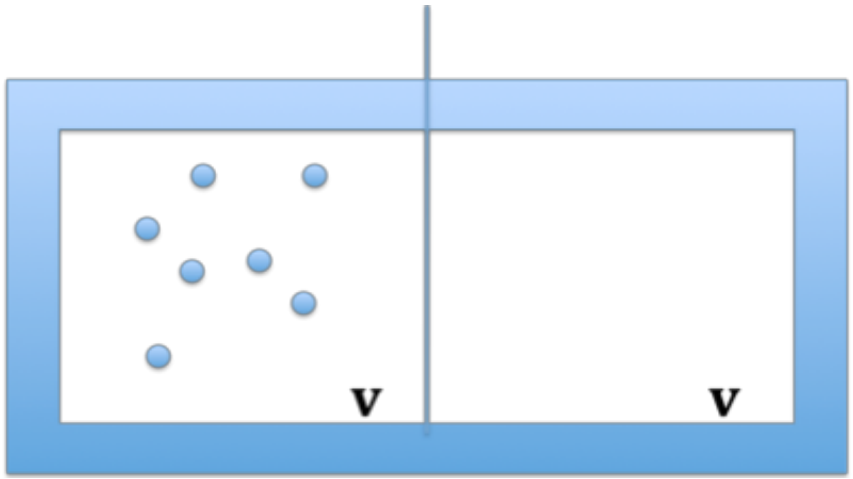
Suppose an isolated box of volume $2V$ is divided into two equal compartments. An ideal gas occupies half of the container and the other half is empty. When the partition separating the two halves of the box is removed and the system reaches equilibrium again, how does the new **free energy** of the gas compare to the entropy of the original system?

1. The free energy increases
2. The free energy decreases
3. The free energy stays the same
4. There is not enough information to determine the answer



Which of the following sets of changes are **guaranteed** to produce a lower G, thereby making a process/reaction more likely to be spontaneous?

A. A negative ΔH
B. A positive ΔS
C. A negative ΔH and negative ΔS
D. A negative ΔH and positive ΔS
E. A positive ΔH and positive ΔS
F. A positive ΔH and negative ΔS
G. None of the above

Suppose a certain chemical reaction AB→ CD is known to have a positive enthalpy change, and the reaction does not spontaneously take place at a temperature T_0. What can you say about the free energy change $\Delta G_{AB \rightarrow CD}$ at T_0?

1. $\Delta G \leq 0$
2. $\Delta G = 0$
3. $\Delta G \geq 0$
4. You can't say anything about ΔG

Suppose a certain chemical reaction AB→ CD is known to have a positive enthalpy change, and the reaction does not spontaneously take place at a temperature T_0. What can you say about whether is will take place at any other T?

1. It is likely to take place at a higher T.
2. It is likely to take place at a lower T.
3. If it doesn't take place at T_0, it won't take place at any T.
4. You can't say anything about other temps.

Consider a set of molecules in a liquid that can be arranged either in a state A or in a state B. In state B there are stronger *attractive* electrical interactions between the molecules than there are when they are in state A. If the kinetic and chemical energies of the molecules are the same in both states, in which state would the **internal energy** of the system be higher?

1. In state A
2. In state B
3. They would be the same.
4. There is not enough information to tell.