| CATEGORY | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| **Formulate a question** | A question was formulated that leads to a clear investigation of the observed phenomena. | A question was formulated that may lead to a clear investigation of the observed phenomena. | A question was formulated that may lead to an investigation of the observed phenomena, but essential components are omitted. | No question was proposed. |
| **Procedures** | Procedures are listed in clear steps. Each step is numbered and is a complete sentence. | Procedures are listed in a logical order, but steps are not numbered and/or are not in complete sentences. | Procedures are listed but are not in a logical order or are difficult to follow. | Procedures do not accurately list the steps of the experiment. |
| **Variables** | All variables are clearly described with all relevant details. | All variables are clearly described with most relevant details. | Most variables are clearly described with most relevant details. | Variables are not described OR the majority lack sufficient detail. |
| **Data** | Data to be gathered was clearly stated and appropriate. Nothing was left out. | Most data to be gathered was clearly stated and appropriate. Little to nothing was left out. | Data to be gathered was not clearly stated and/or appropriate. Items were omitted. | Data are not shown OR are inaccurate. |

3 D Assessment
Planning and Carrying Out an Investigation

Ken, Mike, Susanna and Kathy observed their science teacher place calcium chloride, baking soda and a small vial of liquid universal indicator in a ziplock bag. The teacher sealed the bag and spilled the liquid. The students observed the changes that took place. Based on their observations, the students wanted to determine what materials caused the various reactions they observed and decided on a plan to follow. They also determined the chemical reaction and wrote the following equation:

$$2NaHCO_3 + CaCl_2 \Rightarrow CaCO_3 + CO_2 + 2NaCl + H_2O$$

Answer the following questions based on the scenario above. Provide evidence and explanation for your responses.

1. What Science & Engineering Practice was the main focus of the scenario? Explain.

2. What is the phenomenon the students encountered? Explain.

3. When the students wrote out the chemical equation, what Crosscutting Concept was being emphasized? Explain.

4. Provide examples of questions students might develop if they chose to focus on the Science & Engineering Practice of Asking Questions.

5. How might this activity be changed into an engineering problem?