

"THE HEAT GOES ON!"

Equations to Calculate Heat Loss or Gain

Case 1. Measurement with a calorimeter

$$q = C_{\text{cal}} \Delta T$$

Case 2. From the standard enthalpy change of a reaction

$$q = n \Delta H^{\circ}_{\text{react}}$$

Case 3. For heating or cooling a single phase of a substance

$$q = \text{mass} C_{p,\text{subst}} \Delta T$$

Case 4. For a phase change of a substance

$$q = n \Delta H^{\circ}_{\text{phase}}$$

For any process, heat system + heat surroundings = 0.

So, to use a calorimeter to measure the enthalpy of reaction:

$$C_{\text{cal}} \Delta T + n \Delta H^{\circ}_{\text{react}} = 0$$

Or, to measure heat transfer between two substances:

$$\text{mass}_1 C_{p,\text{subst1}} \Delta T_1 + \text{mass}_2 C_{p,\text{subst2}} \Delta T_2 = 0$$