DAY SIX

Unit Test 1
(General Chemistry)

1 Correct set of four quantum numbers for valence electron of rubidium ($Z = 37$) is

(a) 5, 0, 0, $+\frac{1}{2}$ (b) 5, 1, 0, $+\frac{1}{2}$

(c) 5, 1, 1, $+\frac{1}{2}$ (d) 6, 0, 0, $+\frac{1}{2}$

2 Four diatomic species are listed below in different sequences. Which of these represents the correct order of their increasing bond order?

(a) $O_2^- < NO < C_2^{2-} < He_2^+$ (b) $NO < C_2^{2-} < O_2^- < He_2^+$

(c) $C_2^{2-} < He_2^+ < NO < O_2^-$ (d) $He_2^+ < O_2^- < NO < C_2^{2-}$

3 The de-Broglie wavelength of an electron accelerated by a potential difference of 'V' volts is given by the relation

(a) $\frac{12.28}{\sqrt{V}}$ Å (b) $\frac{12.28}{\sqrt{V}}$ cm

(c) $\frac{12.28}{\sqrt{V}}$ m (d) $\frac{12.28}{V}$ Å

4 Number of spectral lines of Lyman series of electron when it jumps from 6 to first level (in Lyman series) is

(a) 9 (b) 12 (c) 15 (d) 18

5 The equivalent weight of a solid element is found to be 9. If the specific heat of the element is 1.05 J g^{-1} K^{-1}, then its atomic weight is

(a) 17 (b) 21 (c) 25 (d) 27

6 The first line in the Balmer series in the H-atom will have the frequency.

(a) 4.56×10^{14} s^{-1} (b) 3.29×10^{15} s^{-1}

(c) 8.22×10^{15} s^{-1} (d) 8.05×10^{13} s^{-1}

7 The orbital angular momentum of an electron in 2*s* orbital is

(a) $\frac{1}{2} \cdot \frac{h}{2p}$ (b) zero

(c) $\frac{h}{2p}$ (d) $\sqrt{2} \cdot \frac{h}{2\pi}$

8 Hybridisation of the nitrogen atom and electronic geometry around nitrogen atom in pyridine is

(a) sp^3, pyramidal (b) sp^2, trigonal planar

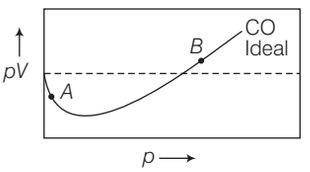
(c) sp^2, linear (d) sp^3, tetrahedral

9 The geometry of H_2S and its dipole moment are

(a) angular and non-zero (b) angular and zero

(c) linear and non-zero (d) linear and zero

10 For CO, isotherm is of the type as shown. Near the point *A*, compressibility factor *Z* is



(a) $1 + \frac{b}{V}$ (b) $1 - \frac{b}{V}$ (c) $1 + \frac{a}{RTV}$ (d) $1 - \frac{a}{RTV}$

11 If Na^+ ion is larger than Mg^{2+} ion and S^{2-} ion is larger than Cl^- ion, which of the following will be stable in water?

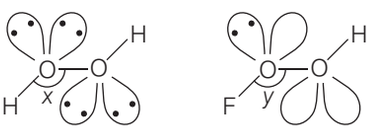
(a) Sodium chloride (b) Sodium sulphide

(c) Magnesium chloride (d) Magnesium sulphide

12 Which of the following is paramagnetic?

(a) CO_2 (b) NO (c) O_2^{2-} (d) CN^-

13 Which of the following is correct order of bond angle *x* and *y* ?



(a) $x > y$ (b) $y > x$

(c) $x = y$ (d) None of these

14 The number of antibonding electron pairs in O_2^{2-} ion, on the basis of MO theory is

(a) 4 (b) 3 (c) 2 (d) 5

15 Consider the following changes,

$$A \longrightarrow A^+ + e^-; E_1 \quad \text{and} \quad A^+ \longrightarrow A^{2+} + 2e^-; E_2$$

The energy required to pull out the two electrons are E_1 and E_2 respectively. The correct relationship between two energies would be

(a) $E_1 < E_2$ (b) $E_1 = E_2$ (c) $E_1 > E_2$ (d) $E_1 \geq E_2$

16 Which of the following statement is correct regarding $BeCl_2$?

(a) It violates octet rule and has sp^2-hybridisation
(b) It has sp-hybridisation and follow octet rule
(c) It violates octet rule and has linear structure
(d) All of the above

17 Cortisone is a molecular substance containing 21 atoms of carbon per molecule. The mass percentage of carbon in cortisone is 69.98%. Its molar mass is

(a) 176.5 (b) 252.2 (c) 360.1 (d) 287.6

18 An inorganic substance has the following composition.

$$N = 35\%, H = 5\%, O = 60\%$$

On being heated, it yielded a gaseous compound containing $N = 63.63\%$ and $O = 36.37\%$. Which of the following reaction can be suggested based on the given data?

(a) $2HNO_3 \longrightarrow N_2O_5 + H_2O$
(b) $NH_2OH + HONO \longrightarrow N_2O + 2H_2O$
(c) $NH_4NO_3 \longrightarrow N_2O + 2H_2O$
(d) $2HNO_3 \longrightarrow N_2O_3 + H_2O$

19 A metal forms two oxides. The higher oxide contains 20% oxygen, while 4.29 g of lower oxide when converted to higher oxide becomes 4.77 g. The equivalent weight of metal in the two oxides lower and higher respectively are

(a) 32 and 48
(b) 48 and 32
(c) 64 and 32
(d) same equivalent weight for both, i.e. 32

20 50 mL of 10 N H_2SO_4, 25 mL of 12 N HCl and 40 mL of 5 N HNO_3 were mixed together and the volume of the mixture was made 1000 mL by adding water. The normality of the resultant solution will be

(a) 1 N (b) 2 N (c) 3 N (d) 4 N

21 The equivalent weight of an element is 4. Its chloride has VD 59.25. Then the valency of the element is

(a) 4 (b) 3 (c) 2 (d) 1

22 Group 15th of the periodic table consists of the elements N, P, As, Sb and Bi. On moving from N to Bi, the oxides of the elements of general formula M_2O_3 become

(a) stronger reducing agent (b) more ionic
(c) more volatile (d) more basic

23 Inhaled air contains O_2 at a pressure of 160 torr. The capacity of a human lung is about 3.0 L. Body temperature is 37°C. The mass of O_2 filling a lung upon respiration is

(a) 8 g (b) 0.80 g (c) 16 g (d) 0.16 g

24 The root mean square velocity of hydrogen is $\sqrt{5}$ times than that of nitrogen. If T is the temperature of the gas, then

(a) $T_{H_2} = T_{N_2}$ (b) $T_{H_2} > T_{N_2}$
(c) $T_{H_2} < T_{N_2}$ (d) $T_{H_2} = \sqrt{7}\,T_{N_2}$

25 0.16 g of a substance on vaporisation displaces 26.2 mL of moist air at 17°C and 764 mm. Weight of substance at STP is (aqueous tension at 17°C = 14 mm)

(a) 37.11 (b) 41.56 (c) 73.62 (d) 79.12

26 Carbon disulphide is an example of

(a) ionic liquid (b) H-bonded liquid
(c) polar liquid (d) non-polar liquid

27 An ideal gas obeying kinetic gas equation can be liquefied if

(a) its temperature is more than critical temperature
(b) its pressure is more than critical pressure
(c) its pressure is more than critical pressure but temperature is less than critical temperature
(d) it cannot be liquefied at any value of p and T

28 Four elements A, B, C, D have atomic numbers $Z-1$, $Z+1$, $Z-2$ and $Z+2$ respectively. If Z is 9 then bond between which pair of elements will be ionic?

(a) A and C (b) D and C
(c) D and B (d) B and C

29 Specific volume of cylindrical virus particle is 6.02×10^{-2} cc/g whose radius and length are 7 Å and 10 Å respectively. If $N_A = 6.02 \times 10^{23}$, find molecular weight of virus

(a) 15.4 kg/mol (b) 1.54×10^4 kg/mol
(c) 3.08×10^4 kg/mol (d) 3.08×10^3 kg/mol

30 In PO_4^{3-} ion, the formal charge on the oxygen atom of P – O bond is → NCERT Exemplar

(a) +1 (b) –1 (c) – 0.75 (d) + 0.75

31 If the electron falls from $n = 3$ to $n = 2$ in hydrogen atom then emitted energy is

(a) 10.2 eV (b) 12.09 eV
(c) 1.9 eV (d) 0.65 eV

32 Molecular shapes of SF_4, CF_4 and XeF_4 are

(a) the same with 2, 0 and 1 lone pair of electrons respectively
(b) the same with 1, 1 and 1 lone pair of electrons respectively
(c) different with 0, 1 and 2 lone pairs of electrons respectively
(d) different with 1, 0 and 2 lone pairs of electrons respectively

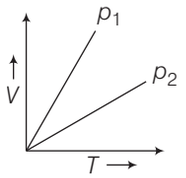
33 Arrange S, O and Se in the ascending order of electron affinity

(a) Se < S< O (b) Se < O < S
(c) S < O < Se (d) S < Se < O

34 Gradual addition of electronic shells in the noble gases causes a decrease in their

(a) ionisation energy (b) atomic radius
(c) boiling point (d) density

35 *V vs T* curves at different pressures p_1 and p_2 for an ideal gas (are shown below)



Which one of the following is correct?

(a) $p_1 > p_2$ (b) $p_1 < p_2$ (c) $p_1 = p_2$ (d) $\frac{p_2}{p_1} = \frac{1}{2}$

36 Elements *X, Y* and *Z* have atomic numbers 19, 37 and 55 respectively. Which of the following statement is true about them?

(a) Their ionisation potential would increases with increasing atomic number
(b) *Y* would have an ionisation potential between those *X* and *Z*
(c) *Z* would have the highest ionisation potential
(d) *Y* would have the highest ionisation potential

Direction (Q. Nos. 37-38) *In the following questions more than one answers given may be correct. Select the answers and mark it according to the codes.*

Codes

(a) 1, 2 and 3 are correct (b) 1 and 2 are correct
(c) 2 and 4 are correct (d) 1 and 3 are correct

37 Select the correct statement(s) about C_3^{4-} ion.

1. It reacts with H_2O forming C_3H_6
2. It reacts with H_2O forming C_3H_4
3. It has three sigma and one pi bonds
4. It has two sigma and two pi bonds

38 A bivalent metal ion has equivalent mass of 12. Then,

1. equivalent mass of its oxide is 20
2. molar mass of its oxide is 40
3. equivalent mass of its hydride is 13
4. molar mass of its hydride is 25

39 Match the type of bond (given in Column I) with method of formation (given in Column II) and choose the correct option from the codes given below.

Column I		Column II	
A.	BCl_3	1.	Linear
B.	$[PdBr_4]^{2-}$	2.	Planar triangular
C.	SF_6	3.	Tetrahedral
D.	I_3^-	4.	Octahedral
		5.	Square planar

The correct match is

	A	B	C	D		A	B	C	D
(a)	2	3	4	1	(b)	5	3	2	1
(c)	2	5	4	1	(d)	5	4	3	2

Direction (Q. Nos. 40-41) *Each of these questions contains two statements : Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.*

(a) Assertion is true, Reason is true; Reason is the correct explanation for Assertion
(b) Assertion is true, Reason is true; Reason is not the correct explanation for Assertion
(c) Assertion is true, Reason is false
(d) Assertion is false, Reason is true

40 **Assertion** Most probable velocity is the velocity possessed by maximum fraction of molecules at the same temperature

Reason On collision, more and more molecules acquire higher speed at the same temperature.

41 **Assertion** Compressibility factor for hydrogen varies with pressure with positive slope at all pressures.

Reason Even at low pressure, repulsive forces dominates in hydrogen gas.

ANSWERS

1 (a)	**2** (d)	**3** (a)	**4** (c)	**5** (d)	**6** (a)	**7** (b)	**8** (b)	**9** (a)	**10** (d)
11 (d)	**12** (b)	**13** (a)	**14** (a)	**15** (a)	**16** (c)	**17** (c)	**18** (c)	**19** (c)	**20** (a)
21 (b)	**22** (d)	**23** (b)	**24** (c)	**25** (c)	**26** (d)	**27** (d)	**28** (b)	**29** (a)	**30** (c)
31 (c)	**32** (d)	**33** (b)	**34** (a)	**35** (a)	**36** (b)	**37** (d)	**38** (a)	**39** (c)	**40** (a)
41 (b)									

Hints and Explanations

1. $_{37}Rb = 1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6\ 3d^{10}, 4s^2\ 4p^6, 5s^1$

For the valence shell electron (i.e. $5s^1$)

$$n = 5, l = 0, m = 0, s = +\frac{1}{2}$$

2. Bond order $= \frac{N_b - N_a}{2}$

$$He_2^+ = \sigma 1s^2\ \sigma^* 1s^1$$

Bond order $= \frac{2-1}{2} = \frac{1}{2} = 0.5$

$$C_2^{2-} = \sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2 \pi 2p_x^2 \approx \pi 2p_y^2\ \sigma 2p_z^2$$

Bond order $= \frac{10-4}{2} = \frac{6}{2} = 3$

$$O_2^- = \sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \sigma 2p_z^2\ \pi 2p_x^2 \approx \pi 2p_y^2\ \pi^* 2p_x^2\ \pi^* 2p_y^1$$

Bond order $= \frac{10-7}{2} = \frac{3}{2} = 1.5$

$$NO = \sigma 1s^2\ \overset{*}{\sigma} 1s^2 \sigma\ 2s^2\ \overset{*}{\sigma} 2s^2 \sigma\ 2p^2 \pi 2p_x^2 \approx \pi 2p_y^2\ \overset{*}{\pi} 2p_x^1$$

Bond order $= \frac{10-5}{2} = 2.5$

Hence, the order of increasing bond order is

$$He_2^+ < O_2^- < NO < C_2^{2-}$$

3. $\lambda = \frac{h}{\sqrt{2m_e V}}$

$$= \frac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 1.6 \times 10^{-19} \times V}}$$

$$= \frac{12.28 \times 10^{-10}}{\sqrt{V}}\ m = \frac{12.28}{\sqrt{V}}\ Å$$

4. Number of spectral lines

$$= \frac{n(n-1)}{2} = \frac{6(6-1)}{2} = 15$$

5. Valency of the element

$$= \frac{\text{approximate atomic weight}}{\text{equivalent weight}}$$

$$= \frac{26.8 / \text{specific heat}}{\text{equivalent weight}} = \frac{26.8/1.05}{9} \approx 3$$

∴ Atomic weight = equivalent weight × valency = 9 × 3 = 27

6. Frequency of first line in Balmer series.

$$\nu = 3.29 \times 10^{15}\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right] s^{-1}$$

$$= 3.29 \times 10^{15}\left[\frac{1}{(2)^2} - \frac{1}{(3)^2}\right] s^{-1}$$

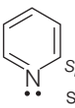
$$= 3.29 \times 10^{15}\left[\frac{1}{4} - \frac{1}{9}\right]$$

$$= 3.29 \times 10^{15} \times \frac{5}{36} = 4.56 \times 10^{14} s^{-1}$$

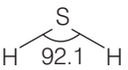
7. For $2s$-orbital, $l = 0, n = 2$

∴ Angular momentum

$$= \sqrt{l(l+1)}\frac{h}{2\pi} = 0$$

8. 

sp^2-hybridised with trigonal planar structure.

9. 

H_2S is angular with two lone pairs of electrons on S. So, it has a net dipole moment.

10. For CO at moderate pressure, V decreases.

Hence, $\frac{a}{V^2}$ increases and cannot be neglected.

On modifying van der Waals' equation,

$$\left(p + \frac{a}{V^2}\right)V = RT$$

$$pV + \frac{a}{V} = RT \Rightarrow pV = RT - \frac{a}{V}$$

$$\frac{pV}{RT} = 1 - \frac{a}{RTV}, \quad Z = 1 - \frac{a}{RTV}$$

11. Higher the lattice energy, lower the solubility. Out of the four combinations possible, the lattice energy of MgS (bivalent ionic solid) is higher than those of Na_2S, $MgCl_2$ (uni-bivalent solids) and hence, MgS is least soluble, i.e. it will be a stable salt in water.

12. Due to the presence of odd electrons, NO is paramagnetic in nature.

13. As we know, greater the electronegativity of surrounding atom, lower its bond angle.

∴ $x > y$

14. $O_2^{2-} = \sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2p_z^2\ \pi 2p_x^2 \approx \pi 2p_y^2\ \overset{*}{\pi} 2p_x^2 \approx \overset{*}{\pi} 2p_y^2$

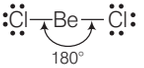
Thus, there are four antibonding electron pairs present.

15. $A \longrightarrow A^+ + e^-; E_1$

$A^+ \longrightarrow A^{2+} + 2e^-; E_2$

$E_1 < E_2$ because in second case effective nuclear charge per electron is larger than that of first case.

16. Since, Be has two valence electrons. It attaches with Cl on violating octet rule.



Linear and sp-hybridised

17. Let, the molar mass be M

Mass of 21 carbon atoms = 252 $(12 \times 21 = 252)$

$$\% \text{ of carbon} = \frac{252 \times 100}{M} = 69.48$$

$$M = 362.69 \approx 360.1\ g$$

18. Empirical formula of the inorganic substance

Element	%	Atomic weight	Mole ratio	Simple ratio	Simplest ratio
N	35.0	14	$\frac{35.0}{14} = 2.5$	$\frac{2.5}{2.5} = 1$	2
H	5.0	1	$\frac{5.0}{1} = 5.0$	$\frac{5.0}{2.5} = 2$	4
O	60.0	16	$\frac{60.0}{16} = 3.75$	$\frac{3.75}{2.5} = 1.5$	3

∴ Empirical formula of the inorganic substance = $N_2H_4O_3$

Empirical formula of gaseous compound

Element	%	Atomic weight	Mole ratio	Simplest ratio
N	63.63	14	$\frac{63.63}{14} = 4.55$	$\frac{4.55}{2.27} = 2$
O	36.67	16	$\frac{36.67}{16} = 2.27$	$\frac{2.27}{2.27} = 1$

∴ Empirical formula of gaseous compound = N_2O

Therefore, reaction may be represented as

$$NH_4NO_3 \longrightarrow N_2O + 2H_2O$$

19. Equivalent weight of higher oxide

$$(\text{oxide formation method}) = \frac{80}{20} \times 8 = 32$$

Metal in higher oxide = 80%

Metal in 4.77 g higher oxide $= \frac{80}{100} \times 4.77$

= 3.816 g = weight of metal in lower oxide

∴ Weight of oxygen = 4.29 – 3.816 = 0.474 g

$$\text{Equivalent weight} = \frac{3.816}{0.474} \times 8 = 64.4$$

20. Normality of resulting solution

$$= \frac{N_1V_1 + N_2V_2 + N_3V_3}{V_{Total}}$$

$$= \frac{50 \times 10 + 25 \times 12 + 40 \times 5}{1000}$$

$$= \frac{500 + 300 + 200}{1000} = 1\,N$$

21. Mol. mass of $MCl_x = 59.25 \times 2 = 118.5$

$$= \text{At. mass of}$$

$$M + 35.5 \times x = E \times x + 35.5x$$

$$= x(E + 35.5)$$

$$x = \frac{118.5}{E + 35.5} = \frac{118.5}{39.5} = 3$$

22. On moving down the group, basic nature of oxides increases.

Hence, oxides of general formula M_2O_3 becomes basic in nature.

23. $p = 160\,\text{torr} = \frac{160}{760} = 0.21\,\text{atm}$

$$T = 37 + 273 = 310\,K$$

$\because \quad n = \frac{pV}{RT}$

$\therefore \quad n = \frac{0.21 \times 3.0}{0.0821 \times 310} = 0.025\,\text{mol}$

$$w = 0.025 \times 32 = 0.80\,g$$

24. $V_{rms} = \sqrt{\frac{3RT}{M}}$,

$\therefore \quad \frac{(V_{rms})H_2}{(V_{rms})N_2} = \sqrt{\frac{T_{H_2}}{M_{H_2}} \times \frac{M_{N_2}}{T_{N_2}}}$

or $\quad \frac{(V_{rms})N_2 \times \sqrt{5}}{(V_{rms})N_2} = \sqrt{\frac{T_{H_2}}{T_{N_2}} \times \frac{28}{2}}$

$$[\because (V_{rms})_{H_2} = \sqrt{5}(V_{rms})_{N_2}]$$

$\frac{\sqrt{5}}{1} = \sqrt{\frac{T_{H_2} \times 14}{T_{N_2}}} \qquad 5 = \frac{T_{H_2}}{T_{N_2}} \times 14$

or $\quad T_{N_2} \times 5 = T_{H_2} \times 14$

$\therefore \quad T_{N_2} > T_{H_2}$.

25. $p(\text{dry air}) = p(\text{moist air})$ – aqueous tension

$p(\text{dry air}) = 764 - 14$

$= 750\,mm$

$V_1 = 26.2\,mL$

$T_1 = 273 + 17 = 290\,K$

$V_2(\text{volume at STP}) = \frac{p_1V_1}{T_1} \times \frac{T_2}{p_2}$

$= \frac{750 \times 26.2 \times 273}{290 \times 760} = 24.34\,mL$

$\therefore$ 24.34 mL at STP weight = 0.16 g

$\therefore$ 11200 mL at STP weight

$= \frac{0.16 \times 11200}{24.34} = 73.62\,g$

26. S = C = S is linear and non-polar molecule.

27. An ideal gas cannot be liquefied at any value of pressure and temperature.

28. $Z - 1 = 8$ (unstable configuration)

$Z + 1 = 10$ (stable configuration)

$Z - 2 = 7$ (unstable configuration)

$Z + 2 = 11$ (unstable configuration)

On loosing one electron $(Z+2)$ - element forms cation and gives stable configuration. Hence, *D* and *C* are correct choice.

29. Specific volume (volume of 1 g) of cylindrical virus particle

$$= 6.02 \times 10^{-2}\,cc/g$$

Radius of virus $(r) = 7 \times 10^{-8}$ cm

Length of virus $= 10 \times 10^{-8}$ cm

Volume of virus

$$= \pi r^2 l = \frac{22 \times (7 \times 10^{-8})^2 \times 10 \times 10^{-8}}{7}$$

$$= 154 \times 10^{-23}\,cc$$

Weight of one virus particle

$$= \frac{\text{Volume}}{\text{Specific volume}} = \frac{154 \times 10^{-23}}{6.02 \times 10^{-2}}$$

$\therefore$ Molecular weight of virus = weight of N_A particle

$$= \frac{154 \times 10^{-23}}{6.02 \times 10^{-2}} \times 6.02 \times 10^{23}$$

$$= 15400\,g/mol = 15.4\,kg/mol$$

30. Formal charge on each O-atom

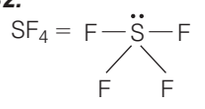
$$= \frac{\text{Total charge}}{\text{Number of O - atom}} = \frac{-3}{4} = -0.75$$

31. $E_n = -\frac{13.6}{n^2}\,eV$

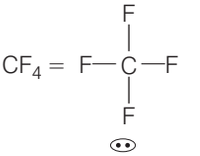
$E_3 = -1.5\,eV, E_2 = -3.4\,eV$

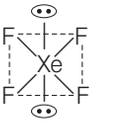
$E_3 - E_2 = [-1.5 - (-3.4)] = 1.9\,eV$

32.

SF_4 =  : *See-saw* structure

One lone pair

CF_4 =  : No lone pair

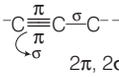
XeF_4 =  : Two lone pairs Square planar

33. In general, electron affinity decreases on moving down the group. However, O has less electron affinity than S due to its extremely small size.

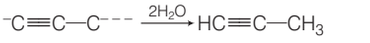
34. On moving down the group, ionisation energy decreases with increase in shell.

35. At given value *T* in the graph value of *V* is higher at p_2 than at p_1. This implies that p_1 is higher than p_2 because $V \propto \frac{1}{p}$ at particular temperature.

36. The atomic numbers 19, 37 (19 + 18) and 55 (37 + 18) indicate that the elements *X, Y* and *Z* belong to the same group. In a particular group, ionisation energy decreases with increase in atomic number. Ionisation energies of *X, Y* and *Z* are in the order $Z < Y < X$.

37. 

2π, 2σ bonds



38. One equivalent of bivalent metal (M^{2+})

$= 12\,g = 24\,g\,mol^{-1} = M^{2+}$

One equivalent of oxygen

$$= 8\,g = 16\,g\,mol^{-1} = O^{2-}$$

One equivalent of hydrogen

$$= 1\,g = 1\,g\,mol^{-1} = H^-$$

1. equivalent mass of oxide $= 12 + 8 = 20$
2. molar mass of oxide $= 24 + 16 = 40$
3. equivalent mass of hydride $= 12 + 1 = 13$
4. molar mass of hydride $= 24 + 2 = 26$

39. (A) $BCl_3 = 3\,bp + 0\,lp$

Hybridisation = sp^2

Geometry = Planar triangular

(B) $[PdBr_4]^{2-}$

Hybridisation = sp^3d^2

Geometry = Square planar

(C) $SF_6 = 6\,bp + 0\,lp$

Hybridisation = sp^3d^2

Geometry = Octahedral

(D) $I^{3-} = 2\,bp + 3\,lp$

Hybridisation = sp^3d

Geometry = Linear (due to the presence of 3 lone pairs)

40. Most probable velocity is the velocity possessed by maximum fraction of molecules at the constant temperature, where more molecules can collide with higher speed resulting effective collision.

41. In case of hydrogen, compressibility factor (Z) increases with pressure. At 273 K, $Z > 1$, which shows that it is difficult to compress the gas as compared to ideal gas. In this case, repulsive forces dominates.