ANSWER TO "TRY YOURSELF" PROBLEM FROM STUDY SECTION 5.7

Try Yourself 5.7 a

Given the following data:

1. $N_2(g) + O_2(g) \rightarrow 2NO(g)$ $\Delta_rH^0_{298} = +180.7$ kJ

2. $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$ $\Delta_rH^0_{298} = -113.1$ kJ

3. $2N_2O(g) \rightarrow 2N_2(g) + O_2(g)$ $\Delta_rH^0_{298} = -163.2$ kJ

Calculate $\Delta_rH^0_{298}$ for the following reaction by using Hess's law and manipulating the given reactions above:

4. $N_2O(g) + NO_2(g) \rightarrow 3NO(g)$ $\mathbf{\Delta_rH^0_{298} = ?}$

Try Yourself 5.7 b

Sucrose (sugar, $C_{12}H_{22}O_{11}$ = 342.3 g.mol^{-1}) can be oxidized to CO_2 and H_2O and the enthalpy change for the reaction can be measured under conditions of constant pressure.

$\mathbf{C_{12}H_{22}O_{11}(s) + 12O_2(g) \rightarrow 12CO_2(g) + 11H_2O(liq.)}$ $\mathbf{\Delta_rH^0 = -5645\ kJ/mol\text{-}rxn}$

Calculate the energy that is transferred as heat by burning 5.00 g of sugar.

Try Yourself 5.7 c

Iso-octane (2,2,4-trimethylpentane = 114.18 g.mol^{-1}), one of the many hydrocarbons that make up gasoline, burns in air to give water and carbon dioxide.

$\mathbf{2C_8H_{18}(l) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(l)}$ $\mathbf{\Delta_rH^o = -10922\ kJ\text{-}rxn}$

Calculate the enthalpy change if you burn 1.00 L of iso-octane (density = 0.69 g/mL).