Thermodynamics and Calorimetry – Study Guide

*sections 5.1 and 5.2 in OpenStax*

**Energy (section 5.1)**

In an endothermic process, heat is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(released or absorbed).

In an exothermic process, heat is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(released or absorbed).

A combustion engine burning fuel is an example of an endothermic or exothermic reaction?

The **heat capacity** of a system is calculated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The units of heat capacity are \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Heat capacity is used for objects. Does a big or small cast iron pan have the larger heat capacity?

The **specific heat capacity** has units of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

It is used for substances, such as those in Table 5.1.

What is the equation that relates heat (q) to temperature change?

If the substances in Table 5.1 were all supplied with the same amount of heat (q), which would you be willing to touch?

Using dimensional analysis, convert the specific heat capacity of water (4.18 J/g °C) to the **molar heat capacity** (J/mol °C).

**Calorimetry (sections 5.2)**

**Heat Exchange at Constant Pressure (Coffee-Cup Calorimeter)**

qsoln = msoln x Cs,soln x ΔT qrxn = -qsoln

In the above equation, Cs,soln represents \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and its units are\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***Watch the video tutorial on*** [Coffee-cup Calorimetry](https://www.youtube.com/watch?v=EhqvVTvuwnM&feature=youtu.be)

Read through Example 5.5 and then attempt the following problem.

Calculate qrxn for the reaction that occurs when 25.0 mL of 1.00 *M* HCl are added to 25.0 mL of 1.00 *M* NaOH in a coffee-cup calorimeter at room temperature (25.0oC). The final temperature of the solution was 31.4oC. Assume that the density of the solution is 1.00 g/mL and that Cs,soln is 4.18 J/g.oC.

*(ans -1340 J)*

**End of Chapter 5 Practice Problems**

#7, 9, 11, 25, 27, 31

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”