

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) The balanced molecular equation for complete neutralization of H_2SO_4 by KOH in aqueous solution is _____. 1) _____
- A) $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{KOH} (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + \text{K}_2\text{SO}_4 (\text{aq})$
B) $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{OH}^- (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + \text{SO}_4^{2-} (\text{aq})$
C) $2\text{H}^+ (\text{aq}) + 2\text{KOH} (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + 2\text{K}^+ (\text{aq})$
D) $2\text{H}^+ (\text{aq}) + 2\text{OH}^- (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l})$
E) $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{KOH} (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + \text{K}_2\text{SO}_4 (\text{s})$
- 2) Which combination will produce a precipitate? 2) _____
- A) $\text{NaCl} (\text{aq})$ and $\text{HC}_2\text{H}_3\text{O}_2 (\text{aq})$
B) $\text{AgNO}_3 (\text{aq})$ and $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2 (\text{aq})$
C) $\text{NaOH} (\text{aq})$ and $\text{HCl} (\text{aq})$
D) $\text{NaOH} (\text{aq})$ and $\text{Fe}(\text{NO}_3)_2 (\text{aq})$
E) $\text{NH}_4\text{OH} (\text{aq})$ and $\text{HCl} (\text{aq})$
- 3) A compound was found to be soluble in water. It was also found that addition of acid to an aqueous solution of this compound resulted in the formation of carbon dioxide. Which one of the following cations would form a precipitate when added to an aqueous solution of this compound? 3) _____
- A) Rb^+ B) Cr^{3+} C) Na^+ D) NH_4^+ E) K^+
- 4) Which of these metals will be oxidized by the ions of cobalt? 4) _____
- A) silver B) tin C) iron D) nickel E) copper
- 5) Based on the activity series, which one of the reactions below will occur? 5) _____
- A) $\text{Zn} (\text{s}) + \text{MnI}_2 (\text{aq}) \rightarrow \text{ZnI}_2 (\text{aq}) + \text{Mn} (\text{s})$
B) $3\text{FeBr}_2 (\text{aq}) + 2\text{Au} (\text{s}) \rightarrow 3\text{Fe} (\text{s}) + 2\text{AuBr}_3 (\text{aq})$
C) $2\text{AgNO}_3 (\text{aq}) + \text{Pb} (\text{s}) \rightarrow 2\text{Ag} (\text{s}) + \text{Pb}(\text{NO}_3)_2 (\text{aq})$
D) $3\text{Hg} (\text{l}) + 2\text{Cr}(\text{NO}_3)_3 (\text{aq}) \rightarrow 3\text{Hg}(\text{NO}_3)_2 + 2\text{Cr} (\text{s})$
E) $\text{SnCl}_2 (\text{aq}) + \text{Cu} (\text{s}) \rightarrow \text{Sn} (\text{s}) + \text{CuCl}_2 (\text{aq})$
- 6) Which of the following is an oxidation-reduction reaction? 6) _____
- A) $\text{HCl} (\text{aq}) + \text{NaOH} (\text{aq}) \rightarrow \text{H}_2\text{O} (\text{l}) + \text{NaCl} (\text{aq})$
B) $\text{H}_2\text{CO}_3 (\text{aq}) + \text{Ca}(\text{NO}_3)_2 (\text{aq}) \rightarrow 2\text{HNO}_3 (\text{aq}) + \text{CaCO}_3 (\text{s})$
C) $\text{Cu} (\text{s}) + 2\text{AgNO}_3 (\text{aq}) \rightarrow 2\text{Ag} (\text{s}) + \text{Cu}(\text{NO}_3)_2 (\text{aq})$
D) $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2 (\text{aq}) + \text{Na}_2\text{SO}_4 (\text{aq}) \rightarrow \text{BaSO}_4 (\text{s}) + 2\text{NaC}_2\text{H}_3\text{O}_2 (\text{aq})$
E) $\text{AgNO}_3 (\text{aq}) + \text{HCl} (\text{aq}) \rightarrow \text{AgCl} (\text{s}) + \text{HNO}_3 (\text{aq})$

Answer the the following six questions by showing all of your calculations in the space provided.

- 7) What volume (mL) of a concentrated solution of magnesium chloride (9.00 M) must be diluted to 350. mL to make a 2.75 M solution of magnesium chloride? 7) _____
- A) 2.75 B) 107 C) 50.0 D) 350 E) 45.0

- 8) Which solution has the same number of moles of KCl as 75.00 mL of 0.250 M solution of KCl? 8) _____
- A) 100 mL of 0.0500 M solution of KCl
B) 25.0 mL of 0.175 M solution of KCl
C) 129 mL of 0.145 M solution of KCl
D) 20.0 mL of 0.200 M solution of KCl
E) 50.0 mL of 0.125 M solution of KCl

- 9) What volume (mL) of 7.48×10^{-2} M perchloric acid can be neutralized with 115 mL of 0.244 M sodium hydroxide? 9) _____
- A) 750 B) 8.60 C) 188 D) 125 E) 375

- 10) What volume (mL) of a concentrated solution of magnesium chloride (9.00 M) must be diluted to 350. mL to make a 2.75 M solution of magnesium chloride? 10) _____
- A) 107 B) 45.0 C) 350 D) 2.75 E) 50.0