

2nd law of thermodynamics

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Second Law of Thermodynamics The second law of thermodynamics is a general principle which places constraints upon the direction of heat transfer and the attainable efficiencies of heat engines. The second law is based on human experience, for example: -Hot frying pans cool down when taken off the stove; -Iron rusts (oxidizes) in the air; -Air in a high-pressure tire shoots out from even a small hole in its side to the lower pressure atmosphere; -Ice cubes melt in a warm room. In each of those processes energy spontaneously disperses from being localized to becoming spread out if it is not hindered from doing so. The historical origin of the second law of thermodynamics was in Carnot's principle, so it refers to a cycle of a Carnot engine. It states that the efficiency of a quasi-static or reversible Carnot cycle depends only on the temperatures of the two heat reservoirs, and is independent of the working substance. A Carnot engine operated in this way is the most efficient possible heat engine using those two temperatures. It is impossible to extract an amount of heat Q_H from a hot reservoir and use it all to do work W . Some amount of heat Q_C must be exhausted to a cold reservoir. This precludes a perfect heat engine. This is sometimes called the "first form" of the second law, and is referred to as the Kelvin-Planck statement of the second law.

It is not possible for heat to flow from a colder body to a warmer body without any work having been done to accomplish this flow. Heat energy will not flow spontaneously from a low temperature object to a higher temperature object. This precludes a perfect refrigerator. The statements about refrigerators apply to air conditioners and heat pumps, which embody the same principles. This is the "second form" or Clausius statement of the second law.

Entropy measures the spontaneous dispersal of energy: how much energy is spread out in a process, or how widely spread out it becomes — at a specific temperature. **YOU SHOULD ADD THE ENTROPY FORM OF THE SECOND LAW**

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