LAB.EXP (1)

DETERMINATION OF HARDNESS OF WATER

Objective

Up on completion of this laboratory experiment, the student will be able to determine the hardness of water.

EQUIPMENT

1. Burette (50 ml)
2. Burette stand and clamp
3. Pipette (10 ml)
4. Beaker (50 ml)
5. Conical flask (100 ml)

Discussion

Water hardness: water that contain higher conc. of $Ca^{2+}$and Mg^{2+} ions which forms insoluble salts inside water. Pumps and boilers are also can contain springly soluble salts with detergents (like soaps) that make detergent less efficient.

There are two types of water hardness:

1. Temperary hardness: that result from presence of salts of calcium and magnesium bicarbonate, which can be melt by boiling or adding some of $Ca(OH)_2$.

$$Ca(HCO_3)_2 \longrightarrow CaCO_3 + CO_2 + H_2O$$

$$Ca(HCO_3)_2 + Ca(OH)_2 \longrightarrow 2CaCO_3 + 2H_2O$$

2. Permenant hardness: that result from presence of salts of calcium and magnesium sulphate,which can't be melt by boiling but it dissolve by adding some of $Ca(OH)_2$.

$$MgSO_4 + Ca(OH)_2 \longrightarrow Mg(OH)_2 + CaSO_4$$

$$CaSO_4 + Na_2CO_3 \longrightarrow CaCO_3 + Na_2SO_4$$

PROCEDURE

1. Wash your equipments in good way.
2. Full burette with **(EDTA)[Ethylene Diamine Tetra Acetic acid]** and take first reading(v_1).
3. Take 10 ml of sample by pipette and but them in conical.
4. Add 1 ml buffer solution and traces of **(EBT)[Erocromic Black T]** which give pink color.
5. Titrate with **EDTA** with shaking until color change from pink to blue.
6. Take the volume of **EDTA** that change color from burette and record (v_2).

RESULTS

$CaCO_3$ (mg/L) = $(N\text{x}V)_{EDTA}$ X 100 X 100 /V_{H2O}

Allowed percentage: the amount of $CaCO_3$ mustn't increase more than 500 mg/L

LAB.EXP (2)

DETERMINATION OF AMOUNT OF DISSOLVED SALT IN WATER

Objective

Up on completion of this laboratory experiment, the student will be able to determine the amount of dissolved salt in water.

EQUIPMENT

1. Filter paper
2. Hot plate
3. Pipette (10 ml)
4. Beaker (50 ml)

PROCEDURE

1. Wash your equipments in good way.
2. Take 10 ml of sample in beaker of known weight(W).
3. Vaporize in water path in beaker of known weight
4. Weight the beaker again (W_1).

RESULTS

Amount of soluble salts(gm/L) = (W_1 - W) /V_{H2O}(ml)

Allowed percentage: the amount of soluble salts mustn't increase more than 2gm/L

LAB.EXP (3)

DETERMINATION OF CHLORIDE IN WATER

Objective

Up on completion of this laboratory experiment, the student will be able to determine the amount of chloride in water.

EQUIPMENT

1. Burette (50 ml)
2. Burette stand and clamp
3. Pipette (10 ml)
4. Beaker (50 ml)
5. Conical flask (100 ml)

PROCEDURE

1. Wash your equipments in good way.
2. Full burette with **$AgNO_3$** and take first reading(v_1).
3. Take 10 ml of sample by pipette and but them in conical.
4. Add 5 drops of potassium dichromate that give yellow color.
5. Titrate with **$AgNO_3$** with shaking until color change from yellow to red.
6. Take the volume of **$AgNO_3$** that change color from burette and record (v_2).

RESULTS

$AgNO_3$ (gm/mL) = $(N \times V)_{AgNO3}$ X 35.5 /V_{H2O}(ml)

Allowed percentage: the amount of $CaCO_3$ mustn't increase more than 0.5gm/L

LAB.EXP (4)

DETERMINATION OF SULPHITE IN WATER

Objective

Up on completion of this laboratory experiment, the student will be able to determine the amount of sulphite in water.

EQUIPMENT

1. Furnace with 1000°C
2. Filter paper
3. Crucible
4. Beaker (50 ml)
5. Conical flask (100 ml)
6. Hot plate
7. Electric digital balance

PROCEDURE

1. Wash your equipments in good way.
2. Take 10 ml of sample in beaker with 10 ml of HCl.
3. Heat the sample to boiling then add 1ml $BaCl_2$ solution drop by drop with stirring on hot.
4. Leave the sample for ½ hr. to cool.
5. Filtrate in filter system and wash the precipitate with hot distilled water.
6. Burn filter paper in crucible that has been weighted before for one hour at 900°C.
7. Cool it then weight it and burn it again until weight stabilized and calculate precipitate weight.

RESULTS

SO_3 (gm/L) = precipitate weight X 0.343 x 1000 /sample weight

Allowed percentage: the amount of SO_3 mustn't increase more than 0.3gm/L

LAB.EXP (5)

DETERMINATION THE LOSS IN WEIGHT FOR CEMENT SAMPLE BY HEATING

Objective

Up on completion of this laboratory experiment, the student will be able to determine the loss in weight for cement sample by heating.

EQUIPMENT

1. Hot plate
2. Crucible
3. Furnace
4. Electric digital balance

PROCEDURE

1. Wash your equipments in good way.
2. Weight about 1 gm of cement sample (W_1) in weighted crucible.
3. Heat the sample in furnace at 900°C for 10 min.
4. Cool the sample and then weight it.
5. Repeat the previous steps until weight is remained constant (W_2).

RESULTS

Ratio of loss in weight = $(W_1 – W_2)$ $x\ 100/W_1$

LAB.EXP (6)

DETERMINATION OF INSOLUBLE SUBSTANCES IN CEMENT SAMPLE

Objective

Up on completion of this laboratory experiment, the student will be able to determine the insoluble substances in cement sample.

EQUIPMENT

1. Furnace with 1000°C
2. Filter paper
3. Conical flask (250ml) and funnel
4. Beaker (50 ml)
5. Conical flask (100 ml)
6. Hot plate
7. Electric digital balance

PROCEDURE

1. Wash your equipments in good way.
2. Weight about 1 gm of cement (W_1).
3. Add (10 ml) of distilled water with (5ml) of concentrated HCl to the sample.
4. Heat the sample with stirring for 15 min.
5. Weight filter paper (W_2).
6. Wash the precipitate with hot distilled water (5 ml).
7. Dry the filter paper in the furnace.
8. Weight the dried filter paper (W_3).
9. Calculate the weight of the precipitate (W_3-W_2).

RESULTS

Precentage of insoluble substances = precipitate weight X 100 /sample weight

$$=[(W_3 - W_2)/W_1] \times 100$$

LAB.EXP (7)

DETERMINATION OF SULPHATE IN CEMENT SAMPLE

Objective

Up on completion of this laboratory experiment, the student will be able to determine the amount of sulphate in cement

EQUIPMENT

1. Furnace with 1000°C
2. Filter paper
3. Conical flask (250ml) and funnel
4. Beaker (50 ml)
5. Conical flask (100 ml)
6. Hot plate
7. Electric digital balance

PROCEDURE

1. Wash your equipments in good way.
2. Weight about 1 gm of cement.
3. Add (10 ml) of distilled water with (5ml) of concentrated HCl to the sample.
4. Heat the sample with stirring for 15 min.
5. Filtrate and heat the filtrate solution in beaker and add (10 ml) of $BaCl_2$ (10%) drop by drop with stirring.
6. Let the solution for 15 min. and then filter it in weighted filter paper(W_1)
7. Put the filter paper with the precipitate in the furnace for 15 min.
8. Weight the dried filter paper (W_2).
9. Calculate the weight of the precipitate (W_2-W_1).

RESULTS

Precentage of SO_4 = precipitate weight X 0.343/sample weight

LAB.EXP (8)

ADDITIVE TESTS

DETERMINATION OFABSORPTION PERCENTAGE OF ADDITIVE

Objective

Up on completion of this laboratory experiment, the student will be able to determine the absorption percentage of additive which involves natural absorption and completely absorption.

EQUIPMENT

1. Furnace with 1000°C
2. Beaker (50 ml)
3. Electric digital balance

PROCEDURE

1. Dry the sample in the furnace then cool and weight it, after that drying it again until the weight become constant.
2. Put the sample in beaker contain water for 24hr.
3. Take the sample and dry its surface from water and weight it.

RESULTS

Natural absorption percentage = moister weight –dried weight/dried weight

LAB.EXP (9)

ADDITIVE TESTS

DETERMINATION OFCOMLETELY ABSORPTION PERCENTAGE OF ADDITIVE

Objective

Up on completion of this laboratory experiment, the student will be able to determine the absorption percentage of additive which involves natural absorption and completely absorption.

EQUIPMENT

1. Furnace with 1000°C
2. Beaker (50 ml)
3. Electric digital balance

PROCEDURE

1. Dry the sample in the furnace then cool and weight it, after that drying it again until the weight become constant.
2. Put the sample in beaker contain water of 100°C for 5hr.
3. Take the sample and dry its surface from water and weight it.

RESULTS

Completely absorption percentage = moister weight –dried weight/dried weight

Saturated coefficient = Natural absorption percentage/ completely absorption percentage

LAB.EXP (10)

ADDITIVE TESTS

DETERMINATION OF SPECIFIC WEIGHT OF STONE OBJECTIVE

Objective

Up on completion of this laboratory experiment, the student will be able to determine the specific weight of additives

EQUIPMENT

1. Furnace with 1000°C
2. Cylinder
3. Electric digital balance

PROCEDURE

1. Dry the sample in the furnace after grinding it then cool and weight it, after that drying it again until the weight become constant.
2. Put the sample in a cylinder containing known amount of water and the increase in the volume of water is equal to the volume of the sample.

RESULTS

Specific weight of stone = weight of stone (gm)/volume grinded of stone (ml)

To determine the volumetric weight of the stone

We will carry out the same experiment but we take the stone in its natural case (the stone contain spaces).

Specific percentage = specific weight – volumetric weight / specific weight