Exercise 6.2
Entropy and Microstates

1. The standard enthalpy of formation of a pure element* is 0 $\frac{kJ}{mol}$.

   The standard free energy of formation of a pure element* is 0 $\frac{kJ}{mol}$.

   The standard entropy for a pure element* is **not** 0 $\frac{J}{mol \cdot K}$. **Why not?**

**the most common allotrope of a pure element in its most common state at* 25℃.

2.

(a) Suppose that you have two opaque jars which contain a total of 8 identical marbles. What is the entropy of this system? Express your answer as a multiple of k_B.

(b) Suppose that you have two opaque jars which contain 4 red marbles and 4 blue marbles. What is the entropy of this system?

(c) Does having two different kinds of marbles make a difference to the entropy of the system?

3.

(a) A good rule of thumb is that the entropy of the system increases if a reaction produces more gas particles than it consumes (and that the entropy of the system will decrease if a reaction consumes more gas particles than it produces).

Why is this the case?

(b) Usually, dissolving an ionic solid in water increases the entropy of the system.

Why is this the case?

(c) In a few cases, dissolving an ionic solid in water decreases the entropy of the system.

What could cause that?