# ***LESSON PLAN***

I. **Subject:** Physical Science, Chemistry
**Topic:** Chemical Reactions
**Grade**: 9-12

II. **Instructional Objective**:

The student will be able to after lecture and data collection on chemical reactions to identify them as either endothermic or exothermic processes.

III. **Course Outline**:

1. Endothermic Process
    a) A process that takes in heat during a chemical reaction.
2. Exothermic Reaction
    a) A process that gives off heat during a chemcial reaction.
3. Identifying processes through temperature change

IV. **Instructional Procedures:**

**Lesson Presentation:** Introduce the concept of endo/exothermic processes through chemical reactions. Give verbal examples of certain types of exothermic processes (i.e. rusting of metal) and endothermic process (i.e. ice pack)

Have the students go to there assigned laboratory stations where they will have setup a Palm handheld with the ImagiProbe software running.

Have students setup trial for the temperature probe for channel 1 ranging from -15$^{o}$C to 110$^{o}$C
Start one group with each a beaker of water. One group will do a chemical reaction with liquid water and ice water.
2nd group will perform a chemical reaction with sodium hydroxide (NaOH) and water.
Make sure both groups set their investigations on their handhelds on preview to gain a perspective on how the temperature probe with the handheld gathers real-time data.
Groups will place the probes in water until a constant temperature (ambient water temperature) is shown, then have the students select "Collect" to actually start collecting data. Have each group pour their substance inside the beakers of water after about 30 to 40 seconds. For the NaOH, make sure a plastic spoon is used to handle the contents.
Students will use the probes to stir the contents inside the water then wait until the temperature becomes constant after changes take place. Students will press the stop

button and obtain a graph of their information. Students will repeat process with each substance. Instructor should handle the sulfuric acid and sodium hydroxide during the lab period.

V. **Assessment**: Examine student graphical results and roundtable discussion of results.

VI. **Materials**: Sodium Hydroxide (NaOH), Water, 4-250 ml Pyrex Beakers, Spoon, Ice, Sulfuric Acid($H_2SO_4$), Safety glasses, lab aprons, 2-m130 Palm handhelds, Imagiworks software/hardware and 2-Temperature Probes.

VII. **Sunshine State Standards/CBC Codes:** SSS (SC.B.1.4.2, SC.B.1.4.3)

VIII. **Extensions**

- Write out the chemical equations for the reactions and use the appropriate symbols in the equation.

- Try placing NaOH inside the sulfuric acid solution and observe and changes in temperature using the temperature probe.