

Lab: Transition Metal Compounds

Colours of Transition Compounds

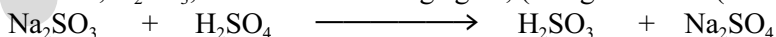
1. Record the colour of the following compounds:

- Compounds of Iron:
 Fe_2O_3 , Fe_3O_4 , FeS , FeSO_4 , FeCl_3 , $\text{Fe}_2(\text{SO}_4)_3$
- Compounds of Copper:
 Cu_2O , CuO , CuCl , CuCl_2 , CuSO_4 , CuCO_3 , $\text{Cu}(\text{NO}_3)_2$
- Colours of Manganese Compounds:
Note colours of solid potassium permanganate, and a solution of potassium permanganate (manganese VII).
- Colours of Nickel Compounds

2. (a) Put a small spatula tip of solid potassium permanganate in a dry test tube. Heat gently then more strongly until no further change occurs. Test for oxygen evolved. Tip the remains into the sink. Manganese (IV) oxide is black. What colour is the other product - potassium manganate (manganese VI)



(b). Put 2-3 drops of potassium permanganate solution, (manganese VII), in a test tube and add 1 cm³ depth dilute sulphuric acid, then a few crystals of sodium sulphite. Sodium sulphite + acid form sulphurous acid, H_2SO_3 , which is a reducing agent, (manganese VII (manganese II).



What is the colour of the manganese (II) sulphate solution formed?
Compare it with solid manganese (II) sulphate and suggest why they differ.

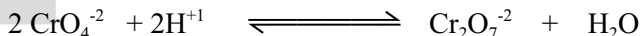
Colours of Chromium Compounds

a. Note colour of potassium chromate (chromate VI) solution then add a little dilute sulphuric acid until there is a colour change. Potassium dichromate (dichromate VI) forms.

Add excess sodium hydroxide, until alkaline. Note the colour change

This is an example of a Reversible reaction.

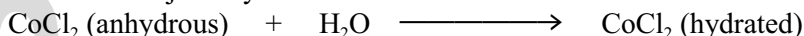
Potassium chromate and dichromate both contain chromium (VI)



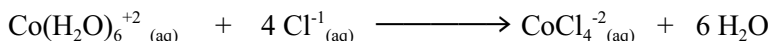
b. To 10 drops of potassium chromate solution in a test tube add 1 cm depth dilute sulphuric acid and then a few crystals of sodium sulphite. The sulphurous acid (H_2SO_3), again acts as a reducing agent. Chromium (III) sulphate forms. What colour is it?

Colours of Cobalt (II) Compounds

a. Note colour of cobalt chloride paper then add 1 drop of water and note new colour. Warm paper CAUTIOUSLY until just dry.



b. To a solution of $\text{CoCl}_{2(aq)}$, CAUTIOUSLY add concentrated $\text{HCl}_{(aq)}$ drop by drop, observe the colour change.



Colours of Copper Compound

- Hold a piece of copper turning with tongs in a Bunsen flame, observe reaction.
- Drop one copper turning into 2 cm³ of dilute $\text{HNO}_{3(aq)}$ and warm, identify the gas.
- Add dilute $\text{NaOH}_{(aq)}$ drop by drop to 2 cm³ of $\text{CuSO}_{4(aq)}$, until the $\text{NaOH}_{(aq)}$ is in excess.
- Add $\text{NH}_{3(aq)}$ drop by drop to 2 cm³ of $\text{CuSO}_{4(aq)}$ until the $\text{NH}_{3(aq)}$ is in excess.