CHEMISTRY
MOHIT
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OBJECTIVE

Single option correct

1. The circulation of blood in human body supplies O_2 and releases CO_2. The concentration of O_2 and CO_2 is variable but on the average, 100ml blood contains 0.02g of O_2 and 0.08g of CO_2. Calculate the volume of O_2 and CO_2 at 1atm and body temperature 37ºC, assuming 10 litre blood in human body.
(A) 2litre, 4 litre (B) 1.5litre, 4.5 litre (C) 1.59litre (D) 3.83litre, 4.62litre

2. The tube in the fig is shielded at both end and is heated up to double the original temperature, both side of Hg column gases are packed with increasing temperature the Hg column

(A)Shift toward B (B) shift towards A (C) Remain same (D) start to vibrate

3. The pressure P of a gas is plotted against its absolute temperature T for two different constant volumes V_1 and V_2 when, $V_1 > V_2$
(A) Curves have the same slope and do not intersect
(B)Curves must intersect at same point other then T=0
(C)Curves for V_2 has a greater slope than that for V_1
(D)Curves for V_1 has a greater slope than that for V_2

4. A flask containing 12g of a gas of relative molecular mass 120 at a pressure of 100atm was evacuated by means of a pump until the pressure was 0.01atm at the same T, which of the following is the best estimate of the number of molecules left in the flask
(A)6×10^{19} (B)6×10^{18} (C) 6×10^{17} (D)6×10^{13}

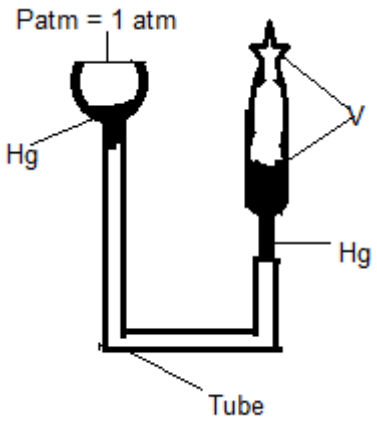
5. The molar volume of CO_2 is maximum at
(A) STP (B) 0ºC and 2.0atm (C)127ºC and 1atm (D) 273ºC and 2atm

6. What weight of solid ammonium carbonate $H_2N-COONH_4$ when vaporised at 200ºC will have a volume of 8.96 litres at 760mm pressure. Assume that the solid completely decomposes under the conditions of the problem.

$$H_2N\,COONH_{4\,(s)} \rightarrow CO_{2\,(g)} + 2NH_{3\,(g)}$$

(A) 4grams (B) 6grams (C) 5grams (D) 10grams

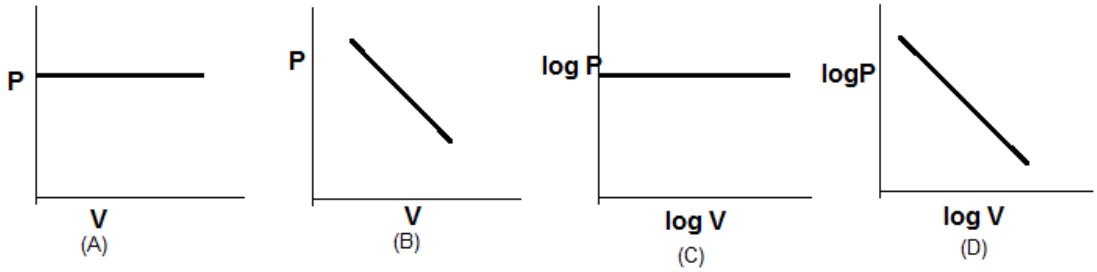
7. Consider the gas burette as shown in figure. Initially, h equals 380mm. If the mercury reservoir is lowered until h equals 190mm, which one of the following statements about the volume of the gas trapped in the burette is correct?



(A) When the reservoir is lowered, V is halved.
(B)When the reservoir is lowered, V remains the same.
(C)When the reservoir is lowered, V is 50% larger
(D)When the reservoir is lowered, V is doubled.

8. A certain volume of ethylene after partial reduction with hydrogen in presence of a metal catalyst required 10% more oxygen for complete combustion than it would have originally. Calculate the ethane : ethylene ratio after partial reduction
(A) 2:3 (B) 3:2 (C) 6:7 (D) 7:6

9. Which of the following curves correctly represents the PV isotherm for an ideal gas?



10. 8.8g of dry ice (solid CO_2) is added to an open container of volume 8.21 at 27ºC .The lid is closed immediately. What will by the final pressure in the container after all the dry ice has vaporized (at a constant temperature of 27ºC throughout).
(A) 0.6atm (B) 1atm (C) 1.6atm (D) 60.83atm

11. Which of the following is not heavier than dry air?
(A)Moist air (B) SO_2 (C) Cl_2 (D) O_2

12. An ideal gas expands according to PV = constant. On expansion the temperature of gas.
(A) Will rise (B) will drop (C) will remin constant
(D)Cannot be determined because the external pressure is not known.

13. Which whows combined relationship of Boyle's law and Charles law
(A) $\frac{P_1}{P_2} = \frac{T_1}{T_2}$ (B) PV=K (C) $\frac{P_2}{P_1} = \frac{V_1}{V_2}$ (D) $\frac{V_2}{V_1} = \frac{P_1}{P_2} \times \frac{T_2}{T_1}$

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14. One mole of a gas is defined as,
(A)The number of molecules in one litre of gas
(B)The number of molecules in 2.24 litre of a gas
(C) The number of atoms contained in 12g of C -14 isotope
(D) The number of molecules in 22.4 litre of a gas at STP.

15. A vessel has nitrogen gas and water vapour at a total pressure of 1 atm the partial pressure of water vapour is 0.3atm.When the contents of this vessel are transformed to another vessel having one third of the capacity of original vessel, completely at the same temperature the total pressure of the system in the new vessel is
(A) 3.0atm (B) 1atm (C) 3.33atm (D) 2.4atm

16. A balloon filed with ethyne is pricked with a sharp point and quickly dropped in a tank of H_2 gas under identical conditions. After a while the balloon will have.
(A) Shrunk (B) enlarged (C) completely collapsed (D) remained unchanged in size

17. A vessel has nitrogen gas and water vapour at a total pressure of 1 atm. The partial pressure of water vapour is 0.3atm.When the contents of this vessel are transferred to another vessel having one third the capacity of the original vessel, completely at the same temperature. The total pressure of the system in the new vessel is.
(A) 2.7atm (B) 1atm (C) 3.33atm (D) 0.3atm

18. Two gases A and B present separately in two vessels X and Y at the same temperature and pressure with molecular weights M and 2M respectively are effused out. The orifice in vessel X is circular while that in Y is a square. If the radius of the circular orifice is equal to that of the length of the square orifice find the ratio of rates of effusion of gas A to that of gas B
(A)$\sqrt{2}\ \pi$ (B) $\sqrt{2}\,\pi$ (C) $2\,\pi$ (D) $\sqrt{2}/\pi$

19. H_2 and N_2 are contained in two separate isothermal vessels connected by a thin tube as shown in fig .

When the valve separating the two vessels is opened which of the following will be true for the final state?
(A)Mass of H_2 in vessel A=Mass of H_2 in vessel B.
(B) Mass of N_2 in vessel A=Mass of N_2 in vessel B.
(C) Mass of H_2 in vessel A=Mass of H_2 in vessel A.
(D) Total pressure will be same in vessels A and B.

20. A cylinder is filled with a gaseous mixture containing equal masses of CO and N_2 the ratio of their partial pressure is
(A) PN_2=PCO (B) PCO=0.875PN_2 (C) PCO=2PN_2 (D) PCO=1/2PN_2

21. A sample of a gas was heated from 30ºC to 60ºC at a constant pressure. Which of the following statement is true?
(A) Kinetic energy of the gas is doubled (B) Boyle's law will apply
(C) Volume of the gas will be doubled (D) None of the above

22. Two gases A and B are at the same temperature. What is the ratio of molar masses [M_A/M_B] if the most probable speed of molecules of A is equal to the mean speed of molecules of B?
(A) 0.875 (B) 0.985 (C) 0.785 (D) 0.885

23. The change in momentum when a molecule (mass m) of an ideal gas, travelling in the x direction with velocity v_x his container wall and rebounds elastically is.
(A) mv_x (B) $2mv_x$ (C) $-mv_x$ (D) $-2mV_x$

24. If equal weights of oxygen and nitrogen are placed in separate containers of equal volume at the same temperature. Which one of the following statements is true?
(A) Both flasks contain the same number of molecules.
(B) The pressure in the nitrogen flask is greater than the one in the oxygen flask.
(C) More molecules are present in the oxygen flask
(D) The nitrogen has a greater average kinetic energy per mole.

25. Van der Waals forces in molecular solids and liquids generally
(A) are found in only systems having permanent dipole moment
(B) are for the most repulsive
(C) increase with increasing size of atoms and molecules involved
(D) result in high melting and boiling temperatures

26. The values of the Vander Waals constant 'a' for N_2, O_2, C_2H_4 and NH_3 are 1, 39, 1.32, 4.47
(A) O_2 (B) N_2 (C) NH_3 (D) C_2H_4

27. 1 Mole each of O_2, SO_2,Xe and Kr with van der Waals constants (atm L^2/mol^2) 1.378, 6.803, 4.250 and 2.349 respectively is kept separately in four different vessels of equal volumes at identical temperature. Their pressure is observed to be P_1, P_2, P_3 and P_4 respectively on the basis of this date alone which of the following may be expected to be expected to be true?
(A)$P_1<P_2<P_3<P_4$ (B) $P_2<P_1<P_3<P_4$ (C) $P_2<P_3<P_4<P_1$ (D) $P_3<P_2<P_4<P_1$

28. Vander waals contains for neon and hydrogen are (a_1, b_1) and (a_2,b_2)respectively. The maximum number of moles of Neon which will be form a homogeneous mixture with n_2 moles of hydrogen at 25ºC and constant pressure P is
(A) $4n_2 \frac{Pb_2^2}{a_2}$ (B) $27n_2\frac{Pb_2^2}{a_2}$ (C) $27n_2\frac{Pb_1^2}{a_1}$ (D) ∞

29. For a real gas, deviations from ideal gas behaviour is maximum at
(A) -10ºC and 5.0atm (B) 10ºC and 2.0atm (C) 0ºC and 1atm (D) 100ºCand 2.0atm

30. A pre-weighted vessel was filled with oxygen at NTP and weighted. It was then evacuated filled with SO_2 at the same temperature and pressure, and again weighted. The weight of oxygen will be
(A) the same as that of SO_2 (B) 1/2that of SO_2 (C)twice that of SO_2 (D)1/4that of SO_2

31. A vessel has two equal compartments A and B containing H_2 and O_2 respectively each at 1atm pressure. If the wall separating the compartment is removed, the pressure
(A) Will remain unchanged in A and B (B) Will increase in A and decrease in B
(C) Will decrease in A and increase in B (D) Will increase in both A and B

32. At a given temperature and pressure 2 volumes of A combines with 5 volumes of B to from 2 volume of C and 1volume of A combine with 1 volume of B to give 2 volume of D. The formula of C is
(A) AB (B) A_5B_2 (C) A_2B_5 (D) AB

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33. The rms speed of N_2 molecule in a gas is u.If the temperature is doubled and the nitrogen molecules dissociate into nitrogen atoms. The rms speed becomes
(A) u/2 (B) 2u (C) 4u (D)14u

34. In Vander Waals equation of state for a non – ideal gas the term that accounts for inter – molecular forces is
(A)$(P+a/V^2)$ (B)(V-b) (C)RT (D)1/RT

35. Four particles have speed 2, 3, 4 and 5cm/s respectively. Their RMS speed is
(A) 3.5 cm/s (B) (27/2) cm/s (C)√ (54) cm/s (D)√ (54/2) cm/s

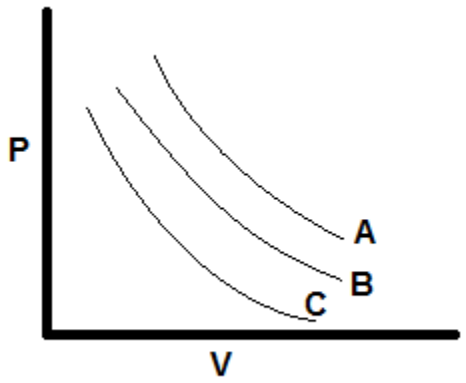
36. X ml of H_2 gas effuses through a hole in a container is 5 second. The time taken for the effusion of the same volume of the gas specified below under identical conditions is
(A) 10 second: He (B) 20 Second: O_2 (C) 25second: CO (D) 55second: CO_2

37. The molecular radius for a certain gas = 1.25A. What is a reasonable estimate of the magnitude of the Vander Waals constant for the gas?
(A) 0.98 $\times 10^{-2}$ litre/ mole (B) 1.43×10^{-2}litre/mole (C)1.97×10^{-2}litre (D)3.33×10^{-2} litre/ mole

38. A gas will approach ideal behaviour at
(A) Low temperature and low pressure (B) low temperature and high pressure
(C) High temperature and low pressure (D) High temperature and high pressure

39. Two flasks X and Y have capacity 1 Land 2 L respectively and each of them contain 1 mole of a gas. The temperatures of the flask are so adjusted that average speed of molecules in X is twice as those in Y. The pressure in flask X would be.
(A) same as that in Y (B) half as that in Y (C) twice as that in Y (D) 8 times of that Y

40. 0.5dm^3flask gas A and 1dm^3 flask contain gas B at the same temperature. If density of A =3.0gm dm^{-3} and that of B=1.5g dm^{-3} and molar mass of A = 1/2 of B, then ratio of pressure exerted by gases is
(A)$\frac{P_A}{P_B}$ = 2 (B) $\frac{P_A}{P_B}$=1 (C) $\frac{P_A}{P_B}$=4 (D) $\frac{P_A}{P_B}$=3



41. A, B, C are three isotherms respectively at T_1, T_2, T_3.
Temperature will be in order
(A)$T_1 = T_2 = T_3$ (B) $T_1<T_2<T_3$ (C) $T_1>T_2>T_3$ (D)$T_1>T_2=T_3$

42. A quantity of hydrogen gas occupies a volume of 30 ml at a certain temperature and pressure. What volume would half this mass of hydrogen occupy at triple the absolute temperature if the pressure were one-ninth that of the original gas?

(A) 270ml (B) 90ml (C) 405ml (D) 135ml

43. A 0.20mole sample of a hydrocarbon CxHy after complete combustion with excess O_2 gas yields 0.80 mole of CO_2 and 1.0 mole of H_2O hence hydrocarbon is
(A) C_4H_{10} (B) C_4H_8 (C) C_4H_5 (D) C_8H_{16}

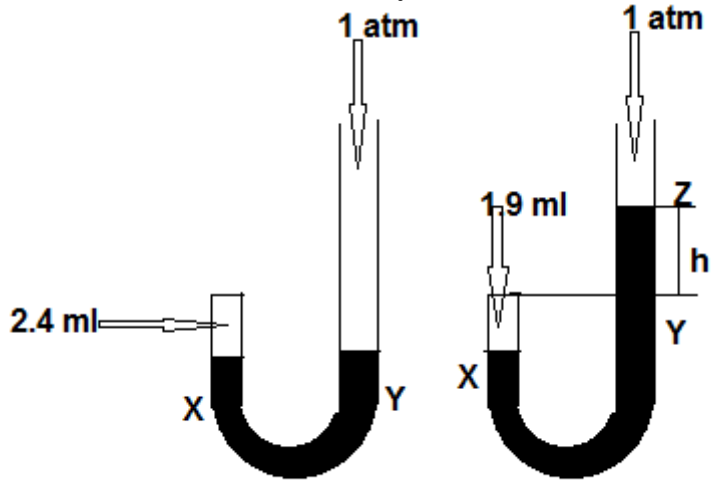
44. A flask contains 12g of gas of relative molecular mass 120 at a pressure of 100atm was evacuated by means of a pump until the pressure was 0.01atm.Which of the following is the best estimate of the number of molecules left in the flask
(A)6×10^{19} (B)6×10^{18} (C)6×10^{17} (D)6×10^{13}

45. Energy of sublimation of solid helium is much lower than that of ice because
(A) Large part of sublimation energy of ice is used to overcome hydrogen bonding
(B) Ice melts at much higher temperature
(C) In solid helium there is Vander Waals force of attraction between helium atoms.
(D) All of the above are correct

46. It takes 26 s for 10ml of H_2 to effuse through a porous membrane. It takes 130 sec for 10 ml of an unknown gas to effuse through the same membrane when both gases are at the same temperature and pressure .Molecular weight of the unknown gas is
(A) 100 (B) 80 (C) 50 (D) 40

47. Where is the pressure less than 1atm?
(A)At a place where water boils at 110ºC (B) At a place where water boils at 90ºC
(C) At a place below sea level (D) At a place where water boils at 100ºC

48. Given j- tube has 2.4ml of air at a pressure of 1atm. On adding mercury, volume of air is reduced to 1.9ml as shown difference in the level of mercury in two columns is.



(A) 700mm (B) 200mm (C) 900mm (D) 760 mm

49. Assume that for every increase in height of 1 m, pressure decreases by 10mm Hg. Initially an experimental air balloon of maximum 200 L capacity has 150 L air at 1 atm at sea- level. At what height, the balloon is expected to burst?

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