

Thermal Energy by Gareth Jones

Temperature is a measure of the movement of the particles in the solution or object. It measures the kinetic energy of the particles, and how fast they are moving.

Thermal Energy is the measure of the total energy contained within the solution, so the kinetic energy of all the particles added up together. This means that a solution of greater mass and the same temperature of one of smaller mass, the temperature is the same as the particles are moving the same amount, but the thermal energy is larger in the larger object.

Thermal energy can be transferred through solids by CONDUCTION.

1. Metal Cross



The centre of the cross was heated and the thermal energy was conducted along the branches of the cross. At the end were thumb tacks attached to the cross by wax. As the heat was conducted along the wax melted and the tack fell off. Metals are good conductors because they have electrons which are free to move around the metal. Unlike non-metals, which are insulators, which conduct heat by one particle vibrating, and making the one next to it vibrate, which is inefficient. In the metals these free electrons can quickly move meaning that the thermal energy is conducted more quickly. The metals fell off in the following order: Copper, Aluminium, Brass and Steel.

2. Wills Hand



Here, although the water boils and gets very hot you can safely hold the end of the test tube because the glass which the tube is made of is an insulator. This means that it does not conduct thermal energy very well. Each particle has to vibrate the one next to it. This is a very slow way of conducting electricity because there are no free moving electrons in the glass.

3. Ball and ring



When the ball is at room temperature it can easily fit through the ring. When it is heated the bonds between the particles of the metal which makes the ball are weakened and the particles begin to move apart. As the gaps between the particles increase the ball expands and becomes too large to fit through the gap. If you then cool the ball by placing it in cool water the ball will lose energy heating the water, and so the gaps between the particles will decrease.

4. Bimetallic Strip



A Bimetallic strip is made from two strips of metal welded together. The Bimetallic strip has one side made from one metal and another made from a different metal. If you heat the strip

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one metal conducts the heat energy more efficiently and so the gaps between the particles expand more rapidly. Because one metal is expanding more rapidly than another the bar bends in the direction of the metal which is the worse conductor.