31. Alkaline earth metal salts have M^{2+} ions which has very high polarising power compared to polarising power of monovalent metal ion (M^{1+}) of alkali metal. Due to high polarising power of M^{2+}, it associate more water than M^{+}.

32. $\underset{A}{3M} + N_2 \longrightarrow \underset{B}{M_3N_2}$

$\underset{B}{M_3N_2} + 6H_2O \longrightarrow \underset{C}{3M(OH)_2} + \underset{D}{2NH_3}$

$\underset{C}{M(OH)_2} + CO_2 \longrightarrow \underset{\text{Milkyness}}{MCO_3}$

M can be either Ca or Ba but essentially not Mg because $Mg(OH)_2$ is very sparingly soluble in water.

33.(ABD) $NaNO_3$ when heated, it decomposes in two stages as :

$$NaNO_3 \xrightarrow{T < 500^\circ C} NaNO_2 + \frac{1}{2}O_2 \; ; \; NaNO_2 \xrightarrow{T > 800^\circ C} Na_2O + N_2 + O_2$$

34. $\underset{OA}{KMnO_4} + \underset{RA}{H_2O_2} \longrightarrow MnO_2 + KOH + O_2$

$\underset{RA}{FeSO_4} + \underset{OA}{H_2O_2} \longrightarrow Fe^{3+} + H_2O$

35.(C) Statement I is correct. Small size of Li^{+} makes it highly polarizing, introduces predominant covalency in LiCl. Statement II is incorrect, there is very large difference in electronegativity of Li and Cl.

36.(AB) In dilute solution of Na in liquid ammonia, solvated electrons are present whose emission gives blue colouration to solution.

$$Na + NH_3 \longrightarrow Na^{+} + \underset{\text{Solvated electron}}{e^{-}_{(NH_3)}}$$

Also, presence of solvated electrons and solvated Na^{+} ion makes solution highly conducting.

37. The substance is Na_2O_2. When Na_2O_2 is dissolved in water, it forms NaOH and H_2O_2. In this case, NaOH is a strong base while H_2O_2 is a weak acid.

(I) $Na_2O_2 + 2H_2O \longrightarrow 2NaOH + H_2O_2$

H_2O_2 decolourises red litmus paper due to its bleaching action which is due to its oxidising character.

$$H_2O_2 \longrightarrow H_2O + \underset{\substack{\text{Bleaches colour} \\ \text{of red litmus}}}{[O]}$$

(II) If the compound is Na_2O, it will hydrolyse to form NaOH.

$Na_2O + H_2O \longrightarrow 2NaOH$

NaOH solution formed above will change colour of red litmus paper into blue.

38. Be in $BeCl_2$ is electron deficient, short of two lone pair of electrons from stable octet. H_2O has lone pair of electrons, reacts with $BeCl_2$.

39.(B) $Mg(HCO_3)_2$ on boiling decomposes to give white precipitate of $MgCO_3$ as :

$$Mg(HCO_3)_2(aq) \xrightarrow{\text{Heat}} MgCO_3 \downarrow + H_2O + CO_2 \uparrow$$

40.(A) Magnesium ammonium phosphate is precipitated out.

$$MgSO_4 + NH_4OH + Na_2HPO_4 \longrightarrow Mg(NH_4)PO_4\downarrow + Na_2SO_4$$

41.(AB) When sodium metal is burnt in excess of air, mainly sodium peroxide (Na_2O_2) with little sodium oxide (Na_2O) are formed.

42.(B) Both statements are correct but blue colour is due to presence of solvated electron $NH_3(e^-)$

43.(B) Lime treatment remove bicarbonate hardness by forming insoluble $CaCO_3$ as

$$Ca(HCO_3)_2 + Ca(OH)_2 \longrightarrow 2CaCO_3\downarrow + 2H_2O$$

44.(B) $$Ca(OH)_2 + Ca(HCO_3)_2 \longrightarrow 2CaCO_3\downarrow + \underset{\text{(Clark's method)}}{2H_2O}$$

45.(A) H_2O_2 reacts with KIO_4 in the following manner :

$$\overset{+7}{K}IO_4 + H_2O_2 \longrightarrow \overset{+5}{K}IO_3 + H_2O + O_2$$

On reaction of KIO_4 with H_2O_2 oxidation state of I varies from +7 to +5, i.e. decreases. Thus, KIO_4 gets reduced hence, H_2O_2 is a reducing agent here.

With NH_2OH, it given following reaction :

$$\overset{-1}{N}H_2OH + H_2O_2 \longrightarrow \overset{+3}{N}_2O_3 + H_2O$$

In the above reaction, oxidation state of N varies from –1 to +3. Here, oxidation number increases, here H_2O_2 is acting as an oxidizing agent here.

46.(ABC) **(A)** $$Na + \underset{\text{(Excess)}}{NH_3} \longrightarrow NaNH_2 + \frac{1}{2}H_2$$

$\left(NaNH_2 + \frac{1}{2}H_2 \text{ are diamagnetic}\right)$

If ammonia is considered as a liquid then reaction will be

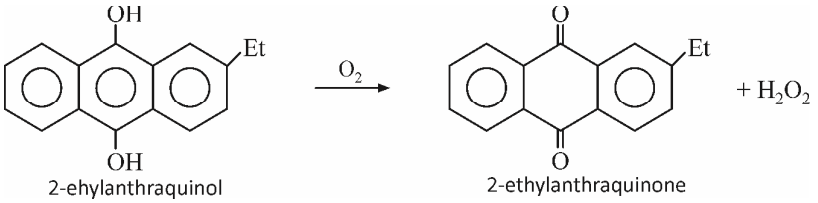
$$M + (x+y)NH_3 \longrightarrow [M(NH_3)_x]^+ + [e(NH_3)_y]^-$$

- Ammoniated electron
- Blue colour
- Paramagnetic
- Very strong reducing agent

(B) $$K + \underset{\text{[Excess)}}{O_2} \longrightarrow \underset{\substack{\text{Potassium superoxide}\\ \text{Paramagnetic}}}{KO_2(K^+, O_2^-)}$$

(C) $$3Cu + 8HNO_3 \longrightarrow \underset{\text{Paramagnetic}}{2Cu(NO_3)_2} + \underset{\text{Paramagnetic}}{2NO} + 4H_2O$$

(D)



2-ehylanthraquinol 2-ethylanthraquinone

Hence, option (a), (b) and (c) are correct choices.

47.(CD) Fe^{3+} cannot be reduced by peroxide in alkaline medium as it is highly precipitable in form of $Fe(OH)_3$.

48.(D) $4\,Au + 8NaCN + 2H_2O + O_2 \longrightarrow 4Na\left[Au(CN)_2\right] + 4NaOH$

$Cu + \underset{\text{conc.}}{4HNO_3} \longrightarrow Cu\left(NO_3\right)_2 + 2NO_2 + 2H_2O$

$2Fe + \underset{\text{conc.}}{6HNO_3} \longrightarrow Fe_2O_3(s) + 6NO_2 + 3H_2O$ (Fe become passive on reaction with concentrated HNO_3)

$Zn + 2NaOH(aq) \longrightarrow Na_2ZnO_2 + H_2$