Lesson 11: Experiment with choice of chemicals to use in final project design (Focus is on amount of chemical to use)

Objective: Students will be able design an experiment to test the amount of heat released by a chemical reaction, then choose chemicals (and amounts to use) for their final project and provide justification for their choice.

Learning Goal: Chemical reactions can be classified as exothermic or endothermic depending on if energy is released or absorbed.

Vocabulary: Exothermic, endothermic, reactant, product, compound, energy

Engage:

1. In groups, students are given the chemicals they chose to test for their final project design of self-warming/cooling device from lesson 7.
2. Students are asked to create a list of materials (and amounts) needed for the experiments and create a procedure that will serve as the directions for their experiment (students will be performing these experiments to justify their choice of chemicals for final project). Students will be given 25 grams and 50 mL of chemicals to experiment with. Students are asked to measure at least 2 different amounts of chemical to use with the same amount of liquid, and then to change amount of liquid at least once)
3. Students will then create a hypothesis to predict the result of the experiment.

Explore:

4. Students practice reading their procedure to other group members, and with materials (except for chemicals at this point) to see if members of group can follow the procedures and no steps are missing. --- Other option: Groups can give procedures to other groups to follow to ensure all steps are included and all safety procedures followed.

Explain:

5. Teacher demonstrates following a procedure to produce a chemical reaction (baking soda and vinegar or other reaction), highlighting important/necessary steps that must be included in all students' procedures and materials (i.e. safety precautions, temperature measured, amount of chemicals to use, etc.)
6. Optional: Teacher then asks a student group to read their procedure and to see if the procedures are complete.
7. Teacher ensures procedures include step to measure how long the reaction produces heat.

Elaborate:

8. Students revise procedures as necessary to ensure reliable results, no steps are missing, and safety precautions are followed.
9. Students create a data table that will be used to record their results (includes temp. change, amount of chemical used, and time of heat production).
10. Students identify other groups with the same chemicals used and different chemicals used to discuss results after experiments are completed.

Evaluation:

11. Students' procedures and experimental design will be assessed when experiments are performed.