ChemicalGeek

Q1. Which of the following assumptions of the kinetic molecular theory best explains the observations that a gas can be compressed?

(1) Gas molecules move at random with no attractive forces between them
(2) The velocity of gas molecules is proportional to their Kelvin temperature
(3) The amount of space occupied by a gas is much greater than the space occupied by the actual gas molecules
(4) In collisions with the walls of the containers or with other molecules, energy is conserved.

Q2. The vapour density of a gas is 11.2 . The volume occupied by 11.2 g of this gas at NTP is :

(1) 22.4 L
(2) 11.2 L
(3) 1L
(4) 2.24 L

Q3. A flask of gaseous CCl_4 was weighed at measured temperature and pressure.CCl_4 was replaced by O_2 at the same temperature and pressure. The mass of the CCl_4 vapour will be about :

(1) Five times as O_2
(2) One fifth as compared to O_2
(3) Same as that of O_2
(4) Twice as O_2

Q4. A balloon has maximum capacity of 20 L .At one atmospheric pressure 10 L of air is filled in the balloon .It will burst when pressure is (assuming isothermal conditions):

(1) 0.5 atm
(2) 0.4 atm
(3) 0. 7 atm'
(4) 0. 8 atm

Q5. A 34 L cylinder contains 212 g of O_2 gas at 27^0C .what mass of O_2 gas must be released to reduce the pressure to 2.463 atm ?

(1) 103.2 g
(2) 108.8 g
(3) 100.0 g
(4) 32.0 g

Q6. Which of the assumptions of the kinetic molecular theory best explains Daltons law of partial pressure?

(1) Gas molecules move at random with no attractive forces between them
(2) The velocity of gas molecules is proportional to their Kelvin temperature
(3) The amount of space occupied by a gas is much greater than the space occupied by the actual gas molecules
(4) Collisions with the walls of the container or with other molecules are elastic.

Q7. At what temperature will the total kinetic energy of 0.3 mol of He be the same as the total kinetic energy of 0.4 mole of Ar at 400 K ?

(1) 533 K
(2) 400 K
(3) 346 K
(4) 300 K

Q8. 50 ml of H_2 gas diffuses through a small hole from a vessel in 20 minutes. Time taken by 40 ml of O_2 gas to diffuse under similar conditions will be :

(1) 12 min
(2) 64 min
(3) 8 min
(4) 32 min

Q9. At 298 K, which of the following has the lowest average molecular speed?

(1) CO_2 at 0.2 atm
(2) He at 0.4 atm
(3) CH_4 at 0.8 atm
(4) NO at 1.00 atm

Q10. It takes 26 seconds for 10 ml of H_2 to effuse through a porous membrane .It takes 130 seconds for 10 ml of an unknown gas under identical condition to effuse .Hence molecular weight of the unknown gas is (in g /mol):

(1) 100
(2) 80
(3) 50
(4) 40

Q11. The average kinetic energy of an ideal gas per molecule in SI units at 25^0C will be :

(1) $6.17 \times 10^{-21}\ kJ$
(2) $6.17 \times 10^{-21}\ J$
(3) $6.17 \times 10^{-20}\ J$
(4) $6.17 \times 10^{-20}\ kJ$

Q12. A comparison is made at standard temperature and pressure of 0.5 mol H_2 (g) and 1.0 mol He(g) . The two gases will :

(1) Have equal average molecular kinetic energies
(2) Have equal molecular speed
(3) Occupy equal volumes
(4) Have equal effusion rates.

Q13. One molecule is moving at a speed of 1 m/s and two other molecules are moving at a speed of 2 m/s .Hence, root mean square velocity is :

(1) 1 m/s
(2) 1.67 m/s
(3) 3 m/s
(4) 1.73 m/s

Q14. Which of the following gases follows non –ideal behaviour ?

(1) N_2 gas having density 1.25 g/L at STP.
(2) 2.8 g CO in 0.1 L flask exerting a pressure of 24. 63 atm at 300 K
(3) 1.6 g of CH_4 in 0.5 L flask at 273 K exerting a pressure of 4 atm
(4) 0.1 g H_2 gas at STP occupies volume of 1.12 L .

Q15. The Vander Waals equation of state reduces itself to the ideal gas equation at :

(1) High pressure and low temperature
(2) Low pressure and low temperature
(3) Low pressure and high temperature
(4) High pressure and high temperature

Q16. Consider the following statements:

The coefficient B in the virial equation of state

$$PV_m = RT\left(1 + \frac{B}{V_m} + \frac{B}{V_m^2} + \ and\ so\ on\ \right)$$

(a) Is independent of temperature
(b) Is equal to zero at Boyle's temperature
(c) Has dimension of molar volume

Which of the above statements are correct ?

(1) a and b
(2) a and c
(3) b and c
(4) All the three (a,b and c)

Q17. Which of the following statements on critical constants of gases are correct ?

(a) Larger the T_c/P_c value of a gas ,larger would be the excluded volume .
(b) Critical temperature T_c of a gas is greater than its Boyle temperature T_b
(c) At the critical point in the vander waals gas isotherm $\left(\frac{\partial P}{\partial V_m}\right)T_c = 0$

Select the correct answers using the codes given below :

(1) a and b
(2) a and c
(3) b and c
(4) All the three (a,b and c)

Q18. Select the correct statements :

(1) Fluids above the critical temperature are known as super critical fluids
(2) Super critical fluids can dissolve many organic substances
(3) CO_2 above 31^0C above 600 bar pressure is used to remove caffeine from coffee beans ,instead of using chlorofluorocarbons .
(4) All are correct statements.

Q19. Which among the following has the maximum mean free path ?

(1) Carbon dioxide
(2) Hydrogen
(3) Oxygen
(4) Nitrogen

Q20. A gas in an open container is heated from 27^0C to 127^0C . The fraction of the original amount of the gas remaining in the container will be

(1) 3/4
(2) 1/2
(3) 1/4
(4) 1/8

Q21. X ml of H_2 gas effuse through a hole in a container in 5 seconds .The time taken for the effusion of the same volume of the gas specified below under ideal conditions is :

(1) 10 seconds : He
(2) 20 seconds : O_2
(3) 25 seconds : CO
(4) 55 seconds : CO_2

Q22. A mixture of 50.0 ml of NH_3 and 60.0 ml of O_2 gas reacts as follows .

$4NH_3(g) + 5O_2(g) \rightarrow 4NO + 6H_2O(g)$

If all the gases are at the same temperature and pressure and the reaction continues until one of the gases is completely consumed ,what volume of water vapour is produced :

(1) 48 ml
(2) 60. ml
(3) 72 ml
(4) 75 ml

Q23. A gas obeys the equation of state $P(V-b)=RT$ where b is constant. The slope for an isochore will be :

(1) Negative
(2) Zero
(3) $\frac{R}{V-b}$
(4) R/P

Q24. If the mean free path of gaseous molecules is 60 cm at a pressure of $10^{-4}\ mm\ of\ Hg$,what will be its mean free path when the pressure is increased by 100 times ?

(1) 0.6 cm
(2) 6.0 cm
(3) 60.0 cm
(4) 600.0 cm

Q25. One mole of N_2O_4 (g) at 300 K is kept in a closed container under one atmosphere. It is heated to 600 K when 20% by mass of N_2O_4 (g) decomposes to NO_2(g) .The resultant pressure is :

(1) 1.2 atm
(2) 2.4 atm
(3) 2.0 atm
(4) 1.0 atm