Specific Heat Capacity (Often just Specific Heat) is a physical property of a specific element or compound and is measured in J/g·˚C. Given the symbol Cp. This would be used when specific masses are known for what is changing temperature.

Example: 125 g of water is heated from 10.0˚ C to a temperature of 20.0˚ C.

q = m Cp ΔT

Heat Capacity is a reference to the amount of energy required to change the temperature of a combination of elements or compounds and is measure in J/˚C. Given the symbol C Used when we do not necessarily know masses but just know something about the entire system that is changing temperature.

Example: A 3.5 g sample of Benzene is placed in a bomb calorimeter and burned. The calorimeter has a Heat Capacity of 3.5 kJ/C˚. The temperature of the calorimeter increases by 4.6 C˚.

q = CΔT

**The biggest confusion is that sometimes authors use the term Specific Heat Capacity, which is technically correct, but not commonly used.**

Sometimes problems can be meticulous:

A bomb calorimeter contains a copper bomb with a mass of 450 g and contains 2500 g of water (or 2.5 kg of water). Here the q calculation would involve two parts, the amount of heat that changes the temperature of the bomb and the amount of heat that changes the temperature of the water:

q = m Cp ΔT (Cu) + m Cp ΔT (H2O)

These are the most tedious problems and do not appear on the new AP Exam (yet).

Dissolution Calorimetry Example

3.50 g of CaCl2 is dissolved in a calorimeter that contains 150 g of water that is initially at 20.0˚ C. The final Temperature of the calorimeter is 24.2˚ C.

a) Determine the amount of heat involved in the reaction. Is the reaction endo- or exothermic?

b) How much heat would be involved in dissolving one mole of CaCl2?

Another way to look at the problem:

3.50 g of CaCl2 is dissolved in a calorimeter that has a heat capacity of 696 J/˚C. The temperature of the calorimeter increases by 3.75˚ C.

a) Determine the amount of heat involved in the reaction. Is the reaction endo- or exothermic?

b) How much heat would be involved in dissolving one mole of CaCl2?