Practice Problems Section 4.4

1) Oxidation is the \_\_\_\_\_\_\_\_\_\_ and reduction is the \_\_\_\_\_\_\_\_\_\_.

A) gain of oxygen, loss of electrons

B) loss of oxygen, gain of electrons

C) loss of electrons, gain of electrons

D) gain of oxygen, loss of mass

E) gain of electrons, loss of electrons

2) Sodium does not occur in nature as Na (s) because \_\_\_\_\_\_\_\_\_\_.

A) it is easily reduced to Na-

B) it is easily oxidized to Na+

C) it reacts with water with great difficulty

D) it is easily replaced by silver in its ores

E) it undergoes a disproportionation reaction to Na- and Na+

3) The net ionic equation for the dissolution of zinc metal in aqueous hydrobromic acid is \_\_\_\_\_\_\_\_\_\_.

A)Zn (s) + 2Br- (aq) 🡪 ZnBr2 (aq)

B) Zn (s) + 2HBr (aq) 🡪 ZnBr2 (aq) + 2 H+ (aq)

C) Zn (s) + 2HBr (aq) 🡪 ZnBr2 (s) + 2 H+ (aq)

D) Zn (s) + 2HBr (aq) 🡪 Zn2+ (aq) + H2 (g)

E) 2Zn (s) + 2H+ (aq) 🡪 2Zn2+ (aq) + H2 (g)

4) Of the reactions below, only \_\_\_\_\_\_\_\_\_\_ is not spontaneous.

A) Mg (s) + 2HCl (aq) 🡪 MgCl2 (aq) + H2 (g)

B) 2Ag (s) + 2HNO3 (aq) 🡪 2AgNO3 (aq) + H2 (g)

C) 2Ni (s) + H2SO4 (aq) 🡪 Ni2SO4 (aq) + H2 (g)

D) 2Al (s) + 6HBr (aq) 🡪 2AlBr3 (aq) + 3H2 (g)

E) Zn (s) + HI (aq) 🡪 ZnI2 (aq) + H2 (g)

5) Based on the activity series, which one of the reactions below will occur?

A) Zn (s) + MnI2 (aq) 🡪 ZnI2 (aq) + Mn (s)

B) SnCl2 (aq) + Cu(s) 🡪 Sn (s) + CuCl2 (aq)

C)2AgNO3 (aq) + Pb(s) 🡪 2Ag(s) + Pb(NO3)2 (aq)

D)3Hg (l) + 2Cr(NO3)3 (aq) 🡪 3Hg(NO3)2 (aq) + 2Cr (s)

E)3FeBr2 (aq) + 2Au (s) 🡪 3Fe(s) + 2 AuBr3 (aq)

6) Which of these metals will be oxidized by the ions of cobalt?

A) nickel

B) tin

C) iron

D) copper

E) silver

7) Which of these metals will be oxidized by the ions of aluminum?

A) magnesium

B) zinc

C) chromium

D) iron

E) nickel

8) In which species does nitrogen have the highest oxidation number?

A) N2

B) NH3

C) HNO2

D) NO2-

E) NaNO3

9) In which species does sulfur have the highest oxidation number?

A)S8 (elemental form of sulfur)

B)H2S

C)SO2

D)H2SO3

E)K2SO4

10) In which reaction does the oxidation number of hydrogen change?

A)HCl (aq) + NaOH (aq) 🡪 NaCl (aq) + H2O (l)

B)2Na (s) + 2H2O (l) 🡪 2NaOH (aq) + H2 (g)

C)CaO (s) + H2O (l) 🡪 Ca(OH)2 (s)

D)2HClO4 (aq) + CaCO3 (s) 🡪 Ca(ClO4)2 (aq) + H2O (l) + CO2 (g)

E)SO2 (g) + H2O (l) 🡪 H2SO3 (aq)

11) In which reaction does the oxidation number of oxygen increase?

A) Ba(NO3)2 (aq) + K2SO4 (aq) 🡪 BaSO4 (s) + 2KNO3 (aq)

B) HCl (aq) + NaOH (aq) 🡪 NaCl (aq) + H2O (l)

C) MgO (s) + H2O (l) 🡪 Mg(OH)2 (s)

D) 2 SO2 (g) + O2 (g) 🡪 2SO3 (g)

E) 2H2O (l) 🡪 2H2(g) + O2 (g)