1. SOLIDS, LIQUIDS & GASES

SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. The space between the molecules are called.....

A)Intermolecular spaces B)Intramolecular spaces C)No change D)Negligible

Answer:A

Solution:The gaps between molecules are called intermolecular spaces. These spaces determine the state of matter (solid, liquid, gas).

2. ..... acquire the shape of container

A)Solids B)Liquids C)Gases D)Plasma

Answer:B

Solution:Liquids take the shape of their container because their molecules can flow past one another (fixed volume, no fixed shape).

3. At 30^{O}C, coconut oil exists as

A) Solid B)Liquid C)Gases D)Substance

Answer:B

Solution:Coconut oil melts around 24-26°C, so at 30°C, it is a liquid.

4. We smell the fragnance of flowers , perfumes,coffee etc.because the .....molecules spread easily

A)Solid B)Liquid C) Gases D)Rubber

Answer:C

Solution:Gaseous molecules diffuse easily in air due to high kinetic energy and large intermolecular spaces.

5. The fourth state of matter is

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

Answer:B

Solution:Plasma is the fourth state (e.g., lightning, stars), where atoms are ionized into free electrons and ions.

6. In plasma state

A)Ions and electrons co exist B)Atoms and molecules coexist

C)Atoms and ions coexist D)Protons and molecules

Answer:A

Solution: Plasma consists of ionized particles (ions + free electrons).

7. Water at room temperature ,above 100^{o}C, below 0^{o}C exist as

A) Liquid,Solid,Vapour B)Liquid, Vapour and Solid

C)Solid, Liquid, Vapour D)Vapour, Liquid , Solid.

Answer:B

Solution:Room temp (25°C): Liquid

>100°C: Vapour (gas)
<0°C: Solid (ice)
8. A form of matter has no fixed shape but it has a fixed volume. An example of this form of matter is
A) Krypton B) Kerosene C) Carbon steel D) Carbon dioxide
Answer:B
Solution:Liquids (like kerosene) have fixed volumes but adapt to container shapes.
9. Which one of the following statements is not true?
A) The molecules in a solid vibrate about a fixed position
B) The molecules in a liquid are arranged in a regular pattern
C) The molecules in a gas exert negligibly small forces on each other, except during collisions
D) The molecules of a gas occupy all the space available
Answer:B
Solution: Liquids have no regular arrangement (only solids do).
10. Particles of matter have .....because they are constantly moving
A) volume B)density C) kinetic energy D) Heat
Answer:C
Solution: Moving particles possess kinetic energy (energy of motion).
11. Matter may be a gas, a solid, or a liquid.It can change from one state to another.Which of the following may cause matter to change state?
A)a change in mass B)a change in color
C)a change in volume D)a change in temperature
Answer:D
Solution:State changes (e.g., melting, boiling) occur due to temperature changes, which alter particle energy.

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:
12. Choose the incorrect statement
A)Solids has no definite shape
B)Solids do not need a container to hold them.
C) Solids have no definite volume
D)Solids do not expand on heatingc
Answer:A,C
Solution:Solids have fixed shape and volume due to strong intermolecular forces and tightly packed particles.
13. Whichof the following are gases?
A) Nitrogen B)Dry ice C) Oxygen D)Hydrogen
Answer:A,C,D

Solution:Gases at room temperature (25°C, 1 atm) include N_2, O_2, H_2, etc. Dry ice is a solid that sublimates.

Statement Type:

14. Statement -I : Solids cannot be compressed.
Statement -II : This is due to compact arrangement of molecules

Answer:A

Solution:Statement-I is true: Solids are nearly incompressible because their particles are tightly packed.
Statement-II is true: The compact molecular arrangement in solids (with minimal inter-molecular spaces) directly explains their incompressibility.

15. Statement -I : Molecules in a solid cannot interchange their position
Statement -II : Solids have strong intermolecular force of attraction

Answer:B

Solution:Statement-I is true: Solid molecules vibrate in fixed positions and do not freely move past one another.
Statement-II is true: Solids indeed have strong intermolecular forces, but this alone doesn't explain the rigid positional fixity (which also depends on the crystalline structure).

Comprehension I:

16. Plasma state is observed at ..... temperature
A) Below $0^{O}C$ B)Room temperature
C)$100^{O}C$ D)$10^{7}\ ^{O}C$(Very high temperature)

Answer:D

Solution:Plasma exists at extremely high temperatures (e.g., $>10^{6}$ °C), where atoms ionize into free electrons and ions.

17. ..... state is observed in sun ,and core of stars
A)Solid B) Liquid C)Plasma D) Gas

Answer:C

Solution:The sun and stars consist of plasma due to ultra-high temperatures ($>10^{6}$ °C), causing ionization of hydrogen/helium atoms.

Comprehension II:

18. The first Bose-Einstein condensate was produced using a gas of ..... atoms
A)Rubidium B)Ruthenium C)Rhodium D) Radium

Answer:A

Solution:The first Bose-Einstein Condensate (BEC) was created in 1995 by Eric Cornell and Carl Wieman using a gas of Rubidium (Rb) atoms cooled to near absolute zero (~170 nK).
This achievement won them the Nobel Prize in Physics (2001).

Integer type:

19. Matter exist in ..... states.

Answer:5

Solution:Matter is classified into five fundamental states:

Solid (e.g., ice)

Liquid (e.g., water)

Gas (e.g., steam)

Plasma (e.g., lightning, stars)

Bose-Einstein Condensate (BEC) (e.g., ultracold atomic gases)

Matrix Matching Type:

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

Solution:

Column - I	Column - II
A)Bose-Einstein condensate	s) fifth state of matter.
B)Solids	q) many no of free surfaces
C)Liquids	p) only one free surface.
D)Gases	r) no free surfaces

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. The state of matter which has definite volume but not shape is

A) Gaseous state B) Liquid state C) Solid state D) Plasma

Answer:B

Solution: Liquids have a fixed volume but take the shape of their container due to fluidity.

2. Intermolecular distances are maximum in

A) Solids B)Liquids C) Gases D) None

Answer:C

Solution: Gases have the largest intermolecular spaces, allowing particles to move freely.

3. Oxygen is an example for ..... state of matter

A) Solids B)Liquids C) Gases D) Plasma

Answer:C

Solution: Oxygen (O_2) is a gas at room temperature.

4. .....is an ionised gaseous state of matter

A) Solid B) Bose-Einstein C) Liquids D) Plasma

Answer:D

Solution:Plasma is an ionized gas (e.g., lightning, stars) with free electrons and ions.
5. Any material which has ..... and occupies ..... is called matter
A) Mass B) Space C) Both A and B D) None
Answer:C
Solution:Matter is defined by having mass and occupying space.
6. Which of the following is solid ?
A)Wood B)Stone C) Rock D) All the above.
Answer:D
Solution: Wood, stone, and rock are all solids with fixed shapes and volumes.
7. The material with negligible intermolecular forces is ....
A) Solid B) Liquid C)Gas D)Plasma
Answer:C
Solution:Gases have weak intermolecular forces, allowing particles to move independently.
8. .....is the fifth state of matter
A) Solid B) Bose-Einstein C) Liquids D) Plasma
Answer:B
Solution:The Bose-Einstein Condensate (BEC) is the fifth state, formed at near absolute zero.
9. The state of matter with no definite shape but have definite volume is .....
A)Gas B)Solid C)Liquid D)None
Answer:C
Solution:Liquids adapt to container shapes (no fixed shape) but maintain a fixed volume.
10. Matter is made up of tiny particles called
A) Atoms B) Molecules C) Element D) Substance
Answer:A
Solution:The smallest unit of matter is an atom, which combines to form molecules.

JEE MAIN LEVEL QUESTIONS

1. What is the physical state of water at room temperature?
A) Solid B) Liquid C)Gas D) All the above
Answer:B
Solution: At room temperature (~25°C), water exists as a liquid.
2. The molecules of _____ are very loosely packed.
A) Solid B) Liquid C)Gas D) substance
Answer:C
Solution:Gases have the loosest molecular packing due to weak intermolecular forces and large spaces between particles.

3. Molecules are in turn made up of .....
A) Element B) Atoms C)Matter D)Substance
Answer:B
Solution:Molecules are composed of atoms (e.g., $H_2O = 2H + 1O$).
4. ..... have high compressibility
A) Solid B) Liquid C)Gases D) Compound
Answer:C
Solution:Gases are highly compressible due to large intermolecular spaces.
5. Air is an example of
A)Solid B) Liquid C) Gas D) Plasma
Answer:C
Solution: Air is a mixture of several gases
6. ..... can flow in all directions
A)Solid B)Liquid
C) Gas D)Bose -Einstein condensate
Answer:C
Solution: Gases can expand to fill any container and flow freely in all directions.
7. Which of the following state of matter does not need a vessel to contain them?
A)Solid B)Liquid C)Gas D)Both B and C
Answer:A
Solution: Solids maintain their own shape and don't require a container
8. Which of the following is the property of Solid?
A) Can be compressed B) Have definite shape
C) Have low density D) Intermolecular force is less
Answer:B
Solution:Solids maintain a fixed shape due to strong intermolecular forces.
9. Which of the following is a property of both liquids and gases, but not solids?
A) has definite volume. B) can be compressed
C) has a definite shape D) has a definite texture
Answer:B
Solution: Both liquids and gases are compressible (though gases much more so), while solids are nearly incompressible.
JEE ADVANCED LEVEL QUESTIONS
Multi correct answer type:
10. Choose the correct statement(s)
A)Solids do not diffuse. B)Density of liquids relatively less than solids
C)Gases exert pressure in all directions. D) None of the above

Answer:B,C
Solution:A) Solids do not diffuse $\rightarrow$Incorrect
(Solids can diffuse, but extremely slowly due to tightly packed molecules)
B) Density of liquids is relatively less than solids $\rightarrow$Correct
(Liquids are generally less dense than their solid forms, except for water/ice)
C) Gases exert pressure in all directions $\rightarrow$Correct
(Gas particles move randomly, colliding with container walls equally in all directions)
11. Which of the following is true about gases?
A) Gases have no definite volume B) Gases have no free surface
C)Gases have no definite shape. D)Gases are highly compressible
Answer:A,B,C,D
Solution:A) No definite volume $\rightarrow$Correct
(Gases expand to fill their container)
B) No free surface $\rightarrow$Correct
(Gases don't form surfaces like liquids/solids)
C) No definite shape $\rightarrow$ Correct
(Gases take the shape of their container)
D) Highly compressible $\rightarrow$ Correct
(Large intermolecular spaces allow significant compression)
Comprehension Type:
12. Which state of matter do not settle to the bottom of container
A)Solids B)Liquids C) Gases D)All
Answer:C
Solution:Solids (A):Always settle at the bottom due to gravity (fixed shape and volume).
Liquids (B):Form a flat surface at the bottom (take container shape but settle due to gravity).
Gases (C):Do not settle—they fill the entire container uniformly (no fixed shape/volume).
Gas molecules move randomly and spread out due to weak intermolecular forces.
Integer type:
13. Matter exist in ..... states.
Answer:5
Solution:The five states of matter are:Solid,Liquid,Gas,Plasma,Bose-Einstein Condensate (BEC).

14. Among solid, liquid and gas how many of them can flow.....

Answer:2

Solution:Liquids and gases can flow (due to weak intermolecular forces).

Solids cannot flow (rigid structure).

15. Among milk ,water,ice,oxygen . How many are solids?.....

Answer:1

Solution:Ice is solid (frozen water).

Milk (liquid), water (liquid), oxygen (gas) are not solids.

16. Rubidium atoms turns to super cooled liquid at ..... nanokelvin temperature.

Answer:170

Solution:Rubidium forms a Bose-Einstein Condensate (BEC) at ~170 nanokelvin (near absolute zero).

17. Among balloon, sponge and scale, how many of them can be compressed?

Answer:2

Solution:Balloon (contains gas $\rightarrow$ compressible).

Sponge (porous solid $\rightarrow$compressible due to air pockets).

Scale (rigid solid $\rightarrow$ incompressible).

Matrix Matching Type:

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

Solution:

Column - I	Column - II
A)Solids	q) wood
B)Liquids	s) kerosene
C)Gases	p)Steam
D)Plasma	r) ions and electyrons co-exist

KEY

			TEACHING TASK						
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
A	B	B	C	B	A	B	B	B	C
11	12	13	14	15	16	17	18	19	20
D	A,C	A,C,D	A	B	D	C	A	5	A-s,B-q,C-
			LEARNERS TASK		(CUQ's)				
1	2	3	4	5	6	7	8	9	10
B	C	C	D	C	D	C	B	C	A
			JEE MAIN LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
B	C	B	C	C	C	A	B	B	B,C
11	12	13	14	15	16	17	18		
A,B,C,D	C	5	2	1	170	2	A-q,B-s,C-p,D-r		