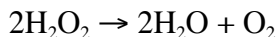


# LECTURE 25

1. Determine the oxidation number of the underlined element in each of the following compounds or ions:

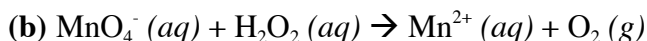
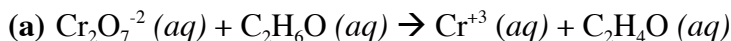
- (a) HCl
- (b) NH<sub>4</sub><sup>+</sup>
- (c) NaH
- (d) NaAlH<sub>4</sub>
- (e) FeCl<sub>4</sub><sup>2-</sup>
- (f) ICl<sub>3</sub>
- (g) SO<sub>4</sub><sup>2-</sup>
- (h) Cu(OH)<sub>2</sub>

2. Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) is a harmful and reactive byproduct of metabolism. To prevent H<sub>2</sub>O<sub>2</sub> from causing oxidative damage to cells, the enzyme catalase catalyzes the conversion of H<sub>2</sub>O<sub>2</sub> to much less reactive molecules, oxygen and water.

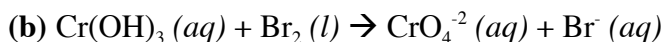
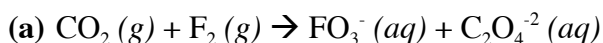


Using oxidation numbers, determine if H<sub>2</sub>O<sub>2</sub> is reduced and/or oxidized in this reaction.

3. Using half-reactions, balance the following equations in **acidic** solution. Determine which atom or compound is the oxidizing agent and which is the reducing agent in each reaction.



4. Using half-reactions, balance the following equations in **basic** solution. Determine which atom or compound is the oxidizing agent and which is the reducing agent in each reaction.



5. In some alkaline batteries, a solid zinc electrode in a basic solution is oxidized to ZnO while solid manganese (IV) oxide is reduced to solid manganese (III) oxide.

(a) Write the half-reactions for both the anode and cathode of the cell, as well as the overall reaction.

(b) Calculate the mass in kg of ZnO(s) formed if  $1.0 \times 10^4$  A are passed through the cell for 12 hours.

6. A jeweler is investigating a novel method for electroplating tungsten onto base metal. The jeweler passes a 30.0 A current through a solution for 1.00 hours and 100. g of tungsten is deposited on the ring. What is the oxidation number of tungsten in the solution?

MIT OpenCourseWare  
<https://ocw.mit.edu>

5.111 Principles of Chemical Science  
Fall 2014

For information about citing these materials or our Terms of Use, visit: <https://ocw.mit.edu/terms>.