.64	Drinkable ☑
2	100	34	1	164.01	Drinkable ☑
3	100	36	1	173.95	Drinkable ☑
4	100	38	1	183.89	Drinkable ☑
5	100	25	1	119.28	Drinkable ☑

Conclusion

The importance of calculating chloride concentration in water samples is to know the amount of salinity for it and the TDS.

The world health organization (WHO) identified the suitable ratio of Cl^- in drinking water (250 mg/L) .

Lab 3

determine the Chlorine concentration in water

Introduction

Chlorine is a chemical element with symbol Cl and atomic number 17. It has a relative atomic mass of about 35.5. Chlorine is in the halogen group (17) and is the second lightest halogen, following fluorine. The element is a yellow-green gas under standard conditions, where it forms diatomic molecules . Chlorine has the highest electron affinity and the third highest electro negativity of all the reactive elements. For this reason, chlorine is a strong oxidizing agent. Free chlorine is rare on Earth, and is usually a result of direct or indirect oxidation by oxygen.

Objective

To determine the Chlorine concentration in water's samples.

Theory

$$\text{Chlorine } Cl_2 \text{ mg/L} = \frac{A * N * EW_{Cl2} * 10^3}{V}$$

Where ..

A= ml of titration solution ($Na_2S_2O_3$)

N = Normality for titration solution ($Na_2S_2O_3$).

EW = Equivalent weight for Cl_2 (35.5 g/mole).

V = the volume of the sample (ml).

Tools and reagents

1- Burette
2- Pipette
3- Flask
4- Starch
5- Water's samples
6- Beaker
7- $Na_2S_2O_3$ (N=0.01)
8- Asitic acid
9- KI (1g)

Procedure

1- Take a sample of water (volume=100 ml).
2. Add 5 ml acetic acid.

3. Add 1g of KI , the color will change to yellow which mean there exist Cl_2 in the sample.

4- Start titration until the color lightens up.

5. Add 1 ml of starch, the color will change to Blue.

6. Start titration again until the color disappear.

7-Calculate the chlorine concentration in water sample.

Calculations

For the first sample …

$A_{Na2S2O3} = 6ml$ $EW_{Cl2} = 35.5g/mole$ $N_{Na2S2O3} = 0.01$

$V_{sample1} = 100ml$

$$\text{Chlorine } Cl_2 \text{ mg/L} = \frac{A * N * EW_{Cl2} * 10^3}{V}$$

$$= \frac{6 * 0.01 * 35.5 * 10^3}{100}$$

$$= 21.3 \text{ mg/L}$$

Sample's number	Sample's volume (ml)	$A_{Na2S2O3}$ (ml)	Chlorine Cl_2 mg/L	Comment

1	100	6	21.3	Undrinkable ☒
2	100	4	14.2	Undrinkable ☒
3	100	11	39.05	Undrinkable ☒
4	100	19	67.45	Undrinkable ☒
5	100	26	92.3	Undrinkable ☒

Conclusion

Chlorine has been the most widely used disinfectant and is the primary disinfectant for drinking water in the world. There is concern in the scientific and regulatory community over the use of chlorine compounds to disinfect drinking water. This stems from the potential adverse health effects of the chemical by-products found in water as a result of their use. The amount of Cl_2 in natural drinking water is (1-1.5 mg/L).

Lab 4

prepare solutions

Introduction

Many experiments involving chemicals call for their use in solution form. That is, two or more substances are mixed together in known quantities. This may involve weighing a precise amount of dry material or measuring a precise amount of liquid. Preparing solutions accurately will improve an experiment's safety and chances for success.

Objective

- prepare H_2SO_4 solution with normality (0.02) .
- prepare NaCl solution with normality (0.02) .

Theory

when we prepare solutions we must calculate the required amount of the material that we need in grams , then calculating Normality and Morality .

$$N = \frac{\text{Weight of solute}}{\text{equivalent weight of solute} \times \text{Volume (L)}}$$

$$M = \frac{\text{mole of solut}}{\text{volume of solution(L)}}$$

$$EW = \frac{MW}{Z}$$

- Where z = valence electrons.

In addition we ues Dilution low to prepare our solutions by equation

$$N_1V_1 = N_2V_2$$

Tools and reagents

1- Graduated Cylinder 2- Balance 3- Volumetric flask
4- Distilled water 5- H_2SO_4 6- NaCl
7- Magnetic stirr 8-funnel 9-Beaker

Procedures

- For H_2SO_4 solution

1- weigh 4.9g of H_2SO_4 , then → 4.9/1.84 = 2.66 ml →
2.66

2- using a clean glass funnel , transfer the solution (2.609ml) into a Volumetric flask . wash out the beaker with H_2O number of times and transfer the washing to the flask .

3- carefully add the solution to the Volumetric flask (1L) , then add water to the mark on the neck .

4- stopper Volumetric flask and shake to ensure the solutions is throughly mixed .

5- Take (200) ml of the stock solution according to the calculations and add water to the mark on the neck .

- For NaCl Solution

1-weigh 5.844g of NaCl using the balance .

2- using a clean glass funnel trasnfer it into the beaker and dissolve it in a small amount of water , ensure all solid has dissolved .

3- add the solution to the Volumetric flask (1L) , then add water to the mark on the neck .

4- stopper Volumetric flask and shake to ensure the solutions is throughly mixed .

5- Take (200) ml of the stock solution according to the calculations and add water to the mark on the neck .

Calculations

H_2SO_4 EW = 49 g N_{stock}=0.1 V = 1000ml N H_2SO_{4} = 0.02

N_{NaCl} = 0.02 EW_{NaCl} = 58.44g Z_{NaCl} = 1e Z H_2So_4 = 2e

$$N = \frac{\text{Weight of solute}}{\text{equivalent weight of solute} \times \text{Volume (L)}}$$

For H_2SO_4 …

1.1 = X~~g~~ / (49 → X = 4.9g

$N_1V_1 = N_2V_2$

$0.1V_1 = 0.02$ → V_1 = 200 ml

For NaCl …

Xg = 0.1 1 58.44 → 5.844g

$N_1V_1 = N_2V_2$

$0.1\ V_1 = 0.02\ 1000 \rightarrow\ V_1 = 200$ ml

Lab5
Determination of oxygen dissolved in water

Introduction
The term dissolved oxygen is used to describe the amount of oxygen dissolved in a unit volume of water, Dissolved oxygen (DO) is essential for the maintenance of healthy lakes and rivers, It's a measure of the ability of water to sustain aquatic life.
Dissolved oxygen content of water is influenced by the source , raw water temperature , treatment and chemical or biological processes taking place in the distribution system .

Objective
To determine the amount of dissolved oxygen (DO) in neutral water .

Theory

$$O_2 \text{ mg/L} = \frac{A * N * EW * 10^3}{V}$$

Where ..
A= ml of titration solution ($Na_2S_2O_3$)
N = Normality for titration solution ($Na_2S_2O_3$).
EW = Equivalent weight for O_2 (8 g/mole).
V = the volume of the sample (ml).

Tools and reagents
1- Burette
2- Pipette
3- Starch
4- Burette stand
5- Manganese sulfate solution
6- Water's samples
7- Beakers
8- $Na_2S_2O_3$ (N=0.025)
9- alkaline azide solution (NaI , KI)
10- sulfuric acid
11- $Na_2S_2O_3$ (N = 0.025)

Procedure

1- Take a sample of water (V = 200ml).
2- Add 1ml of $MnSO_4$.
3- Add 1ml of alkaline azaid .
4- Wait until the sediment appear then add 1ml of H_2SO_4 , the color will change to yellow .
5- Add starch , the color will change to blue which mean that there exist I_2 in the sample.
6- Start titration until the color disappear .
7- Calculate DO (mg/L) .

Calculations

For the first sample …

$A_{Na2S2O3} = 12ml$ $EW_{O2} = 8/mole$ $N_{Na2S2O3} = 0.025$

$V_{sample1} = 200ml$

$$O_2 \text{ mg/L} = \frac{A * N * EW * 10^3}{V}$$

$$= \frac{12 * 0.025 * 8 * 10^3}{200}$$

$$= 12 \text{ mg/L}$$

Sample's number	Sample's volume (ml)	$A_{Na2S2O3}$ (ml)	DO mg/L	Comment
1	200	12	12	Drinking water sample
2	200	4	4	Hot sample Low DO
3	200	12.5	12.5	Distilled water
4	200	8	8	Sample has salts
5	200	6	6	Sample has salts

Conclusion

From our experiment, we can conclude that as the temperature of a water sample increases, the amount of dissolved oxygen decreases, thus the percentage of saturation increases. From this, we can determine that warmer water has low oxygen. also the higher salinity in water produce low level dissolving oxygen . Organizations can use this information to help keep track of the oxygen levels in water, which helps them to track its biodiversity.

Lab 6

Determine sulfate ion concentration in a water

Introduction

Sulfate are found in appreciable quantity in all natural waters, particularly high in arid and semi arid regions where natural waters in general have high salt content. Sulfate salts are mostly soluble in water and impart hardness. Water with high concentrations has a bitter test Sulfate may cause intestinal disorders.

Objective

Determine sulfate ion concentration in a water's sample.

Theory

$$SO_4^{-2} \ mg/L = \frac{X_{gram} * 10^6}{V_{Sample}}$$

Where …

X = Mass of (SO_4^{-2}) g.

V = Volume of the sample (ml).

Tools and reagents

1-Dryer 2-Balance 3-Water bath
4-Furance 5-Crucible 6-Ggraduated cylinder 8-Test tube holder 9-Erlenmeyer flasks 10-Filter paper
11-$BaCl_2$ (7ml) 12-HCl (2ml)

Procedures

1-Put sample of water (100 ml) into the flask.

2-Add 5ml of $BaCl_2$ then 2ml .
3-Add 2ml of HCl and put the flask in the furnace , wait until it boils then let it cool down into a water bath .
4- weigh filter paper and the emptey crucible using the balance and recored it.
5- put the funnel on the grduated cylinder then put the filter paper on the funnel and prepare it to filtarate .
6-filtarate the solution.
7-Put the deposit on the crucible then put it into the furance and burn it at 800 C°.
8- after the crucibl get cool down weigh it and record it.
9-Calculate the mass of $BaSO_4$ (weight of the crucible after burning minus weight of the empty crucible minus weight of filter paper).
10-Calculate SO_4^{-2} (mg/L) on the sample.

Calculations

Mass of empty crucible = 55.688g
Mass of filter paper = 1.43g
Mass of crucible after 800C° = 57.459g
Mass of $BaSO_4$ = 57.459 – (55.688 + 1.43) = 0.341g
Sample's volume = 100ml

$$BaSO_4 \rightarrow Ba^{+2} + SO_4^{-2}$$
1mole 1mole 1mole

233g $BaSO_4$ → 96g SO_4^{-2}
0.341 $BaSO_4$ → X_g SO_4^{-2}

$$X_g\ SO_4^{-2} = \frac{96 * 0.341}{233} = 0.145 \text{ g}$$

$$SO_4^{-2} = \frac{0.14 * 10^6}{100} = 1405 \text{ mg/L}$$

Conclusion

The world health organization (WHO) identified the suitable ratio of SO_4^{-2} in drinking water (200 - 400 mg/L) .

Since the concentration in our sample of SO_4^{-2} = 1400 mg/L very bitter taste , the sample should be treated .

Lab 7
determine the solid in water

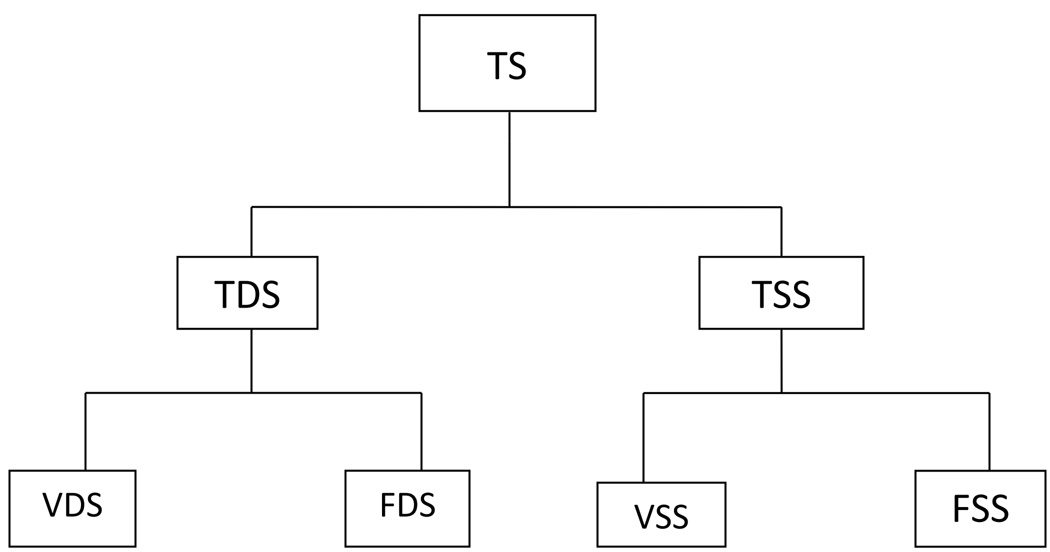
Introduction

Total solids are a measure of the suspended and dissolved solids in water. Suspended solids are those that can be retained on a water filter and are capable of settling out of the water column onto the stream bottom when stream velocities are low. They include silt, clay, plankton, organic wastes, and inorganic precipitates such as those from acid mine drainage. Dissolved solids are those that pass through a water filter. They include some organic materials, as well as salts, inorganic nutrients, and toxins.

Objective

To determine the solid in water's samples.

Theory



TVS = VDS + VSS

TS = TSS + TDS

TS = TVS + TFS

TDS = VDS + FDS

TFS = FDS + FSS

TSS = VSS + FSS

$$TS\ (mg/L) = \frac{A - B}{V} * 10^6$$

$$TDS\ (mg/L) = \frac{A - B}{V} * 10^6$$

$$TSS\ (mg/L) = \frac{A - B}{V} * 10^6$$

$$FSS\ (mg/L) = \frac{A - B}{V} * 10^6$$

Where ..

A = weight of dish after oven.

B = weight of (dish + Filter paper) before oven.

V = volume of the sample.

Tools and reagents

1- Drying oven	2-Balance	3-Furnace
4-water's sample	5-Curicibles	6-graduated cylinder
7-Funnel	8-Filter paper	

Procedure

1-Take a sample of water (volume=50 ml).

2- Weigh the First Crucible (55.686g) then put the sample in it and put the Crucible in oven for 24 hours in a temperature 103-105◦c.

3- Weigh the Crucible after oven (55.961g), Calculate TS .

4-Weigh the second Crucible (48.317g) and the filter paper (1.02g).

5- Filtrate the sample by put the filter in the funnel above graduated cylinder and put the sample in it.

6- Take the filter paper and put it in the crucible number 2 then put the crucible in the oven at temperature 103-105◦c for 2 hour, after that Weigh the crucible (49.544g) and calculate TSS.

- Put the second crucible in the furnace at temperature 550◦c for 1 hour (49.544g).

- weigh it (48.363g), calculate FSS.

7- Weigh the third crucible (50.995g) and put the water we filtrated in cylinder in crucible and put it in the oven 180◦ for 2 hour, Then weigh the crucible (51.061g) , calculate the TDS.

Calculations

$$TS = \frac{55.961 - 55.686 * 10^6}{50}$$

$$= 5500 \text{ mg /L}$$

$$TSS = \frac{55.44 - (48.317+1.02) * 10^6}{50}$$

$$=4140 \text{ mg /L}$$

$$TDS = \frac{51.061 - 50.995 * 10^6}{50}$$

$$= 1320 \text{mg/L}$$

$$FSS = \frac{49.544 - 48.363 * 10^6}{50}$$

$$= 23620 \text{mg /L}$$

Conclusion

TDS in drinking-water originate from natural sources, sewage, urban run-off, industrial wastewater, and chemicals used in the water treatment process, and the nature of the piping or hardware used to convey the water the plumbing.

Environmental Protection Agency (EPA) classifies Total Dissolved Solids (TDS) as a secondary contaminant. It is measured in milligrams per unit volume of water (mg/L) and also referred to as parts per million (PPM).
For drinking water, the maximum concentration level set by (EPA)
Is 500 mg/L.
World Health Organization (WHO) has prescribed an acceptable limit of 500 mg/L.
Presence of TDS beyond 500 mg/L in drinking water decreases palatability and may cause gastrointestinal irritation.

Lab 8

determine the total Hardness in water

Introduction

Hardness or Hard water is water that has high mineral content (in contrast with soft water). Hard water is formed when water percolates through deposits of calcium and magnesium-containing minerals such as limestone, chalk and dolomite. Hard drinking water is generally not harmful to one's health, but can pose serious problems in industrial settings, where water hardness is monitored to avoid costly breakdowns in boilers, cooling towers, and other equipment that handles water. In domestic settings, hard water is often indicated by a lack of suds formation when soap is agitated in water, and by the formation of lime scale in kettles and water heaters. Wherever water hardness is a concern, water softening is commonly used to reduce hard water's adverse effects.

Objective

To determine the total Hardness in water's samples .

Theory

If the sample's color turned to pink that mean that there exist hardness in the sample, if not there isn't hardness in the sample.

-We can calculate Total hardness using the following equation

$$\text{Total Hardness mg/L as } CaCO_3 = \frac{A * N * EW_{CaCO3} * 10^3}{V}$$

Where..

A = The volume of titration solution (EDTA)

N = Normality of titration solution (EDTA) (0.02)

EW_{CaCO3} = 50mg

V = The volume of the sample (ml)

Tools and reagents

1-Burette
2- Graduated cylinder
3- Samples of water
4- EDTA
5- Barkers
6- funnel
7- EBT
8-Buffer solution

Procedures

1. Fill the burette of titration solution (EDTA) using the funnel.
2. Take a specific volume of water (50 ml).
3. Add (1 ml) of buffer solution , that will be sufficient to give a PH of 10 ± .5
4. Add two-three drops of EBT, if the color change to pink then there exist hardness in the sample.
5. Start titration by using EDTA solution until you reach to blue water color.
6. Calculate the Hardness.

Calculations and Results

$$\text{Total Hardness mg/L as } CaCO_3 = \frac{A * N * EW_{CaCO3} * 10^3}{V}$$

-For the first sample

$A = 14ml$ $N = 0.02$ $EW_{CaCO3} = 50g$ $V_{sample} = 50ml$

$$\text{Total hardness} = \frac{14 * 0.02 * 50 * 10^3}{50}$$

$$= 280 \text{ mg/L as } CaCO_3$$

Sample's number	Sample's volume (ml)	A_{EDTA} (ml)	Total Hardness Mg/L as $CaCO_3$
1	50	14	280
2	50	20	400
3	50	16	320
4	50	18	360
5	50	22	440

Conclusion

Water described as "hard" is high in dissolved minerals, specifically calcium and magnesium.

Since the allowable amount of hardness in drinking water is 500mg/L as Jordan standards so our sample are drinkable☑.

Sample's number	Total Hardness Mg/L as CaCO3	Comment
1	280	Moderately hard
2	400	Very hard
3	320	Very hard
4	360	Very hard
5	440	Very hard

Lab 9

determine oil and grease concentration in the water

Introduction

The concentration of dispersed oil and grease (OG) is an important parameter for water quality and safety. OG in water can cause surface films and shoreline deposits leading to environmental degradation, and can induce human health risks when
discharged in surface or ground waters.
Additionally, OG may interfere with aerobic
and anaerobic biological processes and lead to decreased wastewater treatment fficiency. Regulatory bodies worldwide set limits in order to control the amount of OG entering natural bodies of water or reservoirs through industrial discharges, and also to limit the amount present in drinking water.

Objective

To determine oil and grease concentration in the water's sample .

Theory

$$\text{Oil mg/L} = \frac{Xg * 10^6}{V}$$

Where ..
V = the volume of the sample (ml).
X = grams of oil and grease ($W_2 - W_1$).

Tools and reagents

1-Desiccator
2- Balance
3- Heater
4- Condenser
5- thermometer
6- Flask
7-graduated cylinder
8-Separation funnel.
9- Chloroform ($CHCl_3$)
10- Pipette and funnel

Procedure

1- Take a sample of water (100ml) .
2- Put it in the separation funnel and add 2ml of HCl.
3- Add 20 ml of $CHCl_3$.
4- Weigh the empty flask (W_1 = 66.194g).
5- Open the valve until the oil an $CHCl_3$ come down.
6- Add 5 ml of $CHCl_3$.
7- Put the sample on the heater and do distillation to separate oil and grease from $CHCl_3$.
8- Leave the sample until it cool down and weigh it (W_2 = 73.591g) .
9- Calculate oil and grease concentration .

Calculations

$$\text{Oil mg/L} = \frac{Xg * 10^6}{V}$$

$$Xg = W_2 - W_1 \rightarrow 73.591 - 66.194 = 7.397\text{g}$$

$$\text{Oil mg/L} = \frac{7.397 * 10^6}{100}$$

$$= 73970 \text{ mg/L.}$$