



CHEMISTRY

BOOKS - DISHA PUBLICATION

CHEMISTRY (HINGLISH)

STATES OF MATTER

Exercise

1. Assuming ideal gas behaviour, the ratio of density of ammonia to that of hydrogen

chloride at same temperature and pressure is :

(Atomic wt. of Cl = 35.5 u)

A. 1.46

B. 1.64

C. 0.46

D. 0.64

Answer: C



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2. Among the following, the incorrect statement is :

A. At low pressure, real gases show ideal behaviour.

B. At very low temperature, real gases show ideal behaviour.

C. At very large volume, real gases show ideal behaviour.

D. At Boyle's temperature, real gases show ideal behaviour.

Answer: B



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3. At 300 K, the density of a certain gaseous molecule at 2 bar is double to that of dinitrogen (N_2) at 4 bar. The molar mass of gaseous molecule is:

A. 28g mol^{-1}

B. 56g ml^{-1}

C. 112g mol^{-1}

D. 224g mol^{-1}

Answer: C



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4. At very high pressure, the compressibility factor of one mole of a gas is given by :

A. $1 + \frac{pb}{RT}$

B. $\frac{Pb}{RT}$

C. $1 - \frac{pb}{RT}$

D. $1 - \frac{b}{(VRT)}$

Answer: A



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5. Initially, the root mean square (rms) velocity of N_2 molecules at certain temperature is u . If this temperature is doubled and all the

nitrogen molecules dissociate into nitrogen atoms, then the rms velocity will be:

A. $2u$

B. $14u$

C. $4u$

D. $u/2$

Answer: A



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6. Oxidation of succinate ion produces ethylene and carbon dioxide gases. On passing 0.2 Faraday electricity through an aqueous solution of potassium succinate, the total volume of gases (all both cathode and anode) liberated at STP (1 atm and 273 K) is

A. 8.96 L

B. 4.48 L

C. 6.72 L

D. 2.24 L

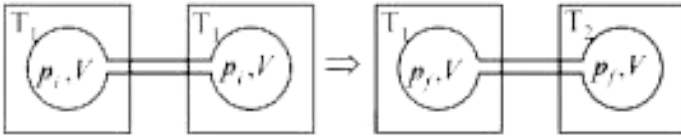
Answer: A



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7. Two closed bulbs of equal volume (V) containing an ideal gas initially at pressure p_i and temperature T_1 are connected through a narrow tube of negligible volume as shown in the figure below. The temperature of one of the bulbs is then raised to T_2 . The final

pressure p_f is:



A. $2p, \left(\frac{T_2}{T_1 + T_2} \right)$

B. $2p, \left(\frac{T_1 T_2}{T_1 + T_2} \right)$

C. $p, \left(\frac{T_1 T_2}{T_1 + T_2} \right)$

D. $2p, \left(\frac{T_1}{T_1 + T_2} \right)$

Answer: A



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8. Which of the following is not an assumption of the kinetic theory of gases?

A. Gas particles have negligible volume.

B. A gas consists of many identical particles which are in continual motion.

C. At high pressure, gas particles are difficult to compress.

D. Collisions of gas particles are perfectly elastic.

Answer: C



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9. When does a gas deviate the most from its ideal behavior?

- A. At low pressure and low temperature
- B. At low pressure and high temperature
- C. At high pressure and low temperature
- D. At high pressure and high temperature

Answer: C



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10. The temperature at which oxygen molecules have the same root mean square speed as helium atoms have at 300 K is:

Atomic masses: He=4 u, O = 16u)

A. 300 K

B. 600 K

C. 1200 K

D. 2400 K

Answer: D



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11. van der Waal's equation for a gas is stated

as,

$$P = \frac{nRT}{V - nb} - a\left(\frac{n}{V}\right)^2$$

This equation reduces to the perfect gas

equation, $P = \frac{nRT}{V}$ when,

A. temperature is sufficient high and pressure is low.

B. temperature is sufficient low and pressure is high.

C. both temperature and pressure are very high.

D. both temperature and pressure are very low.

Answer: A



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12. The initial volume of a gas cylinder is 750.0 mL. If the pressure of gas inside the cylinder changes from 840.0 mm Hg to 360.0 mm Hg, the final volume the gas will be:

A. 1.750 L

B. 3.60 L

C. 4.032 L

D. 7.50 L

Answer: A



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13. The ratio of masses of oxygen and nitrogen in a particular gaseous mixture 1 : 4. The ratio of number of their molecule is :

A. 1 : 4

B. 7 : 32

C. 1 : 8

D. 3 : 16

Answer: B



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14. If Z is a compressibility factor, van der Waals' equation at low pressure can be written as

A. $Z = 1 + \frac{RT}{pb}$

B. $Z = 1 - \frac{a}{VRT}$

C. $Z = 1 - \frac{Pb}{RT}$

D. $Z = 1 + \frac{Pb}{RT}$

Answer: B



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15. Dipole-dipole forces act between the molecules possessing permanent dipole. Ends of dipoles possess 'partial charges'. The partial charge is

- A. more than unit electronic charge.
- B. equal to unit electronic charge.
- C. less than unit electronic charge.
- D. double the unit electronic charge.

Answer: C



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16. Gas equation $PV = nRT$ is obeyed by

- A. only isothermal process
- B. only adiabatic process
- C. both (a) and (b)
- D. none of these

Answer: C



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17. Air at sea level is dense. This is a practical application of

A. Boyle's law

B. Charle's law

C. Kelvin's law

D. Brown's law

Answer: A



18. Equal volumes of gases at the same temperature and pressure contain equal number of particles. This statement is a direct consequence of

- A. Perfect gas law
- B. Avogadro's law
- C. Charle's law
- D. Boyle's law

Answer: B



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19. A gas in an open container is heated from $27^{\circ}C$ to $127^{\circ}C$. The fraction of the original amount of gas remaining in the container will be .

A. $3/4$

B. $1/2$

C. $1/4$

D. 1/8

Answer: A



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20. Initial temperature of an ideal gas is $75^{\circ}C$. At what temperature, the sample of neon gas would be heated to double its pressure, if the initial volume of gas is reduced by 15%?

A. $319^{\circ}C$

B. $592^{\circ}C$

C. $128^{\circ}C$

D. $60^{\circ}C$

Answer: A



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21. Two flasks A and B of 500 mL each are respectively filled with O_2 and SO_2 at 300 K and 1 atm. Pressure . The flasks will contain:

A. the same number of atoms

B. the same number of molecules

C. more number of moles of molecules in
flask A as compared to flask B

D. the same amount of gases.

Answer: B



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22. At what pressure a quantity of gas will occupy a volume of 60 mL, if it occupies a volume of 100mL at a pressure of 720 mm (while temperature is constant) :

A. 700mm

B. 800mm

C. 100mm

D. 1200mm

Answer: D



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23. The density of $O_2(g)$ is maximum at :

- A. STP
- B. 273 K and 2 atm
- C. 546 K and 1 atm
- D. 546 K and 2 atm

Answer: B



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24. The pressure of sodium vapour in a 1.0 L container is 10 torr at 1000°C . How many atoms are in the container?

A. 9.7×10^{17}

B. 7.6×10^{19}

C. 4.2×10^{17}

D. 9.7×10^{19}

Answer: B



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25. The atmospheric pressure on Mars is 0.61 kPa. What is the pressure in mm Hg?

A. 0.63

B. 4.6

C. 6.3

D. 3.2

Answer: B



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26. 56 g of nitrogen and 96 g of oxygen are mixed isothermally and at a total pressure of 10 atm. The partial pressures of oxygen and nitrogen (in atm) are respectively :

A. 4,6

B. 5,5

C. 2,8

D. 6,4

Answer: A



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27. What is the ratio of diffusion rate of oxygen to hydrogen?

A. 1 : 4

B. 4 : 1

C. 1 : 8

D. 8 : 1

Answer: A



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28. Equal weights of methane and oxygen are mixed in an empty container at $25^{\circ}C$. The fraction of the total pressure exerted by oxygen is

A. $\frac{1}{3}$

B. $\frac{1}{2}$

C. $\frac{2}{3}$

D. $\frac{1}{3} \times \frac{273}{298}$

Answer: A



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29. Pressure remaining the same, the volume of a given mass of an ideal gas increases for every degree centigrade rise in temperature by definite fraction of its volume at

A. $0^{\circ} C$

B. its critical temperature

C. absolute zero

D. its Boyle's temperature

Answer: A



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30. The ratio of the rate of diffusion of helium and methane under identical conditions of pressure and temperature will be

A. 4

B. 2

C. 1

D. 0.5

Answer: B



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31. A gas diffuse $\frac{1}{5}$ times as fast as hydrogen at same pressure. Its molecular weight is

A. 50

B. 25

C. $25\sqrt{2}$

D. $50\sqrt{2}$

Answer: A



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32. A mixture of 16 g CH_4 and 64 g of O_2 is ignited in a sealed bulb of 3L and then cooled to $27^\circ C$. The pressure in the bulb will be

A. 0.82 atm

B. 8.2 atm

C. 24.6 atm

D. 2.46 atm

Answer: B



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33. 500 mL of nitrogen at $27^{\circ}C$ is cooled to $-5^{\circ}C$ at the same pressure. The new volume becomes

A. 326.32 mL

B. 446.66 mL

C. 546.66 mL

D. 771.56 mL

Answer: B



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34. 600 cc of a gas at a pressure of 750 mm is compressed to 500 cc. Taking the temperature to remain constant, the increase in pressure is

- A. 150 mm of Hg
- B. 250 mm of Hg
- C. 350 mm of Hg
- D. 450 mm of Hg

Answer: A



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35. Equal weights of methane and hydrogen are mixed in an empty container at $25^{\circ}C$. The fraction of the total pressure exerted by hydrogen is

A. $\frac{1}{2}$

B. $\frac{8}{9}$

C. $\frac{1}{9}$

D. $\frac{16}{17}$

Answer: B



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36. Oxygen and cyclopropane at partial pressures of 570 torr and 170 torr respectively are mixed in a gas cylinder. What is the ratio of the number of moles of cyclopropane to the number of moles of oxygen?

A. 0.39

B. 0.19

C. 0.23

D. 0.3

Answer: D



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37. A container contains 1 mole of a gas at 1 atm pressure and 27° C, while its volume is

24.6 litres. If its pressure is 10 atm and temperature 327°C , then new volume is

A. 2.56 litres

B. 3.15 litres

C. 4.92 litres

D. 5.44 litres

Answer: C



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38. A certain gas takes three times as long to effuse out as helium. Its molar mass will be

A. 27u

B. 36u

C. 64u

D. 9u

Answer: B



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39. For 1 mol of an ideal gas at a constant temperature T , the plot of $(\log P)$ against $(\log V)$ is a (P: Pressure, V: Volume)

- A. Straight line parallel to x-axis.
- B. Straight line with a negative slope.
- C. Curve starting at origin.
- D. Straight line passing through origin.

Answer: B



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40. At a pressure of 760 torr and temperature of 273.15 K, the indicated volume of which system is not consistent with the observation

A. 14 g of N_2 + 16g of O_2 ,Volume=22.4L

B. 4 g of He + 44 g of CO_2 , Volume= 44.8 L

C. 7 g of N_2 + 36 g of O_3 , Volume= 22.4 L

D. 17 g of NH_3 + 36.5 g of HCl, Volume
=44.8 L

Answer: D



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41. 14 g of N_2 and 36 g of ozone are at the same pressure and temperature. Their volumes will be related as

A. $2V_{N_2} = 3V_{O_3}$

B. $3V_{N_2} = 2V_{O_3}$

C. $3V_{N_2} = 4V_{O_3}$

D. $4V_{N_2} = 3V_{O_3}$

Answer: B

42. One mole of gas A and three moles of a gas B are placed in flask of volume 100 litres at 27°C . Calculate the total partial pressure of the gases in the mixture.

A. 1.0 atm.

B. 0.9 atm

C. 0.985 atm

D. 10.850 atm

Answer: C



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43. At $27^{\circ}C$, hydrogen is leaked through a tiny hole into a vessel for 20 min. Another unknown gas at the same temperature and pressure as that of hydrogen is leaked through the same hole for 20 min. After the effusion of the gases, the mixture exerts a pressure of 6 atm . The hydrogen content of the mixture is 0.7 mol . If the volume of the

container is $3L$, what is the molecular weight of the unknown gas?

A. 1033

B. 1050

C. 900

D. 980

Answer: A



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44. If densities of two gases are in the ratio 1 : 2 and their temperatures are in the ratio 2 : 1, then the ratio of their respective molar mass at certain pressure is:

A. 1 : 1

B. 1 : 2

C. 2 : 1

D. 4 : 1

Answer: A



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45. The ratio among most probable velocity, mean velocity and root mean velocity is given by

A. $\sqrt{2} : \sqrt{8/\pi} : \sqrt{3}$

B. $\sqrt{2} : \sqrt{3} : \sqrt{8/\pi}$

C. 1 : 2 : 3

D. $1 : \sqrt{2} : \sqrt{3}$

Answer: A





46. As the temperature is raised from $20^{\circ}C$ to $40^{\circ}C$ the average kinetic energy of neon atoms changes by a factor .

A. $\frac{313}{293}$

B. $\sqrt{(313/293)}$

C. $1/2$

D. 2

Answer: A



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47. Boyle's law may be expressed as

A. $PV=KT$

B. $PV=RT$

C. $PV = \frac{3}{2}kT$

D. $PV = \frac{2}{3}kT$

Answer: D



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48. The *rms* velocity of CO_2 at temperature T (in Kelvin) is $x \text{ cm s}^{-1}$. At what temperature (in Kelvin) would the *rms* velocity of nitrous oxide be $4x \text{ cm s}^{-1}$?

A. $16 T$

B. $2 T$

C. $4 T$

D. $32 T$

Answer: A



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49. The molecular velocities of two gases at same temperature are u_1 and u_2 , their masses are m_1 and m_2 respectively, which of the following expression is correct ?

A. $\frac{m_1}{u_1^2} = \frac{m_2}{u_2^2}$

B. $m_1 u_1 = m_2 u_2$

C. $\frac{m_1}{u_1} = \frac{m_2}{u_2}$

D. $m_1 u_1^2 = m_2 u_2^2$

Answer: D



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50. Two flask A and B of equal volumes maintained at temperature $300K$ and $700K$ contain equal mass of $He(g)$ and $N_2(g)$ respectively. What is the ratio of total translational kinetic energy of gas in flask A to that of flask B ?

A. unity

B. 2

C. 4

D. 0.25

Answer: C



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51. The root mean square velocity of an ideal gas to constant pressure varies with density (d) as

A. d^2

B. d

C. \sqrt{d}

D. $1 / \sqrt{d}$

Answer: D



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52. Which of the following statements about kinetic energy (K.E.) is true?

A. All objects moving with the same velocity have the same K.E.

B. The K.E. of a body will quadruple if its velocity doubles .

C. As the velocity of a body increases, its K.E. decreases.

D. The K.E. of a body is independent of its mass.

Answer: B



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53. Consider Three one -litre flasks labeled A,B and C filled with the gases NO , NO_2 , and N_2O , respectively, each at 1 atm and 273 K. In which flask do the molecules have the highest average kinetic energy?

A. Flask C

B. All are the same

C. Flask A

D. None

Answer: B



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54. Which of the following change is observed occurs when a substance X is converted from liquid to vapour phase at the standard boiling point?

- I. Potential energy of the system decreases
- II. The distance between molecules increases
- III. The average kinetic energy of the molecules in both phases are equal

A. I only

B. II only

C. III only

D. II and III only

Answer: D



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55. The u_{rms} of a gas at $300K$ is $3R^{1/2}$ The molar mass of the gas in $kgmol^{-1}$ is .

A. 0.02 kg/mol

B. 0.001 kg/mol

C. 0.003 kg/mol

D. 1 kg/mol

Answer: D



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56. Consider an ideal gas contained in a vessel
If the intermolecular interaction suddenly

begins to act which of the following will happen ?.

- A. Pressure decreases
- B. Pressure increases
- C. Pressure remains unchanged
- D. Gas collapses

Answer: B



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57. The pressure of real gas is less than the pressure of an ideal gas because of

- A. increase in number of collisions
- B. finite size of molecule
- C. increase in KE of molecules
- D. intermolecular forces of attraction

Answer: D



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58. At what temperature will the *rms* velocity of SO_2 be the same as that of O_2 at $303K$?

A. 273 K

B. 606 K

C. 303 K

D. 403 K

Answer: B



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59. A closed flask contains water in all its three states solid, liquid and vapour at $0^{\circ}C$. In this situation, the average kinetic energy of water molecules will be

- A. equal in all the three states
- B. the greatest in vapour state
- C. the greatest in the liquid state
- D. the greatest in the solid state

Answer: B



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60. The compressibility factor for H_2 and He is usually

A. $Z > 1$

B. $Z = 1$

C. $Z < 1$

D. Either of these

Answer: A



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61. If v is the volume of one molecule of a gas under given conditions, then van der Waals constant b is

A. $4V$

B. $\frac{4V}{N_0}$

C. $\frac{N_0}{4V}$

D. $4VN_0$

Answer: D



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62. A gas described by van der Waal's equation

(i) behaves similar to an ideal gas in the limit of large molar volume

(ii) behaves similar to an ideal gas in the limit of large pressure

(iii) is characterised by van der Waal's coefficients that are dependent on the identity of the gas but are independent of the temperature

(iv) has the pressure that is lower than the

pressure exerted by the same gas behaving ideally

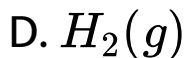
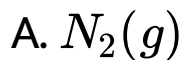
- A. (i) and (ii)
- B. (i) and (iii)
- C. (i), (ii) and (iii)
- D. (ii) and (iv)

Answer: B



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63. Maximum deviation from ideal gas is expected from



Answer: C



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64. At which one of the following temperature pressure conditions, the deviation of a gas from ideal behavior is expected to be minimum?

A. 350 K and 3 atm.

B. 550 K and 1 atm.

C. 250 K and 4 atm.

D. 250 K and 4 atm.

Answer: B



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65. In van der Waals equation of state for a non-ideal gas , the term that accounts for intermolecular forces is

A. $(V-b)$

B. RT

C. $\left(P + \frac{a}{V^2}\right)$

D. $(RT)^{-1}$

Answer: C



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66. The value of van der Waals constant a for the gases O_2 , N_2 , NH_3 , and CH_4 are 1.360, 1.390, 4.170, and $2.253L^2atmmol^{-2}$, respectively. The gas which can most easily be liquefied is

A. O_2

B. N_2

C. NH_3

D. CH_4

Answer: C



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67. Positive deviation from ideal behaviour takes place because of

A. molecular interaction between atoms and $PV/nRT > 1$

B. molecular interaction between atoms and $PV/nRT < 1$

C. finite size of atoms and $PV/nRT \rightarrow 1$

D. finite size of atoms and $PV/nRT \rightarrow 1$

Answer: C



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68. The ratio of Boyle's temperature and critical temperature for a gas is:

A. $\frac{8}{27}$

B. $\frac{27}{8}$

C. $\frac{1}{2}$

D. $\frac{2}{1}$

Answer: B



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69. The compressibility factor for a real gas at high pressure is .

A. 1

B. $1 + \frac{Pb}{RT}$

C. $1 - \frac{pb}{RT}$

D. $1 + \frac{RT}{Pb}$

Answer: B



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70. The vander waal's constant "a" for gases P,Q,R and S are 4.17 , 359 . 6.71 & 3.8 atm $L^2 \text{ mol}^{-2}$. Therefore , the ascending order of their ease of liquefaction is :-

A. $R < P < S < Q$

B. $Q < S < R < P$

C. $Q < S < P < R$

D. $R < P < Q < S$

Answer: C



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71. Soap helps in cleaning clothes, because

A. chemical of soap change.

B. it increases the surface tension of the solution.

C. it absorbs the dirt.

D. it lowers the surface tension of the solution.

Answer: D



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72. When the temperature increases the viscosity of

A. gases decreases and viscosity of liquids increases.

B. gases increases and viscosity of liquids decreases.

C. gases and liquids increases.

D. gases and liquids decreases.

Answer: B



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73. The liquid which has the highest rate of evaporation is

A. petrol

B. nail-polish remover

C. water

D. alcohol

Answer: A



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74. Which of the following is a correct statement?

A. Surface tension of a liquid decreases with increase in temperature

B. Vapour pressure of a liquid decreases with increase in temperature

C. Viscosity of a liquid decreases with decrease in temperature

D. The boiling point of a liquid is independent of the altitude of the place

Answer: A



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75. A gas is enclosed in a vessel of volume V at temperature T_1 and P , the vessel is connected to another vessel of volume $V/2$ by a tube and a stopcock. The second vessel is initially evacuated. If the stopcock is opened, the

temperature of second vessel becomes T_2 . The first vessel is maintained at a temperature T_1 . What is the final pressure P_1 in the apparatus ?

A. $\frac{2pT^2}{2T_2 + T_1}$

B. $\frac{2pT^2}{T_2 + 2T_1}$

C. $\frac{pT^2}{2T_2 + T_1}$

D. $\frac{2pT^2}{T_1 + T_2}$

Answer: A



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76. Certain perfect gas is found to obey the law $PV^{3/2} = \text{constant}$, during adiabatic process. If such a gas at initial temperature T is adiabatically compressed to half of the initial volume, its final temperature will be

A. $2T\sqrt{2}$

B. $4T$

C. $T\sqrt{2}$

D. $2T$

Answer: C



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77. The temperature of a gas placed in an open container is raised from $27\text{ }^{\circ}\text{C}$ to $227\text{ }^{\circ}\text{C}$. The percent of the original amount of the gas expelled from the container will be

A. 20

B. 40

C. 60

D. 80

Answer: B



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78. 4.5 g of PCl_5 on vapourisation occupied a volume of 1700 mL at 1 atmosphere pressure and 227°C temperature. Its degree of dissociation is

A. 0.0921

B. 0.0091

C. 0.921

D. None of these

Answer: C



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79. When $2g$ of a gas A is introduced into an evacuated flask kept at $25^{\circ}C$, the pressure is found to be $1atm$. If $3g$ of another gas B is then heated in the same flask, the total

pressure becomes 1.5atm . Assuming ideal gas behaviour, calculate the ratio of the molecular weights M_A and M_B .

A. 1:3

B. 1:1

C. 2:1

D. 3:1

Answer: A



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80. A given volume of ozonised oxygen (containing 60% oxygen by volume) required 220 sec to effuse while an equal volume of oxygen took 200 sec only under identical conditions. If density of O_2 is 1.6 g/L then find density of O_3 .

A. 1.936 g/L

B. 2.16 g/L

C. 3.28 g/L

D. 2.24 g/L

Answer: D



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81. Calculate the total pressure in a 10.0 L cylinder which contains 0.4 g helium, 1.6 g oxygen and 1.4 g nitrogen at 27°C.

A. 0.492atm

B. 49.2atm

C. 4.52atm

D. 0.0492atm

Answer: A



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82. A gaseous mixture containing He, CH_4 and SO_2 in 1 : 2 : 3 mole ratio, calculate the molar ratio of gases effusing out initially.

A. 2 : 2 : 3

B. 6 : 6 : 1

C. $\sqrt{2} : \sqrt{2} : 3$

D. 4 : 4 : 3

Answer: D



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83. A gaseous mixture contains three gaseous A , B and C with a total number of moles of 10 and total pressure of 10atm . The partial pressure of A and B are 3atm and 1atm respectively and if C has molecular weight of 2g/mol . Then, the weight of C present in the mixture will be :

A. 8g

B. 12g

C. 3g

D. 6g

Answer: B



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84. The root mean square velocity of a gas is doubled when the temperature is :

A. increased four times

B. increased two times

C. reduced to half

D. reduced to one fourth

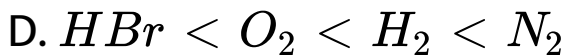
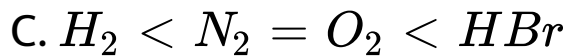
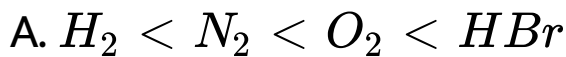
Answer: A



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85. The root mean square speeds at STP for the gases H_2 , N_2 , O_2 and HBr are in the order

:



Answer: B



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86. A mixture of Ne and Ar kept in a closed vessel at 250 K has a total K.E.=3 kJ. The total

mass of Ne and Ar is 30 g. Find mass % of Ne in gaseous mixture at 250 K.

A. 61.63

B. 38.37

C. 50

D. 28.3

Answer: D



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87. For a real gas (mol.mass =60) if density at critical point is $0.80g/cm^{-3}$ and its

$$T_c = \frac{4 \times 10^5}{821} K, \quad \text{then van der Waals'}$$

constant a (in atm $L^2 mol^{-2}$) is

A. 0.3375

B. 3.375

C. 1.68

D. 0.025

Answer: B



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88. van der Waals constant b of helium is 24 mL mol^{-1} . Find molecular diameter of helium.

A. $1.335 \times 10^{-10} \text{ cm}$

B. $1.335 \times 10^{-8} \text{ cm}$

C. $2.67 \times 10^{-8} \text{ cm}$

D. $4.34 \times 10^{-8} \text{ cm}$

Answer: C



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89. The van der Waals' constant 'b' of a gas is $4\pi \times 10^{-4} L/mol$. How near can the centers of the two molecules approach each other?

[Use : $N_A = 6 \times 10^{23}$]

A. $10^{-7} m$

B. $10^{-10} m$

C. $5 \times 10^{-11} m$

D. $5 \times 10^{-9} m$

Answer: B



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90. The volume of 0.0168 mol of O_2 obtained by decomposition of $KClO_3$ and collected by displacement of water is 428 mL at a pressure of 754 mm Hg at 25 °C. The pressure of water vapour at 25 °C is

A. 18 mm Hg

B. 20 mm Hg

C. 22 mm Hg

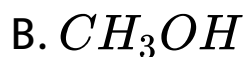
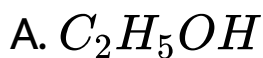
D. 24 mm Hg

Answer: D



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91. The surface tension of which of the following liquid is maximum?



D. C_6H_6

Answer: C



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92. Choose the incorrect statement in the following.

A. Surface tension is the force acting per unit length perpendicular to the line drawn on the surface of the liquid

B. Surface tension of a liquid increases with
increase in temperature

C. The SI unit of surface tension is J m^{-2}

D. Viscosity is a measure of resistance for
the flow of

Answer: B



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93. A bubble of air is underwater at temperature $15^{\circ}C$ and the pressure 1.5 bar. If the bubble rises to the surface where the temperature is $25^{\circ}C$ and the pressure is 1.0 bar, what will happen to the volume of the bubble?

A. Volume will become greater by a factor of 1.6.

B. Volume will become greater by a factor of 1.1.

C. Volume will become smaller by a factor of 0.70

D. Volume will become greater by a factor of 2.5 .

Answer: A



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94. When 1 mol of a monoatomic ideal gas at TK undergoes adiabatic change under a constant external pressure of 1 atm , changes

volume from $1L \rightarrow 2L$. The final temperature
(in K) would be

A. $\frac{T}{2^{(2/3)}}$

B. $T + \frac{2}{3} \times 0.0821$

C. T

D. $T - \frac{2}{3} \times 0.0821$

Answer: A



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95. The limiting density of hydrogen bromide is 3.6108 at $0^{\circ}C$. The exact atomic weight of bromine is (At. wt. of H = 1.008)

A. 80.92

B. 79.92

C. 89.29

D. 79.29

Answer: B



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96. A bottle of dry ammonia and a bottle of dry hydrogen chloride connected through a long tube are opened simultaneously at both ends. The white ammonium chloride ring first formed will be

- A. at the centre of the tube.
- B. near the hydrogen chloride bottle.
- C. near the ammonia bottle.
- D. throughout the length of the tube

Answer: B



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97. A 0.50 L container is occupied by nitrogen at a pressure of 800 torr and a temperature of 0°C . The container can only withstand a pressure of 3.0 atm. What is the highest temperature ($^{\circ}\text{C}$) to which the container may be heated?

A. 505

B. 450

C. 625

D. 560

Answer: A



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98. Two closed vessel A and B of equal volume of 8.21 L are connected by a narrow tube of negligible volume with open valve. The left hand side container is found to contain 3 mole CO_2 and 2 mole of He at 400 K. What is the partial pressure of He in vessel B at 400 K?

A. 2.4atm

B. 8atm

C. 12atm

D. None of these

Answer: B



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99. Which of the following does not determine the translational kinetic energy of an ideal gas

?

A. Temperature

B. Amount of the gas

C. Number of moles of gas

D. Pressure of the gas

Answer: D



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100. The Ne atom has 10 times the mass of H_2 molecule. Which of the following statements is true?

I. At $25^{\circ}C$ both of them have the same kinetic energy.

II. Ten moles of H_2 would have the same volume as 1 mole of Ne at same temp. and pressure.

III. One mole of Ne exerts the same pressure as one mole of H_2 at STP.

IV. A H_2 molecule travels 10 times faster than Ne atom at same temperature.

V. At STP, one litre of Ne has 10 times the density of 1 litre of H_2 .

A. II, IV, V

B. I, III, V

C. I, II, III

D. I, II

Answer: B



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101. The van der Waals' equation for one mole may be expressed as

$$V_M^3 - \left(b + \frac{RT}{P} \right) V_m^2 + \frac{aV_m}{P} - \frac{ab}{P} = 0$$

where V_m is the molar volume of the gas.

Which of the following is incorrect?

A. For a temperature less than T_c V has three real roots

B. For a temperature more than T_c , V has one real and two imaginary roots

C. For a temperature equal to T_c all three roots of V are real and identical

D. All of these

Answer: D



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102. A 4.40 g piece of solid CO_2 (dry ice) is allowed to sublime in a balloon. The final volume of the balloon is 1.00 L at 300 K. What is the pressure (atm) of the gas?

A. 0.122

B. 2.46

C. 122

D. 24.6

Answer: B



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103. Which gas shows real behaviour?

A. 16 g O_2 at 1 atm and 273 K occupies 11.2

L

B. 1 g H_2 in 0.5 L flask exerts pressure

of 24.63 atm at 300K

C. 1 mole NH_3 at 300 K and 1 atm occupies

volume 22.4 L

D. 5.6 L of CO_2 at 1 atm and 273 K is equal

to 11 g

Answer: C



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104. A box of 1 L capacity is divided into two equal compartments by a thin partition which are filled with 2g H_2 and 16 g CH_4 respectively.

The pressure in each compartment is recorded as P atm. The total pressure when partition is removed will be:

A. P

B. $2P$

C. $P/2$

D. $P/4$

Answer: A



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