Lesson 4 - Use of solubility tables to predict and identify precipitation reactions between ions in solution.

Visit this link to refresh yourself with the writing of chemical and ionic equations of precipitate reactions.

Consider the solubility table shown on the right when answering the questions below.

1. Complete the table below. The first one is done for you.

Solubility of some common ionic compounds

Soluble Ionic Compounds		Important Exceptions
Compounds containing	NO_3^-	None
	$C_2H_3O_2^-$	None
	Cl^-	Compounds of Ag^+, Hg_2^{2+}, and Pb^{2+}
	Br^-	Compounds of Ag^+, Hg_2^{2+}, and Pb^{2+}
	I^-	Compounds of Ag^+, Hg_2^{2+}, and Pb^{2+}
	SO_4^{2-}	Compounds of Sr^{2+}, Ba^{2+}, Hg_2^{2+}, and Pb^{2+}
Insoluble Ionic Compounds		**Important Exceptions**
Compounds containing	S^{2-}	Compounds of NH_4^+, the alkali metal cations, and Ca^{2+}, Sr^{2+}, and Ba^{2+}
	CO_3^{2-}	Compounds of NH_4^+ and the alkali metal cations
	PO_4^{3-}	Compounds of NH_4^+ and the alkali metal cations
	OH^-	Compounds of the alkali metal cations, and Ca^{2+}, Sr^{2+}, and Ba^{2+}

Activity	Precipitate	Spectator ions	
Silver nitrate solution is mixed with an equal volume of sodium chloride	AgCl Silver chloride	Na^+, NO_3^-	Chemical equation - $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$ Ionic equation – $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$
Sodium sulfate solution is mixed with an lead nitrate solution	*$PbSO_4$* *Lead sulfate*	*Na^+, NO_3^-*	Chemical equation – *$Na_2SO_4(aq) + Pb(NO_3)_2(aq) \rightarrow PbSO_4(s) + 2NaNO_3(aq)$* Ionic equation – *$SO_4^{2-}(aq) + Pb^{2+}(aq) \rightarrow PbSO_4(s)$*
Ammonium carbonate solution is mixed with a solution of calcium nitrate	*Calcium carbonate*	*NH_4^+, NO_3^-*	Chemical equation – *$(NH_4)_2CO_3(aq) + Ca(NO_3)_2 \rightarrow CaCO_3(s) + 2NH_4NO_3(aq)$* Ionic equation – *$CO_3^{2-}(aq) + Ca^{2+}(aq) \rightarrow CaCO_3(s)$*
Ammonium chloride solution is mixed with a solution of sodium carbonate	Nil		Chemical equation Ionic equation
Solid calcium nitrate is placed in a sodium sulfate solution.	*$CaSO_4$* *Calcium sulfate*	*Na^+, NO_3^-*	Chemical equation – *$Ca(NO_3)_2 + Na_2SO_4(aq) \rightarrow CaSO_4(s) + 2NaNO_3(aq)$* Ionic equation – *$Ca^{2+}(aq) + SO_4^{2-}(aq) \rightarrow CaSO_4(s)$*
Ammonium sulfide solution is mixed with an iron(iii) nitrate solution.	*$Fe_2S_3(s)$* *Iron sulfide*	*NH_4^+,NO_3^-*	Chemical equation – *$3(NH_4)_2S(aq) + 2Fe(NO_3)_3(aq) \rightarrow Fe_2S_3(s) + 6NH_4NO_3(aq)$* Ionic equation – *$3S^{2-}(aq) + 2Fe^{3+}(aq) \rightarrow Fe_2S_3(s)$*
Ammonium phosphate solution is mixed with a solution of calcium nitrate	*$Ca_3(PO_4)_2$* *Calcium phosphate*	*NH_4^+,NO_3^-*	Chemical equation – *$2(NH_4)_3PO_4(aq) + 3Ca(NO_3)_3(aq) \rightarrow Ca_3(PO_4)_2(s) + 6NH_4NO_3(aq)$* Ionic equation – *$2PO_4^{3-}(aq) + 3Ca^{2+}(aq) \rightarrow Ca_3(PO_4)_2(s)$*