PART B - CHEMISTRY

SECTION I - SINGLE ANSWER CORRECT TYPE

1. c) 984 kJ/mol

$$\frac{-1321}{4} - \left(\frac{1312}{1}\right) = 984 \text{ J}$$

2. c) 3.2×10^{-19}J

KE = (Energy of radiation – Work function)

$$= \left(h \times \frac{c}{\lambda} - 4.2\right)$$

$$= \left(\frac{6.6 \times 10^{-34} \text{ Js} \times 3 \times 10^{8} \text{ m}}{2000 \times 10^{-10} \text{ m}}\right) - (4.2 \times 1.602 \times 10^{-19}\text{J})$$

$= (9.9 \times 10^{-19}\text{J}) - (6.7 \times 10^{-19})$

$= 3.2 \times 10^{-19}$J

3. b) 0.1 g atom of Ca

Mwt of $CaCO_3$ = 40 + 12 + 48 = 100

Moles of $CaCO_3$ in 10g = $\frac{10}{100}$

= 0.1 mol = 0.1 g atom

4. a) 14

Let the formula of oxide = M_2O_x = 44

$2 \times M + x \times 16 = 44$

$2(E \times x) + x \times 16 = 44$

$2 (14 \times x) + 16x = 44$

$\therefore$ x = 1

5. c) $I^-_{(aq)} > Cl^-_{(aq)}$

Hydrated radius α charge per unit on ion.

$I^-_{(aq)} > Cl^-_{(aq)}$

6. a) Cu^{2+}

7. c) sp^2 - hybridized

zero dipole moment means a triangular planar molecule is formed. And this shape is formed by sp^2-hybridization.

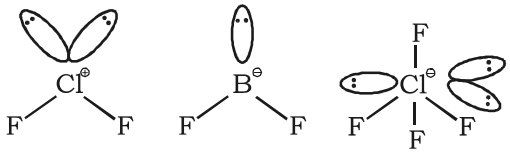
8. a) O^-_2

O^-_2 has 8 + 8 + 1 = 17 electrons. It must have at least one unpaired electron which makes it paramagnetic.

SECTION II - MULTIPLE ANSWER CORRECT TYPE

9. a) ClF^+_2

c) BF^-_2



10. a) Electronegativity : F > Cl > Br > I

c) Oxidizing power : $F_2 > Cl_2 > Br_2 > I_2$

d) Acidic nature in water : HI > HBr > HCl > HF

11. a) $NH_3 < PH_3 < AsH_3$ (Acidic)

c) $Al_2O_3 < MgO < Na_2O < K_2O$ (Basic)

d) $Li^+ < Na^+ < K^+ < Cs^+$ (Ionic radius)

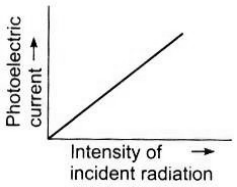
12. a) Increasing size : $Al^{3+} < Mg^{2+} < Na^+ < F^-$

c) Increasing $E.A_1$: I < Br < F < Cl

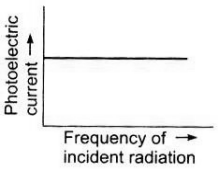
d) Increasing metallic radius : Li < Na < K < Rb

IE_1 of N > IE_1 of 0, due to half filled nature in N.

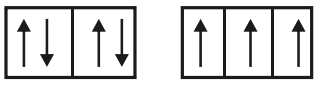
13. b)



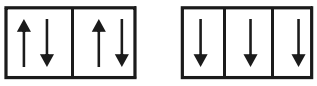
d)



14. a)



d)



Both (a) and (b) are correct because each p orbital has one electron with parallel spin.

This is correct in accordance with Hund's rule of maximum multiplicity.

15. b) O_2 is the limiting quantity.

c) Mass of P_4O_{10} obtained is 2.2g

d) Mass of P_4O_6 obtained is 2.84g

$$n_{p_4} = \frac{1.24}{31 \times 4} = 0.01 \text{ mol}, \; n_{O_2} = \frac{8}{32}$$

$= 0.25$ moles

In reaction (i), moles of O_2 required

$$= (0.01 \text{ mol } P_4)\left(\frac{5 \text{ mol } O_2}{\text{mol } P_4}\right)$$

$= 0.01 \times 5 = 0.05$ mol

Since there is more O_2 present than required

a. Therefore, O_4 is the limiting quantity

b. Wrong.

c. [Mw P_4O_{10} = 284]

0.01 mol of P4 produces = 0.01 mol of P_4O_{10}

$$= (0.01 \text{ mol } P_4)\left(\frac{1 \text{mol } P_4O_{10}}{\text{mol } P_4O_{10}}\right)\left(\frac{284 \text{ g } P_4O_{10}}{\text{mol } P_4O_{10}}\right)$$

$= 0.01 \times 284 = 2.84$g

16. **c) N_2 and CO**

d) N_2O and CO_2

Equal number of molecules are present when moles are same. For the same mass the molecular weight has to be same.

Hence/ Mw of N_2 = Mw of CO = 28g

Mw of N_2O = Mw of CO_2 = 44g

Paragraph - 1

17. a) 14.6, 13.6

IE_1. As > se because of half filled configuration.

18. d) All are correct statements

19. d) low value of $(I.E)_1$ and high value of $(I.E)_2$

$$K \xrightarrow{I.E_1} K^+ \xrightarrow{I.E_2} K^{2+}$$

$I.E_2 >> I.E_1$

∴ Potassium gets ionized only once after which it attains inert gas configuration.

$K^+ = 1s^2, 2s^2, 2p^6, 3s^2\ 3p^6$.

Paragraph - 2

20. a) I, II & III

21. c) III & IV

22. c) Hexagonal