

Ch 5 HW: Written; Reinf Wks Sec 5.1  
Sec 5.1A

obj: How do we calculate changes in thermal energy?

### Heat

- A transfer of Thermal energy

\* Work is a transfer of ME.

- Heat always flows from warm objects to cold objects.

\* Heat flows from Hot to Cold.

- Insulators - materials which slow the transfer of Thermal Energy

\* R-Value - Higher R-Value the better the insulator.

### Heat Capacity

- The amount of Heat needed to change the temperature of an object.

\* Heat Capacity depends on the object.

\* Depends on the mass of the object.

Specific Heat

- The specific heat is the amount of energy needed to change a 1kg substance by 1°C.  
\* Depends on the object but not on the mass.
- Specific Heat allows us to calculate the change in Thermal Energy

$$Q = m \Delta T C_p$$

$Q$  = Heat or Change in Thermal Energy

$m$  = mass of the object

$C_p$  = Specific Heat of the Object

$\Delta T$  = Change in Temp.

$$\Delta T = T_f - T_i$$

- \* Specific Heat is a physical Property for the object.

How much Heat is needed to change 1kg of water by 10°C

Known

$$m = 1 \text{ kg H}_2\text{O}$$

$$\Delta T = 10^\circ\text{C}$$

$$C_p = 4180 \text{ J/kg}^\circ\text{C}$$

Unknown

$$Q = ?$$

$$\begin{aligned}
 Q &= m \Delta T C_p \\
 &= 1 \cancel{\text{kg}} (10 \cancel{^\circ\text{C}}) (4180 \text{ J} / \cancel{\text{kg}^\circ\text{C}}) \\
 &= 41800 \text{ J}
 \end{aligned}$$

- Energy cannot be created or destroyed.

\* Conservation of Energy.

- The Heat Lost by the hot object  
is gained by the cold object.

$$Q_{\text{Lost}} = Q_{\text{gained}}$$

Conservation of Energy!