CHEMISTRY

NCERT - NCERT CHEMISTRY (GUJRATI)

GASEOUS STATE

Problem

1. Calculate the partial pressures N_2 and H_2 in a mixture of two moles of N_2 and two moles of H_2 at STP.

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2. If a gas diffuses at the rate of one-half as fast as O_2, find the molecular mass of the gas.

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3. 50 ml of gas A effuse through a pin -hole in 146 second . The same volume of CO_2 under identical condition effuse in 115 seconds . Calculate the molecular mass of A .

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4. One mole of carbon-dioxide was found to occupy a volume of 1.32 litre at 48°C and at a pressure of 16.4 atm. Calculate the pressure of the gas that would have been expected to behave ideally and non-ideally.

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5. Vanderwaal's constants for hydrogen chloride gas are a = 3.67 atm lit^{-2} and b =

40.8 ml mol^{-1}. Find the critical temperature and critical pressure of the gas.

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6. The critical temperature of hydrogen gas is $33.2^{\circ}C$ and its critical pressure is 12.4 atm. Find out the values of a' and b' for the gas.

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Self Test

1. Calculate the partial pressures of O_2 and H_2 in a mixture of 3 moles of O_2 and 1 mole of H_2 at S.T.P.

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2. If a gas diffuses at the rate of one quarter as fast as N_2 . Find the molecular mass.

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3. 75ml of gas A effuses through a pin hole in 73 seconds. The same volume of SO_2 under identical conditions effuses in 75 seconds. Calculate the molecular mass of A.

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Questions Choose The Correct Answer

1. A curve drawn at constant temperature is called an isotherm. This shows relationship

between

A. P and $\frac{1}{V}$

B. PV and V

C. P and V

D. V and $\frac{1}{P}$

Answer:

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2. The critical temperature of a gas is that temperature

A. Above which it can no longer remain in the gaseous state

B. Above which it can not be liquified by pressure

C. At which it solidifies

D. At which volume of gas becomes zero.

Answer:

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3. If a gas expands at constant temperature.

A. Number of molecules of the gas decreases

B. The kinetic energy of the molecules decreases

C. The kinetic energy of the molecules remain same

D. The kinetic energy of the molecules increases

Answer:

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4. The molecules of a gas A travel four times faster than the molecules of gas B at the same temperature. The ratio of molecular weight (M_A / M_B) will be

A. $\frac{1}{16}$

B. 4

C. $\frac{1}{4}$

D. 16

Answer:

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Questions B Fill In The Blanks

1. The correction term for pressure deviation is .....in the Vanderwaal equation of state.

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2. The relation between inversion temperature and Vanderwaal's constants a' and b' is _____

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3. The rate of diffusion of gas is _____to square root of both _____ and molecular mass.

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Questions D Write In One Or Two Sentence

1. Write the mathematical expression for Boyle's law.

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2. Compare the partial pressures of gases A and B when 3 moles of A and 5 moles of B mixed in constant volume, and $25^{\circ}C$ and 1 atm pressure.

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3. A sample of an ideal gas escapes into an evacuated container, there is no change in the kinetic energy of the gas. Why?

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4. What is the change in temperature when a compressed real gas is allowed to expand adiabatically through a porous plug

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5. Define Boyle's law and Charle's law.

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6. What is the molar volume of nitrogen at 500K and 600 atm according to ideal gas law?

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7. Give the values of R-gas constant in calories and Joules.

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8. What are the units of Vanderwaals constants a' and b' ?

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Questions E Explain Briefly On The Following

1. At $27^{\circ}C$, H_2 is leaked through a tiny hole into a vessel for 20 minutes Another unknown gas at the same T and P as that of H_2 is leaked through the same hole for 20 minutes. After

effusion of the gas, the mixture exerts a pressure of 6 atm. The H_2 content of the mixture is 0.7 moles. If volume of the container is 3 litres what is the molecular weight of unknown gas ?

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2. Calculate the pressure exerted by 5 moles of CO_2 in one litre vessel at 47°C using Vanderwaal's equation. Also report the pressure of gas if it behaves ideally in nature.

Given that a=3.592 atm $lit^2 mol^{-2}$. b = 0.0427 lit mol^{-1}

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3. Calculate the total pressure in a 10 L cylinder which contains 0.4 g of helium, 1.6 g of oxygen and 1.4 g of nitrogen at 27° C. Also calculate the partial pressures of He gas in the cylinder. Assume Ideal behaviour for gases.

R = 0.082 L atm $k^{-1} mol^{-1}$

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4. The critical constants for water are $374^{\circ}C$, 218 atm and 0.0566 litre mol^{-1}. Calculate a' and b' of water

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5. Vanderwaal's constant in litre atmosphere per mole for carbon dioxide are a = 3.6 and b = 4.28×10^{-2}. Calculate the critical temperature and critical volume of the gas. R = 0.0820 lit atm $K^{-1}.Mol^{-1}$

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