Matter

Exercise

Question 1.

Explain the term 'matter'. One kind of matter can be distinguished from another by its physical properties and chemical properties. State the main physical properties of matter.

Answer:

Matter is the basic substance of which all materials are made of

- **Physical Properties** They are those properties which include state, colour, odour, density etc.
- **Chemical Properties** They are properties which include reactions of different materials with different chemical.

Physical Properties of Matter are :

- 1. **Colour :** All matter an be distinguished by their varied colours.
- 2. **Odour :** Matter shows variation in odour or smell.
- 3. **Solubility :** Matter may vary in solubulity in water or other solvents.
- 4. **Melting & Boiling Points :** Substances variation in their melting and boiling points.

Question 2.

The three main states of matter are solids, liquids and gases. Compare the three states with reference to the following characteristics of matter –

- (a) volume
- (b) shape
- (c) compressibility
- (d) diffusion.

Answer:

Characteristics	Solids	Liquids	Gases
* Volume	Have a definite volume	Have a definite volume	Have no definite volume
* Shape	Have a definite	Have no	Have no
	shape	definite shape	definite shape
* Compressibility	Cannot be compressed	Slightly compressible	Highly compressible
 Diffusion [Intermingling of Molecules] 	Cannot diffuse	Shows diffusion	Diffuses very easily

Question 3.

Matter in any state is composed of particles. Compare the three states of matter i.e. solids, liquids and gases with reference to :

- (a) intermolecular space
- (b) intermolecular force of attraction
- (c) movement of particles

Answer:

c	haracteristics	Solids	Liquids	Gases
*	Intermolecular space	Minimum space	More than solids	Maximum space
*	Intermolecular Force of attraction	Very strong	Less strong	Very weak
*	Movement of particles	About their own position	In continuous motion	In any random direction

Question 4.

Describe simple experiments to prove that - solids

- (a) occupy space
- (b) have mass
- (c) have a definite volume

Answer:

(a) occupy space : solid-occupies space -

'A'-A measuring cylinder is filled with water to a particular mark- 'A'.

'B'-A piece of wooden block- is immersed inside the measuring cylinder. The water level rises up.

 $^{\prime}C'$ - On removal of the block- the water level in the measuring cylinder falls down back to the mark – $^{\prime}A'$

Conclusion : The block pushes the water out and occupies its space, hence all solids occupy space.



(b) Have mass : A solid has mass

A : A simple scale – is taken, as shown below

B : A solid is placed – on one side of the scale, causes the scale tilts towards one side.

Conclusion : The scale tilts due to the mass of the solid, hence all solids have mass.



(c) Have a definite volume : A solid placed in any container filled with water displace the same amount of water.

Conclusion : Solid displace water and retain their own volume, hence all solids have a definite volume.



Question 5.

Describe simple experiments to prove that – liquids

- (a) have mass
- (b) have a definite volume
- (c) have no definite shape

Answer:

(a) have mass — a liquid occupies mass

Experiment : A liquid placed on one side of the scale, causes the scale to tilt towards one side.

Conclusion : The scale tilts due to the mass of the liquid, hence all liquids have mass.



(b) have a definite volume -

Experiment : A liquid in a measuring cylinder can be poured into any container. The volume of liquid in the container, is the same as that in the measuring cylinder.

Observation : The volume of liquid in the container, is the same as that in the measuring cylinder. Hence, all liquids have a definite volume.



(c) have no definite shape -

Experiment : A liquid poured into any container takes up the shape of each container.

Conclusion : All liquids have no definite shape



Question 6.

Describe simple experiments to prove that - gases

- (a) occupy space
- (b) have mass
- (c) have no definite volume or shape

Answer: (a) occupy space — Experiment :

- 'A' A glass beaker or bowl is half filled with water.
- 'B' An empty glass tumbler [which of course contains air] is inverted an lowered inside it.
- 'C' On tilting the tumbler, air is displaced and bubbles are seen coming out.

Conclusion : Air or gases occupy space.



(b) Have mass — Experiment :

• An inflated balloon placed on one side of the scale causes it to tilt towards one side.

Conclusion : The scale tilts due to the mass of the gas, hence all gases have mass.



(c) Have no definite volume or shape – Experiment :

• A gas takes up the volume of any enclosed space filling it up completely.

Conclusion : Gases take up any volume and hence all gases have no definite volume.



Question 7.

Explain the term 'Interconversion of matter'. With reference to ice, water and

water vapour show diagrammatically the change of state of matter from solid to liquid to gaseous and back to original state.

Answer:

INTERCONVERSION OF MATTER :

"Change of ,state of matter from one state to another state and back to its original state is called inter – conversion of matter."

The diagram showing the Change of State of Matter :



(a) Ice To Water (Melting) : Conversion of a solid into a liquid on heating e.g. ice to water.

(b) Water To Water Vapour (Vaporisation) : Conversion of a – liquid into vapours (or gas) on heating e.g. water to water vapour.

(c) Water Vapour To Water (Liquefaction Or Condensation) : Conversion of VAPOUR (or gas) into a LIQUID on cooling e.g. water vapour to water.

(d) Water To Ice (Solidification Or Freezing) : Conversion of a LIQUID into a SOLID e.g. water to ice.

Question 8. Explain the terms

(a) melting

- (b) vaporization
- (c) condensation

(d) freezing

(e) melting point

(f) boiling point.

Answer:

Matter can change from solid to liquid to gaseous state and back to solid state. This is called change of state of matter.

(a) Melting — The process of conversion of a solid into liquid on heating.

e.g. Ice to water. k

(b) Vaporization — The process of conversion of a liquid into vapour on heating.

e.g. Water to water vapour.

(c) Condensation — The process of conversion of vapour into a liquid.

e.g. Water vapour to water.

(d) Freezing — The process of conversion of a liquid into a solid.

e.g. Water to ice.

(e) Melting point — The constant temperature at which a solid melts into a liquid.

M.P. of ice – 0°C.

(f) Boiling point — The constant temperature at which a liquid starts boiling. B.P. of water – 100°C.

Question 9.

State what would you observe if

(a) sugar is added to pebbles take in a plastic beaker

(b) sand is added to glass balls in a beaker. What would you conclude from this imaginative demonstration.

Answer:

- **Experiment :** Add sugar to pebbles taken in a plastic beaker or sand to glass balls in a beaker.
- **Observation :** The sugar or the sand goes into the space between the pebbles & the glass balls respectively.
- **Conclusion :** An imaginative demonstration to show that intermolecular spaces between particles are occupied easily.



Question 10.

With the help of a simple diagram how would you show that – solids expand on heating.

Answer:

Solids expand on heating can be shown by two different experiments. The experiments are :

- **Experiment A :** An iron bar is taken and its length measured accurately. The iron bar is then slowly heated for a certain period of time & measured accurately [with a vernier calipers or otherwise]
- **Observation :** It is observed that the iron bar has Increased in length on heating.
- **Experiment B**: A simple ball & ring apparatus is taken, which consists of a metal ball which can just pass through the circular metal ring. The metal ball is then heated for a certain period of time.
- **Observation :** After heating, the metal ball does not pass through the ring, since on heating it has expanded in size and hence cannot pass through the ring.
- **Conclusion :** All solids expand on heating.



Question 11. Give reasons for the following :

(a) Solids have a definite shape and are highly rigid while gases have to definite shape and are least rigid.

(b) Sugar can be distinguished from talcum powder using water.

(c) Water on freezing turns into ice.

(d) A bottle of perfume on opening evolves an odour which can be sensed over a long distance.

Answer:

(a) Solids have very closely packed atoms with minimum spaces between them while gases have atoms which are for apart with maximum spaces between them. Solids have a definite shape and are highly rigid while gases have no definite shape and are least rigid.

(b) Sugar is soluble in water whereas talcum powder is not.

(c) Every pure substance has a fired melting point or boiling point.

(d) A bottle of perfume on opening evolves an odour because gases diffuse very easily and odour spreads over a large distance.

Question 12. Complete the statements given below by selecting the correct word/s.

(a) Solids and liquids have a definite _____ but gases do not. [mass, shape, volume]

Answer:

Solids and liquids have a definite **volume** but gases do not.

(b) The space between atoms in is maximum while in _____ is minimum.[solids, liquids, gases]

Answer:

The space between atoms in gases is maximum while in **solids** is minimum.

(c) Conversation of a vapour into a liquid is called _____ [vaporization,

condensation, freezing]

Answer:

Conversation of a vapour into a liquid is called **condensation.**

(d) _____ is an example of a crystalline substance. [wax, sugar, tea]

Answer:

Wax, sugar is an example of a crystalline substance.

Question 13.

State which of the following statements are false. If false write the correct statement.

(a) Solids are highly compressible and rigid.

Answer:

True.

(b) Atoms/molecules in gases move only about their own positions.

Answer:

False.

Atoms/molecules in gases move every where.

(c) The conversion of water to ice is called freezing.

Answer:

True.

Objective Type Questions

Q.1. Fill in the blanks with the correct word/s from the bracket.

- 1. From the three states of matter, **solids** expand the least.
- 2. Brownian movement is maximum in gases.
- 3. Cohesive forces are negligible in **gases.**
- 4. Matter can change from one state to another by change in **temperature** or pressure.
- 5. The space between atoms [molecules] of solids is minimum.
- 6. Intermingling of molecules is called **diffusion**.
- 7. Ice on absorption of heat converts to 'X' a process called **melting.** 'X' changes to water vapour on **heating.** Water vapour changes back to 'X' on **condensation.** The constant temperature at which ice changes into 'X' is called its **fusion point.**

Q.2. State which of the following are physical properties of a substance.

Question 1.

Chlorine gas has a – strong irritating odour.

Answer:

Physical.

Question 2.

Sodium nitrate is soluble in water, but calcium carbonate is not.

Answer:

Physical.

Question 3.

Magnesium reacts with dilute hydrochloric acid, liberating hydrogen gas.

Answer:

Chemical.

Question 4.

Manganese dioxide, a catalyst which alters the rate of a chemical reaction is black in colour.

Answer:

Chemical.

Question 5.

The melting point of ice is 0°C. **Answer:** Physical.

Question 6.

Lead chloride reacts with barium sulphate to give a white precipitate of lead sulphate.

Answer:

Chemical.

Question 7.

Water acidified with dilute sulphuric acid is a good conductor of electricity.

Answer:

Physical.

Question 8.

Naphthalene on heating directly turns into vapour.

Answer:

Chemistry.

Question 9.

Hydrogen sulphide gas has a strong rotten egg odour. **Answer:** Physical.

Question 10.

Sulphur is a yellow amorphous powder insoluble in water. **Answer:** Physical.

Q.3. Match the characteristics of the three states of matter in List I with their correct answer from List II.

List II
A : Solids and gases only
B : Solids only
C : Liquids and gases only
D : Gases only
E : Solids, liquids and gases
F : Liquids only
G : Solids and liquids only

	List I	List II
1.	Are highly rigid and have	B : Solids only
	a definite shape	
2.	Have no definite shape	C : Liquids and gases only
3.	Have a definite volume but	F : Liquids only
	no definite shape	
4.	Are highly compressible	D : Gases only
	and least rigid	
5.	Have no definite volume	D : Gases only
6.	Have no definite shape	D : Gases only
	and volume	
7.	Occupy space	E : Solids, liquids and gases
8.	Are not compressible	B : Solids only
9.	Are slightly compressible	F : Liquids only
10.	Have mass	E : Solids, liquids and gases

Q.4. Match the arrangement of atoms in the three states of matter in List I with the correct state in List II.

	List I	List II
1.	Arrangement of atoms is far apart	A : Solids
2.	Force of attraction between atoms is very strong	B : Liquids
3.	Movement of atoms is in any random direction	C : Gases
4.	Particles diffuse very easily	
5.	Particles show movement about	
	their own position	
-		
Ans	swer:	
Ans ——	List 1	List II
Ans 	List I Arrangement of atoms is far apart	List II C : Gases
Ans 1. 2.	List I Arrangement of atoms is far apart Force of attraction between atoms	List II C : Gases A : Solids
1. 2.	List I Arrangement of atoms is far apart Force of attraction between atoms is very strong	List II C : Gases A : Solids
1. 2. 3.	List I Arrangement of atoms is far apart Force of attraction between atoms is very strong Movement of atoms is in any	List II C : Gases A : Solids' C : Gases
1. 2. 3.	List I Arrangement of atoms is far apart Force of attraction between atoms is very strong Movement of atoms is in any random direction	List II C : Gases A : Solids C : Gases
Ans 1. 2. 3. 4.	List I Arrangement of atoms is far apart Force of attraction between atoms is very strong Movement of atoms is in any random direction Particles diffuse very easily	List II C : Gases A : Solids C : Gases C : Gases
Ans 1. 2. 3. 4. 5.	List I Arrangement of atoms is far apart Force of attraction between atoms is very strong Movement of atoms is in any random direction Particles diffuse very easily Particles show movement about	List II C : Gases A : Solids' C : Gases C : Gases A : Solids

Q.5. State the correct term from A, B, C, D, E or F in List II which represents the change of state of matter or its relevant property from List I.

List I	List II
1. Solid 'X' to a Liquid 'Y'	A : Condensation
2. Liquid 'Y' to its vapour 'Z'	B : Vaporization
3. 'Z' to 'Y'	C: Melting
4. 'Y' to 'X'	D : Freezing
5. The temperature at which 'Y'	E : Melting point
changes to 'Z'	
	F · Boiling point
	r . boning point
Answer:	r . boning point
List I	List II
Inswer: List I 1. Solid 'X' to a Liquid 'Y'	List II C : Melting
List I 1. Solid 'X' to a Liquid 'Y' 2. Liquid 'Y' to its vapour	List II C : Melting B : Vaporization
List I 1. Solid 'X' to a Liquid 'Y' 2. Liquid 'Y' to its vapour 'Z'	List II C : Melting B : Vaporization
List I 1. Solid 'X' to a Liquid 'Y' 2. Liquid 'Y' to its vapour 'Z' 3. 'Z' to 'Y'	List II C : Melting B : Vaporization A : Condensation
List I 1. Solid 'X' to a Liquid 'Y' 2. Liquid 'Y' to its vapour 'Z' 3. 'Z' to 'Y' 4. 'Y' to 'X'	List II C : Melting B : Vaporization A : Condensation D : Freezing
List I 1. Solid 'X' to a Liquid 'Y' 2. Liquid 'Y' to its vapour 'Z' 3. 'Z' to 'Y' 4. 'Y' to 'X' 5. The temperature at	List II C : Melting B : Vaporization A : Condensation D : Freezing F : Boiling point