2.1.4. Diffusion

The mixing and spreading out of a substance with another substance due to the movement or motion of its particles is called diffusion. It is also defined as the net movement of particles from an area of high concentration to an area of low concentration.

Diffusion in gases is very fast. This is because the particles move very quickly in all direction. Example: The smell of hot sizzling food reaches us even when we are at considerable distance.

Diffusion in liquids is slower that in gas, because the particles in liquids move slower as compared to particles in gases. Example: If a drop of ink is put into a beaker of water, then the color of ink spreads into the whole water of the beaker.

Diffusion in solids is very very slow process because the particles of solids are highly restricted to motion. Diffusion in Daily Life Diffusion is everywhere around us in our everyday life. The followings are some common effect of diffusion in day to day activities.

Tea: A tea bag placed in a cup of hot water will diffuse into the water.

Perfume: When perfume is produced in one part of a room, it spreads to the rest through diffusion. There are fewer of the scent-producing chemicals in the further parts of the room, so the molecules naturally spread out.

Food Coloring: A drop of food coloring in a glass of water colors the water through diffusion. The dye molecules slowly spread evenly through the liquid, creating one particular shade.

Soda: Leave a soda bottle open and the carbon dioxide bubble will diffuse and leave it flat. Air has a lower concentration of that bubbly carbon dioxide than the drink does, so the CO2 molecules depart the beverage and spread into the air.

Part I : choose the correct answer for the following questions

1. What is the best definition of diffusion?

a) The heating of particles until they disappear

b) The spreading of heat from one object to another

c) The mixing and spreading out of particles from high to low concentration

d) The movement of solids to form a new compound

2. Why does diffusion occur faster in gases than in liquids?

a) Gases are heavier than liquids

b) Gas particles are tightly packed

c) Gas particles move more quickly and freely

d) Liquids evaporate faster than gases

3. Which of the following is an example of diffusion in a gas?

a) Tea diffusing in hot water

b) Ink spreading in water

c) Carbon dioxide escaping from soda

d) A coin heating up in the sun

4. What happens when a tea bag is placed in hot water?

a) Heat dissolves the tea bag

b) Tea particles float without mixing

c) Tea particles diffuse into the water

d) Water becomes solid.

5. Which statement best explains why diffusion in solids is very slow?

a) Solids are hot

b) Solid particles are fixed in position and can only vibrate

c) Solids are larger in volume

d) Solids contain gas inside them

6. What causes the smell of sizzling food to reach someone across the room?

a) Movement of sound waves

b) The food gets colder and floats

c) Diffusion of scent particles through air

d) Air currents push the smell

7. Why does a soda become flat when left open?

a) All water evaporates

b) The bottle is too small

c) The sugar diffuses into the air

d) Carbon dioxide diffuses into the air.

8. In which state of matter does diffusion occur fastest?

a) Solids b) Liquids c) Gases d) Plasma.

9. Which of the following is an example of diffusion in gases?

a) Sugar dissolving in water

b) Ink spreading in water

c) Perfume spreading in a room

d) Metal melting on heating

10. Why do gases diffuse faster than liquids?

a) They are lighter

b) Their particles are more tightly packed

c) Their particles move slower

d) Their particles are more spread out and move faster

11. Which factor does NOT affect the rate of diffusion?

a) Temperature

b) Concentration gradient

c) Size of container

d) Size of particles

12. What happens to the rate of diffusion when temperature increases?

a) Decreases

b) Stays the same

c) Increases

d) Stops completely

13. Which of the following shows diffusion in liquids?

a) Spreading of gas from a cylinder

b) Mixing of food coloring in water

c) Melting of ice

d) Burning of paper

14. Why is diffusion very slow in solids?

a) Particles in solids are always in motion

b) Particles in solids are loosely packed

c) Particles in solids are tightly packed and only vibrate

d) Solids are made of gases.

15. Which of the following will increase the rate of diffusion in a liquid?

a) Cooling the liquid

b) Adding salt

c) Stirring the liquid

d) Making the container smaller

16. What happens during diffusion in solids (e.g., two metal blocks in contact)?

a) The metals turn to gas

b) The metals completely melt

c) The atoms of each metal slowly spread into each other

d) Nothing happens.

Part II : Matching Questions – Put the correct number from column "A" to the space provided in column "B"

Column A (Concepts)	Column B (Descriptions/Examples)
1. A. Diffusion	……. Particles are far apart and move Freely And quickly

2. Gas diffusion …….. Movement of particles from a region of higher concentration to a region of lower concentration

3. Liquid diffusion …….. Slow mixing of metal atoms at the point of contact between two solids

4. Solid diffusion …….. Food coloring spreading in a glass of water

5. Temperature …… Spreading of perfume in a room

6. Particle arrangement in gases …… Factor that increases the rate of diffusion when raised

7. Example of diffusion in everyday life …… Smell of cooked food reaching a person in another room