

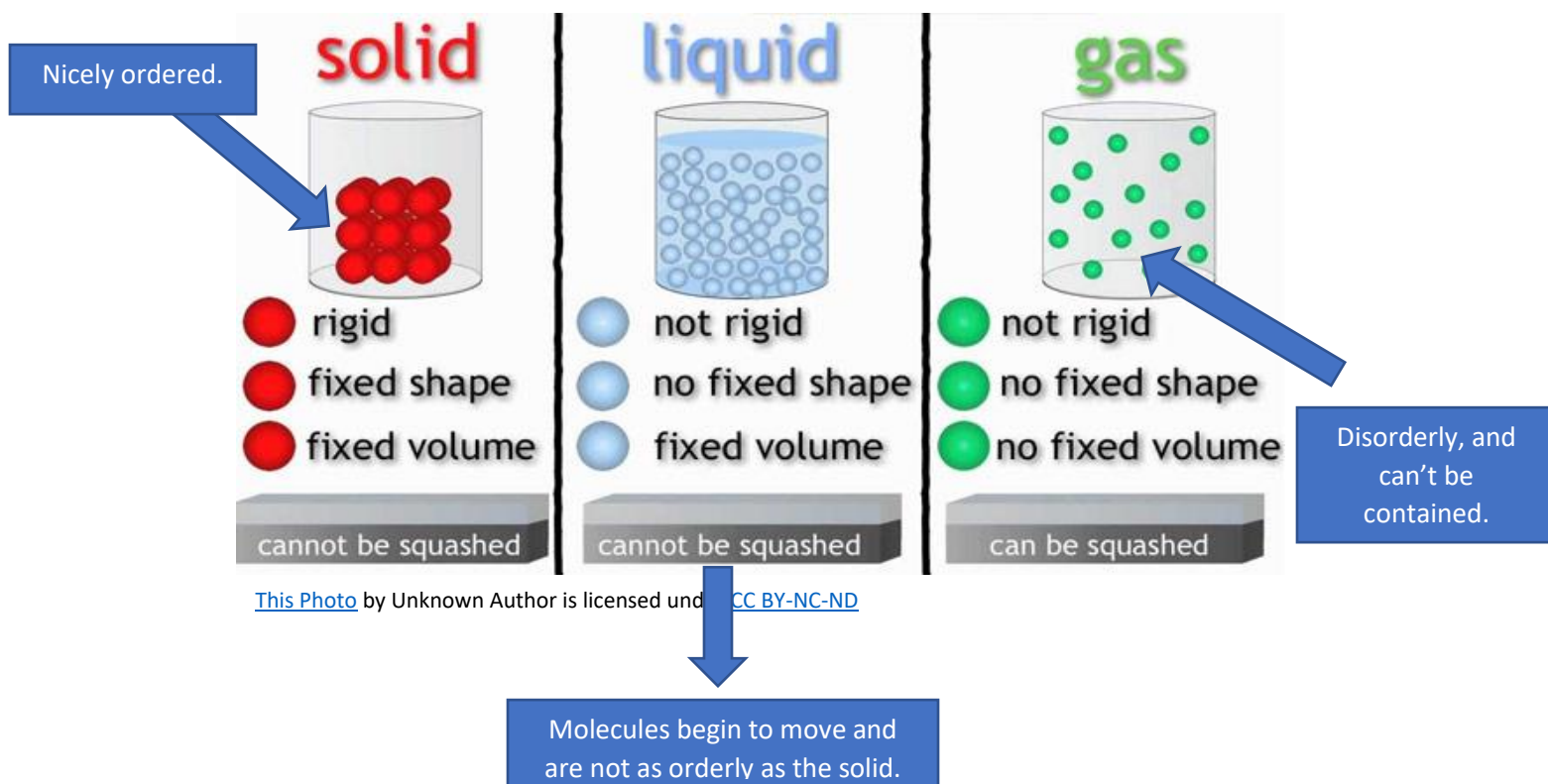
Are you a musical learner? Learn the jingle!

Check out the song here: [The Laws of Thermodynamics Jingle](#)

The Laws of Thermodynamics

*Def. **Thermodynamics**- the branch of physical science that deals with the relations between heat and other forms of energy (such as mechanical, electrical, or chemical energy), and, by extension, of the relationships between all forms of energy.¹*

There are three laws of thermodynamics and they are present all around you. Have you ever left a drink containing ice cubes outside at a summer cookout, only to return and find that the cubes were melted? Flipped a light switch to turn on the lights? Witnessed a thunderstorm? Well, what you are observing is science in action. When ice melts in your drink the first law of thermodynamics—which is the **law of conservation that states, energy cannot be created or destroyed, but instead energy is transferred**—is in action. The heat from the outside environment has transferred into the glass and melted the ice. The **second law of thermodynamics which states that entropy of any isolated system always increases**, has also occurred. **Entropy** is the idea that everything in the universe moves from order to disorder. It is the measure of change from order to disorder. When the ice melted, it went from a solid to a liquid. A solid has molecules that are more compacted (close together). A liquid has molecules that are more spread out and thus more disorderly than a solid with molecules that are more orderly. Take a look at the picture below:



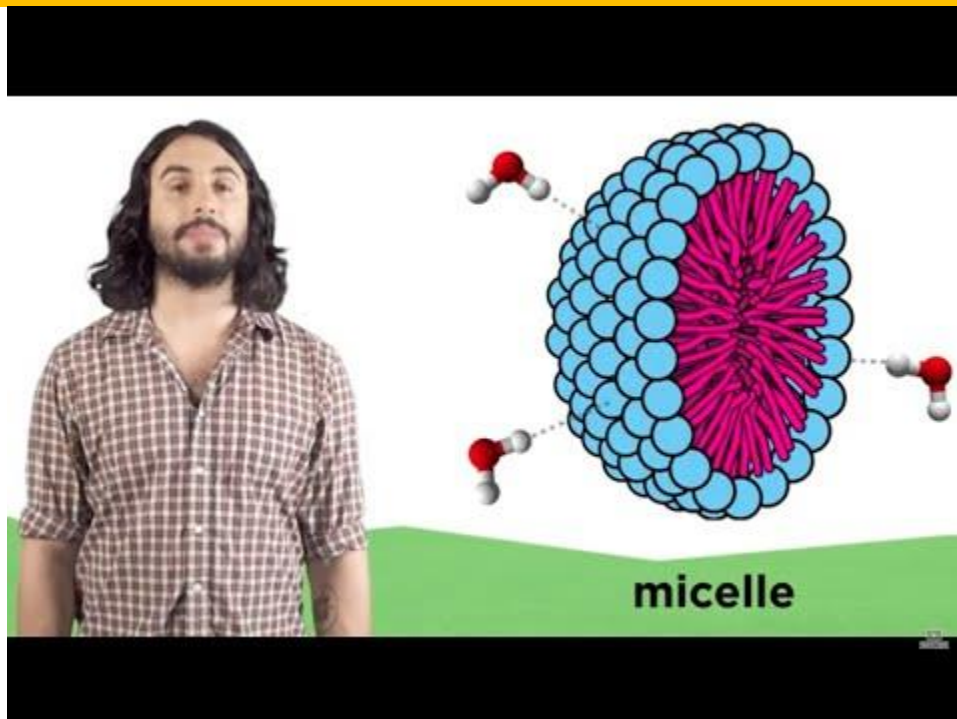
¹ www.dictionary.com

This is not just the case with the ice in your glass, but the universe is subject to moving from order to disorder. It is easier to have a messy room than a clean room. You naturally progress toward a messier room than one that is organized.

Flipping on a light switch requires electrical energy. Electrical energy is produced at an energy plant and comes from another source of energy like coal, natural gas, or nuclear energy that produces heat. Again, this is the first law of thermodynamics, which is the **law of conservation**. One source of energy is transferred to produce electrical energy to provide light in your home, building or any other space using electricity.

The third law of thermodynamics states that entropy of an isolated system is constant when absolute zero degrees Kelvin or -273.15 degrees Celsius. Well, what is an isolated system? An isolated system is a physical system that is removed from other systems and does not interact with its surroundings. This means the system is completely shut off from its environment, preventing **matter** from being transferred. Energy in an isolated system cannot be transferred. When cooking a pot of soup, if the pot remains closed with a lid, the heat from the burner transfers energy to the pot, and for this reason, it is not a closed system. However, if the soup is poured into a container with a lid placed on top, it is an isolated system. No energy is being transferred and the soup has no way for interacting with the environment to bring in matter. The state of the system is therefore constant.

Further Insight



Question & Answer Online → <https://www.onlinequizcreator.com/cfv-science-the-laws-of-thermodynamics/quiz-447638>

Write it Out!

1. What is the first law of thermodynamics?
 - a. The idea that everything in the universe moves from order to disorder. It is the measure of change from order to disorder.
 - b. The law of conservation that states energy can be created nor destroyed. Energy can only change forms.
2. What is **entropy**?
 - a. The idea that everything in the universe moves from order to disorder. It is the measure of change from order to disorder.
 - b. An isolated system that is constant.
 - c. The law of conservation that states energy can be created nor destroyed. Energy can only change forms.
3. When does entropy of an isolated system become constant?
4. Elijah wanted to take the marshmallows from the bag to make smores. His father agreed, and they sat by the campfire melting the marshmallows. Which law(s) of thermodynamics is/are taking place?
 - a. Laws 1 & 2- The heat is transferred into the marshmallows and causes them to melt, and consequently the marshmallows go from solid form to more of a liquid making it more disorderly.
 - b. Laws 2 & 3- The heat is transferred into the marshmallows and causes them to melt, and consequently the marshmallows go from solid form to more or a liquid, making it more disorderly and an isolated system.
 - c. Laws 1,2, & 3- The heat is transferred into the marshmallows and causes them to melt, and consequently the marshmallows go from solid form to more or a liquid, making it more disorderly and an isolated system.