$S_2O_3^{-2}$

Blue Ring test →

$$(NH_4)_2MoO_4 + conc.H_2SO_4 + S_2O_3^{-2} \longrightarrow \text{Blue Ring}$$

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Test with $[Ni(en)_3](NO_3)_2$

$$S_2O_3^{-2} + [Ni(en)_3](NO_3)_2 \xrightarrow[\text{or}]{\text{neutral}} [Ni(en)_3]S_2O_3$$

Slightly alkaline medium

Violet ppt

Note ⇒ SO_3^{-2} SO_4^{-2} $S_4O_6^{-2}$ $\bar{S}CN$ don't Interfer this test

but H_2S and $(NH_4)_2S$ Interfere this test

because they decompose $[Ni(en)_3]S_2O_3$ this complex

and form Black ppt of NiS

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Test with KCN

$S_2O_3^{-2} + \bar{C}N \xrightarrow[\text{Medium}]{\text{Strong alkaline}} \bar{S}CN + SO_3^{-2}$

$\bar{S}CN \xrightarrow{FeCl_3}$ $Fe(SCN)_3$ [ferric thiocyanate]

or

$[Fe(H_2O)_5(SCN)]^{+2}$ — Blood Red colour

$Fe^{+2} + \overset{\ominus}{S}CN \longrightarrow X$

$Fe^{+3} + \bar{S}CN \longrightarrow$ Blood Red

$[Fe(H_2O)_5(SCN)]^{+2} \xrightarrow{F^{\ominus}} [FeF_6]^{-3}$ (Col. less)

$[Fe(H_2O)_5(SCN)]^{+2} \xrightarrow{Hg^{+2}} Hg(SCN)_2$ Col. less

$[Fe(H_2O)_5(SCN)]^{+2} \xrightarrow{H_2C_2O_4} [Fe(OX)_2]^{-2}$ Col. less

Note ⇒ Such kind of test in which poison gas formed carried out in fume cup board.

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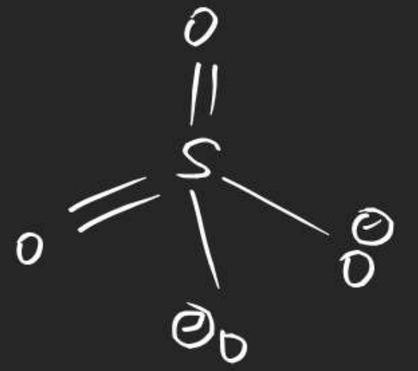
Heating effect

$$Na_2S_2O_3 \cdot 5H_2O \xrightarrow[-5H_2O]{\Delta} Na_2S_2O_3 \xrightarrow[\text{temp.}]{\text{High}} Na_2SO_4 + Na_2S_5$$

Sodium sulphate — Sodium Polysulphide

Note ⇒ Sodium thiosulphate is the only thiosulphate which is Hydrated.



Sp3 tetrahedral

Zig-zag

avg O.S = $-\frac{2}{5}$

CH_3COO^-

all CH_3COO^- are soluble except Ag^+ | Hg_2^{+2} | Cu_2^{+2}

Note ⇒ Some basic acetates of Al^{+3} Cr^{+3} Fe^{+3} are Insoluble

① Test with acid

$$CH_3COO^- + H^+ \longrightarrow CH_3COOH$$

Vinegar smell

Test with $AgNO_3$

$$CH_3COO^- + AgNO_3 \rightleftharpoons CH_3COOAg\downarrow$$

White ppt
(Sparingly soluble)

on boiling white ppt soluble

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Test with Conc. H_2SO_4 and C_2H_5OH

$$CH_3COO^- + H_2SO_4 \longrightarrow CH_3COOH$$

$$CH_3-\underset{\underset{O}{\|}}{C}-OH + H-OC_2H_5 \xrightarrow[\text{(dehydrating agent)}]{\text{Conc. } H_2SO_4} CH_3-\underset{\underset{O}{\|}}{C}-OC_2H_5$$

Fruity smell

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Test with neutral $FeCl_3$

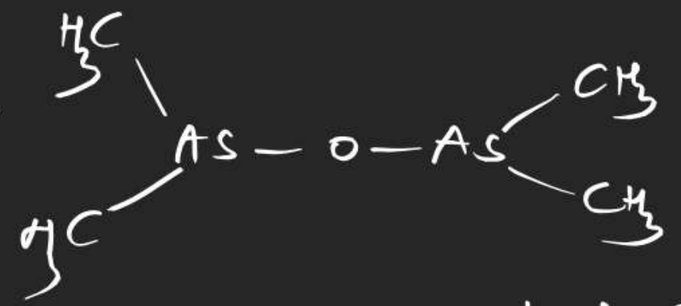
$$3Fe^{+3} + 6CH_3COO^- + 2H_2O \longrightarrow \underbrace{[Fe_3(CH_3COO)_6(OH)_2]^+}_{\text{Deep Red Complex}} + 2H^+$$

$$[Fe_3(CH_3COO)_6(OH)_2]^+ + H_2O \xrightarrow{\text{boil}} \underbrace{3Fe(OH)_2CH_3COO}_{\text{Brownish Red}} + 3CH_3COOH + H^+$$

Note → Why neutral $FeCl_3$ use?

because neutral $FeCl_3$ added in water then $Fe(OH)_3$ and HCl are formed. HCl can dissolve ppt of $Fe(OH)_2CH_3COO$
So it is neutralize by adding NH_3 solution.

Cacodyl test :→

As_2O_3 (solid) + CH_3COONa $\xrightarrow{\Delta}$ 

+ Na_2CO_3 + CO_2

Poisonous

Nauseating smell

$La(NO_3)_2$ test

$$La(NO_3)_2 + NH_4OH + I_2 + CH_3COO^- \xrightarrow{\text{boil}} \underset{I_2}{La(OH)_2CH_3COO}$$

Blue colour due to adsorbtion of I_2 by basic Lanthanum acetate

* SO_4^{-2} and PO_4^{-3} infer this test

NO_2^- ⇒ all are soluble except $AgNO_2$

(1) Test with acid

$$NO_2^- + H^+ \longrightarrow NO_2\uparrow$$

(Brown fumes)

$$NO_2^- + H^+ \longrightarrow HNO_2 \text{ (unstable)}$$

First Pale blue liq is formed due to formation of HNO_3 / N_2O_3

$$\left\{ \begin{array}{l} \overset{+3}{H}\overset{}{N}O_2 \longrightarrow \overset{+5}{H}\overset{}{N}O_3 + \overset{+2}{N}O \\ NO + \frac{1}{2}O_2 \longrightarrow NO_2\uparrow \text{(Brown)} \end{array} \right\}$$

$$\left\{\begin{array}{l} HNO_2 \longrightarrow N_2O_3 + H_2O \\ N_2O_3 \longrightarrow NO + NO_2 \end{array}\right\}$$

$$NO + \tfrac{1}{2}O_2 \longrightarrow \underline{NO_2\uparrow}$$

Nishant Jindal

Test with $AgNO_3$

$NO_2^- + AgNO_3 \longrightarrow AgNO_2$

(White ppt)

Soluble in NH_3 solution and dil HNO_3