

## GENERAL FLOWCHART FOR GROUP D CATIONS

### CC1: CATIONS FOR OTHER GROUPS

Heat to dryness in low heat then cool for 5 minutes

Add 6 drops of concentrated  $\text{HNO}_3$

Heat to dryness in low heat then cool for 5 minutes

Dissolve the residue in 5 drops of 6 M  $\text{HCl}$  and transfer quantitatively in a centrifuge tube using distilled water

#### 1 drop of the solution

Add 6 M  $\text{NH}_3$  until neutral (Red litmus paper stayed red, while the blue litmus paper stayed blue)

Add 2 drops of 6 M acetic acid to make it slightly acidic (blue litmus paper turned slightly red).

Add 3-4 drops of 0.1 M  $\text{K}_4\text{Fe}(\text{CN})_6$

The solution should turn **MAROON**.

**Your sample is  $\text{Cu}^{2+}$**

#### 1 drop of the solution

Add 6 M  $\text{NH}_3$  with stirring until basic (red litmus paper turned blue)

Add 10-15 drops of 1% dimethylglyoxime (DMG)

The solution should turn **CHERRY-RED** to indicate the presence of  $\text{Ni}^{2+}$

**Your sample is  $\text{Ni}^{2+}$**

**D**

**D**

Add 6 M  $\text{NH}_3$  until neutral (**Red** litmus paper stayed **red**, while the **blue** litmus paper stayed **blue**)

Add 2 drops of 6 M  $\text{CH}_3\text{COOH}$  to make it slightly acidic (**blue** litmus paper turned slightly **red**)

Add 0.2 – 0.3 g solid  $\text{Na}_2\text{S}_2\text{O}_3$  then **heat** for 10 minutes in a boiling water bath

**Cool** for 1 minute by swirling in cold temperature then centrifuge

RESIDUE

CENTRIFUGATE

Add 50 drops of 6 M  $\text{NaOH}$  using Pasteur pipet. Stir and centrifuge. Quickly transfer the centrifugate to a centrifuge tube

Add 6 M  $\text{NH}_3$  until basic (**red** litmus paper turned **blue**)

Add 6-8 drops of 0.1 M  $\text{Na}_2\text{HPO}_4$ . Allow to stand for several minutes then centrifuge

A **WHITE** precipitate/solid should be produced to indicate presence of  $\text{Mg}^{2+}$

**Your sample is  $\text{Mg}^{2+}$**

RESIDUE

CENTRIFUGATE

Wash it twice with 10 drops of distilled water.

Add 6 drops of 6 M  $\text{HCl}$  then stir. Centrifuge and quickly transfer the centrifugate into a centrifuge tube. Discard the residue

**Di**

Add 6 M acetic acid dropwise with stirring until slightly acidic (**blue** litmus paper turned slightly **red**)

Add 4 drops of 0.1 M  $\text{K}_4\text{Fe}(\text{CN})_6$  under the fumehood

A **WHITE** precipitate/solid should be produced to indicate presence of  $\text{Zn}^{2+}$

**Your sample is  $\text{Zn}^{2+}$**

**Di**

**2 ways to confirm presence of  $\text{Cd}^{2+}$**

**3 drops of centrifugate**

Add 6 M  $\text{NH}_3$  until neutral (**Red** litmus paper stayed **red**, while the **blue** litmus paper stayed **blue**)

Add 2 drops of 6 M  $\text{CH}_3\text{COOH}$  to make it slightly acidic (**blue** litmus paper turned slightly **red**)

Add 5 drops of 0.1 M  $\text{K}_4\text{Fe}(\text{CN})_6$

A **WHITE** precipitate/solid should be produced to indicate presence of  $\text{Cd}^{2+}$  (in the form of  $\text{Cd}_2\text{Fe}(\text{CN})_6$ )

**Your sample is  $\text{Cd}^{2+}$**

**3 drops of centrifugate**

Add 6 M  $\text{NH}_3$  until neutral (**Red** litmus paper stayed **red**, while the **blue** litmus paper stayed **blue**)

Add 5 drops of 0.2 M  $\text{Na}_2\text{S}$

A **YELLOW** precipitate/solid should be produced to indicate presence of  $\text{Cd}^{2+}$  (in the form of  $\text{CdS}$ )

**Your sample is  $\text{Cd}^{2+}$**