

## Experiment 10

### AIM



To show that crystals of copper sulphate contain water of crystallisation.

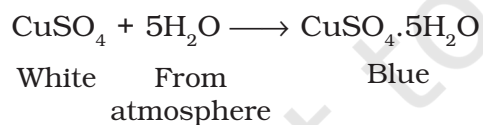
### THEORY



Blue crystals of copper sulphate contains water of crystallisation. These crystals dehydrate on heating to lose water of crystallisation at a particular temperature and also change their colour.



If the dehydrated copper sulphate solid material is allowed to cool in air, then it regains blue colour after gaining water molecules from the atmosphere.



### MATERIALS REQUIRED



Spatula, watch glass, copper sulphate, and a burner.

### PROCEDURE



1. Take some crystals of copper sulphate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) in a spatula.

2. Heat these crystals on a burner by keeping the spatula directly over the flame of the burner.
3. Note the change in colour of the copper sulphate crystals during the heating. Does it show a bluish white colour? If yes, keep on heating the crystals for some more time. After some time as temperature reaches around  $250^{\circ}\text{C}$ , the copper sulphate crystals starts appearing white.
4. Stop heating when it becomes complete white .
5. Transfer the content (white powder) to a watch glass.
6. Keep the watch glass in open atmosphere for some time and allow it to cool. Do you find a change in the colour of copper sulphate crystals.

## OBSERVATIONS



- (i) On heating, the blue colour of copper sulphate crystals first changes into \_\_\_\_\_ and then to \_\_\_\_\_.
- (ii) On cooling, the colour of copper sulphate again turns \_\_\_\_\_ .

## RESULTS AND DISCUSSION



Infer from your observations that the hydrated sample of copper sulphate loses water of crystallisation on heating and becomes dehydrated whose colour is white. This dehydrated copper sulphate regains water of crystallisation on cooling and it again becomes blue. Thus the hydration and dehydration is the precise cause of colour change.

## PRECAUTION



- Hold the spatula containing copper sulphate crystals very carefully. Do not bring your face near to hot spatula, as it may hurt.

## QUESTIONS

- How can you test that a given sample contains water or not?
- What shall be the total action of heat on copper sulphate?
- It is regarded that each molecule of copper sulphate crystals at room temperature contains five water molecules as water of crystallisation. Do you see any difference in them? (Hint: Look at the dehydration reaction of copper sulphate)