

Name: _____
Period: _____

Solubility

(1) Determine whether the following compounds are soluble (S) or insoluble (IN) in water.

- | | |
|------------------------------|--------------------------|
| (a) CaF_2 | (f) silver chloride |
| (b) sodium hydroxide | (g) ammonium phosphate |
| (c) iron (II) carbonate | (h) K_2S |
| (d) PbBr_2 | (i) CuI_2 |
| (e) $\text{Ca}(\text{OH})_2$ | (j) calcium sulphate |

(2) Write the formula equation, complete ionic equations, and net ionic equation for the following reactions.

- (a) silver nitrate and sodium chloride
(b) $\text{FeSO}_4 + (\text{NH}_4)_2\text{S}$
(c) potassium carbonate and strontium nitrate
(d) $\text{K}_3\text{PO}_4 + \text{AlBr}_3$
(e) aluminum sulphate and calcium chloride

(3) Describe a procedure to separate each of these ions from solution.

- (a) Cl^- and F^-
(b) Ag^+ and Ca^{2+}
(c) Cu^+ , Mg^{2+} , and Sr^{2+}
(d) SO_4^{2-} , OH^- , and S^{2-}
(e) Ba^{2+} , Ag^+ , and Ca^{2+}

Answers:

(1) (a) IN (b) S (c) IN (d) IN (e) IN (f) IN (g) S (h) S (i) S (j) IN

(2) (a) formula equation: $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$

complete ionic equation: $\text{Ag}^+(\text{aq}) + \text{NO}_3^-(\text{aq}) + \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{Na}^+(\text{aq}) + \text{NO}_3^-(\text{aq})$

net ionic equation: $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$

(b) formula equation: $\text{FeSO}_4(\text{aq}) + (\text{NH}_4)_2\text{S}(\text{aq}) \rightarrow \text{FeS}(\text{s}) + (\text{NH}_4)_2\text{SO}_4(\text{aq})$

complete ionic equation: $\text{Fe}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) + 2\text{NH}_4^+(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{FeS}(\text{s}) + 2\text{NH}_4^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$

net ionic equation: $\text{Fe}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{FeS}(\text{s})$

(c) formula equation: $\text{K}_2\text{CO}_3(\text{aq}) + \text{Sr}(\text{NO}_3)_2(\text{aq}) \rightarrow 2\text{KNO}_3(\text{aq}) + \text{SrCO}_3(\text{s})$

complete ionic equation: $2\text{K}^+(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) + \text{Sr}^{2+}(\text{aq}) + 2\text{NO}_3^-(\text{aq}) \rightarrow 2\text{K}^+(\text{aq}) + 2\text{NO}_3^-(\text{aq}) + \text{SrCO}_3(\text{s})$

net ionic equation: $\text{CO}_3^{2-}(\text{aq}) + \text{Sr}^{2+}(\text{aq}) \rightarrow \text{SrCO}_3(\text{s})$

(d) formula equation: $\text{K}_3\text{PO}_4(\text{aq}) + \text{AlBr}_3(\text{aq}) \rightarrow 3\text{KBr}(\text{aq}) + \text{AlPO}_4(\text{s})$

complete ionic equation: $3\text{K}^+(\text{aq}) + \text{PO}_4^{3-}(\text{aq}) + \text{Al}^{3+}(\text{aq}) + 3\text{Br}^-(\text{aq}) \rightarrow 3\text{K}^+(\text{aq}) + 3\text{Br}^-(\text{aq}) + \text{AlPO}_4(\text{s})$

net ionic equation: $\text{PO}_4^{3-}(\text{aq}) + \text{Al}^{3+}(\text{aq}) \rightarrow \text{AlPO}_4(\text{s})$

(e) formula equation: $\text{Al}_2(\text{SO}_4)_3(\text{aq}) + 3\text{CaCl}_2(\text{aq}) \rightarrow 2\text{AlCl}_3(\text{aq}) + 3\text{CaSO}_4(\text{s})$

complete ionic equation: $2\text{Al}^{3+}(\text{aq}) + 3\text{SO}_4^{2-}(\text{aq}) + 3\text{Ca}^{2+}(\text{aq}) + 6\text{Cl}^-(\text{aq}) \rightarrow 2\text{Al}^{3+}(\text{aq}) + 6\text{Cl}^-(\text{aq}) + 3\text{CaSO}_4(\text{s})$

net ionic equation: $\text{SO}_4^{2-}(\text{aq}) + \text{Ca}^{2+}(\text{aq}) \rightarrow \text{CaSO}_4(\text{s})$

(3) (Answers may vary)

(a) Add AgNO_3 to ppt AgCl , filter

Add $\text{Ca}(\text{NO}_3)_2$ to ppt CaF_2 , filter

(b) Add NaCl to ppt AgCl , filter

Add NaOH to ppt $\text{Ca}(\text{OH})_2$, filter

(c) Add NaCl to ppt CuCl , filter

Add NaOH to ppt $\text{Mg}(\text{OH})_2$, filter

Add Na_2CO_3 to ppt SrCO_3 , filter

(d) Add $\text{Sr}(\text{NO}_3)_2$ to ppt SrSO_4 , filter

Add MgCl_2 to ppt $\text{Mg}(\text{OH})_2$, filter

Add CdCl_2 to ppt CdS , filter

(e) Add NaCl to ppt AgCl , filter

Add NaOH to ppt $\text{Ca}(\text{OH})_2$, filter

Add Na_2CO_3 to ppt BaCO_3 , filter