

AP 2 Thermodynamics WS 7

Name: _____ Period: _____



"You should call it **entropy**, because nobody knows what entropy really is, so in a debate you will always have the advantage."

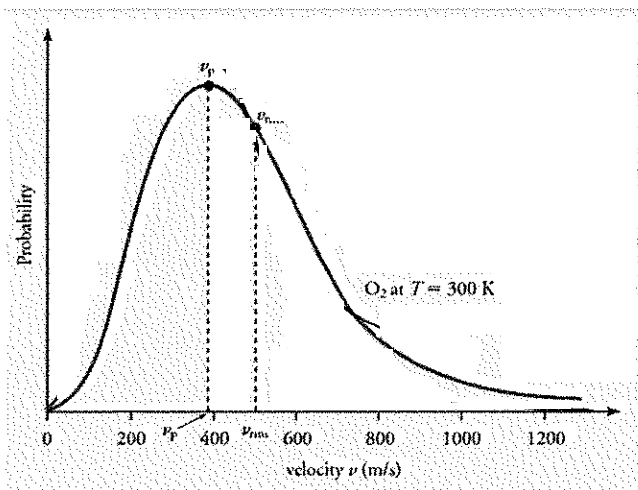
— John Neumann (c.1939), suggestion to Claude Shannon on what to call his new formula for information [6]

"There is no concept in the whole field of physics which is more difficult to understand than is the concept of **entropy**, nor is there one which is more fundamental."

— Francis Sears (1950), *Principles of Physics I: Mechanics, Heat, and Sound* [8]

1. A steel rod has a length of exactly 20 cm at 30°C. How much longer is it at 50°C? [Use $\alpha_{\text{Steel}} = 11 \times 10^{-6} / \text{C}^\circ$.]

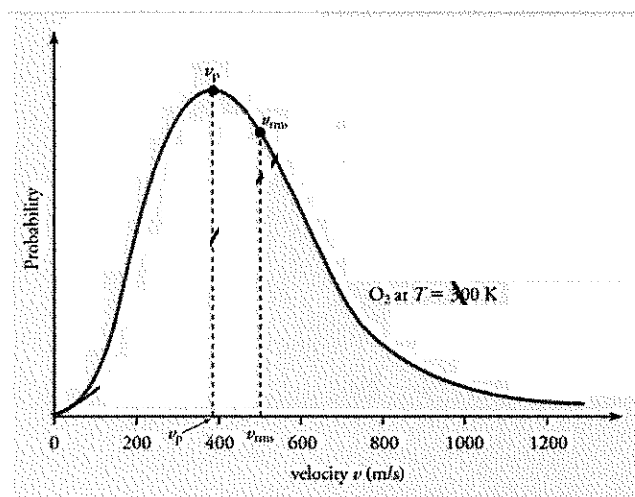
- An aluminum flagpole is 33 m high. By how much does its length increase as the temperature increases by 15 C°? [Use $\alpha_{\text{Al}} = 23 \times 10^{-6} / \text{C}^\circ$.
- The Pyrex glass mirror in the telescope at the Mt. Palomar Observatory has a diameter of 200 in. The temperature ranges from -10°C to 50°C on Mt. Palomar. Determine the maximum change in the diameter of the mirror. [Use $\alpha_{\text{Pyrex}} = 3.2 \times 10^{-6} / \text{C}^\circ$.]
- Name and describe the three ways that heat can flow from one object to another.



5. The graph represents the probability distribution for the velocity of atoms of Oxygen gas (28 g/mol) at 300 K.

a. On the graph draw a qualitative graph of the velocity distribution for Oxygen gas at a temperature of 150 K. Explain why the graph has the qualities you represented.

b. On the graph draw a qualitative graph of the velocity distribution for Helium gas at a temperature of 300 K. Explain why the graph has the qualities you represented.



6. A. Describe entropy. B. Give 2 examples of things that cannot happen because the 2nd law of thermodynamics would be violated, but not the first. C. What is the change in entropy for a complete thermodynamic process?