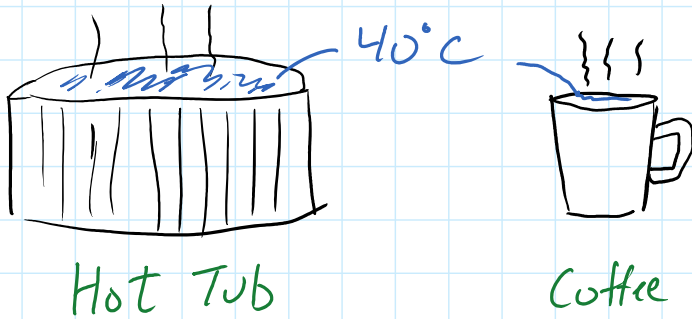


Heat Energy

Thursday, April 27, 2017 1:52 PM



Which one has more heat energy?

Heat Energy: is the total energy stored inside matter, the ^{total} E_k of the molecules.

Temperature: is the average E_k of the molecules

Heat energy flows from high concentration to low concentration.
(temp) (temp)

- 1) Conduction: particles in contact (solid, liquid)
- 2) Convection: movement of fluid (liquid, gas)
- 3) Radiation: a wave, infrared

Energy required to heat an object.

$$\Delta E_h = m \cdot c \cdot \Delta T$$

↑ heat energy ↑ mass (kg) ↑ Temperature ($^{\circ}\text{C}$, K)

specific heat capacity,

- a measure of the amount of heat energy needed to raise 1 kg of material by 1°C

- units are $\frac{\text{J}}{\text{kg}^{\circ}\text{C}}$

- Table P.248

Ex Determine the energy needed to raise 10kg of ice from -30°C to -10°C .

$$\begin{aligned} E_h &= m \cdot c \cdot \Delta T \\ &= (10\text{kg}) \left(2060 \frac{\text{J}}{\text{kg}^{\circ}\text{C}} \right) (20^{\circ}\text{C}) \\ &= 412,000 \text{ J} = 412 \text{ kJ} \end{aligned}$$

Ex If 27 kJ of heat energy is added to 4.0kg of lead at 10°C , what would be its new temperature?

$$\begin{aligned} \Delta E_h &= m c \cdot \Delta T \\ \frac{27000 \text{ J}}{4(130)} &= \frac{(4.0\text{kg})(130)}{4(130)} \Delta T \end{aligned}$$

$$10^{\circ}\text{C} + 52^{\circ}\text{C} = 62^{\circ}\text{C}$$

$$52^{\circ} = \Delta T$$