Q1 - 25 January - Shift 1

49. Match the **List-I** with **List-II** :

Cations	Group reaction
P → Pb^{2+}, Cu^{2+}	(i) H_2S gas in presence of dilute HCl
Q → Al^{3+}, Fe^{3+}	(ii) $(NH_4)_2CO_3$ in presence of NH_4OH
R → Co^{2+}, Ni^{2+}	(iii) NH_4OH in presence of NH_4Cl
S → Ba^{2+}, Ca^{2+}	(iv) H_2S in presence of NH_4OH

(1) P→i, Q→iii, R→ii, S→iv

(2) P→iv, Q→ii, R→iii, S→i

(3) P→iii, Q→i, R→iv, S→ii

(4) P→i, Q→iii, R→iv, S→ii

Space for your notes:

Q2 - 30 January - Shift 1

In the wet tests for identification of various cations by precipitation, which transition element cation doesn't belong to group IV in qualitative inorganic analysis?

(1) Fe^{3+}

(2) Zn^{2+}

(3) Co^{2+}

(4) Ni^{2+}

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Q3 - 30 January - Shift 2

Formulae for Nessler's reagent is:

(1) KHg_2I_2 (2) $KHgI_3$

(3) K_2HgI_4 (4) HgI_2

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Q4 - 31 January - Shift 2

Given below are two statements :

Statement I : Upon heating a borax bead dipped in cupric sulphate in a luminous flame, the colour of the bead becomes green.

Statement II : The green colour observed is due to the formation of copper(I) metaborate.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Both **Statement I** and **Statement II** are true

(2) **Statement I** is true but **Statement II** is false

(3) Both **Statement I** and **Statement II** are false

(4) **Statement I** is false but **Statement II** is true

Space for your notes:

Answer Key

(As per Official NTA Key released on 2 Feb)

Q1 (4) **Q2** (1) **Q3** (3) **Q4** (3)

Q1 (4)

Cations	Group No.	Group reagent
Pb^{+2}, Cu^{+2}	II	$H_2S(g)$ in presence of dilHCl
Al^{+3}, Fe^{+3}	III	NH_4OH in presence of NH_4Cl
CO^{+2}, Ni^{+2}	IV	H_2S in presence of NH_4OH
Ba^{+2}, Ca^{+2}	V	$(NH_4)_2CO_3$ in presence of NH_4OH

Q2 (1)

$Zn^{2+}, Co^{2+}, Ni^{2+} = IV^{th}$ Group

$Fe^{3+} = III^{rd}$ Group

Q3 (3)

Nessler's reagent is K_2HgI_4

Q4 (3)

(Borax Bead Test)

On treatment with metal salt, boric anhydride forms metaborate of the metal which gives different colours in oxidising and reducing flame. For example, in the case of copper sulphate, following reactions occur.

$$CuSO_4 + B_2O_3 \xrightarrow[(\text{Oxidising})]{\text{Non-luminous flame}} \underset{\substack{\text{Cupric metaborate}\\ \text{blue-green}}}{Cu(BO_2)_2} + SO_3$$

Two reactions may take place in reducing flame (Luminous flame)

(i) The blue-green $Cu(BO_2)_2$ is reduced to colourless cuprous metaborate as :

$$2Cu(BO_2)_2 + 2NaBO_2 + C \xrightarrow[\text{flame}]{\text{Luminous}} 2CuBO_2 + Na_2B_4O_7 + CO$$

(ii) Cupric metaborate may be reduced to metallic copper and bead appears red opaque.

$$2Cu(BO_2)_2 + 4NaBO_2 + 2C \xrightarrow[\text{flame}]{\text{Luminous}} 2Cu + 2Na_2B_4O_7 + 2CO$$