

Lab Partners (First Name & Last Initial):

#1                      #2.                      #3.                     

## Design Investigation and Procedure

### The Question We will try to answer:

Different for every group

### Materials List:

Detailed and different for every group

### Background Information Related to Our Investigation:

Explain at least three relevant science concepts that need to be considered in answering the research question.

1) (p 484 and 537) First Law of Thermodynamics because this law states that energy cannot be created or destroyed. It can only change form. In our investigation we are running chemical reactions. Chemical reactions are sources of energy because potential energy in the matter making up the reactants transfers energy when it is transformed into new compounds. Burning wood, for example releases the stored energy in the wood out to the surroundings in the form of heat and light. In our first lab we observed that energy transfer can also occur when a compound is dissolved in water. The direction of heat flow is determined by measure temperature change before the reaction and the final temperature of the mixture.

P 494-When heat is given to an object it can cause the object's temperature to increase. The temperature increase or decrease I measure should be proportional to the amount of heat the object absorbs or releases. It turns out that the temperature change in an object is related to the amount of heat it absorbs or releases according to the equation:

$$q = m \times c \times \Delta T$$

2) (p 479) System and Surroundings because we need to be able to tell where heat energy is transferring to or from in order to categorize a chemical process according to the direction of heat transfer. The system is the matter we are interested in. Once you define the system, everything else is the surroundings. For example, in the first lab we did, the mixture of calcium chloride in water is the system and everything else is the surroundings.

3) (p. 479) Endothermic process, because AND/OR Exothermic process because chemists categorize chemical changes according to the direction of energy transfer. When the heat energy is transferred from the system out to the surroundings then the beaker feels hot and it is classified as an exothermic process. When heat energy is transferred from the surroundings into the system, the beaker feels cold and the process is called endothermic.

\*Required for '4'

4) \*Hess' Law because almost all chemical reactions either release or absorb energy and the energy stored in substances is called the enthalpy of that substance. The energy associated with a chemical reaction is the **change in enthalpy ( $\Delta H$ )**. It is possible to determine delta-H for a chemical reaction by experimentation, using bond energies, and the 3rd way uses Hess's Law is one of three ways to measure  $\Delta H$  for a reaction.

**Final Procedure (listed as steps):**

Different for every group

**Blank Data Tables (ready to fill-in during your investigation):**

Different for every group