Name _____ Class _____ Date _____

## SECTION 22.3 BALANCING REDOX EQUATIONS

**1.** Balance these equations using the oxidation-number-change method.

**a.** $C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$

**b.** $H_2S + HNO_3 \rightarrow S + NO + H_2O$

**c.** $HNO_3 + HI \rightarrow NO + I_2 + H_2O$

**d.** $Sb + HNO_3 \rightarrow Sb_2O_5 + NO + H_2O$

**e.** $KMnO_4 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O + KCl$

**f.** $KIO_4 + KI + HCl \rightarrow KCl + I_2 + H_2O$

**g.** $Zn + Cr_2O_7^{2-} + H^+ \rightarrow Zn^{2+} + Cr^{3+} + H_2O$

**2.** Write half-reactions for the oxidation and reduction processes for each of the following reactions.

**a.** $Fe^{2+} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$ (acidic solution)

**b.** $Sn^{2+} + IO_3^- \rightarrow Sn^{4+} + I^-$ (acidic solution)

**c.** $S^{2-} + NO_3^- \rightarrow S + NO$ (acidic solution)

**d.** $Mn^{2+} + H_2O_2 \rightarrow MnO_2 + H_2O$ (basic solution)

**3.** Balance these reactions using the half-reaction method.

**a.** $Zn + HgO \rightarrow ZnO_2^{2-} + Hg$ (basic solution)

**b.** $Fe^{2+} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$ (acidic solution)

**c.** $Sn^{2+} + IO_3^- \rightarrow Sn^{4-} + I^-$ (acidic solution)

**d.** $S^{2-} + NO_3^- \rightarrow S + NO$ (acidic solution)

**e.** $Mn^{2+} + H_2O_2 \rightarrow MnO_2 + H_2O$ (basic solution)

**f.** $CrO_2 + ClO^- \rightarrow CrO_4^{2-} + Cl^-$ (basic solution)