SENIOR SECTION
DEPARTMENT OF CHEMISTRY
CLASS IX
LAB SHEET -I
DIFFERENT PHYSICAL & CHEMICAL CHANGES

Reaction of iron with copper sulphate

Experiment No: …5…. Date: …….

(a) Iron with copper sulphate solution

Objectives: To study the reaction of iron with copper sulphate
Requirements: Iron nails, thread, test tubes, copper sulphate, distilled water, spatula, TT stand, sand paper, etc.
Points to remember:

1. Colour of pure iron is greyish
2. Colour of pure copper is brownish.
3. Aqueous solution of copper sulphate is blue due to the presence of Cu^{2+} ions and ferrous sulphate is light green due to the presence of Fe^{2+} ions.
4. Fe is more reactive than Cu. Due to their difference in reactivity, copper get deposited on iron when iron is kept in a solution of copper sulphate and metallic iron dissolves in water to form iron sulphate.
5. This is an example of a single displacement reaction.

Procedure:

1. Take 10 ml each of copper sulphate solution in two test tubes and keep on a TT stand.
2. Take two iron nails and clean them using a sand paper to remove any rust.
3. Put one iron nail in one of the test tubes.
4. After 15 minutes, take out the iron nail keep it on a filter paper next to the clean iron nail and compare them. Compare also the solutions in both the test tubes.
5. Record your observation in the following table.

Nature of the:	Observation	Inference
Iron nail before the experiment	Silvery grey in colour and lustrous	Metals are lustrous.
Iron nail after the experiment	Brown deposit on the nail	Copper is deposited on the nail due the displacement reaction that takes place between Fe & Cu.
Solution before the experiment	Light blue and transparent	Copper sulphate solution is peacock blue in colour
Solution after the experiment	Light green and dirty	Due to the chemical reaction, Fe displaces Cu from$CuSO_4$ and $FeSO_4$ is formed in the solution. Dirtiness is due to the rusting of iron.

Conclusions:
Fe displaces Cu from $CuSO_4$ and forms $FeSO_4$ in the solution hence the colour of the solution changes from light blue to pale green. The displaced copper gets deposited on iron nail. It appears as brown coating on iron nail
Precautions:

1. Iron nail should be clean; otherwise impurity such as rust will cause interference to the expected reaction.
2. During the experiment the test tube should not be disturbed. (The deposit of copper might fall off)
3. More the time taken better will be the result.

(b) Burning of Magnesium in air

Objectives: To study the burning of Mg in air
Requirements: A strip of Mg ribbon, a pair of tongs, china dish, Bunsen burner, litmus paper, match box etc.
Points to remember:

1. Mg is an active metal.It combines with oxygen to form magnesium oxide.
2. The reaction is an example of direct combination reaction.
3. MgO on dissolving (It is only partially soluble) in water gives a base magnesium hydroxide.
4. Both MgO and $Mg(OH)_2$ turn red litmus blue.

Procedure:

1. Take a clean strip of Mg ribbon and burn it by showing to a Bunsen flame with the help of a pair of tongs.
2. Collect the white powder that is formed during burning in a china dish.

EXPERIMENT	OBSERVATION	INFERENCE
Rub the magnesium ribbon with a sand paper	Silvery grey colour with lustre	Metals are lustrous
Burn Mg ribbon and note the nature of the flame and smoke.	It burns with an intensely bright flame and white smoke	Mg burns in oxygen to form MgO
Put a small portion of the white powder on a moist red litmus paper.	Red litmus turns to blue	MgO is alkaline/basic. It dissolves in water to form $Mg(OH)_2$

Conclusions:

1. When Mg burns in air, it combines with oxygen (of air) to form a white powder of magnesium oxide. & MgO is basic in nature.

Precautions:

1. Mg ribbon should be clean
2. Avoid looking directly at the flame when the Mg ribbon burns as the intensity of the flame may damage your eye sight.
3. A pair of tongs should be used to hold the Mg ribbon while burning.
4. The white powder formed should not come in contact with your body partsReaction of Zinc with sulphuric acid

(c) Zinc with Dil.Sulphuric acid

Objectives: To study the chemical reaction between Zn and dil H_2SO_4 acid.
Points to remember:

1. Zn is an active metal. It has two valance electrons.
2. Hydrogen is less reactive than Zn, so the following reaction takes place when Zn comes in contact with acid.
3. This reaction is an example of a single displacement .

EXPERIMENT	OBSERVATION	INFERENCE
Take a small piece of Zn granule in a test tube and treat it with 3 ml of dilute sulphuric acid. Wait for 10 minutes.	Slow evolution of a colourless odourless gas.	Zn displaces H_2 gas from HCl and forms $ZnCl_2$ $Zn + H_2SO_4 \rightarrow Zn SO_4 + H_2$

Precautions:

1. Sulphuric acid should be handled carefully.
2. Use clean Zn granules.

Conclusion:
Zn is more reactive than hydrogen.

(d)Heating of Copper sulphate

Objective : To study the chemical reaction when hydrated copper sulphate is heated.
Apparatus: Test tubes ,bunsen burner ,hydrated copper sulphate,tongs ,spatula etc
Theory : The hydrated copper sulphate loses its water of crystallisation on heating

$$\underset{\text{blue}}{CuSO_4.5H_2O} \longrightarrow \underset{\text{white}}{CuSO_4} + 5H_2O$$

- It is a reversible chemical reaction

Procedure:

Experiment	Observation	Inference
Take 1 spatula of hydrated copper sulphate (blue) in a hard glass tube gently heat over a Bunsen flame .	Blue coloured copper sulphate changes to white	Hydrated copper sulphate loses water of crystallisation on heating and becomes anhydrous.

- Use safety goggle while heating..
- Be careful when you handle hot objects.

(e) Reaction between Sodium sulphate &Barium chloride

Objectives: To study the chemical reaction between Sodium sulphate and Barium Chloride.
Requirements: Solutions of Na_2SO_4 & $BaCl_2$, test tubes etc.
Points to remember:

1. Sodium sulphate contains 2 sodium ions and one sulphate ion.
2. On mixing the solutions a double displacement reactions takes place.

EXPERIMENT	OBSERVATION	INFERENCE
Take 1 ml of Sodium sulphate solution in a test tube and add 1 ml of $BaCl_2$ solution to it. Record the change observed.	A white precipitate is formed	The white precipitate formed is $BaSO_4$ **$Na_2SO_4+BaCl_2 \rightarrow BaSO_4+2NaCl$**

Questions:

1. What is meant by displacement reaction? (Ans: A stronger element displaces a weaker element from its compound)
2. Which is more reactive? Copper or iron and why? (Ans: Fe is more reactive as it displaces Cu from its compounds)
3. Which is more reactive? Copper or iron and why? (Ans: Fe is more reactive as it displaces Cu from its compounds)
4. Which is more reactive? Copper or iron and why? (Ans: Fe is more reactive as it displaces Cu from its compounds)
5. What is the colour of copper sulphate solution before the experiment? (Blue/Peacock blue)
6. Which out of the following get coated on iron nail? What is its colour?
   (Copper oxide, copper sulphate, copper sulphide, copper metal) [Reddish brown]
7. Why it is not advised not to look directly at the flame of a burning Mg piece? (Ans: intense dazzling flame may damage retina)
8. What is the colour of barium chloride solution? What is the colour of barium sulphate precipitate?
9. What is the colour nature of hydrated copper sulphate?
10. What is the colour of the residue when copper sulphate crystals are heated? .
11. What do you mean by water of crystallisation?

Multiple choice type questions

1	The colour of copper sulphate solution a) deep blue b) light green c) blue d) light yellow
2	A 10 cm long magnesium ribbon is heated in a Bunsen burner flame till it catches fire.the flame produced in magnesium ribbon is a) Yellow b)dazzling white c) brick red d) silvery blue
3	The compound formed when zinc reacts with dil sulphuric acid is a) Zinc sulphite b) zinc sulphate c) zinc chloride d)zinc sulphide
4	When solutions of sodium sulphate &barium chloride are mixed ,an insoluble solid settles at the bottom of the test tube.,its colour a) blue b) yellow c) white d)green
5	While heatinng the crystals of copper sulphate the incorrect observation is: a) blue crystals change to white b) crackling sound c) water droplets along the sides of test tube d) liberates colourless gas
6	Which one of the following is an example of physical change a) Burning of magnesium ribbon in air b)Burning of candle c) mixing Zinc &dil sulphuric acid d)boiling of water
7	Which one is true about the behaviour of magnesium oxide in presence of water a) It is basic b) It is acidic c) It is amphoteric d) It is neutral
8	The gas evolved during reaction of zinc with Dil.Sulphuric acid is: a) a supporter of combustion b) a potential fuel c) non – combustible d) soluble in water
9	What is observed when iron nails are added to copper sulphate solution? a) the solution becomes pale and eddish brown deposit is seen on the nails. b) the solution becomes colourless c) there is no reaction d) the solution changes to pale green and no change in the iron nails.
10	When magnesium is burnt in air,it produces magnesium oxide that appears to be like: (CCE 2011) a) wood ash b) chalk powder c) table salt d) powdered sugar
11	When Dil.Sulphuric acid is added to granulated zinc placed in a test tube, the observation made is: a) the surface of the metal turns shining b) the reaction mixture turns milky c) the odour of sulphur is observed d) the colourless and odourless gas evolves with bubbles.
12	The crystals of copper sulphate turn white on heating due to (CCE 2011) a) loss of sulphate ions. b) loss of copper ions. c) loss of water of crystallisation. d) decomposition of copper sulphate.