

Workbook



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Reactions in Aqueous Solutions

Introduction to Aqueous Solutions

Questions

- 1) Determine the concentration of the following ions:
 - a. $[K^+]$ in 0.328 M KCl
 - b. $[SO_4^{2-}]$ in 0.267 M $Al_2(SO_4)_3$
 - c. $[Al^{3+}]$ in 0.267 M $Al_2(SO_4)_3$
 - d. $[Na^+]$ in 0.198 M Na_2SO_4

- 2) A solution is 0.17 M Na_2SO_4 and 0.23 M $CuSO_4$.
What are the concentrations of the ions in the solution?

- 3) What are the molarities of the following ions?
 - a. 455 mg Na^+ /1 L
 - b. 22.8 mg I⁻/100 mL

- 4) What molarity of MgI_2 (aq) corresponds to an iodine content of 16 mg I⁻/1 L solution?

Answer Key

1) a. 0.328 M

b. 0.801 M

c. 0.534 M

d. 0.396 M

2) 0.34 M Na⁺

0.23 M Cu²⁺

0.40 M SO₄²⁻

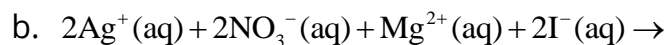
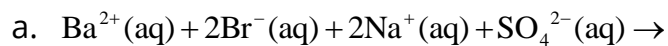
3) a. 0.02 M

b. $1.8 \cdot 10^{-3}$ M

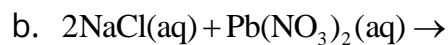
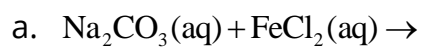
4) $6.3 \cdot 10^{-5}$ M

Precipitation Reactions

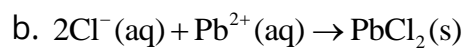
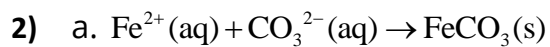
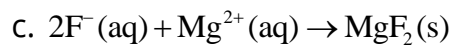
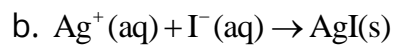
1) Complete each of the following as a net ionic equation:



2) Complete each of the following as a net ionic equation:

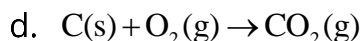
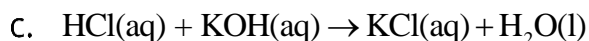
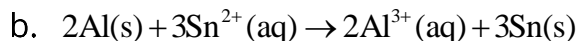
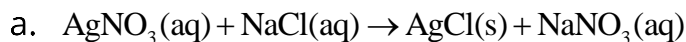


Answer Key

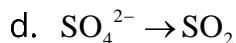
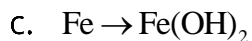
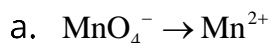


Oxidation-Reduction Reactions

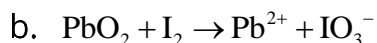
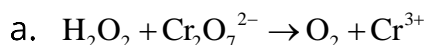
1) Indicate which of the following reactions are redox reactions and which are not:



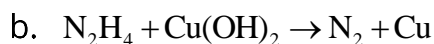
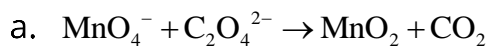
2) Complete and balance the following half equations:



3) Balance the following equations for redox reactions occurring in acidic solution:



4) Balance the following equations for redox reactions occurring in basic solution:



Answer Key

1) a. Not redox reaction

b. Redox reaction

c. Not redox reaction

d. Redox reaction

2) a. $5e^- + \text{MnO}_4^- + 8\text{H}^+ \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$

b. $2\text{NH}_2\text{OH} + 2\text{OH}^- \rightarrow \text{N}_2 + 2e^- + 4\text{H}_2\text{O}$

c. $\text{Fe} + 2\text{OH}^- \rightarrow \text{Fe}(\text{OH})_2 + 2e^-$

d. $\text{SO}_4^{2-} + 2e^- + 4\text{H}^+ \rightarrow \text{SO}_2 + 2\text{H}_2\text{O}$

3) a. $8\text{H}^+ + 3\text{H}_2\text{O}_2 + \text{Cr}_2\text{O}_7^{2-} \rightarrow 3\text{O}_2 + 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$

b. $8\text{H}^+ + 5\text{PbO}_2 + \text{I}_2 \rightarrow 5\text{Pb}^{2+} + 2\text{IO}_3^- + 4\text{H}_2\text{O}$

4) a. $4\text{H}_2\text{O} + 2\text{MnO}_4^- + 3\text{C}_2\text{O}_4^{2-} \rightarrow 2\text{MnO}_2 + 6\text{CO}_2 + 8\text{OH}^-$

b. $\text{N}_2\text{H}_4 + 2\text{Cu}(\text{OH})_2 \rightarrow \text{N}_2 + 2\text{Cu} + 4\text{H}_2\text{O}$