Experiment 8

Aim

To identify bleaching powder among given samples of chemicals.

Theory

Bleaching powder is calcium oxochloride ($CaOCl_2$). On treatment with small quantity of dilute acid, it liberates hypochlorous acid which can easily furnish oxygen (called nascent oxygen) and thus acts as an oxidising and bleaching agent.

$$2CaOCl_2\ (s) + H_2SO_4\ (aq) \longrightarrow CaSO_4\ (aq) + CaCl_2\ (aq) + 2HClO\ (aq)$$

$$HClO \rightarrow HCl + [O]$$

(Nasent oxygen)

In this experiment, we shall make use of this bleaching reaction to identify the bleaching powder from the given samples of chemicals (four, say).

Materials Required

Given four samples: bleaching powder; sodium chloride; calcium chloride; and ammonium chloride (or alternate salts), dil. sulphuric acid, flowers petals or small pieces of coloured cotton cloth, eight beakers (100 mL), a measuring cylinder (100 mL), and a glass rod.

Procedure

1. Prepare about 50 mL, 5% solution (by volume) of each of the four given samples of chemicals in four beakers. Label these beakers as A, B, C, and D.
2. Take about 20 mL of dilute sulphuric acid in each of remaining four beakers. Label them as E, F, G, and H.
3. Dip a small piece of coloured cloth or flower petal in beaker A.
4. Take out the cloth or flower petal from the beaker A and dip it in dil. sulphuric acid in beaker E and stir it gently with the help of a glass rod. Does the cotton cloth or flower petal decolourise? Record your observation.
5. Repeat steps 3 and 4 with other three samples of given chemicals and dil. sulphuric acid and record your observations.

Observations

Sl. No.	Sample	Colour of the cloth or flower petal dipped in the solution of sample chemical	Colour of cloth or flower petal (dipped in sample solution and then in dil. sulphuric acid)
1.	A		
2.	B		
3.	C		
4.	D		

Results and Discussion

Infer from the observations that which chemical solution decolourises the cotton cloth or flower petal. The chemical which decolourises, exhibits bleaching action. Thus the bleaching powder can be identified.

In this case, the solution in beaker ___ shows bleaching reaction and therefore the chemical in solution in that beaker is bleaching powder. The nascent oxygen produced by the decomposition of hypochlorous acid (HClO) is the cause for bleaching action.

Precautions

- Handle the sample solutions and sulphuric acid carefully. These must not touch your skin.
- Glass rod used for one sample solution should be used for the other sample solution only after washing it with water.

Note for the Teacher

- In the samples of chemicals, sulphites (SO_3^{2-}) and hydrogen sulphites (HSO_3^-) should not be given because these chemicals react with dil. sulphuric acid and produce sulphur dioxide gas which also acts as a temporary bleaching agent.

Questions

- Name the substance which on treating with chlorine yields bleaching powder.
- Why does the bleaching powder known as a mixture?
- What happens when bleaching powder is exposed to air?
- How does the bleaching powder help in the purification of water?
- What is the chemical name of bleaching powder?