Homework

$$CH_3OH_{(l)} + \tfrac{3}{2}O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$$

① $\Delta H_r = nH_r$

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

$$\Delta H_r = \left[\left(1\,mol\right)\left(-393.5\,\tfrac{kJ}{mol}\right) + \left(2\,mol\right)\left(-241.8\,\tfrac{kJ}{mol}\right)\right] - \left[\left(1\,mol\right)\left(-239.1\,\tfrac{kJ}{mol}\right) + \left(\tfrac{3}{2}\,mol\right)\left(0\,\tfrac{kJ}{mol}\right)\right]$$

$$\Delta H_r = -638\,kJ$$

$$\Delta H_r = nH_r$$

$$H_r = \frac{\Delta H_r}{n} = \frac{-638\,kJ}{1\,mol} = \boxed{-638\,kJ/mol}$$

Thermal Stability

Thermal Stability - the tendency of a compound to resist decomposition when heated.

- the more endothermic the simple decomposition (sd), the more stable the compound.

Ex. $H^{o}_{(sd)}$ = + 280.7 kJ/mol
SnO

$H^{o}_{(sd)}$ = + 577.6 kJ/mol
SnO_2

Therefore SnO_2 is more stable.

*Normally not given the H_{sd}, but given the H_f

Which is more stable, ammonia or butane?

NH_3

$H_f = -45.9$ kJ/mol

$H_{SD} = 45.9$ kJ/mol

C_4H_{10}

$H_f = -125.6$ kJ/mol

$H_{SD} = 125.6$ kJ/mol

$Sn + \frac{1}{2}O_2 \rightarrow SnO$ $\Delta H = -280.7 \frac{kJ}{mol}$

$SnO \rightarrow Sn + \frac{1}{2}O_2$ $\Delta H = 280.7 \frac{kJ}{mol}$

$SnO_2 \rightarrow Sn + O_2$

Worksheet