MATTER AROUND US - SOLIDS,LIQUIDS AND GASES
SOLUTIONS

TEACHING TASK

JEE MAIN LEVEL QUESTIONS

1. Which of the following statements is/are correct ?
A) Intermolecular forces of attraction is solids are maximum.
B) Intermolecular forces of attraction is gases are minimum.
C) Intermolecular spaces in solids are minimum.
D) All of the above
Answer:D
Solution:Solids have the strongest intermolecular forces, keeping particles tightly packed.
Gases have the weakest intermolecular forces, allowing particles to move freely.
Solids have the least intermolecular space, while gases have the most.
2. What happens to the volume of the solution when small amount of sugar is dissolved in it ?
A) Volume will increase. B) Volume will decrease.
C) Volume first increases then decreases. D) No change in volume.
Answer:D
Solution:Sugar molecules occupy the spaces between water molecules, so the total volume remains almost unchanged.
3. Which of the following statements is correct ?
A) Interparticle spaces are maximum in the gaseous state of a substance.
B) Particles which constitute the matter follow a zig-zag path.
C) Solid state is the most compact state of substance.
D) All are correct
Answer:D
Solution:A) Gases have the largest interparticle spaces.
B) Particles in gases move randomly (Brownian motion).
C) Solids are the most compact due to tightly packed particles.
4. Which out of the following does not make sense.
A) Solids have fixed shape and fixed volume.
B) Liquids can be compressed easily, but not gases.
C) The particles of solids have negligible kinetic energy.
D) Property of diffusion is maximum in the gaseous state.
Answer:B

Solution:Gases are highly compressible, whereas liquids are nearly incompressible.
5. Which of the following is/are application(s) of high compressibility of gases ?
A) L.P.G. is used as fuel in homes for cooking food.
B) Oxygen cylinders are supplied to hospitals.
C) C.N.G. is used as fuel in vehicles.
D) All of these
Answer:D
Solution:Gases are compressed for storage and transport (LPG, CNG, oxygen cylinders).
6. Which of the following statements does not go with the liquid state ?
A) Particles are loosely packed in the liquid state.
B) Fluidity is the maximum in the liquid state.
C) Liquids can be compressed.
D) Liquids take up the shape of any container in which these are placed.
Answer:C
Solution:Liquids are nearly incompressible, unlike gases.
7. The pressure exerted by a gas is due to
A) inter particle collisions B) collisions with the walls of the container
C) gravity D) atmospheric pressure
Answer:B
Solution:Gas particles move randomly and collide with the container walls, exerting pressure.
While inter-particle collisions (A) occur, they do not directly contribute to pressure.
8. If a perfume bottle is opened in one corner of a room, the smell can be felt after sometime in the opposite corner. This shows that
A) particles of matter are constantly moving B) the perfume is strong
C) the room has fan which circulates the perfume D) None of these
Answer:A
Solution:This phenomenon is called diffusion, which occurs due to the random motion of gas particles.
9. The type of motion that is present in gases is
A) random B) linear (in a straight line) C) vibratory D) circular
Answer:A
Solution:Gas particles move in random directions at high speeds (Brownian motion).
10. The physical state of matter whose volume can change significantly by changing temperature only is
A) solid B) gas C) liquid D) all three
Answer:B
Solution:Gases expand/contract significantly with temperature changes (Charles's

Law).
Solids and liquids have negligible volume changes compared to gases.

JEE ADVANCED LEVEL

Multi Correct Answer Type

1. Solid cannot be compressed because
A) constituent particles are very closely packed
B) inter particle attractive forces are weak
C) movement of constituent particles is restricted
D) constituent particles diffuse very slowly

Answer:A,C

Solution:A) Solids have minimal intermolecular spaces due to tight packing, making them incompressible.
C) Particles in solids vibrate in fixed positions, restricting movement and preventing compression.
B) Incorrect: Solids have strong inter-particle forces (not weak).
D) Incorrect: Diffusion rate is irrelevant to compressibility.

2. Which is not true for dry ice ?
A) solid ammonia B) solid carbon dioxideC) solid sulphur dioxide D) Normal ice

Answer:A,C,D

Solution:Dry ice is solid CO_2, so:
B (Solid CO_2) is true.
A (Solid NH_3), C (Solid SO_2), and D (Normal ice = H_2O) are false.

3. Which of the following statement is correct about Graham's law of diffusion
A) The rate of diffusion of a gas is inversely proportional to the square root of its density
B) The rate of diffusion of a gas is directly proportional to the square root of its density
C) The rate of diffusion of a gas increases with increase in temperature
D) Both A & C

Answer:A,C

Solution:A) Correct: Rate $\alpha \sqrt{\frac{1}{density}}$ (lighter gases diffuse faster).
B) Incorrect: Inverse relationship, not direct.
C) Correct: Higher temperature increases kinetic energy, speeding up diffusion.
D) Incorrect: Only A & C are independently correct, but "Both A & C" is not a valid combined option since they are separate truths.

Statement Type

4. Statement - I : Plasma state can exists everywhere.
Statement - II : Plasma state of matter is a fused ionic state.

Answer:B

Solution:Statement-I (True):
Plasma (the 4th state of matter) exists in stars, lightning, neon signs, and even interstellar space. It is the most abundant state in the universe.
Statement-II (True):
Plasma is an ionized gas where atoms lose electrons, forming a mixture of free electrons and ions (fused ionic state).

5. Statement - I : Moelcules can exist independently.
Statement - II : Molecule are made up of atoms.

Answer:B

Solution:Statement-I (True):
Molecules (e.g., O_2, H_2O) can exist independently as stable neutral entities.
Statement-II (True):
Molecules are indeed composed of atoms bonded together.
Explanation Check:
Statement-II describes the composition of molecules but does not explain their independent existence. For example, noble gases (e.g., He, Ne) exist as independent atoms, not molecules, yet Statement-I still holds for molecular substances.

Comprehension Type:

6. The process of diffusion taken in the above process is between
A) Air and Chalk powder B) Air and Board
C) Chalk powder and Board D) All the above

Answer:C

Solution:When chalk is used on a blackboard and left uncleaned, chalk particles slowly diffuse into the blackboard
This is a solid-solid diffusion process (chalk particles into board material)
Options A and B are incorrect because air is not involved in this specific diffusion process

7. Process of diffusion is very slow between
A) Gases and Gases B) Gas and Liquid
C) Liquid and Solid D) Solid and Solid

Answer:D

Solution:Solids generally do not diffuse due to strong interparticle forces and fixed positions.

The chalk-blackboard example is an exception, but even there, diffusion is extremely slow compared to gases/liquids.

Integer Type

8. Number of states of matter that exists are _____

Answer:5

Solution:The commonly recognized states of matter are:Solid,Liquid,Gas,Plasma (ionized gas, most abundant in the universe),Bose-Einstein Condensate (BEC, formed at ultra-low temperatures near absolute zero)

9. $CuSO_4$, $KMnO_4$, Water, carbon dioxide. In these how many exists as solids?

Answer:2

Solution:$CuSO_4$ (Copper sulfate): Solid at room temperature (white crystalline powder).
$KMnO_4$ (Potassium permanganate): Solid at room temperature (purple crystals).
Water (H_2O): Liquid at room temperature (25°C).
Carbon dioxide (CO_2): Gas at room temperature

Matching Type

10**.Answer:A-r,B-s.C-p,D-q**

Solution:

Column-I	Column-II
A) diffusion	r) Intermixing of particles
B) Brownian movement	s) zig-zag manner
C) lattice	p) geometrical shape
D) maximum fluidity	q) gases

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ'S)

1. The quantity of matter present in an object is called its -

A) weight B) volume C) mass D) Density

Answer:C

Solution:Mass is the measure of the amount of matter in an object (SI unit: kilogram).

2. Which of the following is/are rigid(s) ?

A) Solids B) Liquids C) Gases D) Both B and C

Answer:A

Solution:Solids are rigid due to strong intermolecular forces and fixed positions. Liquids and gases are fluids (not rigid) as they can flow.

3. Which of the following is not an example of matter ?
A) Air B) Feeling of cold C) Dust D) None of these
Answer:B
Solution:Matter has mass and occupies space (air, dust are matter).
"Feeling of cold" is a sensation (energy/experience), not matter.
4. Gas have _____ shape and _____volume
A) definite, definite B) definite, indefinite
C) indefinite, definite D) indefinite, indefinite
Answer:D
Solution:Gases fill any container, so they have no fixed shape or volume.
5. Which is not a pure substance in the four options given ?
A) alloy B) sugar C) distilled water D) copper wire
Answer:A
Solution:Alloy is a mixture of metals (e.g., brass = Cu + Zn), not pure.
Sugar (sucrose), distilled water (H_2O), and copper wire (Cu) are pure substances.
6. The matter that has stronger inter particle forces between an iron piece and a chalk piece is
A) iron B) chalk piece C) both D) neither
Answer:A
Solution:Metallic bonds in iron are stronger than the ionic/covalent bonds in chalk (calcium carbonate).
7. The volume of matter in 1 kg of cotton is _____ that present in 1 kg of sugar
A) smaller than B) greater than C) equal to D) can not say
Answer:B
Solution:Cotton is less dense than sugar, so 1 kg of cotton occupies more volume.
8. The type of motion that is present in solids is
A) random B) linear (in a straight line) C) vibratory D) circular
Answer:C
Solution:Solid particles vibrate about fixed positions due to strong intermolecular forces.
9. The type of motion that is present in liquid is
A) random B) linear (in a straight line) C) vibratory D) circular
Answer:A
Solution:Liquid particles move randomly (translational + vibrational motion) but are less chaotic than gases.

JEE MAIN LEVEL QUESTIONS

1. Which of the following is not correct for gases ?
A) Gases have definite mass. B) Gases have definite shape.
C) Gases have definite volume D) Both B and C

Answer:D

Solution:Gases have definite mass (A is correct).
Gases do not have definite shape or volume (B and C are incorrect).

2. The physical state of matter whose volume can change significantly by changing pressure only is
A) solid B) gas C) liquid D) all three

Answer:B

Solution:Gases are highly compressible due to large interparticle spaces

3. "All matter is made up of very small particles which cannot be further broken down. These particles are called atoms". This statement is one of the assumptions of
A) Rutherford's nuclear theory B) Bohr's theory
C) Dalton's atomic theory D) Kinetic theory of gases

Answer:C

Solution:Dalton's Atomic Theory (1808):
Matter consists of indivisible atoms.
Other theories focus on subatomic structure (Rutherford/Bohr) or particle motion (Kinetic Theory).

4. When an incense stick is lit in one corner of the room, the aroma is felt equally in all parts of the room. This is due to
A) Evaporation B) Combustion C) Sublimation D) Diffusion

Answer:D

Solution:Diffusion is the random movement of gas particles from high to low concentration.
Combustion (B) produces the aroma, but diffusion spreads it.

5. Choose the correct statement
A) potassium permanganate formula is $KMnO_4$
B) potassium permanganate formula is $KMnO_2$
C) potassium permanganate formula is $KMnO_3$
D) potassium permanganate formula is $KMnO_5$

Answer:A

Solution:$KMnO_4$ is the correct formula

6. Which of the following statement is incorrect
A) Gas particles always keep on moving in a zig-zag manner
B) The movement in gas particles is called Brownian movement.
C) Both A & B D) None

Answer:C

Solution:A) Incorrect.

Gas particles move in random directions and in straight lines between collisions. The "zig-zag" description is a misrepresentation. It's more accurate for visible particles in a fluid observed under a microscope.

B) Incorrect. Brownian motion refers to the random movement of small particles (like pollen grains) suspended in a fluid (liquid or gas), caused by collisions with the fast-moving molecules of the fluid — not the movement of gas particles themselves.

7. Which of the following statement is correct

A) When the temperature rises, kinetic energy of the particles also increases

B) When the temperature rises, rate of diffusion of the particles also increases

C) Both A & B D) None

Answer:C

Solution:Kinetic Energy α Temperature (A is correct).

Higher KE $\rightarrow$ Faster particle movement $\rightarrow$ Increased diffusion rate (B is correct).

8. The reason why we can smell hot food from long distance compared to cold food

A) movement B) diffusion C) energy D) All

Answer:D

Solution:Hot food:

Higher temperature $\rightarrow$ More kinetic energy (C) $\rightarrow$Faster diffusion (B) of aroma particles.

Convection currents (movement, A) also aid in spreading the smell.

9. The highly ordered arrangement of constituent particles of a solid is called

A) lattice B) Geometry C) Both A & B D) None

Answer:A

Solution:Lattice refers to the repeating 3D pattern of particles in crystalline solids.

10. The random motion of particles of a gas

A) Larger inter particle distances B) Weaker inter particle forces of attraction

C) Both A & B D) None

Answer:C

Solution:Gases:

Large interparticle spaces (A) $\rightarrow$ Free movement.

Negligible intermolecular forces (B)$\rightarrow$ Unrestricted motion

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Answer Type

1. The state of matter where matter is condensed in

A) solid state B) liquid state C) Gaseous state D) Plasma state

Answer:A,B
Solution:Condensed matter refers to states where particles are closely packed with strong intermolecular interactions.

Solids (A) are the most condensed state with particles in fixed positions and minimal intermolecular space.
Liquids (B) are also condensed but less so than solids, with particles that can move past each other while maintaining close proximity.
Gases (C) and Plasma (D) are not considered condensed states as their particles are far apart with negligible intermolecular forces.
2. Separation of a mixture into its constituents depend on
A) physical properties B) chemical properties C) physical state D) nuclear change
Answer:A,B
Solution:Physical Properties (A):
Most separation techniques rely on differences in physical properties:
Boiling point (distillation)
Solubility (chromatography, extraction)
Density (centrifugation)
Magnetic properties (magnetic separation)
Particle size (filtration, sieving)
Chemical Properties (B):
Some advanced separation methods utilize chemical differences:
Precipitation reactions (forming insoluble compounds)
Chemical affinity (ion exchange chromatography)
Reactivity differences (selective dissolution)
Why not C/D:
Physical state (C) is a factor but is itself a physical property
Nuclear changes (D) are irrelevant to standard separation techniques
Statement Type
3. Statement - I : Liquid do not have fixed shape but have a fixed volume
Statement - II : Liquids are not rigid but have a property to flow
Answer:B
Solution:Statement-I (True):Liquids take the shape of their container (no fixed shape) but maintain a fixed volume (cannot be compressed easily).
Example: Water poured into different containers.
Statement-II (True):Liquids flow (property called fluidity) because they are not rigid

(particles can slide past each other).
Explanation Check:

While both statements are true, Statement-II does not explain why liquids have no fixed shape but fixed volume. It only describes fluidity, which is a different (though related) property.

4. Statement - I : Movement of liquids differ from one liquid to other.
Statement - II : Relative fluidity of liquids differ from one liquid to other.

Answer:A

Solution:Statement-I (True):Different liquids have different viscosities (e.g., honey vs. water), affecting their movement.
Statement-II (True):Fluidity (ease of flow) is inversely related to viscosity. Higher viscosity ? lower fluidity (e.g., honey is less fluid than water).
Explanation Check:Statement-II directly explains Statement-I. The difference in movement (I) is due to differences in fluidity (II).

Comprehension Type:

5. Which of the following statement is correct
A) Stronger the forces of attraction, lower is the average speed
B) Stronger the forces of attraction, higher is the average speed
C) Both A & B D) None

Answer:A

Solution:Interparticle Forces vs. Motion:
Stronger intermolecular forces (like in solids) restrict particle movement, reducing their average speed (kinetic energy).
Weaker forces (like in gases) allow particles to move freely at higher speeds.

6. Which of the following statement is incorrect
A) The highly ordered arrangement of constituent particles of a solid is called a lattice
B) lattice gives rise to a regular geometrical shape to the crystals.
C) Both A & B D) None

Answer:D

Solution:Statement A (Correct):
A lattice is indeed the highly ordered, repeating 3D arrangement of particles in crystalline solids.
Statement B (Correct):
The lattice structure determines the crystal's geometry (e.g., cubic, hexagonal).
Why not A/B/C?

Both statements are factually accurate.
Option C ("Both A & B") implies they are incorrect, which is false.
Option D ("None") is correct because neither statement is incorrect.

Integer Type

7. Air, exhaust from chimney, water, honey, cotton, chalk & Iron. How many exists as Fluids?

Answer:4

Solution:Air (Gas) → Fluid
Exhaust from chimney (Gas) →Fluid
Water (Liquid) → Fluid
Honey (Liquid) →Fluid
Cotton (Solid) → Not a fluid
Chalk (Solid) → Not a fluid
Iron (Solid) → Not a fluid

Matching Type

Answer:A-s,B-r,C-p,D-q

Solution:

8. Column-I Column-II
A) Plasma s) Core of the sun
B) Solid r) Dry ice
C) Liquid p) Mercury- a metal
D) Gas q) methane

KEY

				TEACHING TASK					
				JEE MAIN LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
D	D	D	B	D	C	B	A	A	B
				JEE ADVANCED LEVEL					
1	2	3	4	5	6	7	8	9	10
A,C	A,C,D	A,C	B	B	C	D	5	2	A-r,B-s,C-p
				LEARNERS TASK					
			CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ'S)						
1	2	3	4	5	6	7	8	9	
C	A	B	D	A	A	B	C	A	
				JEE MAIN LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
D	B	C	D	A	C	C	D	A	C
				JEE ADVANCED LEVEL QUESTIONS					
1	2	3	4	5	6	7	8		
A,B	A,B	B	A	A	D	4	A-s,B-r,C-p,D-q		