

Re: Entropy confusion, please help!

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Uno Lapideus wrote:

Trying to explain entropy to kids, I find that I need some help with understanding the concept... The second law of thermodynamics is usually stated as "Heat (energy) flows from higher temperature objects to lower temperature objects, until thermal equilibrium is reached" (please correct me if I'm wrong here...), sometimes as "in a closed system, entropy (a measure of disorder) will always increase" and sometimes as "natural processes cause things to move from improbable and unstable orderly states (less entropy) to probable and stable disorderly states (more entropy)."

I have found that equating entropy with disorder can be very confusing....so don't do it. Every process will be less than 100% efficient, this is because some of the energy [or heat] that goes into driving the process will be lost and is no longer available to do work.

A prime example is a car engine....burning gasoline creates a great deal of energy, of which only about 25% is actually put into moving that car forward. The rest is lost as wasted heat that goes out the tailpipe, and is dissipated through the radiator and heats the air. Other losses are due to friction causing waste heat in brakes and other mechanical parts. All this wasted heat warms up the atmosphere, increasing its entropy.

This rule is true for every process....nothing is free from the second rule, it applies everywhere, all the time.

Ken

Now, for example, is not ice (water crystals) a "stable and ordered" form, liquid water a more random form, and steam the most chaotic form, of H<sub>2</sub>O molecule "order"? I also remember reading somewhere that "entropy is zero in an object that has no thermal

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motion, such as a fictitious crystal at 0 K"...

This is where I find confusion: Since heat indeed flows from hotter to colder objects, it seems to me that, at least in the water example, entropy goes from higher to lower... And if "absolute zero" is where we find the highest form of order (zero entropy), isn't universal entropy running from maximum disorder (big bang, with its very high temperature) towards minimum disorder (the absolute zero "heat death" of a completely "run down" Universe)?

Intuitively, I think of the atoms in a white-hot piece of iron as "moving more randomly" than does the atoms in a piece of iron that has been in a freezer for a few days. Likewise, I think of the state of affairs immediately following the "big bang" as a whole lot more chaotic than the absolute thermal uniformity of a Universe that, some time far in the distant future, has reached "absolute equilibrium"

Obviously, my thinking is flawed. Can someone please help me get this entropy stuff straight?

Many thanks in advance,

Uno