

1.

- a) CaF_2 (s)
- b) NaI (aq)
- c) MgS (s)
- d) ZnCO_3 (s)
- e) PbCl_4 (s)
- f) $(\text{NH}_4)_2\text{CO}_3$ (aq)
- g) AgNO_3 (aq)
- h) K_3PO_4 (aq)
- i) $\text{Al}(\text{OH})_3$ (s)
- j) FeSO_4 (aq)

2.

- a) $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$
 $\text{Ag}^+_{(\text{aq})} + \text{Cl}^-_{(\text{aq})} \rightarrow \text{AgCl}_{(\text{s})}$
- b) $\text{ZnSO}_4 + \text{BaCl}_2 \rightarrow \text{ZnCl}_2 + \text{BaSO}_4$
 $\text{Ba}^{2+}_{(\text{aq})} + \text{SO}_4^{2-}_{(\text{aq})} \rightarrow \text{BaSO}_4_{(\text{s})}$
- c) $2(\text{NH}_4)_3\text{PO}_4 + 3\text{Ni}(\text{NO}_3)_2 \rightarrow 6\text{NH}_4\text{NO}_3 + \text{Ni}_3(\text{PO}_4)_2$
 $2\text{PO}_4^{3-}_{(\text{aq})} + 3\text{Ni}^{2+}_{(\text{aq})} \rightarrow \text{Ni}_3(\text{PO}_4)_2_{(\text{s})}$
- d) $2\text{KI} + \text{MgSO}_4 \rightarrow \text{K}_2\text{SO}_4 + \text{MgI}_2$
No reaction
- e) $\text{Pb}(\text{NO}_3)_2 + 2\text{NaI} \rightarrow \text{PbI}_2 + 2\text{NaNO}_3$
 $\text{Pb}^{2+}_{(\text{aq})} + 2\text{I}^-_{(\text{aq})} \rightarrow \text{PbI}_2_{(\text{s})}$

3.

Mix a sample with an iodide – if there's a precipitate, it's lead
Otherwise mix a sample with a hydroxide – if there's a precipitate, it's magnesium
Otherwise it's sodium

4.

- 1 K
- 2 Ag
- 3 Ba
- 4 Cu
- 5 Sr
- 6 Fe^{2+}
- 7 Pb
- 8 Na