

# Specific Heat

- An energy exchange that is *not* describable by work is **heat**,  $Q$
- Adding this heat to an object changes its temperature  $Q = mc\Delta T$   
 Specific heat
- Objects in a system can exchange heat (+ is gaining energy, - losing)

# Heat Problems

- Objects can exchange heat by contact
- They will eventually reach temperature equilibrium
- If isolated system, objects exchange heat with each other, net exchange is zero  
( $Q_1 + Q_2 + \dots = 0$ )

# Latent Heat

- At certain temperatures (depending on material), adding or removing heat doesn't change the temperature
- Instead, the phase (type of behavior of the substance) changes
- Amount of heat required to fully change phase depends on mass and **latent heat** of material

$$Q = mL$$

# Types of Latent Heat

- Solid  $\leftrightarrow$  liquid: **latent heat of fusion**
- Liquid  $\leftrightarrow$  gas: **latent heat of vaporization**
- Solid  $\leftrightarrow$  gas: **latent heat of sublimation** (rare)
- Sign of  $Q$  depends on direction: “hotter” phases require pos.  $Q$ , “cooler” neg.  $Q$
- For all three, energy required to change phase usually large compared to energy required to change temp 1 K

# Example: Boiling Water