

EXPERIMENT-4

AIM: a) To observe the action of Zn, Fe, Cu and Al on

- 1) ZnSO_4 (aq)
- 2) FeSO_4 (aq)
- 3) CuSO_4 (aq)
- 4) $\text{Al}_2(\text{SO}_4)_3$ (aq)

b) Arrange Zn, Fe, Cu and Al metals in the decreasing order of reactivity based on the above results.

CHEMICALS REQUIRED:

Granulated Zinc, iron filings, copper turnings, aluminium metal, an aqueous solution of zinc sulphate, ferrous sulphate, copper sulphate and aluminium sulphate

APPARATUS:

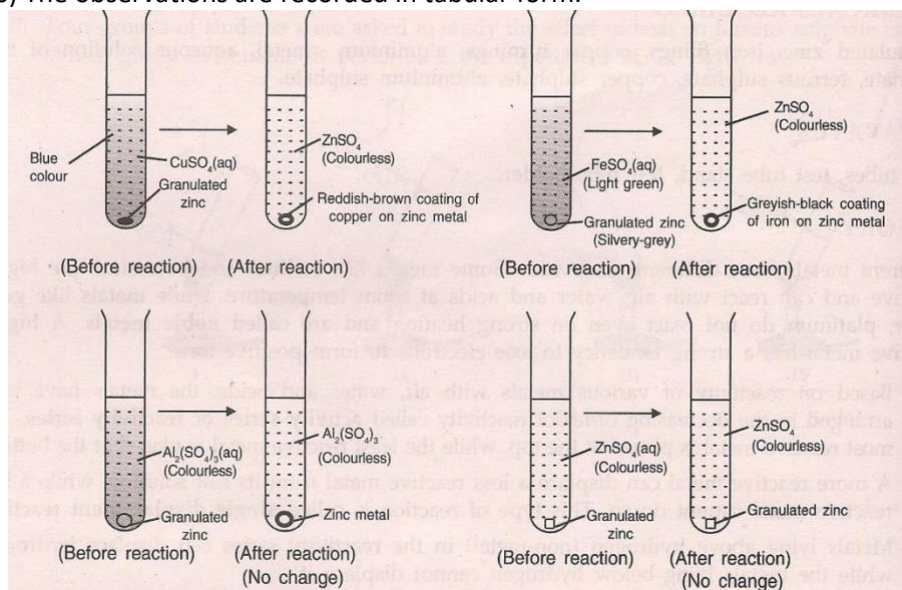
Test tubes, test tube stand, test tube holder

BASIC PRINCIPLES INVOLVED:

The arrangement of metals in the decreasing order of their reactivities is called reactivity series or activity series. The decreasing order of the series is potassium, sodium, calcium, magnesium, aluminium, zinc, iron, tin, lead, hydrogen, copper, mercury, and silver, gold.

PROCEDURE:

- 1) 4 test tubes are taken and marked A, B, C and D
- 2) About 5ml of aqueous zinc sulphate, aqueous ferrous sulphate, aqueous copper sulphate and aqueous aluminium sulphate are taken in test tubes A, B, C and D respectively.
- 3) A piece of zinc metal is added to each of the above test tubes A, B, C and D.
- 4) The observations are recorded.
- 5) The above steps are repeated by adding Fe, Cu and Al to each salt solution taken in the test tubes, B, C and D.
- 6) The observations are recorded in tabular form.



OBSERVATION TABLE:**REACTION OF ZINC METAL WITH SALT SOLUTIONS:**

- 1 $\text{Zn} + \text{CuSO}_4$
- 2 $\text{Zn} + \text{FeSO}_4$
- 3 $\text{Zn} + \text{Al}_2(\text{SO}_4)_3$
- 4 $\text{Zn} + \text{ZnSO}_4$

REACTION OF COPPER METAL WITH SALT SOLUTIONS:

- 1 $\text{Cu} + \text{ZnSO}_4$
- 2 $\text{Cu} + \text{FeSO}_4$
- 3 $\text{Cu} + \text{Al}_2(\text{SO}_4)_3$
- 4 $\text{Cu} + \text{CuSO}_4$

REACTION OF IRON METAL WITH SALT SOLUTIONS:

- 1 $\text{Fe} + \text{ZnSO}_4$
- 2 $\text{Fe} + \text{CuSO}_4$
- 3 $\text{Fe} + \text{Al}_2(\text{SO}_4)_3$
- 4 $\text{Fe} + \text{FeSO}_4$

REACTION OF ALUMINIUM METAL WITH SALT SOLUTIONS:

1. $\text{Al} + \text{ZnSO}_4$
2. $\text{Al} + \text{CuSO}_4$
3. $\text{Al} + \text{FeSO}_4$
4. $\text{Al} + \text{Al}_2(\text{SO}_4)_3$

REACTION OF IRON METAL WITH SALT SOLUTIONS:

- 1 $\text{Fe} + \text{ZnSO}_4$
- 2 $\text{Fe} + \text{CuSO}_4$
- 3 $\text{Fe} + \text{Al}_2(\text{SO}_4)_3$
- 4 $\text{Fe} + \text{FeSO}_4$

REACTION OF ALUMINIUM METAL WITH SALT SOLUTIONS:

1. $\text{Al} + \text{ZnSO}_4$
2. $\text{Al} + \text{CuSO}_4$
3. $\text{Al} + \text{FeSO}_4$
4. $\text{Al} + \text{Al}_2(\text{SO}_4)_3$

RESULT:

A] Based on the above observations, we conclude that:

- 1) Zinc is more reactive than----but less reactive than----.
- 2) Copper is less reactive than -----.
- 3) Iron is ---- reactive than but less reactive than-----.
- 4) -----is more reactive than copper, iron and zinc.

B] The arrangement according to decreasing order of reactivity:

- 1) -----is the most reactive metal.
- 2) -----is the least reactive metal.
- 3) The decreasing order of reactivity for the given metals is-----.

PRACTICAL BASED QUESTIONS

1. A student took four test tubes I, II, III and IV containing aluminium sulphate, copper sulphate, ferrous sulphate and zinc sulphate solutions respectively. He placed an iron strip in each of them. In which test tube is a brown deposit formed?
2. Iron filings were added to a solution of copper sulphate. After 10 minutes, it was observed that the blue colour of the solution changes and a layer gets deposited on iron filings. What is the colour of the solution and the layer deposited