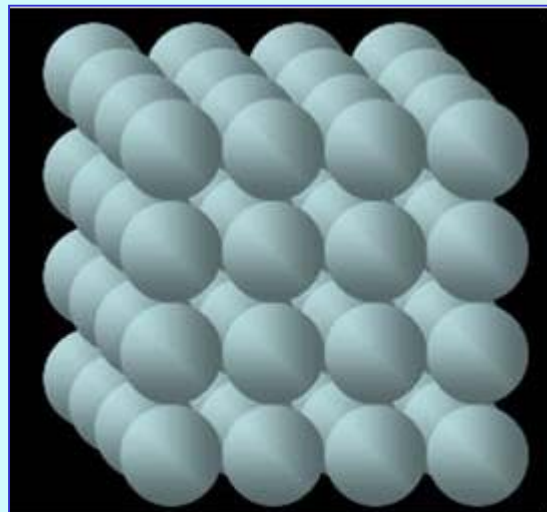


Entropy change



http://www.t2i2edu.com/WebMovie/3Chap18_files/image002.jpg

Standard entropies

The standard entropy of a substance is the entropy change per mole that results from heating the substance from 0 K to the standard temperature (25 °C / 298 K).

At 0 K (-273 °C) the entropy of a perfect crystalline solid is zero.

Standard entropy change

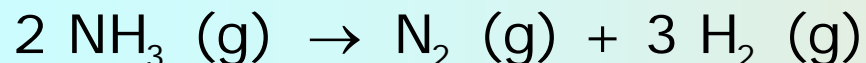
The standard entropy change is the entropy change per mole for conversion of reactants in their standard states into products at their standard states:

$$\Delta S^{\circ} = S^{\circ} (\text{products}) - S^{\circ} (\text{reactants})$$

Entropy change

Exercise

Determine the standard entropy change for the decomposition of ammonia:



The standard entropies of ammonia, nitrogen and hydrogen are 192, 192 and 131 J / K mol

Solution

The change in enthalpy for the reaction is:

$$\Delta S^0 = S^0 (\text{N}_2) + 3 * S^0 (\text{H}_2) - 2 * S^0 (\text{NH}_3)$$

$$\Delta S^0 = 192 \frac{\text{J}}{\text{K mol}} + 3 * 131 \frac{\text{J}}{\text{K mol}} - 2 * 192 \frac{\text{J}}{\text{K mol}}$$

$$\Delta S^0 = +201 \frac{\text{J}}{\text{K}}$$

The standard entropy change is positive, which signifies that there has been an increase in disorder: two mol of gas changes into 4 mol of gas.