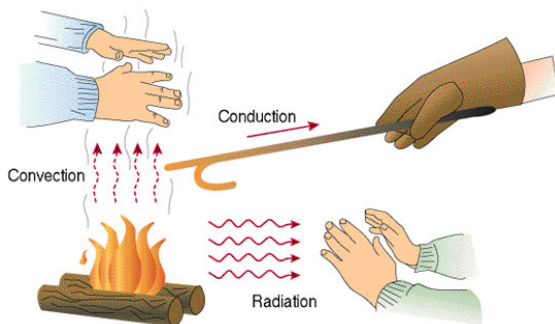


Heat transfer

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Introduction to heat transfer

What is Heat Transfer?



Heat transfer is a process by which internal energy from one substance

transfers to another substance. [Thermodynamics](#) is the study of heat transfer and the changes that result from it.

[Heat](#) can be transferred from one place to another by three methods: conduction in solids, convection of fluids (liquids or gases), and radiation through anything that will allow radiation to pass. The method used to transfer heat is usually the one that is the most efficient. If there is a temperature difference in a system, heat will always move from higher to lower [temperatures](#).

Different Methods of Heat Transfer

Conduction:

Conduction
Energy is transferred by direct contact.



Conduction occurs when two objects at different temperatures are in contact with each other. Heat

flows from the warmer to the cooler object until they are both at the same temperature. Conduction is the movement of heat through a substance by the [collision](#) of molecules. At the place where the two object touch, the faster-moving molecules of the warmer object collide with the slower moving [molecules](#) of the cooler object. As they collide, the faster molecules give up some of their energy to the slower molecules. The slower molecules gain more thermal energy and collide with other molecules in the cooler object. This process continues until heat energy from the warmer object spreads throughout the cooler object. Some substances conduct heat more easily than others. Solids are better conductors than liquids, and liquids are better conductors than gases. Metals are very good conductors of heat, while air is very poor conductor of heat.

Example: Whenever you touch something that is hotter or colder than your skin, e.g. when you wash your hands in warm or cold water.

Convection:

Convection
Energy is transferred by the mass motion of molecules.

gas takes the place of the warmer areas which have risen higher. This cycle results in a continues circulation pattern that transfers heat to cooler areas.

Example: You see convection when you boil water in a pan. The bubbles of water that rise are the hotter parts of the water rising to the cooler area of water at the top of the pan. You have probably heard the expression "Hot air rises and cool air falls to take its place" -- this is a description of convection in our atmosphere. Heat energy is transferred by the circulation of the air.

Radiation :

Both conduction and convection require matter to transfer heat. Radiation is a method of heat transfer that does not rely upon any contact between the heat source and the heated object. For example, we feel heat from the sun even though we are not touching it. Radiation is a form of energy transport consisting of [electromagnetic waves](#) traveling at the speed of light. No mass is exchanged and no medium is required.



Objects emit radiation when high energy electrons in a higher [atomic level](#) fall down to lower

energy levels. The energy lost is emitted as light or electromagnetic radiation. Energy that is absorbed by an atom causes its electrons to "jump" up to higher energy levels. All objects absorb and emit radiation. When the [absorption](#) of energy balances the [emission](#) of energy, the temperature of an object stays constant. If the absorption of energy is greater than the emission of energy, the temperature of an object rises. If the absorption of energy is less than the emission of energy, the temperature of an object falls.

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Reference links:

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- <http://www.en.wikipedia.org/wiki/temperature>
- <http://www.physics.about.com/od/energyworkpower/f/KineticEnergy.htm>
- <http://physics.about.com/od/glossary/g/heat.htm>

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