Review: Equations using Heats of Chemical Reactions

SCH4U_07 - 08

1. Nitroglycerine decomposes according to the following equation:

$$4\ C_3H_5(NO_3)_{3\ (l)} \longrightarrow 6\ N_{2\ (g)} + O_{2(g)} + 12\ CO_{2\ (g)} + 10\ H_2O_{(g)} \qquad \Delta H^0 = -5687.6\ kJ$$

Determine ΔH^0 for the following:

a. If 20 mol of nitroglycerine are detonated.

b. If 30 mol of nitrogen gas form.

c. If 36 mol of nitroglycerine form.

d. If one mol of nitroglycerine are detonated.

e. If one mol of nitroglycerine are formed.

f. If 2.27 g of nitroglycerine ore detonated.

g. If 440.0 g of carbon dioxide are reacted with excess $N_{2\ (g)}$, $O_{2(g)}$ and $H_2O_{(g)}$.

2. Explosion of black powder occurs according to the following equation:

$$4\ KNO_{3\ (s)} + 7\ C_{(s)} + S_{(s)} \longrightarrow 3\ CO_{2(g)} + 3\ CO_{(g)} + 2\ N_{2\ (g)} + K_2CO_{3(s)} + K_2S_{(s)}$$

The enthalpy change for this reaction, ΔH^0, is — 2843.8 kJ.

Determine ΔH^0 for the following:

a. If 1 mol of $KNO_{3\ (s)}$ are mixed to form black powder.

b. $6CO_{2(g)} + 6CO_{(g)} + 4\ N_{2\ (g)} + 2K_2CO_{3(s)} + 2K_2S_{(s)} \longrightarrow 8KNO_{3\ (s)} + 14C_{(s)} + 2S_{(s)}$

c. 1f 500.0 g of $KNO_{3\ (s)}$ are reacted.

d. If 1.00 kg of carbon monoxide are formed.