

Extra Problems for Chapter 12

1. Using the definition of oxidation state (not the rules we developed), what is the oxidation state of each atom in SiS?

2. Using the rules you learned in this chapter, give the oxidation states for every atom in the following substances:

- a. HClO_3 b. P_2 c. Na_2S d. SO_4^{2-} e. CaCO_3 f. FBr g. KNO_2 h. H_2S

3. For each of the following reactions, indicate whether or not it is a redox reaction. If it is, indicate the atom being oxidized and the atom being reduced. Also, indicate the oxidizing agent and the reducing agent.

- a. $2\text{Sr} + \text{O}_2 \rightarrow 2\text{SrO}$
b. $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$
c. $2\text{HNO}_3 + 6\text{HI} \rightarrow 2\text{NO} + 3\text{I}_2 + 4\text{H}_2\text{O}$
d. $2\text{KBr} + \text{Mg}(\text{NO}_3)_2 \rightarrow \text{MgBr}_2 + 2\text{KNO}_3$
e. $2\text{Sb} + 2\text{HNO}_3 \rightarrow \text{Sb}_2\text{O}_3 + 2\text{NO} + \text{H}_2\text{O}$

4. One side of a Galvanic cell has Cu (s) becoming Cu^{2+} .

- a. Is this the anode or the cathode of the cell?
b. Are electrons flowing towards the electrode or away from it on this side of the cell?
c. In the salt bridge, are positive or negative ions flowing towards this side of the cell?

5. The reactions that run two Galvanic cells are given below. Draw the cell, identifying the anode and cathode, the electron flow, and the substances on each side of the cell.

- a. $2\text{Al}(\text{s}) + 3\text{Pb}^{2+}(\text{aq}) \rightarrow 2\text{Al}^{3+}(\text{aq}) + 3\text{Pb}(\text{s})$
b. $\text{I}_2(\text{aq}) + \text{Ca}(\text{s}) \rightarrow 2\text{I}^{-}(\text{aq}) + \text{Ca}^{2+}(\text{aq})$

6. Balance the following redox reactions.

- a. $\text{Co}^{2+}(\text{aq}) + \text{Ce}^{3+}(\text{aq}) \rightarrow \text{Ce}^{4+}(\text{aq}) + \text{Co}(\text{s})$
b. $\text{Pb} + \text{Au}^{3+} \rightarrow \text{Au} + \text{Pb}^{2+}$