



CHEMISTRY

BOOKS - JEEVITH PUBLICATIONS

CHEMISTRY (KANNADA ENGLISH)

**STATES OF MATTER : GASES AND
LIQUIDS**

One Mark Questions And Answers

1. Write ideal gas equation for one mole of gas.



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2. Write the van der Waals equation for one mole of a real gas.



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3. Define intermolecular force.



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4. Give the combined gas equation (or general equation for gases).



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5. Give the combined gas equation (or general equation for gases)



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6. Write kinetic equation for gases.



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7. Define dispersion forces or London forces



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8. Write an equation for the root mean square of gas.



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9. Define Thermal energy.



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10. Define absolute zero concept.



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11. Which property of liquid is responsible shape of liquid drops ?





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12. What is the effect of temperature on viscoisty and why ?



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13. What is the effect of pressure on (i) visocity, (ii) surface tension, (iii) density of liquid ?



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14. What is the boiling point of water at (i) higher altitudes, (ii) in pressure cooker ?



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15. define Kelvin temperature scale.



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16. Define Avogadro constant (N_A).



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17. Define an ideal gas.



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18. Give various forms of ideal gas equation.



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19. What are real gases ?



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20. Define molar volume (V_m)



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21. What is compressibility factor (Z).



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22. Define Boyle's temperature (or) Boyle's point.



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23. Define critical temperature (T_e)



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24. Define critical volume [V_e]



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25. Define critical pressure (P_e)



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26. Define vapour pressure.



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27. What is normal boiling point of the liquid



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28. What is standard boiling of the liquid.



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29. What is the SI unit of surface tension.



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30. What is the SI unit of viscosity.



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31. What is poise (P)?



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Two Mark Questions And Answers

1. State Boyle's law gases. Give its mathematical expression.



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2. State Charle's law. Give the mathematical expression.



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3. Give any two differences between ideal and real gas.



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4. Mention of causes for the deviation of real gas from ideal behaviour.



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5. Briefly explain dipole-induced-dipole interaction with example.



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6. How many molecules of an ideal gas are there is $1 \times 10^{-3} dm^3$ at STP ?



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7. Calculate the number of moles of hydrogen present in 500cm^3 of a gas under a pressure of 101.3 kPA at a temperature of 300K . ($R = 8.314\text{JK}^{-1}\text{mol}^{-1}$).



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8. 50 ml of oxygen were collected at 10°C under 750 mm pressure. Calculate volume at STP.



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9. Why ethyl alcohol has lower boiling point than water ?



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10. A human adult breathes in approximately 0.50 L of air with each breath. If an air tank holds 10 L of air at 200 atm, how many breaths the tank will supply ?



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11. Briefly explain dipole-induced-dipole interaction with example.



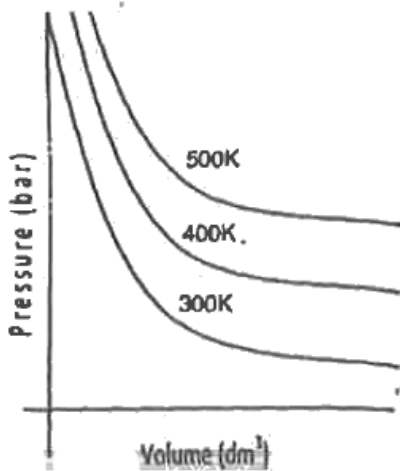
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12. Briefly explain London or dispersion forces



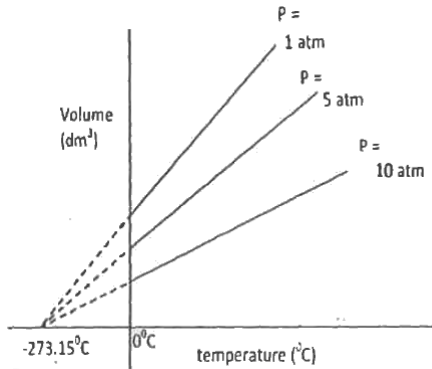
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13. Explain graphical representation of Boyle's law on effect of pressure v/s volume.



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14. Explain graphical representation of Charle's law on effect of volume v/s



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15. Calculate the total pressure in a 10 L cylinder which contains 0.4 g helium, 1.6 g of oxygen and 1.4 g nitrogen at $27^{\circ}C$. Also calculate the partial of helium gas in the cylinder. Assume ideal behaviour for gases.

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16. Calculate the number of moles of hydrogen gas at a pressure of 760 mm Hg and $27^{\circ} C$

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17. 34.95 ml of phosphorus vapour weighs 0.0625g at 0.1 bar pressure. What is the molar mass of phosphorus ?

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18. In terms of Charles's law explain why $-273^{\circ}C$ is the lowest possible temperature.



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19. Why is Boyle's law obeyed by N_2 , O_2 or CO_2 only at low pressure and high temperature ?



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20. Compare the rate of diffusion of HCl and NH_3 (Atomic masses of $H=1u$, $Cl = 35.35u$, $N = 14u$)



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21. State Avogadro law and write mathematical form.



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22. What is STP ?



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23. Derive ideal gas equation from gas laws.



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24. Calculate gas constant (R) value in litre.

Bar. /K/ mole.



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25. Calculate gas constant (R) value in litre.
Bar. /K/ mole.



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26. Derive the relation between Density and
Molar mass of a gaseous substance from ideal
gas equation.



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27. State Dalton's law of partial pressure and write mathematical form.



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28. Explain Aqueous tension.



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29. What is average speed (\bar{c} or u_{av}) ?



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30. Explain root mean square speed

(C or U_{rms})



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31. What are the causes for deviation of real gases from ideal behaviour.



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32. What are the conditions for ideal behaviour ?



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33. Define surface tension.



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34. Define viscosity of a liquid.



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Three Mark Questions And Answers

1. Write the postulates of kinetic theory of gases.



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2. Discuss the intermolecular forces v/s thermal interaction.

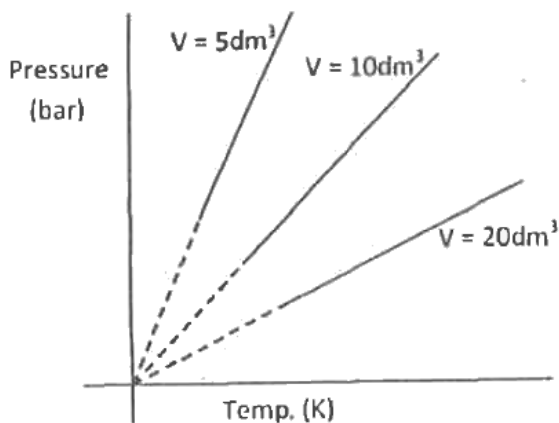


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3. What are the characters of gaseous state.

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4. Explain Gay Lussac's law.



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5. Derive the relationship between partial pressure of gas and its mole fraction.



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6. Mention of causes for the deviation of real gas from ideal behaviour.



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7. Explain the significance of compressibility factor.



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8. (i) What is the effect of temperature on (a) density, (b) surface tension, (c) viscosity and (d) vapour pressure of a liquid?

(ii) What is the effect of pressure on (a) volume, (b) boiling point and (c) viscosity of a liquid?





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9. The pressure of real gases is less than that of ideal gas because of



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Numerical Problems And Answers

1. A balloon is filled with hydrogen at room temperature. It will burst if pressure exceeds 0.2 bar . If at 1 bar pressure the gases occupies

0.30 L volume , upto what volume can the balloon be expanded by filling H_2 ?



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2. A sample of a gas is found to occupy a volume of 800cm^3 at 27° celsius. Calculate the temperature at which it will occupy a volume of 400cm^3 , provided the pressure is kept constant.



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3. It is desired to increase the value of 80cm^3 of gas by 20% without changing the pressure to what temperature the gas be heated if its initial temperature is 25°C ?



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4. When a ship is sailing in ocean where temperature is 30°C , a balloon is filled with 4.0L of air. What will be the volume of the balloon when the ship reaches other ocean, where temperature is 33°C .



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5. An iron tank contains helium at a pressure of 2.5 atmosphere at $25^{\circ}C$. The tank can withstand a maximum pressure of 10 atmosphere. The building in which tank has been placed catches fire- predict whether, the tank blow up first or melt. (MP of iron = $1535^{\circ}C$).



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6. A sample of nitrogen gas occupies a volume of 320cm^3 at STP. Calculate its volume at 66°C and 0.825 bar pressure.



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7. 1.0 mole of pure dinitrogen gas at SATP conditions was put into a vessel of volume 0.025cm^3 , maintained at the temperature of 50°C , what is the pressure of the gas in the vessel ?



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8. How many moles of oxygen are present in 400cm^3 sample of the gas at a pressure of 760 mm of Hg at a temperature of 310K. (The value of R is $8.31\text{ kPa dm}^{-3}\text{K}^{-1}\text{mol}^{-1}$)



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9. Calculate the volume occupied by 5.09 ethyne gas at 50°C and 740 mm pressure.



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10. At a constant temperature, a gas occupies a volume of 500 ml under a pressure of 500 ml under a pressure of 0.82 bar. What will be its volume under a pressure of 1.5 bar ?



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11. A certain gas was found to occupy a volume of 1000cm^3 at 27°C . Calculate the temperature at which the gas occupies a volume of 600cm^3 at a constant pressure.



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12. The initial temperature of a gas is 27 to temperature 80cm^3 of the gas should be heated to increase the volume by 25%.



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13. Calculate the number of moles of hydrogen present in 500cm^3 of a gas under a pressure

of 101.3 kPa at a temperature of 300K. (

$$R = 8.314JK^{-1}mol^{-1}).$$



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14. 50 ml of oxygen were collected at $10^{\circ}C$ under 750 mm pressure. Calculate volume at STP.



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15. A discharge tube containing nitrogen gas at $25^{\circ}C$ is evacuated till the pressure is 2×10^{-2} mm. If the volume of discharge tube is 2 litre. Calculate the number of nitrogen molecules still present in the tube ($R = 0.0821 \text{ Latm mol}^{-1} K^{-1}$)



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16. Calculate the temperature of 14 mol of a gas occupying 10 dm^3 at 3.32 bar pressure (

$$R = 0.083 \text{ bar } dm^3 \text{ mol}^{-1} K^{-1})$$



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17. What will be the minimum pressure required to compress $500 dm^3$ of air at 1 bar to $200 dm^3$ at $30^\circ C$?



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18. A vessel of 120 mL capacity contains a certain amount of gas at $35^\circ C$ and 1.2 bar

pressure. The gas is transferred to another vessel of volume 180 mL at $35^{\circ}C$. What would be its pressure ?



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19. Using the equation of state $pV = nRT$ show that at a given temperature, the density of the gas is proportional to the gas pressure P .



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20. 34.95 mole of phosphorus vapour weighs 0.0625g at 0.1 bar pressure. What is the molar mass of phosphorus ?



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21. 40 g of a gas occupies 20dm^3 at 300 K and 100 kPa pressure. If the pressure is changed to 50 kPa without changing the temperature, what would be its volume ?



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22. At $33^\circ C$, g of gas occupies 250cm^3 under normal pressure. What would be its volume if the temperature is increased to $54^\circ C$ at the same pressure.



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23. Calculate the pressure in a mixture of 8g of $O_2(g)$ and 4 g of $H_2(g)$ confined in a vessel of 1dm^3 at $27^\circ C$ ($R = 0.083\text{dm}^3\text{barK}^{-1}\text{mol}^{-1}$)



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24. Calculate the volume occupied by 8.8 g of CO_2 at $31.1^\circ C$ and 1 bar pressure ($R = 0.083 \text{ bar L K}^{-1} \text{ mol}^{-1}$)



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25. Oxygen is present in a 1 litre vessel at a pressure of 10^{-7} Nm^{-2} . Calculate the number of oxygen molecule at $0^\circ C$



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