

Lesson 13: Redox Reactions

text: 146-159

what to know:

- concept of oxidation-reduction (redox), §4-4
- how to determine oxidation numbers, use them in identifying redox reactions and balancing them, §4-4
- how to recognize oxidizing and reducing agents, §4-4
- examples of combination, decomposition, oxygenation, hydrogenation, displacement, and disproportionation reactions, §4-4
- concept and use of the activity series, §4-4

questions:

1. What is the oxidation number of:

H in HCl?	O in $\text{S}_2\text{O}_3^{2-}$?	Cl in NaClO_4 ?	I in I_2 ?	Fe in Fe_2O_3 ?
H in H_2 ?	S in $\text{S}_2\text{O}_8^{2-}$?	Mn in Mn_2O_3 ?	I in IO_4^- ?	N in NH_4^+ ?
Cl in Cl	Fe in $\text{Fe}_2(\text{SO}_4)_3$?	Cr in $\text{Cr}_2\text{O}_7^{2-}$?	O in O_2 ?	N in NO_3^- ?

2. When Sn^{4+} is converted to Sn^{2+} , is it being oxidized or reduced?

3. Consider the reaction of Mg metal with N_2 gas to form Mg_3N_2 .

- What substance is being reduced?
- What substance is the oxidizing agent?
- Write the balanced reaction.

4. Classify each change as oxidation or reduction and classify each first named substance as either a reducing or oxidizing agent.

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|---|---|
| a. NO to NO_3^- | e. aluminum metal to aluminum ion |
| b. SO_3^{2-} to SO_4^{2-} | f. bromide ion to Br_2 |
| c. MnO_4^- to Mn^{2+} | g. BrO_3^- to Br_2 |
| d. MnO_4^- to MnO_2 | h. $\text{Cr}_2\text{O}_7^{2-}$ to Cr^{3+} |

5. Consider the reaction, $\text{Mg}(\text{s}) + \text{H}^+(\text{aq}) \rightleftharpoons \text{Mg}^{2+}(\text{aq}) + \text{H}_2(\text{g})$.

- What substance is being oxidized? b. gaining electrons?
- What substance is serving as the oxidizing agent?
- Balance the reaction.

6 For the following reactions give the oxidizing and reducing agents and give the number of electrons lost or gained per mole of each . Assume aqueous solutions.

- Sn^{2+} reacts with IO_4^- to form Sn^{4+} and I in acid.
- $\text{Na}_2\text{Cr}_2\text{O}_7$ plus $\text{Fe}(\text{NO}_3)_2$ forms $\text{Cr}(\text{NO}_3)_3$ and $\text{Fe}(\text{NO}_3)_3$ in acid.
- $\text{Cu} + \text{HNO}_3$ forms cupric nitrate and NO.
- $\text{Bi}(\text{OH})_3 + \text{SnO}_2^{2-}$ forms SnO_3^{2-} and Bi in base.
- Br_2 forms BrO_3^- and Br^- in base
- $\text{Zn}(\text{s}) + \text{AgNO}_3$ forms $\text{Zn}(\text{NO}_3)_2$ and Ag(s)