***Chemistry***

**17: Electrochemistry**

**17.1: Balancing Oxidation-Reduction Reactions**

1. If a 2.5 A current is run through a circuit for 35 minutes, how many coulombs of charge moved through the circuit?

Solution

Because A = C/s, time must be converted to seconds. Round to two significant digits based on the initial values in the problem. 

3. For each of the following balanced half-reactions, determine whether an oxidation or reduction is occurring.

(a) 

(b) 

(c) 

(d) 

Solution

(a) reduction (b) oxidation (c) oxidation (d) reductions

5. Given the following pairs of balanced half-reactions, determine the balanced reaction for each pair of half-reactions in an acidic solution.

(a) , 

(b) , 

(c) , 

(d) , 

Solution

(a)



(b) 

(c) 

(d) 

7. Identify the species that undergoes oxidation, the species that undergoes reduction, the oxidizing agent, and the reducing agent in each of the reactions of the previous problem.

Solution

Oxidized: (a) Ag; (b) Sn2+; (c) Hg; (d) Al, reduced: (a) ; (b) H2O2; (c) PbO2; (d) , oxidizing agent: (a) ; (b) H2O2; (c) PbO2; (d) , reducing agent: (a) Ag; (b) Sn2+; (c) Hg; (d) Al.

9. Identify the species that was oxidized, the species that was reduced, the oxidizing agent, and the reducing agent in each of the reactions of the previous problem.

Solution

Oxidized = reducing agent: (a) ; (b) Mn(OH)2; (c) H2; (d) Al; reduced = oxidizing agent: (a) Cu(OH)2; (b) O2; (c) ; (d) 

11. Why is it not possible for hydrogen ion (H+) to appear in either of the half-reactions or the overall equation when balancing oxidation-reduction reactions in basic solution?

Solution

In basic solution, [OH–] > 1  10–7*M* > [H+]. Hydrogen ion cannot appear as a reactant because its concentration is essentially zero. If it were produced, it would instantly react with the excess hydroxide ion to produce water. Thus, hydrogen ion should *not* appear as a reactant or product in basic solution.

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