Level 1

(1) c $NH_3 > NF_3 > BF_3$

(2) d b depends upon Molecular size.

(3) d

(4) c $\frac{P_{CO_2}}{P_{He}} = \sqrt{\frac{44}{4}} = \sqrt{11} = \frac{3.31}{1}$

(5) d 'a' is a measure of intermolecular force of attraction.

(6) a same as ques. 4

(7) b

(8) d

Let $CO = x$ L

$CO_2 + C \rightarrow 2CO$

$1-x$ $2(1-x)$

$2 - 2x + x = 1.6$

$x = 0.4$

$CO_2 = 0.6$ L or 60%

(9) b balloon will have enlarged.

(10) a a will be neglected.

(11) c greater the value of a more easily the gas can be liquified.

(12) c

(13) c $P = \frac{2P_1}{T_1 + T_2}$

(14) a $P_1 > P_2$

(15) b $\frac{4}{P} = \frac{300}{330} \Rightarrow P = 4.4$ atm.

(16) b $n_1 \times 300 = n_2 \times 600$

$n_2 = \frac{n_1}{2}$

(17) b it will expand.

(18) d K.E is temperature dependent.

~~(19) d~~

(19) ~~(20)~~ d Gases do not have definite shape and volume.

(20) d because Dalton's law of partial pressure is valid for non reacting gases.

(21) a $P \propto d \times T$

(22) b charles Law

(23) c

(24) c due to ~~low mass of H_2~~ Graham's law of diffusion.

(25) c

$$2CO + O_2 \rightarrow 2CO_2$$

2 ml	1 ml	2 ml
20 ml	50 ml	20 ml
	40 ml	

Remaing volume = 40 ml of O_2.

(26) a $Z > 1$ H_2 & He. shows positive deviation.

(27) c

$$\frac{r_A}{r_B} = \frac{P_A}{P_B}\sqrt{\frac{M_B}{M_A}}$$

(28) c

$$1.25 = \sqrt{\frac{64}{28} \times \frac{T}{323}}$$

(29) a Average K.E. = $\frac{3}{2}kT = \frac{3}{2} \times 1.38 \times 10^{-23} \times 298$

$= 6.17 \times 10^{-21}$ KJ

(30). c.

$u \propto \sqrt{\frac{T}{M}}$ $\sqrt{7} = \sqrt{\frac{T_{H_2} \times 28}{T_{H_2} \times 2}}$

$7 = \frac{T_{H_2} \times 14}{T_{N_2}}$

$T_{N_2} = 2 T_{H_2}$

(31) a same as ques. 30

(32) d ~~$U_{rms} \propto \sqrt{\frac{T}{M}}$ same as ques~~ $U_{rms} = \sqrt{\frac{3RT}{M}}$

(33) b. $\frac{U_1}{U_2} = \sqrt{\frac{1200}{300}} \Rightarrow U_2 = \frac{U_1}{2}$

(34) c Real gas behave as ideal gas at high temperature and low pressure.

(35) b $d \propto \frac{P}{T}$

(36) b $P \times 20 = \frac{120}{40} \times 0.0821 \times 400$

$P = 4.92$ atm

(37) b

$$T_c = \frac{8a}{27Rb} \qquad T_B = \frac{a}{Rb}$$

(38) c

PV against P

(39) c

$$P \times 125.3 = 4 \times 0.0821 \times 398$$

$$P = 1.056 \text{ bar.}$$

(40) d

(41) b

$$P = \frac{202 \times 3 + 101 \times 4}{7} \simeq 144 \text{ kpa}$$

(42) b

$$n \propto \frac{PV}{T}$$

(43) d

$$\frac{n_1}{n_2} = \frac{\frac{3 \times 1.65}{493}}{\frac{0.7 \times 1}{383}} \Rightarrow \frac{n_2}{n_1} = \frac{1}{5.49} \Rightarrow \frac{n_1 - n_2}{n_1} = 81.8\%.$$

(44) c

at high Pressure $PV = RT + Pb$

(45) b

$$PV = \frac{n}{\cancel{R}} RT \Rightarrow PV = \frac{w}{M} \times RT$$

$$w = 4.22 g$$

$$\% \text{ purity} = \frac{4.228}{5} \times 100 \approx 84.6$$

(46) b

(47) d

20m above sea level.

(48) a

$$PV = 3\left(RT - \frac{9a}{V}\right)$$

(49) c

$$\frac{U_{H_2}}{U_{O_2}} = \sqrt{\frac{5\cancel{0} \times \times 32}{80\cancel{0} \times 2}} = 1$$

(50) a

$$\text{intercept} = \frac{RT}{M}.$$

Level-2

(1) b   22.4L

(2) c

$$\frac{10}{x} = \frac{1000}{2000}\sqrt{\frac{2}{4}} \Rightarrow x = 20\sqrt{2} \text{ torr min}^{-1}$$

(3) a   high pressure and low temperature

(4) d   Kinetic energy will be same.

(5) b

$$\frac{t_{gas}}{t_{H_2}} = \sqrt{\frac{32}{2}} \Rightarrow \frac{t_{gas}}{5} = 4 \Rightarrow t_{gas} = 20 \text{ sec.}$$

if gas is oxygen.

(6) b

(7) b   high pressure and low temperature

(8) d $a = \text{atm } L^2 \text{ mol}^{-2}$

(9) a

$$U_{rms} : U_{av} : U_{mp} = \sqrt{\frac{3RT}{M}} : \sqrt{\frac{8RT}{\pi M}} : \sqrt{\frac{2RT}{M}}$$

$$= \sqrt{3} : \sqrt{\frac{56}{22}} : \sqrt{2}$$

(10) c $\frac{P'}{P} - 1 = \frac{100}{95} - 1 = \frac{5}{95} \times 100 = 5.26\%$

(11) b $V_t = V_0\left(1 + \frac{t^\circ C}{273}\right)$

(12) c * same as Ques. 4

(13) c $T_1 > T_2 > T_3 \therefore V \propto T$

(14) a balloon filled with hydrogen due to low molar mass

(15) a $P_{O_2} = P_T \times \chi_{O_2}$

$$= P_T \times \frac{n_{O_2}}{n_{O_2} + n_{CH_4}} = P_T \times \frac{w/32}{\frac{w}{32} + \frac{w}{16}} = P_T \times \frac{1}{3}$$

(16) b $n_1 \times 300 = n_2 \times 400$

$n_2 = \frac{3}{4} n_1$

(17) d $\frac{n_1}{n_2} = \frac{17}{57} = 0.3$

(18) c

(19) c

(20) d by Graham's Law of Diffusion

(21) a

(22) c

(23) b same as Ques 12

(24) c

(25) b

22.4 g – 22.4 L

11.2 – 11.2 L

(26) d

$PV = nRT$

$1 \times V = \left(\frac{16}{32} + \frac{3}{2}\right) \times 0.0821 \times 273$

$V = 44.8 L$

(27) a Translational Kinetic energy

(28) d NH_3

(29) a $d \propto \frac{P}{T}$

(30) d

$$V_0 = \sqrt{\frac{2R(t+273)}{M}}$$

$$V_{rms} = \sqrt{\frac{3R \times 2 \times (t+273)}{M/2}} = \sqrt{6}\, V_0$$

(31) a $d \propto \frac{P}{T}$

(32) a same as Ques. 16

(33) b

$$P \times 0.44 = \frac{0.2}{X} RT$$

$$P \times 0.32 = \frac{0.1}{44} \times RT$$

$$X = 64$$

SO_2

(34) a $U \propto \sqrt{T}$

(35) a $PV = \frac{5.4}{X} \times R \times 300$; $PV = \frac{0.14}{2} \times R \times 290$

$$X = 79.8$$

Assertion - Reason

(1) d Real gas behave as ideal gas at low pressure and high temperature.

(2) d

(3) c $P \propto T$

(4) c Intermolecular hydrogen bonding

(5) d Kinetic energy is Temperature dependent.

(6) a Nacl is good conductor in aqueous or molten state.

(7) d

(8) a same as ques. 2.

(9) b Hydrogen and Helium shows positive deviation.

(10) b Ideal gas equation $PV = nRT$

Previous year's Questions

(1) a $V_{H_2} : V_{O_2} : V_{CH_4} = \frac{1}{2} : \frac{1}{32} : \frac{1}{16}$

$16 : 1 : 2.$

(2) a NH_3

(3) b same as ques 2. level 2.

(4) d 'a' is the measure of intermolecular force of attraction.

(5) c same as ques. 5 level 2

(6) c same as ques. 5

(7) a $U \propto \sqrt{T}$

(8) b $P_{N_2} = \frac{n}{n+n} \times P_T = \frac{1}{2} P_T$

(9) c $P_{CH_4} = \frac{w/16}{w/16 + \frac{w}{2}} P_T = \frac{1}{9} P_T$

(10) d

(11) d it will form homogeneous mixture.

(12) b

(13) a

$$n_1 T_1 = n_2 T_2$$

$$\frac{w_1}{M_1} T_1 = \frac{w_2}{M_2} T_2$$

(14) a Atmolysis

(15) c

$$PV = nRT$$

(16) d

$$d = \frac{PM}{RT}$$

(17) a

$$~~P~~ 2.46 \times 10 = \frac{28}{~~28~~} \times 0.0821 \times T$$

$$T = 299.6 K.$$

(18) a

$$K.E. \propto T$$

(19) a $PV = nRT$

$P \propto W$

(20) d same as ques. 6

(21) d $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$

(22) c b is covolume.

(23) a for ideal gas $Z = 1$

(24) c ~~$P \propto \frac{d \times T}{M}$~~

~~$\frac{P_A}{P_B} = \frac{d_A}{d_B} \times \frac{T_A}{T_B} = 2 \times 2 = 4$~~

$P \propto \frac{d}{M}$

$\frac{P_A}{P_B} = \frac{d_A}{d_B} \times \frac{M_B}{M_A} = 4$

(25) d same as ques. 7.

(26) c same as ques. 25

(27) d greater value of a means more easily the gas can be liquified.

(28) c same as ques. 25.

(29) a ~~same as ques 29 level 1.~~ $3\sqrt{3} = \sqrt{\frac{M}{2}} \Rightarrow M = 54$

$12n + 2n - 2 = 54$

$n = 4$

(30) b same as ques. 29 Level I

(31) c at high temperature and low pressure

(32) a K.E. remains constant.

(33) b $P \times 3 = 0.6 \times 0.0821 \times 298$

(34) b same as ques. 27.

(35) c below critical temperature gas can be liquify.

(36) c same as ques. 32

(37) c ~~same as~~ by using $P = \frac{d}{M} RT$

(38) a

(39) d $U_{m.p.} = \sqrt{\frac{2RT}{M}}$ $U_{rms} = \sqrt{\frac{3RT}{M}}$

$$U_{rms} = \frac{\sqrt{3}}{\sqrt{2}} \times U_{m.p.} = \frac{\sqrt{3}}{\sqrt{2}} \times 300 = 367 \text{ m/s}$$

(40) a

(41) b $\quad v_{avg.} = \sqrt{\frac{8RT}{\pi M}}$

(42) a $\quad \frac{dP}{P} = -\frac{dv}{V}$

(43) d

(44) a same as ques. 5

(45) a at high pressure $\quad Z = 1 + \frac{Pb}{RT}$

(46) d

(47) b $\quad Z > 1$

(48) c due to attraction between its molecules

(49) d $\quad r \propto \frac{1}{\sqrt{M}}$

(50) a

(51) d

(52) a $\quad \frac{K.E_1}{K.E_2} = \frac{3/2}{4/32} = 12/1$