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

$H_f = -45.9 \frac{kJ}{mol}$

$H_{sd} = 45.9 \frac{kJ}{mol}$

C_4H_{10}

$H_f = -125.6 \frac{kJ}{mol}$

$H_{sd} = 125.6 \frac{kJ}{mol}$

$\frac{1}{2}N_2 + \frac{3}{2}H_2 \rightarrow NH_3 \qquad \Delta H_f = -45.9\,kJ$

$NH_3 \rightarrow \frac{1}{2}N_2 + \frac{3}{2}H_2 \qquad \Delta H_{sp} = 45.9\,kJ$

Worksheet

$$\Delta H_r = \Sigma n H_{f_p} - \Sigma n H_r$$

molar

$$H_r = \frac{\Delta H_r}{n}$$