

Solution

1.) Write an equation for the dissociation of each of the following in water

- a.) $\text{BaCl}_2 (\text{s}) \rightarrow \text{Ba}^{2+} (\text{aq}) + 2 \text{Cl}^- (\text{aq})$
- b.) $\text{AgNO}_3 (\text{s}) \rightarrow \text{Ag}^+ (\text{aq}) + \text{NO}_3^- (\text{aq})$
- c.) $\text{Mg}(\text{OH})_2 (\text{s}) \rightleftharpoons \text{Mg}(\text{OH})_2 (\text{s})$ (*insoluble*)
- d.) $\text{Na}_2\text{SO}_4 (\text{s}) \rightarrow 2 \text{Na}^+ (\text{aq}) + \text{SO}_4^{2-} (\text{aq})$
- e.) $\text{NH}_4\text{NO}_3 (\text{s}) \rightarrow \text{NH}_4^+ (\text{aq}) + \text{NO}_3^- (\text{aq})$
- f.) $(\text{NH}_4)_3\text{PO}_4 (\text{s}) \rightarrow 3 \text{NH}_4^+ (\text{aq}) + \text{PO}_4^{3-} (\text{aq})$

2.) Which of the above solutions are electrical conductors

All of them are conductors **except** $\text{Mg}(\text{OH})_2$

3.) If 1.00 L of a 1.00 mol/L solution of AgNO_3 was mixed, then

- a.) $[\text{Ag}^+] = 1.00 \text{ mol/L}$
- b.) $[\text{NO}_3^-] = 1.00 \text{ mol/L}$

4.) If 500.0 mL of a 1.00 mol/L solution of BaCl_2 was mixed, then

- a.) Moles of $\text{Ba}^{2+} = 0.500 \text{ mol}$
- b.) $[\text{Ba}^{2+}] = 1.00 \text{ mol/L}$
- c.) Moles of $\text{Cl}^- = 1.00 \text{ mol}$ (*2 moles per mole of BaCl_2*)
- d.) $[\text{Cl}^-] = 2.00 \text{ mol/L}$

5.) If 500.0 mL of 1.00 mol/L NaCl was added to the solution in question 4, then
(New total volume = 1000.0 mL = 1.00 L)

- a.) $[\text{Ba}^{2+}] = 0.500 \text{ mol} \div 1.00 \text{ L} = \mathbf{0.500 \text{ mol/L}}$
- b.) $[\text{Cl}^-] = (1.00 \text{ mol from } \text{BaCl}_2 + 0.500 \text{ mol from } \text{NaCl}) \div 1.00 \text{ L} = \mathbf{1.50 \text{ mol/L}}$

More solutions

- 1.) For each of the following combinations of equal volumes of 0.2 mol/L aqueous solutions
 - 1.) Identify the possible products by formula
 - 2.) State which (if any) product has a low solubility (will precipitate)
 - 3.) If there **is** a precipitate, write the formula equation and net ionic equation for the reaction

a.) $\text{MgS} + \text{Sr}(\text{OH})_2$

- 1.) $\text{Mg}(\text{OH})_2 (\text{s}) + \text{SrS} (\text{aq})$
- 2.) $\text{Mg}(\text{OH})_2 (\text{s})$
- 3.) $\text{MgS} (\text{aq}) + \text{Sr}(\text{OH})_2 (\text{aq}) \rightarrow \text{Mg}(\text{OH})_2 (\text{s}) + \text{SrS} (\text{aq})$
 $\text{Mg}^{2+} (\text{aq}) + 2 \text{OH}^- (\text{aq}) \rightarrow \text{Mg}(\text{OH})_2 (\text{s})$

b.) $\text{CuBr}_2 + \text{Pb}(\text{NO}_3)_2$

- 1.) $\text{Cu}(\text{NO}_3)_2 (\text{aq}) + \text{PbBr}_2 (\text{s})$
- 2.) $\text{PbBr}_2 (\text{s})$
- 3.) $\text{CuBr}_2 (\text{aq}) + \text{Pb}(\text{NO}_3)_2 (\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2 (\text{aq}) + \text{PbBr}_2 (\text{s})$
 $\text{Pb}^{2+} (\text{aq}) + 2 \text{Br}^- (\text{aq}) \rightarrow \text{PbBr}_2 (\text{s})$

c.) $\text{FeBr}_3 + \text{SrI}_2$

- 1.) $\text{FeI}_3 (\text{aq}) + \text{SrBr}_2 (\text{aq})$
- 2.) Neither

d.) $\text{Ba}(\text{NO}_3)_2 + \text{Li}_2\text{SO}_4$

- 1.) $\text{BaSO}_4 (\text{s}) + \text{LiNO}_3 (\text{aq})$
- 2.) $\text{BaSO}_4 (\text{s})$
- 3.) $\text{Ba}(\text{NO}_3)_2 (\text{aq}) + \text{Li}_2\text{SO}_4 (\text{aq}) \rightarrow \text{BaSO}_4 (\text{s}) + 2 \text{LiNO}_3 (\text{aq})$
 $\text{Ba}^{2+} (\text{aq}) + \text{SO}_4^{2-} (\text{aq}) \rightarrow \text{BaSO}_4 (\text{s})$

e.) $\text{K}_3\text{PO}_4 + \text{CuCl}_2$

- 1.) $6 \text{KCl} (\text{aq}) + \text{Cu}_3(\text{PO}_4)_2 (\text{s})$
- 2.) $\text{Cu}_3(\text{PO}_4)_2 (\text{s})$
- 3.) $2 \text{K}_3\text{PO}_4 (\text{aq}) + 3 \text{CuCl}_2 (\text{aq}) \rightarrow 6 \text{KCl} (\text{aq}) + \text{Cu}_3(\text{PO}_4)_2 (\text{s})$
 $3 \text{Cu}^{2+} (\text{aq}) + 2 \text{PO}_4^{3-} (\text{aq}) \rightarrow \text{Cu}_3(\text{PO}_4)_2 (\text{s})$

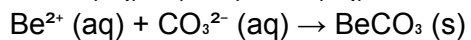
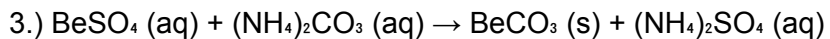
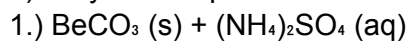
f.) Zinc (II) sulphate and lithium carbonate

- 1.) $\text{ZnCO}_3 (\text{s}) + \text{Li}_2\text{SO}_4 (\text{aq})$
- 2.) $\text{ZnCO}_3 (\text{s})$
- 3.) $\text{ZnSO}_4 (\text{aq}) + \text{Li}_2\text{CO}_3 (\text{aq}) \rightarrow \text{ZnCO}_3 (\text{s}) + \text{Li}_2\text{SO}_4 (\text{aq})$
 $\text{Zn}^{2+} (\text{aq}) + \text{CO}_3^{2-} (\text{aq}) \rightarrow \text{ZnCO}_3 (\text{s})$

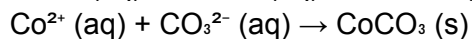
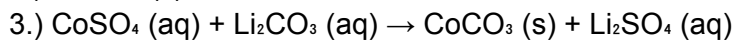
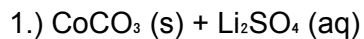
g.) Iron (III) nitrate and magnesium sulphide

- 1.) $\text{Fe}_2\text{S}_3 (\text{s}) + \text{Mg}(\text{NO}_3)_2 (\text{aq})$
- 2.) $\text{Fe}_2\text{S}_3 (\text{s})$

h.) Beryllium sulphate and ammonium carbonate



i.) Cobalt (II) sulphate and lithium carbonate



j.) Magnesium sulphate and strontium hydroxide

