Chemistry Class VII – Chapter 3

Changes Around Us: Physical and Chemical

A. VERY SHORT ANSWER TYPE (2 MARKS)

1. What is the process of depositing a layer of zinc on iron called?

It is called **galvanisation**.

2. Why does stainless steel not rust?

Stainless steel contains chromium, which forms a protective layer and prevents rusting.

3. Which gas turns limewater milky?

Carbon dioxide (CO_2).

4. Can rusting take place in dry air?

No. Rusting requires both oxygen and moisture.

5. What type of change is the digestion of food?

It is a chemical change.

6. Name one alloy of iron which does not get rusted easily.

Stainless steel.

7. Burning of magnesium wire is which type of change?

It is a chemical change.

8. What is the reaction called in which blue copper sulphate turns green when iron is added to it?

It is called a displacement reaction.

9. What is a chemical reaction?

A chemical reaction is a process in which one or more substances change into new substances.

10. Name the change in which no new substance is formed.

Physical change.

11. Name the process through which solid crystals of pure substances are obtained from saturated solutions.

Crystallisation.

12. Name the change in which a new substance is formed.

Chemical change.

13. Is crystallisation an irreversible change?

No. Crystallisation is generally considered a reversible physical change.

14. Give an example in which both physical and chemical changes take place.

Burning of a candle. The melting of wax is a physical change, while burning of wax is a chemical change.

15. Write the composition of the alloy called bronze.

Bronze is an alloy of copper and tin.

B. SHORT ANSWER TYPE (3 MARKS)

1. A) Define an irreversible physical change. B) What happens when a saturated solution is cooled?

A) Irreversible physical change:

A physical change that cannot be easily reversed to obtain the original substance is called an irreversible physical change.

Example: Breaking a glass.

B) Cooling a saturated solution:

When a hot saturated solution is cooled, the solubility of the substance usually decreases, and crystals separate out.

2. What is evaporation? How is evaporation useful in getting salt from seawater?

Evaporation: The process by which a liquid changes into vapour from its surface is called evaporation.

Obtaining salt from seawater:

1. Seawater is collected in shallow ponds.
2. The Sun's heat causes the water to evaporate.
3. Salt remains behind and is collected.

3. Which type of changes are represented by the following examples?

(i) An iron piece left in a moist atmosphere develops a brown layer of rust.

It is a chemical change because a new substance, iron oxide, is formed.

(ii) Carbon dioxide is evolved when vinegar is added to baking soda.

It is a chemical change because new substances are formed and a gas is released.

4. A) Give an example to justify that physical changes can be reversible as well as irreversible. B) Write the equation of the reaction between baking soda and vinegar.

A) Examples:

- Reversible physical change: Melting of ice.
- Irreversible physical change: Breaking of a glass.

B) Chemical equation:

Baking soda + Vinegar $\rightarrow$ Salt + Water + Carbon dioxide

$NaHCO_3 + CH_3COOH \rightarrow CH_3COONa + H_2O + CO_2$

5. A) Give an example of a chemical change in which a colour change takes place. B) Why do cut vegetables and fruits turn brown when exposed to air? What type of change is it?

A) When an iron nail is placed in blue copper sulphate solution, the solution turns green.

B) Cut fruits and vegetables turn brown because their substances react with oxygen in the air. This is a chemical change called oxidation.

6. Define combustion. What type of change is it? Demonstrate with an activity.

Combustion: The process in which a substance burns in oxygen, releasing heat and usually light, is called combustion.

It is a chemical change.

Activity:

1. Take a small piece of paper and hold it with tongs.
2. Bring it near a flame.
3. The paper burns and forms ash and gases.

New substances are formed, so combustion is a chemical change.

7. What is a chemical equation? Write the steps for balancing it. Explain with an example.

A chemical equation represents a chemical reaction using the symbols and formulae of substances.

Steps for balancing:

1. Write the correct formulae of the reactants and products.
2. Count the atoms of each element on both sides.
3. Add suitable coefficients to balance the atoms.
4. Check that both sides have equal numbers of each type of atom.

Example:

Unbalanced equation: $H_2 + O_2 \rightarrow H_2O$

Balanced equation: $\mathbf{2H_2 + O_2 \rightarrow 2H_2O}$

8. What type of chemical reactions take place in the following cases?

A) Magnesium wire is burnt in air.

Combination reaction.

$2Mg + O_2 \rightarrow 2MgO$

B) Limestone is heated.

Decomposition reaction.

$CaCO_3 \rightarrow CaO + CO_2$

C) Silver bromide is exposed to sunlight.

Photochemical decomposition reaction.

2AgBr -> 2Ag + Br2

D) Zinc strip is dipped into copper sulphate solution.

Displacement reaction.

Zn + CuSO4 -> ZnSO4 + Cu

9. Which gas is evolved when dilute hydrochloric acid is added to calcium carbonate? How will you test the gas? Write the chemical equation.

Gas evolved: Carbon dioxide (CO_2).

Test: Pass the gas through limewater. The limewater turns milky.

Chemical equation:

$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$

10. A) Give two examples of harmful chemical changes. B) Why are they harmful? C) How can you prevent them?

A) Examples:

1. Rusting of iron.
2. Spoiling of food.

B) Why are they harmful?

- Rusting weakens iron objects and damages structures.
- Spoiled food may cause food poisoning.

C) Prevention:

- Rusting can be prevented by painting, oiling or galvanising iron.
- Food spoilage can be prevented by refrigeration, drying or proper storage.

C. LONG ANSWER TYPE (5 MARKS)

1. With a diagram, explain what happens when an iron nail is exposed to (i) dry air, (ii) only moisture, and (iii) both moisture and air.

(i) Dry air:

The iron nail does not rust because moisture is absent.

(ii) Only moisture:

The iron nail does not rust because oxygen is absent.

(iii) Both moisture and air:

The iron nail rusts because both oxygen and water are required for rusting.

Conclusion: Iron rusts only when both oxygen and moisture are present.

Diagram to draw in your notebook:

- Test tube 1: Iron nail with dry air and a drying agent.
- Test tube 2: Iron nail with boiled water covered by a layer of oil.
- Test tube 3: Iron nail with water and air.

Label the three test tubes clearly.

2. A) What is crystallisation? How will you obtain crystals of alum from an impure sample? B) What is a displacement reaction? Why is it a chemical reaction? Explain with an example.

A) Crystallisation:

Crystallisation is the process of obtaining pure solid crystals from a saturated solution.

Steps to obtain pure alum crystals:

1. Dissolve impure alum in a small amount of hot water.
2. Filter the hot solution to remove insoluble impurities.
3. Heat the filtrate to obtain a concentrated solution.
4. Allow the solution to cool slowly.
5. Pure alum crystals form. Separate and dry the crystals.

B) Displacement reaction:

A displacement reaction is a chemical reaction in which a more reactive element displaces a less reactive element from its compound.

Example:

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

When an iron nail is placed in blue copper sulphate solution, iron displaces copper. The solution turns green, and copper is deposited on the nail.

It is a chemical change because new substances are formed.

3. State five differences between a physical change and a chemical change.

Physical Change	Chemical Change
1. No new substance is formed.	1. A new substance is formed.
2. Usually only the shape, size or state changes.	2. The chemical composition changes.
3. It is often reversible.	3. It is often irreversible.
4. The chemical properties remain unchanged.	4. The chemical properties of the products differ from those of the reactants.
5. Example: Melting of ice.	5. Example: Rusting of iron.

4. Define the following chemical reactions and give an example of each.

A) Exothermic reaction

A chemical reaction that releases heat energy is called an exothermic reaction.

Example: Burning of coal.

$C + O_2 \rightarrow CO_2 + Heat$

B) Oxidation reaction

A reaction in which a substance combines with oxygen is called an oxidation reaction.

Example: Formation of magnesium oxide.

$2Mg + O_2 \rightarrow 2MgO$

C) Combination reaction

A reaction in which two or more substances combine to form a single product is called a combination reaction.

Example:

$CaO + H_2O \rightarrow Ca(OH)_2$

D) Reduction reaction

A reaction in which oxygen is removed from a substance is called a reduction reaction.

Example:

$CuO + H_2 \rightarrow Cu + H_2O$

Here, copper oxide loses oxygen and is reduced to copper.

E) Decomposition reaction

A reaction in which one compound breaks down into two or more simpler substances is called a decomposition reaction.

Example:

$CaCO_3 \rightarrow CaO + CO_2$

This occurs when limestone is heated.

5. With an activity, explain the burning of magnesium in air. What compound is formed? What happens when this compound is dissolved in water?

Activity:

1. Take a small strip of magnesium ribbon.
2. Clean it with sandpaper to remove the oxide layer.
3. Hold it with tongs and burn it in air.
4. It burns with a dazzling white flame.
5. A white powder of magnesium oxide is formed.

Chemical equation:

$2Mg + O_2 \rightarrow 2MgO$

Compound formed: Magnesium oxide (MgO).

When magnesium oxide is dissolved in water:

It reacts with water to form magnesium hydroxide, which is basic in nature.

$MgO + H_2O \rightarrow Mg(OH)_2$

Conclusion: Burning magnesium is a chemical change because a new substance, magnesium oxide, is formed. Magnesium hydroxide is basic and turns red litmus paper blue.