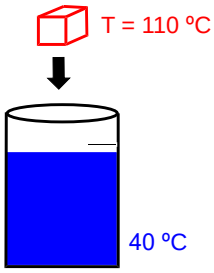
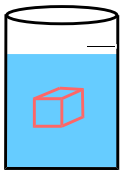
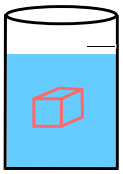
**CONCEPT:** THERMAL EQUILIBRIUM (SIMPLIFIED)

- **Thermal Equilibrium** is when two substances in physical contact with one another are at the _____ temperature.
  - □ At the same temperature, these two substances would no longer exchange *thermal energy*.

## Thermal Equilibrium

| Initial States | Heat Transfer | Final States |
|---|---|---|
|   | ● Heat moves from _____ to _____ object  ____ $q_{lost\ (Object)}$ ____ $q_{gained(H_2O)}$ | ● Eventually thermal equilibrium is reached.  ____ $q_{object}$ = ____ $q_{H_2O}$ ____ $m \cdot c \cdot DT$ = ____ $m \cdot c \cdot DT$ |

- Under *ideal thermal equilibrium*, heat transfers only occur between the solvent and immersed heated object.

**EXAMPLE:** If 50 g block of lead at 250 °C is submerged in a solution at 90 °C, the final temperature of the solution will be:

a) Equal to 90 °C b) Greater than 90 °C c) Less than 90 °C

**PRACTICE:** If 53.2 g Al at 120.0 °C is placed in 110.0 g $H_2O$ at 90 °C within an insulated container that absorbs a negligible amount of heat, what is the final temperature of the aluminum? The specific heat capacities of water and aluminum are 4.184 J/g · °C and 0.897 J/g · °C, respectively.