Reaction Enthalpies

- **Communicating Enthalpy Changes**

(ΔH_r notation, balanced equation, potential energy diagrams)

- **Hess' Law**

$\Delta H_r = \sum nH_{fp} - \sum nH_{fr}$

- **Enthalpy Changes using Formation Reactions**
- **Reference Energy State**
- **Thermal Stability**
- **Multi-Step Energy Calculations**

$Sn + \frac{1}{2}O_2 \rightarrow SnO$

$SnO \rightarrow Sn + \frac{1}{2}O_2$

SnO

$H_f = -280.7$ kJ/mol

$H_{SD} = 280.7$ kJ/mol

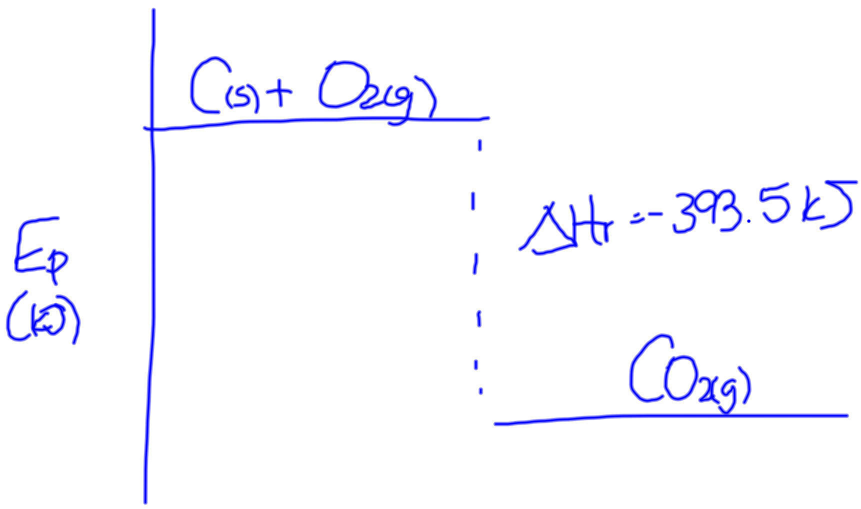
SnO_2

$H_f = -577.6$ kJ/mol

$H_{SD} = 577.6$ kJ/mol

$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta H_r = -393.0\ kJ$

$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} + 393.5\ kJ$



$$CH_3OH_{(l)} + \frac{3}{2}O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)}$$

Step 1: Hr (general)

$$\Delta H_r = \sum nH_{fp} - \sum nH_{fr}$$

$$\Delta H_r = -726.0\ kJ$$

$$\Delta H_r = nH_r$$

$$H_r = \frac{\Delta H_r}{n} = \frac{-726.0\ kJ}{1\ mol} = -726.0\ kJ/mol$$

Step 2: n (specific)

$$3.40\,g \times \frac{1\ mol}{32.05\,g} = 0.106\ mol$$

Step 3:

$$\Delta H_c = -q$$

$$nH_c = -C\Delta T$$

$$(0.106\ mol)\left(-726.0\ \frac{kJ}{mol}\right) = -\left(6.75\ \frac{kJ}{°C}\right)\Delta T$$

$$\Delta T = -\frac{(0.106\ mol)(-726.0\ kJ/mol)}{6.75\ \frac{kJ}{°C}}$$

$$\boxed{\Delta T = 11.4\,°C}$$

Review Worksheet