BALANCING REDOX REACTIONS

61. Balance each redox reaction using the half-reaction method.

(a) $K(s) + Cr^{3+}(aq) \longrightarrow Cr(s) + K^{+}(aq)$

(b) $Mg(s) + Ag^{+}(aq) \longrightarrow Mg^{2+}(aq) + Ag(s)$

(c) $Al(s) + Fe^{2+}(aq) \longrightarrow Al^{3+}(aq) + Fe(s)$

62. Balance each redox reaction using the half-reaction method.

(a) $Zn(s) + Sn^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Sn(s)$

(b) $Mg(s) + Cr^{3+}(aq) \longrightarrow Mg^{2+}(aq) + Cr(s)$

(c) $Al(s) + Ag^{+}(aq) \longrightarrow Al^{3+}(aq) + Ag(s)$

63. Classify each half-reaction occurring in acidic aqueous solution as an oxidation or a reduction and balance the half-reaction.

(a) $MnO_4^{-}(aq) \longrightarrow Mn^{2+}(aq)$

(b) $Pb^{2+}(aq) \longrightarrow PbO_2(s)$

(c) $IO_3^{-}(aq) \longrightarrow I_2(s)$

(d) $SO_2(g) \longrightarrow SO_4^{2-}(aq)$

64. Classify each half-reaction occurring in acidic aqueous solution as an oxidation or a reduction and balance the half-reaction.

(a) $S(s) \longrightarrow H_2S(g)$

(b) $S_2O_8^{2-}(aq) \longrightarrow 2\,SO_4^{2-}(aq)$

(c) $Cr_2O_7^{2-}(aq) \longrightarrow Cr^{3+}(aq)$

(d) $NO(g) \longrightarrow NO_3^{-}(aq)$

65. Use the half-reaction method to balance each redox reaction occurring in acidic aqueous solution.

(a) $PbO_2(s) + I^{-}(aq) \longrightarrow Pb^{2+}(aq) + I_2(s)$

(b) $SO_3^{2-}(aq) + MnO_4^{-}(aq) \longrightarrow SO_4^{2-}(aq) + Mn^{2+}(aq)$

(c) $S_2O_3^{2-}(aq) + Cl_2(g) \longrightarrow SO_4^{2-}(aq) + Cl^{-}(aq)$

66. Use the half-reaction method to balance each redox reaction occurring in acidic aqueous solution.

(a) $I^{-}(aq) + NO_2^{-}(aq) \longrightarrow I_2(s) + NO(g)$

(b) $BrO_3^{-}(aq) + N_2H_4(g) \longrightarrow Br^{-}(aq) + N_2(g)$

(c) $NO_3^{-}(aq) + Sn^{2+}(aq) \longrightarrow Sn^{4+}(aq) + NO(g)$

67. Use the half-reaction method to balance each redox reaction occurring in acidic aqueous solution.

(a) $ClO_4^{-}(aq) + Cl^{-}(aq) \longrightarrow ClO_3^{-}(aq) + Cl_2(g)$

(b) $MnO_4^{-}(aq) + Al(s) \longrightarrow Mn^{2+}(aq) + Al^{3+}(aq)$

(c) $Br_2(aq) + Sn(s) \longrightarrow Sn^{2+}(aq) + Br^{-}(aq)$

68. Use the half-reaction method to balance each redox reaction occurring in acidic aqueous solution.

(a) $IO_3^{-}(aq) + SO_2(g) \longrightarrow I_2(s) + SO_4^{2-}(aq)$

(b) $Sn^{4+}(aq) + H_2(g) \longrightarrow Sn^{2+}(aq) + H^{+}(aq)$

(c) $Cr_2O_7^{2-}(aq) + Br^{-}(aq) \longrightarrow Cr^{3+}(aq) + Br_2(aq)$

69. Balance each redox reaction occurring in basic solution.

(a) $ClO^{-}(aq) + Cr(OH)_4^{-}(aq) \longrightarrow CrO_4^{2-}(aq) + Cl^{-}(aq)$

(b) $MnO_4^{-}(aq) + Br^{-}(aq) \longrightarrow MnO_2(s) + BrO_3^{-}(aq)$

70. Balance each redox reaction occurring in basic solution.

(a) $NO_2^{-}(aq) + Al(s) \longrightarrow NH_3(g) + AlO_2^{-}(aq)$

(b) $Al(s) + MnO_4^{-}(aq) \longrightarrow MnO_2(s) + Al(OH)_4^{-}(aq)$