

Chapter 4 Multiple Choice Review

- Which of these compounds is a strong electrolyte?
 - H₂O
 - N₂
 - CH₃COOH (acetic acid)
 - C₂H₆O (ethanol)
 - KOH
- Which of these compounds is a weak electrolyte?
 - HCl
 - CH₃COOH (acetic acid)
 - C₆H₁₂O₆ (glucose)
 - O₂
 - NaCl
- Identify the major ionic species present in an aqueous solution of Na₂CO₃.
 - Na₂⁺, CO₃²⁻
 - Na₂⁺, C²⁻, O₃
 - Na⁺, C⁴⁺, O₃²⁻
 - Na⁺, C⁺, O²⁻
 - Na⁺, CO₃²⁻
- The distinguishing characteristic of all electrolyte solutions is that they
 - contain molecules.
 - conduct electricity.
 - react with other solutions.
 - always contain acids.
 - conduct heat.
- Based on the solubility rules, which one of these compounds should be insoluble in water?
 - Na₂SO₄
 - BaSO₄
 - CuSO₄
 - MgSO₄
 - Rb₂SO₄
- Based on the solubility rules, which one of these compounds should be soluble in water?
 - Hg₂Cl₂
 - Na₂S
 - Ag₂CO₃
 - Ag₂S
 - BaSO₄
- Which of these choices is the correct net ionic equation for the reaction that occurs when solutions of Pb(NO₃)₂ and NH₄Cl are mixed?
 - Pb(NO₃)₂(aq) + 2NH₄Cl(aq) → NH₄NO₃(aq) + PbCl₂(s)
 - Pb²⁺(aq) + 2Cl⁻(aq) → PbCl₂(s)
 - Pb²⁺(aq) + 2NO₃⁻(aq) + 2NH₄⁺(aq) + 2Cl⁻(aq) → 2NH₄⁺(aq) + 2NO₃⁻(aq) + PbCl₂(s)
 - NH₄⁺(aq) + NO₃⁻(aq) → 2NH₄NO₃(s)
 - No reaction occurs.
- What is the chemical formula of the salt produced by the neutralization of hydrobromic acid with magnesium hydroxide?
 - MgBr
 - Mg₂Br₃
 - Mg₃Br₂
 - Mg₂Br
 - MgBr₂
- What is the chemical formula of the salt produced by the neutralization of potassium hydroxide with sulfuric acid?
 - KSO₃
 - K₂(SO₄)₃
 - K₂SO₄
 - K(SO₄)₂
 - KSO₄
- The oxidation number of S in K₂SO₄ is
 - +6.
 - +4.
 - +2.
 - 1.
 - none of these.
- The highest possible oxidation number of nitrogen is
 - +8.
 - +5.
 - +3.
 - +1.
 - 3.
- Which of these equations does not represent an oxidation–reduction reaction?
 - 3Al + 6HCl → 3H₂ + 4AlCl₃
 - 2H₂O → 2H₂ + O₂
 - 2NaCl + Pb(NO₃)₂ → PbCl₂ + 3NaNO₃
 - 2NaI + Br₂ → 2NaBr + I₂
 - Cu(NO₃)₂ + Zn → Zn(NO₃)₂ + Cu
- In the chemical reaction
 $5\text{H}_2\text{O}_2 + 2\text{MnO}_4^- + 6\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 8\text{H}_2\text{O} + 5\text{O}_2$,
the oxidizing agent is
 - H₂O₂.
 - MnO₄⁻.
 - H⁺.
 - Mn²⁺.
 - O₂.

14. Identify the reducing agent in the chemical reaction
- $$5\text{Fe}^{2+}(\text{aq}) + \text{MnO}_4^{-}(\text{aq}) + 8\text{H}^{+}(\text{aq}) \rightarrow 5\text{Fe}^{3+}(\text{aq}) + \text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}(\text{l}).$$
- A. Fe^{2+}
 B. MnO_4^{-}
 C. H^{+}
 D. Mn^{2+}
 E. Fe^{3+}
15. Predict the products of the single replacement reaction
- $$\text{Fe}(\text{s}) + \text{CuSO}_4(\text{aq}) \rightarrow ?$$
- A. $\text{Cu}(\text{s}) + \text{FeSO}_4(\text{aq})$
 B. $\text{Fe}(\text{s}) + \text{Cu}(\text{s}) + \text{SO}_4(\text{aq})$
 C. $\text{CuS}(\text{s}) + \text{Fe}_2\text{SO}_4(\text{aq})$
 D. $\text{FeCuSO}_4(\text{aq})$
 E. $\text{FeO}(\text{s}) + \text{CuSO}_3(\text{aq})$
16. Which of these chemical equations describes a hydrogen displacement reaction?
- A. $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l})$
 B. $2\text{KBr}(\text{aq}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{KCl}(\text{aq}) + \text{Br}_2(\text{l})$
 C. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
 D. $\text{CaBr}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{HBr}(\text{g})$
 E. $2\text{Al}(\text{s}) + 3\text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Al}_2(\text{SO}_4)_3(\text{aq}) + 3\text{H}_2(\text{g})$
17. 25.0 mL of a 0.2450 M NH_4Cl solution is added to 55.5 mL of 0.1655 M FeCl_3 . What is the concentration of chloride ion in the final solution?
- A. 0.607 M
 B. 0.418 M
 C. 1.35 M
 D. 0.190 M
 E. 0.276 M
18. When 50.0 mL of a 0.3000 M AgNO_3 solution is added to 50.0 mL of a solution of MgCl_2 , an AgCl precipitate forms immediately. The precipitate is then filtered from the solution, dried, and weighed. If the recovered AgCl is found to have a mass of 0.1183 g, what was the concentration of magnesium ions in the original MgCl_2 solution?
- A. 0.300 M
 B. 8.25×10^{-3} M
 C. 1.65×10^{-2} M
 D. 2.06×10^{-5} M
 E. 4.13×10^{-3} M
19. One method of determining the concentration of hydrogen peroxide (H_2O_2) in a solution is through titration with iodide ion. The net ionic equation for this reaction is
- $$\text{H}_2\text{O}_2 + 2\text{I}^{-} + 2\text{H}^{+} \rightarrow \text{I}_2 + 2\text{H}_2\text{O}$$
- A 50.00 mL sample of a hydrogen peroxide solution is found to react completely with 37.12 mL of a 0.1500 M KI solution. What is the concentration of hydrogen peroxide in the sample?
- A. 5.568×10^{-2} M
 B. 0.2227 M
 C. 0.1010 M
 D. 0.4041 M
 E. 0.1114 M
20. Zinc dissolves in hydrochloric acid to yield hydrogen gas:
- $$\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$$
- When a 12.7 g chunk of zinc dissolves in 500. mL of 1.450 M HCl , what is the concentration of hydrogen ions remaining in the final solution?
- A. 0.776 M
 B. 0.388 M
 C. 0.674 M
 D. 1.06 M
 E. 0 M