Ion Analysis

The actual design of your template will vary from school to school but you will probably be asked to record your results (primary data) in a way that will help you write your report.

1. Describe the tests you did (our advice is to copy this off your flow chart).
2. Record your observations (our advice is to copy this off your flow chart).
3. Write balanced equations for
   - Every precipitate that forms – if you still can't do that despite your teacher's best efforts, then write the name of every precipitate! And by every precipitate, we mean every precipitate! They will either be hydroxides (or silver oxide), sulfates, chlorides or iodides and it's easy to know which by "where you are" on the flow chart.
   - Every complex ion that forms
     - The ones where a white precipitate dissolves in excess NaOH; $[Pb(OH)_4]^{2-}(aq)$, $[Zn(OH)_4]^{2-}(aq)$, $[Al(OH)_4]^{-}(aq)$
     - The ones where precipitates dissolve in excess NH_3 ; $[Zn(NH_3)_4]^{2+}(aq)$, $[Cu(NH_3)_4]^{2+}(aq)$, and $[Ag(NH_3)_2]^{+}(aq)$
     - The one with the KSCN and the new sample that confirms Fe^{3+}; $[FeSCN]^{2+}$; this is a bit different as it isn't a precipitate dissolving BUT it is still a complex ion that's being formed between $Fe^{3+}(aq)$ and $SCN^{-}(aq)$.

Don't write equations for ANYTHING ELSE!!! E.g.

- litmus colour changes,
- bubbles of CO_2 gas,
- precipitates that remain (i.e. NOT dissolving); if you did your job properly you already wrote an equation for the precipitate forming..... don't write another for it remaining as it is already there!
- reactions when a precipitate or complex ion is NOT formed e.g. adding H_2SO_4 to a solution containing Mg^{2+} ions.

E.g. If the cation was $Pb^{2+}(aq)$

Test	Observation	Equations and identification of precipitates
Add 2 drops of dilute NaOH solution	white precipitate	$Pb^{2+}(aq) + 2OH^{-}(aq) \rightarrow Pb(OH)_2(s)$ lead hydroxide
Add excess NaOH solution	white precipitate dissolves	$Pb(OH)_2(s) + 2OH^{-}(aq) \rightarrow [Pb(OH)_4]^{2-}(aq)$ *
New sample		
Add 2 drops of dilute NH_3 solution	white precipitate	$Pb^{2+}(aq) + 2OH^{-}(aq) \rightarrow Pb(OH)_2(s)$ lead hydroxide
Add excess NH_3 solution	white precipitate remains	
New sample		
Add 2 drops of dilute H_2SO_4 solution	white precipitate	$Pb^{2+}(aq) + SO_4^{2-}(aq) \rightarrow PbSO_4(s)$ lead sulfate

*or $Pb^{2+}(aq) + 4OH^{-}(aq) \rightarrow [Pb(OH)_4]^{2-}(aq)$