L 16 Thermodynamics-1

- This unit deals with one of the most practical aspects of everyday life – how we use energy
- We do not create energy, but transform it from one form into another
- These transformations should be done as efficiently as possible, since natural resources are limited
- These issues include science, but political and economic considerations as well







THERMODYNAMICS

- The science dealing with *heat, work and energy*
- The study of *heat energy* and its transformation into *mechanical energy*.
- Is a set of a few basic <u>empirical</u> (based on observations) rules that place limits of how these transformations can occur, and how *efficiently* they can be carried out.

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Some of the topics we will cover

- · What is temperature?
- · How is it measured?
- What is heat?
- What is internal energy?
- What is the difference between internal energy, temperature, and heat?
- <u>Applications:</u> engines, refrigerators, air conditioners, human body, electric power production systems, the atmosphere

















Work can change internal energy

- When one object is rubbed against another, work is done and heat is produced
- When a gas is compressed its internal energy is increased; when it expands, its internal energy decreases
- The internal energy of a system can change if work is done on the system or heat is transferred to it. (1st Law of Thermo.)

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Absolute zero – as cold as it gets!

- There is nothing particularly significant about 0°C or 0°F.
- Is there a temperature scale where 0 really is ZERO the lowest possible temperature?
- YES It is called the <u>KELVIN</u> scale.
- It doesn't get any colder than 0 K!
- At zero Kelvin, all molecular motion stops.
- We can see this from the behavior of gases, where pressure decreases with temperature.

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