

## Chapter 4

- 10) Measure the electrical conductivity of a solution and compare it to the conductivity of a solution of equal concentration of a strong electrolyte.
- 16) 5.2 M
- 20) 75.0 ml of 0.150 M  $\text{Na}_3\text{PO}_4$
- 28)
- |            |                                  |
|------------|----------------------------------|
| Solution A | $1.442 \times 10^{-3} \text{ M}$ |
| Solution B | $5.768 \times 10^{-5} \text{ M}$ |
| Solution C | $1.154 \times 10^{-6} \text{ M}$ |
- 30)
- No precipitate
  - $\text{Al}(\text{OH})_3(\text{s})$
  - $\text{CaSO}_4(\text{s})$
  - $\text{NiS}(\text{s})$
- 32)
- No reaction
  - $$2\text{Al}(\text{NO}_3)_3(\text{aq}) + 3\text{Ba}(\text{OH})_2(\text{aq}) \rightarrow 2\text{Al}(\text{OH})_3(\text{s}) + 3\text{Ba}(\text{NO}_3)_2(\text{aq})$$

$$2\text{Al}^{3+}(\text{aq}) + 6\text{NO}_3^{-}(\text{aq}) + 3\text{Ba}^{2+}(\text{aq}) + 6\text{OH}^{-}(\text{aq}) \rightarrow 2\text{Al}(\text{OH})_3(\text{s}) + 3\text{Ba}^{2+}(\text{aq}) + 6\text{NO}_3^{-}(\text{aq})$$

$$\text{Al}^{3+}(\text{aq}) + 3\text{OH}^{-}(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{s})$$
  - $$\text{CaCl}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$$

$$\text{Ca}^{2+}(\text{aq}) + 2\text{Cl}^{-}(\text{aq}) + 2\text{Na}^{+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{Na}^{+}(\text{aq}) + 2\text{Cl}^{-}(\text{aq})$$

$$\text{Ca}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{CaSO}_4(\text{s})$$
  - $$\text{K}_2\text{S}(\text{aq}) + \text{Ni}(\text{NO}_3)_2(\text{aq}) \rightarrow 2\text{KNO}_3(\text{aq}) + \text{NiS}(\text{s})$$

$$2\text{K}^{+}(\text{aq}) + \text{S}^{2-}(\text{aq}) + \text{Ni}^{2+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) \rightarrow 2\text{K}^{+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) + \text{NiS}(\text{s})$$

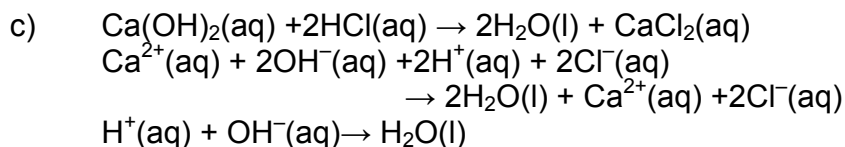
$$\text{Ni}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{NiS}(\text{s})$$
- 34) There are many possible reactions the following are examples:
- $\text{Fe}(\text{NO}_3)_3(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_3(\text{s}) + 3\text{NaNO}_3(\text{aq})$
  - $\text{Hg}_2(\text{NO}_3)_2(\text{aq}) + 3\text{NaCl}(\text{aq}) \rightarrow \text{Hg}_2\text{Cl}_2(\text{s}) + 2\text{NaNO}_3(\text{aq})$
  - $\text{Pb}(\text{NO}_3)_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{NaNO}_3(\text{aq})$
  - $\text{Ba}(\text{NO}_3)_2(\text{aq}) + \text{Na}_2\text{CrO}_4(\text{aq}) \rightarrow \text{BaCrO}_4(\text{s}) + 2\text{NaNO}_3(\text{aq})$
- 36)
- $\text{Cr}^{3+}(\text{aq}) + 3\text{OH}^{-}(\text{aq}) \rightarrow \text{Cr}(\text{OH})_3(\text{s})$
  - $2\text{Ag}^{+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \rightarrow \text{Ag}_2\text{CO}_3(\text{s})$
  - $\text{Hg}_2^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{Hg}_2\text{SO}_4(\text{s})$
  - No reaction
- 46)
- $$3\text{HNO}_3(\text{aq}) + \text{Al}(\text{OH})_3(\text{s}) \rightarrow 3\text{H}_2\text{O}(\text{l}) + \text{Al}(\text{NO}_3)_3(\text{aq})$$

$$3\text{H}^{+}(\text{aq}) + 3\text{NO}_3^{-}(\text{aq}) + \text{Al}(\text{OH})_3(\text{s}) \rightarrow 3\text{H}_2\text{O}(\text{l}) + \text{Al}^{3+}(\text{aq}) + 3\text{NO}_3^{-}$$

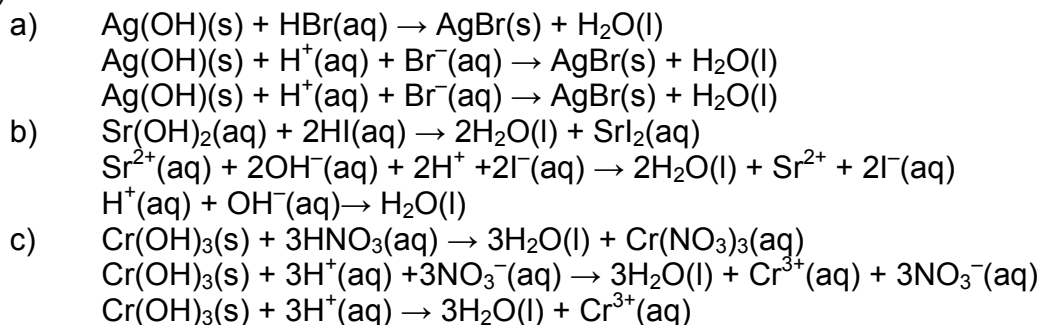
$$3\text{H}^{+}(\text{aq}) + \text{Al}(\text{OH})_3(\text{s}) \rightarrow 3\text{H}_2\text{O}(\text{l}) + \text{Al}^{3+}(\text{aq})$$
  - $$\text{HC}_2\text{H}_3\text{O}_2(\text{aq}) + \text{KOH}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{KC}_2\text{H}_3\text{O}_2(\text{aq})$$

$$\text{HC}_2\text{H}_3\text{O}_2(\text{aq}) + \text{K}^{+}(\text{aq}) + \text{OH}^{-}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{K}^{+}(\text{aq}) + \text{C}_2\text{H}_3\text{O}_2^{-}(\text{aq})$$

$$\text{HC}_2\text{H}_3\text{O}_2(\text{aq}) + \text{OH}^{-}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{C}_2\text{H}_3\text{O}_2^{-}(\text{aq})$$



48)



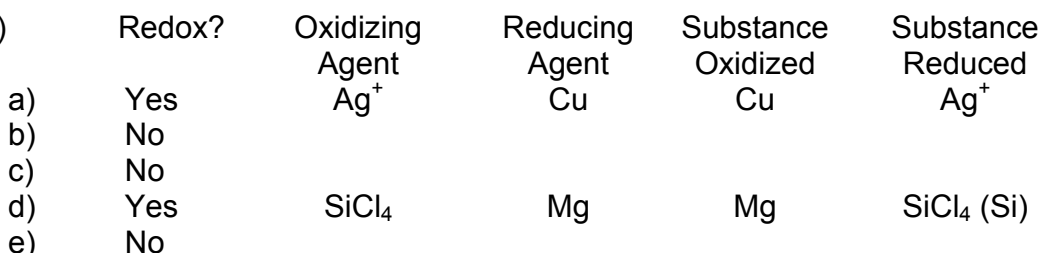
52)

56)

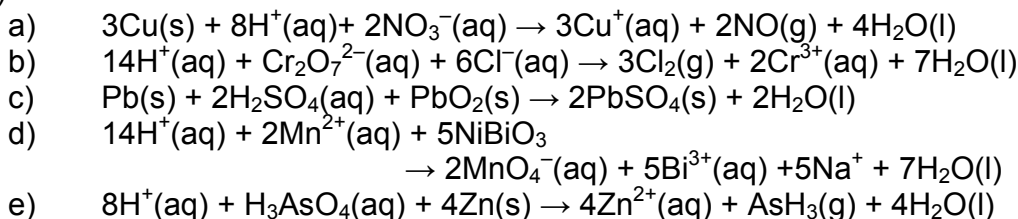
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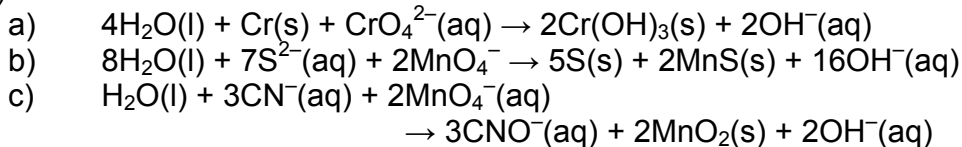
62)



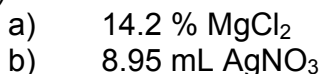
64)



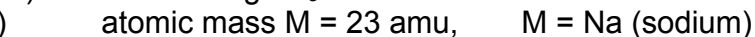
66)



72)



74)



76)

a) 0.0559 g Fe

b) 0.242 g  $\text{Fe}(\text{NO}_3)_3$

c) 53.1 %  $\text{Fe}(\text{NO}_3)_3$

88) 77.1 % KCl

22.9 % KBr

94)  $\text{C}_{22}\text{H}_{20}\text{O}_{13}$