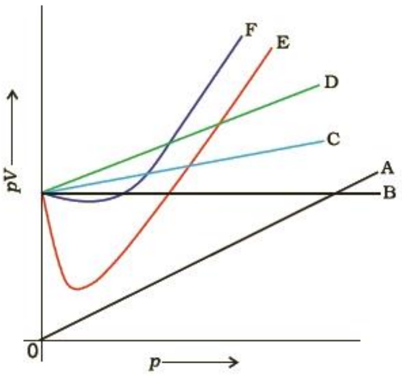
	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	Department: SCIENCE 2021 - 22 SUBJECT : CHEMISTRY	Date of submission: 30.11.2021
Worksheet No: 09 WITH ANSWERS	Chapter: STATES OF MATTER	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

MULTIPLE CHOICE QUESTIONS

1. If a gas expands at constant temperature, it indicates that
   a. Kinetic energy of molecules remains the same.
   b. Number of gas molecules increases.
   c. Kinetic energy of molecules increases.
   d. Pressure of gas increases.

2. Which curve in the figure represents the curve of ideal gas?



a. B only b. C and D only
c. E and F only d. A and B only

3. As the temperature increases, average kinetic energy of molecules increases. What would be the effect of increase of temperature on pressure provided the volume is constant?
   a. increases b. decreases
   c. remains same d. becomes half

4. Charles law is represented by
   a. V∞ n at T and p b. pV/T = constant
   c. V ∞ T at constant n and p d. p ∞ 1/V at constant n and T

5. Define the term Absolute zero.
   a. The highest hypothetical or imaginary temperature at which gases are supposed to occupy zero volume.
   b. Its value is -273.15 K.
   c. The lowest hypothetical or imaginary temperature at which gases are supposed to occupy zero volume.
   d. None of these.

6. Write the van der Waals gas equation.

a. $$\left(p+\frac{an^2}{V^2}\right)(V-nb)=nRT$$

b. $$\left(p-\frac{an^2}{V^2}\right)(V+nb)=nRT$$

c. pV = nRT

d. $$\left(p+nb\right)(V-an^2/V^2)=nRT$$

7. Which among the following molecules show London or Dispersion forces.

a. CCl_4
b. HCl
c. CO_2
d. HF

Questions 8 - 10 are *Assertion Reason* type questions

a. If both *Assertion* and *Reason* are correct and *Reason* is the correct explanation of *Assertion*.
b. If both *Assertion* and *Reason* are correct but *Reason* is not the correct explanation of *Assertion*.
c. If *Assertion* is correct and *Reason* is wrong.
d. If *Assertion* is wrong and *Reason* is correct.

8. *Assertion:* Three states of matter are the result of balance between intermolecular forces and thermal energy of the molecules.
Reason : Intermolecular forces tend to keep the molecules together but thermal energy of molecules tends to keep them apart.

9. *Assertion*: The value of a is higher for NH_3 in comparison to N_2.
Reason: H- bonding occurs in NH_3.

10. *Assertion*: Thermal energy is a measure of average kinetic energy of the particles of the matter.
Reason: Liquids can be converted into vapour on reducing thermal energy.

2 Marks Questions

11. What is equation of state for an ideal gas? Why is it called so?

12. 200 cm^3 of a gas at 0.5 atm pressure is allowed to expand till the pressure is 0.9 atm keeping the temperature constant. Calculate the volume of the gas.

13. Two flasks A and B have equal volumes. Flask A contains Hydrogen at 300 K while flask B has same mass of CH_4 at 600 K.
i. Which flask contains larger number of molecules?
ii. In which flask is the pressure greater?

iii. In which flask the molecules move faster?
iv. In which flask is the number of collisions with the walls greater?

14. Which postulates of Kinetic theory do not hold good for real gases?

15. How many moles of oxygen are present in 400 cm^3 sample of the gas at a pressure of 76 mm Hg at a temperature of 300 K? (760 mm Hg = 1 atm)

<u>3 Marks Questions</u>

16. A discharge tube containing nitrogen gas at 25° C is evacuated till the pressure is 2 mm Hg. If the volume of the discharge tube is 2 L, calculate the number of nitrogen molecules still present in the tube.

17. The density of a certain gaseous oxide at 1.5 bar at 10°C is same as that of dioxygen at 20°C and 4.5 bar pressure. Calculate the molar mass of the gaseous oxide.

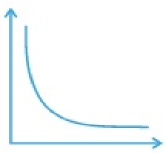
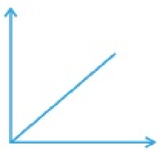
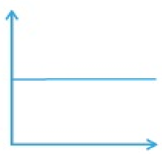
18. a. Derive a relation between density and molar mass of a gaseous substance.
 b. Explain Dipole -Dipole interactions using an example.

<u>5 Marks Questions</u>

19. a. What will be the pressure of a gaseous mixture when 0.5L of H_2 at 0.8 bar and 2.0 L of O_2 at 0.7 bar are introduced in a 1L empty vessel at 27°C?

 b. A mixture of hydrogen and oxygen at one bar pressure contains 20% by mass of H_2. Calculate the partial pressure of H_2.

20. a. Match the following graphs of ideal gas with their coordinates.

	Graphical representation		x and y co-ordinates
(i)		(a)	pV vs. V
(ii)		(b)	p vs. V
(iii)		(c)	p vs. $\frac{1}{V}$

 b. Write the conditions under which gas approaches ideal behaviour
 c. State Daltons Law of Partial pressures.

PASSAGE BASED QUESTIONS
Intermolecular forces are the forces of attraction and repulsion between interacting particles (atoms and molecules). Attractive intermolecular forces are known as van der Waals forces,

Dispersion Forces or London Forces are seen in atoms and nonpolar molecules which are electrically symmetrical

Dipole-dipole forces act between the molecules possessing permanent dipole. This type of attractive forces operates between the polar molecules having permanent dipole and the molecules lacking permanent dipole.

The behaviour of gases is governed by same general laws, which were discovered as a result of their experimental studies. These laws are relationships between measurable properties of gases. Some of these properties like pressure, volume, temperature and mass are very important because relationships between these variables describe state of the gas.

21. Which type of intermolecular forces are broken in the following process?
    Vaporisation of ammonia
    a. Dispersion forces
    b. Dipole dipole forces
    c. H bonds
    d. Dipole-Induced dipole forces

22. A plot of p vs T at constant volume is called ________
    a. Isochore
    b. Isotherm
    c. Isobar
    d. Isotope

23. Combined gas law is ________
    a. pV = nRT
    b. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
    c. $\frac{p_1}{T_1} = \frac{p_2}{T_2}$
    d. $\frac{p_1V_1}{T_1} = \frac{p_2V_2}{T_2}$

24. Tyres of automobiles are inflated to less pressure in summer than in winter. Give reason.
    a. p α T
    b. p α 1/V
    c. T α V
    d. p α 1/T

25. Choose the species which exhibits Dispersion forces.
    a. He
    b. Ne
    c. SiH_4
    d. All of these

Q.No:	Answers	Marks
1	A	1
2	A	1
3	A	1
4	C	1
5	C	1
6	a	1
7	a	1
8	a	1
9	a	1
10	c	1

11	$pV = nRT$ This equation is a relation between four variables and it describes the state of any gas, therefore, it is called equation of state.2	2
12	$p_1V_1 = p_2V_2$ 111.11 cm^3	2
13	i. A ii. Pressure is higher in B iii. Molecules move faster in B iv. B	2
14	1. Gases consist of large number of identical particles (atoms or molecules) that are so small and so far apart on the average that the actual volume of the molecules is negligible in comparison to the empty space between them 2. There is no force of attraction between the particles of a gas at ordinary temperature and pressure	2
15	400 cm^3 = 400 ml = 0.4 L R = .0821 atm L $K^{-1} mol^{-1}$ pV = nRT Ans : n = 0.01623 mol	2
16	: p = 2 mm Hg = 0.00263 atm (760 mm Hg = 1 atm) V = 2 L T = 298 K R = 0.0821 atm L K^{-1} mol^{-1} pV = nRT n = .000215 moles No : of molecules = moles × Avogadro number (no : of moles = No: of particles / Avogadro number) = $0.000215 \times 6.022 \times 10^{23}$ = 1.29×10^{20} molecules	3
17	**<u>oxide</u>** Density = d(oxide) Molar mass M T = 283 K p = 1.5 bar **<u>Dioxygen</u>** Density = d(dioxygen) Molar mass = 32 g mol^{-1} T = 293 K p = 4.5 bar Formula - **pM = dRT** **d(oxide) = 1.5 × M / R × 283** **d(oxygen) = 4.5 × 32 / R × 293** **Molar mass M = 92.7 g mol^{-1}**	3
18	a. pV = nRT	3

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$$\frac{n}{V} = \frac{p}{RT}$$

Replacing n by $\frac{m}{M}$

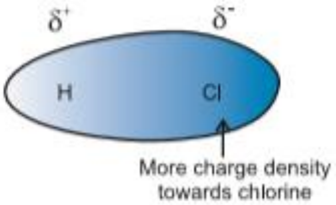
$$\frac{m}{MV} = \frac{p}{RT}$$

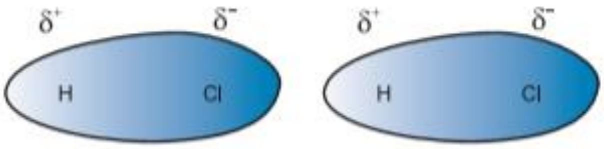
$$\frac{d}{M} = \frac{p}{RT}$$ (where d is the density)

On rearranging equation

$$M = \frac{dRT}{p}$$

b . eg HCl





The force of attraction which exists between two HCl molecules is dipole dipole interaction.

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a.

Moles of H_2 , $nH_2 = pV/RT$

$= 0.8 \text{ bar} \times 0.5 \text{ L} / RT = 0.4 / RT$

Moles of O_0, $nO_2 = pV /RT$

$0.7 \text{ bar} \times 2 \text{ L} / RT = 1.4 / RT$

Total number of moles = $0.4/RT + 1.4 /RT = 1.8 /RT$

Gas eqn , $pV = nRT$

$P = n RT/V$

$= 1.8 / RT \times RT/V$

$= 1.8 / 1$

$= 1.8$ bar

b. Let the mass of H_2 be 20 g.

mass of O_2 be 80 g.

No: of moles of H_2 = mass / Molar mass

= 20 / 2

= 10 moles

No: of moles of O_2 = mass/molar mass

= 80 / 32

= 2.5 moles

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	$\chi_{H_2} = nH_2 / nO_2 + nH_2$ $= 10 / 12.5$ $= 0.8$ Partial pressure of H_2 , $pH_2 = \chi H_2 \times$ ptotal $= 0.8 \times 1$ $= 0.8$ bar	
20	a. i. b , ii. c , iii. a b. The two conditions are i. High T ii. Low p c. It states that the total pressure exerted by the mixture of non-reactive gases is equal to the sum of the partial pressures of individual gases.	5
21	c	1
22	a	1
23	d	1
24	a	1
25	d	1

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