2.PHYSICAL AND CHEMICAL CLASSIFICATION OF MATTER

SOLUTIONS

TEACHING TASK

1. Sugar dissolved in water forms a...

A) Compound B) Element C) Mixture D) Pure substance

Solution:Sugar (sucrose) + water forms a homogeneous mixture (solution).

Answer:C

2.When dry ice (solid CO_2) changes directly to gas, this is called...

A) Melting B) Sublimation C) Evaporation D) Condensation

Solution:Sublimation is the direct transition from solid to gas (bypassing the liquid phase).

Dry ice (solid CO_2) sublimates at -78.5°C (1 atm), creating fog-like vapor.

Answer:B

3.Which will NOT mix with water to form a solution?

A) Salt B) Sand C) Sugar D) Food coloring

Solution:Sand is insoluble in water—it settles at the bottom or forms a suspension but does not dissolve.

Salt , sugar , and food coloring dissolve in water to form homogeneous solutions.

Answer:B

4.A metal spoon left in hot soup becomes warm because...

A) Metals create heat B) Heat transfers through conduction

C) The soup evaporates D) Condensation occurs

Solution:Conduction is the transfer of heat through a material (like metal) when particles collide.

The spoon's metal atoms vibrate faster as they absorb heat from the soup, spreading energy along the spoon.

Answer:B

5.When water vapor cools on a mirror, it forms droplets through...

A) Freezing B) Condensation C) Sublimation D) Melting

Solution:Condensation occurs when water vapor (gas) cools and turns into liquid droplets on a surface

Answer:B

6.Which substance has a definite shape but no fixed volume?

A) Ice cube B) Oxygen gas C) Liquid mercury D) None of these

Solution:Definite shape + no fixed volume is impossible for any natural state of matter.

Solids (e.g., ice cube): Definite shape and volume.

Liquids (e.g., mercury): No definite shape but fixed volume.

Gases (e.g., oxygen): No definite shape or volume.

Answer:D

7.If you add food coloring to water and it spreads evenly, this shows...
A) Diffusion B) Evaporation C) Condensation D) Sublimation
Solution:Diffusion is the movement of particles from an area of high concentration to low concentration until evenly distributed.
When food coloring mixes evenly in water, its molecules diffuse through the liquid.
Answer:A
8.Which change requires REMOVAL of heat energy?
A) Water boiling B) Ice cream melting C) Puddle freezing D) Dry ice sublimating
Solution:Freezing (liquid → solid) requires removal of heat energy (cooling).
Example: A puddle turning to ice on a cold night loses thermal energy to the environment.
Answer:C
9.A glowing neon sign contains matter in which state?
A) Solid B) Liquid C) Gas D) Plasma
Solution:Neon signs contain plasma, created when electricity ionizes neon gas (or other noble gases) inside the tube.
Answer:D
10.When wax melts and burns in a candle, how many phase changes occur?
A) 1 (solid to liquid) B) 2 (solid→liquid→gas)
C) 3 (solid→liquid→gas→plasma) D) No phase changes occur
Solution:Melting (Solid → Liquid):
Wax melts from a solid to liquid when heated by the candle flame.
Vaporization (Liquid → Gas):
The liquid wax vaporizes into a gas (invisible fumes), which then burns in the flame.
Answer:B

MULTIPLE CORRECT ANSWER TYPE

11. Which of the following substances can undergo sublimation?
A) Camphor (used in puja) B) Iron nails C) Dry ice (solid CO2) D) Sugar crystals
Solution:A) Camphor (used in puja)
Sublimes at room temperature (turns directly from solid to gas)
C) Dry ice (solid CO2)
Sublimes at -78.5°C (skips liquid phase under normal conditions)
Answer:A,C
12.The conversion of matter between states depends on:
A) Atmospheric pressure B) Color of the substance C) TemperatureD) Magnetic fields
Solution:A) Atmospheric pressure
Pressure changes can alter melting/boiling points (e.g., water boils at lower temps at high altitudes)
C) Temperature
Heating/cooling drives phase changes (e.g., ice → water →steam)
Answer:A,C

STATEMENT TYPE:

13.Statement-I: Ice cubes maintain their shape when placed in a glass.

Statement-II: Solids have tightly packed particles with strong intermolecular forces.

Solution:Statement-I: True – Solids (like ice) have a fixed shape due to their rigid structure.

Statement-II: True – This is why solids resist deformation.

Statement-II correctly explains Statement-I →The fixed shape of ice (and all solids) is due to tightly packed particles with strong forces.

Answer:A

14. Statement-I: Diamond is a pure substance because it contains only carbon atoms.

Statement-II: All pure substances can undergo sublimation.

Solution:Statement-I: True – Diamond is an allotrope of carbon (pure elemental form).

Statement-II:False – Only some pure substances sublime (e.g., dry ice, iodine). Most melt/boil first (e.g., diamond sublimates only at ~4000°C; many metals melt instead).

Answer:C

COMPREHENSION -I :

15.What is the process called when a liquid changes into a solid by releasing heat energy?

a) Melting b) Freezing c) Evaporation d) Condensation

Solution:The process of conversion of liquid to solid by giving out heat eneryg is called freezing or solidification

Answer:B

16.What is the freezing point of water at atmospheric pressure?

a) 100°C b) 0°C c) -10°C d) 50°C

Solution:The freezing point of water is 0°C

Answer:B

COMPREHENSION -II:

17.What happens to the kinetic energy of vapour molecules during condensation?

A) It increases B) It decreases

C) It remains the same D) It becomes zero

Solution:When heat energy is extracted from vapour molecules, kinetic energy decreases.

Answer:B

18.Above which temperature can a gas not be liquefied, no matter how much pressure is applied?

A) Boiling point B) Freezing point C) Critical temperature D) Melting point

Solution:For every gas there is a certain temperature called critical temperature. Above this temperature the gas cannot be converted into liquid even if high pressure is applied.

Answer:C

INTEGER TYPE:

19.The freezing point of mercury (a liquid metal used in thermometers) is ____ °C.

Solution: The freezing point of mercury (Hg) is -39°C.

Answer: -39

20.The boiling point of ethanol (alcohol commonly used in sanitizers) is ____ °C.

Solution:The boiling point of ethanol (C_2H_5OH) is 78°C

Answer:78

MATRIX MATCH TYPE :

21.COLUMN-I	COLUMN-II
A. Solids	i. Particles move freely and fill the entire container
B. Liquids	ii. Particles vibrate in fixed positions
C. Gases	iii. Particles slide past each other but remain close
D. Plasma	iv. Contains charged particles (ions and electrons)

Solution:

A. Solids	ii. Particles vibrate in fixed positions
B. Liquids	iii. Particles slide past each other but remain close
C. Gases	i. Particles move freely and fill the entire container
D. Plasma	iv. Contains charged particles (ions and electrons)

Answer:A-ii,B-iii,C-i,D-iv

22.COLUMN-I	COLUMN-II
A. Solid to Gas	i. Sublimation
B. Gas to Solid	ii. Deposition
C. Liquid to Gas (at boiling point)	iii. Evaporation
D. Liquid to Gas (below boiling point)	iv. Boiling

Solution:

A. Solid to Gas	i. Sublimation
B. Gas to Solid	ii. Deposition
C. Liquid to Gas (at boiling point)	iv. Boiling
D. Liquid to Gas (below boiling point)	iii. Evaporation

Answer:A-i,B-ii,C-iv,D-iii

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. Which of the following is NOT a state of matter?

A) Solid B) Liquid C) Gas D) Light

Solution:The main states of matter are solid, liquid, gas, and plasma. Light is a form of energy, not matter.

Answer:D

2. A mixture where substances are evenly distributed (like saltwater) is called a _____.

A) Homogeneous mixture B) Heterogeneous mixture C) Compound D) Element
Solution: In homogeneous mixtures, the composition is uniform throughout
Answer:A
3. The process of a gas turning directly into a solid (without becoming a liquid) is called _____.
A) Sublimation B) Deposition C) Condensation D) Evaporation
Solution:The process of a gas turning directly into a solid (without becoming a liquid) is called Deposition .
Answer:B
4. Which of these substances sublimes at room temperature?
A) Water B) Iron C) Dry Ice (Solid CO_2) D) Salt
Solution: Dry ice changes directly from solid to gas at room temperature.
Answer:C
5. The smallest unit of an element that retains its properties is called a(n) _____.
A) Molecule B) Atom C) Compound D) Mixture
Solution: Atoms are the basic building blocks of matter that maintain an element's characteristics.
Answer:B
6. Which of the following is a pure substance?
A) Air B) Sugar ($C_{12}H_{22}O_{11}$) C) Saltwater D) Milk
Solution:Pure substances have fixed composition and properties. Sugar is a pure compound.
Answer::B
7. The temperature at which a liquid turns into a gas is called its _____.
A) Freezing point B) Melting point C) Boiling point D) Condensation point
Solution:The temperature at which a liquid turns into a gas is called its Boiling point .
Answer:C
8. Which of these is highly compressible?
A) Wood B) Water C) Oxygen gas D) Gold
Solution:Oxygen gas - Gases are highly compressible due to large spaces between particles
Answer:C
9. Which of the following is an example of a chemical change?
A) Melting ice B) Burning paper C) Dissolving sugar D) Crushing a can
Solution: Burning paper - This creates new substances (ash, smoke, gases) through combustion
Answer:B
10. The process of separating solids from liquids using filter paper is called _____.
A) Evaporation B) Filtration C) Sublimation D) Distillation
Solution: Filtration - This physical separation method uses a porous barrier to trap solids.
Answer:B

JEE MAIN LEVEL QUESTIONS

1. Which of these undergoes sublimation at room temperature?

A) Wax B) Iodine crystals C) Iron nail D) Sugar

Solution: Iodine sublimes (changes directly from solid to purple gas) at room temperature

Answer:B

2. The state of matter with the highest kinetic energy is:

A) Solid B) Liquid C) Gas D) Plasma

Solution: Plasma particles have extremely high energy due to ionization at very high temperatures.

Answer:D

3. Which substance has a fixed volume but no fixed shape?

A) Oxygen gas B) Ice cube C) Mercury (liquid metal) D) Carbon dioxide

Solution:Mercury (liquid metal) - Like all liquids, mercury has fixed volume but takes the shape of its container.

Answer:C

4. The process of a gas turning into a liquid is called:

A) Freezing B) Condensation C) Sublimation D) Deposition

Solution:The process of a gas turning into a liquid is called Condensation.

Answer:B

5. Odd one out based on compressibility:

A) Helium gas B) Water vapor C) Stone D) Carbon dioxide

Solution:Solids like stone are nearly incompressible, while gases (A, B, D) are highly compressible.

Answer:C

6. Which substance diffuses fastest in air?

A) Perfume (liquid) B) Copper (solid) C) Hydrogen gas D) Honey

Solution: Gaseous particles move fastest, and hydrogen is the lightest gas (H_2).

Answer:C

7. What happens to particle motion when a liquid freezes?

A) Speeds up B) Stops completelyC) Slows down and becomes fixedD) Turns into plasma

Solution:Slows down and becomes fixed - Particles lose energy and lock into a rigid structure.

Answer:C

8. Which is NOT a pure substance?

A) Distilled water B) Gold nugget C) Saltwater D) Oxygen gas

Solution: Saltwater - It's a homogeneous mixture of salt (NaCl) and water (H_2O).

Answer:C

9. The temperature at which a liquid becomes a solid is its:

A) Boiling point B) Melting point C) Freezing point D) Sublimation point

Solution:The temperature at which a liquid becomes a solid is its Freezing point.

Answe:C

10. Which state of matter is found in stars like the Sun?

A) Solid B) Liquid C) Gas D) Plasma

Solution:Plasma - Stars consist of ionized gas at extremely high temperatures (mil-

lions of degrees).

Answer:D

ADVANCED LEVEL QUESTIONS

MULTIPLE CORRECT ANSWER TYPE

11. Which of the following substances can undergo sublimation?

A) Dry Ice (Solid CO_2) B) Camphor

C) Iron D) Ammonium Chloride

Solution:

A) Dry Ice (Solid CO2) - Sublimes at -78.5°C (used in fog effects)

B) Camphor - Sublimes at room temperature (used in puja/medicine)

D) Ammonium Chloride - Sublimes when heated (white vapor forms)

C) Iron - Melts at 1538°C (does not sublime under normal conditions)

Answer:A,B,D

12. The temperature at which a liquid converts to a gas and vice versa is called:

A) Boiling Point B) Condensation Point

C) Melting Point D) Freezing Point

Solution:A) Boiling Point - Liquid → Gas at this temperature (e.g., water boils at 100°C)

B) Condensation Point - Gas → Liquid at the same temperature as boiling (just the reverse process)

Answer:A,B

COMPREHENSION TYPE :

COMPREHENSION-I :

13.The melting point of a pure substance is always ____.

A) Variable (changes with shape) B) Sharp and definite

C) Lower than its boiling point D) Impossible to measure

Solution:Pure substances melt completely at a specific temperature .

Answer:B

14.If a sample of wax melts over a range of 45°C–65°C, what does it indicate?

A) The wax is pure B) The wax contains impurities

C) The thermometer is faulty D) Wax has no melting point

Solution:Impurities lower and broaden the melting range. Pure wax would melt sharply at one temperature

Answer:B

COMPREHENSION-II:

15.A material has the following properties:

It is homogeneous,Its particles are of only one kind,It has a definite boiling point

This material must be a:

A) Mixture B) Pure substance C) Heterogeneous compound D) Colloid

Solution:The description matches a pure substance (either an element or compound), as it has uniform composition, identical particles, and sharp physical properties (like boiling point).

Answer:B

16.Substance X has molecules made of identical atoms, while Substance Y has molecules made of different atoms. According to the passage:

A) Both X and Y are elements B) X is an element; Y is a compound

C) Both X and Y are mixtures D) X is a compound; Y is an element

Solution:X (identical atoms): Element (e.g., O_2, Fe).

Y (different atoms): Compound (e.g., H_2O, CO_2).

Answer:B

INTEGER TYPE:

17.The number of states of matter that can flow (take the shape of their container) is ____.

Solution:Liquids – They flow and take the shape of the bottom of their container.

Gases – They flow and completely fill the shape of the container.

Plasma – Like gases, plasma also flows and takes the shape of its container.

So, the number of states of matter that can flow is:Three: Liquid, Gas, and Plasma

Answer:3

18. Among the following, how many are pure substances?

(Iron, Saltwater, Oxygen gas, Carbon dioxide, Milk)

Solution:Iron – Pure substance (an element)

Saltwater – Mixture (homogeneous mixture of salt and water)

Oxygen gas (O_2) – Pure substance (an element)

Carbon dioxide (CO_2) – Pure substance (a compound)

Milk – Mixture (colloidal mixture of fat, water, proteins)

Answer:3

19.If you mix sugar, sand, and iron filings, how many of these can be separated using a magnet? ____.

Solution:Sugar – Non-magnetic

Sand – Non-magnetic

Iron filings – Magnetic

Answer:1

KEY

					TEACHING TASK				
1	2	3	4	5	6	7	8	9	10
C	B	B	B	B	D	A	C	D	B
11	12	13	14	15	16	17	18	19	20
A,C	A,C	A	C	B	B	B	C	-39	78
21		22							
A-ii,B-iii,C-I,D-iv		A-I,B-ii,C-iv,D-iii							
					LEARNERS TASK		(CUQ's)		
1	2	3	4	5	6	7	8	9	10
D	A	B	C	B	B	C	C	B	B
					JEE MAIN LEVEL QUESTIONS				
1	2	3	4	5	6	7	8	9	10
B	D	C	B	C	C	C	C	C	D
11	12	13	14	15	16	17	18	19	
A,B,D	A,B	B	B	B	B	3	3	1	