

**Can't Judge a Powder**  
SJ County Event Clarifications  
Science Olympiad 2011

1. I will follow the rules in the manual.
2. Safety requirements will be strictly followed (I will dismiss any students without goggles, aprons, long pants, or close-toed shoes). Long-sleeved shirts are also required.
3. The focus will be on the quality of data and the ability of students to use data to answer questions (not on naming the powder). Look in the rules for examples of questions that might be asked and powders that might be tested.
4. Most questions will be straight-forward questions asking students to characterize qualities of the powder, BUT there will be one or two difficult tie-breaker questions.
5. Students may and should bring everything on the list in the coaches' manual. In addition, I recommend bringing spot plates.
6. They may not bring reference materials, calculators, pens, or pencils
7. As event leader, I will provide balances, a hot plate, 1M HCl, 1M NaOH, thermometers, distilled water, and writing implements.
8. Students should be able recognize when a precipitate is produced and be able to characterize it.
9. Student should understand the difference between observations and inferences (see attached).
10. The students should err on the side of over-documenting their observations with data and on being too specific in answering questions.

Please email me (Daniel Hadsall) at [dhadsall@lUSD.net](mailto:dhadsall@lUSD.net) if you have any questions.

### Observations

- Emphasize to students that the purpose of this lab is NOT to identify the powder. (That is the Science Crime Buster event-not this one)
- The purpose is to characterize the powder!
- This event hits all of the Middle School National Physical Science Standards.
- Therefore it is an excellent event to actually use in the classroom to teach observation and the difference between observation and inference

### Observations

- Students need to learn to write down observations, not inferences.
- Students need to be as specific as possible.
  - While both flour & cornstarch might at first glance be described as "white powders", flour is generally more of an ivory white or creamy white, whereas cornstarch is more bright white
- Students should be as quantitative as possible
  - Students should state how many grams of the substance were attempted to dissolve in how many ml of water and from what temperature to what temperature the water changed during how long a time

### Observations

- Students should do tests on the reagents they are given as well as the powder.
  - If you do not know for sure if the liquid you are attempting to dissolve the solid in does or does not conduct electricity, you can not say for sure what the solid did
  - If you do not know what the temperature of the liquid was before you start dissolving, you can not know by how much the temperature changed.

### Observation & Inference

- If the student attempts to dissolve the .1g of the powder in 1 ml of water and the temperature goes down from 22.1°C to 20.9°C, that is an observation
- If instead the student writes down that dissolving the powder is an endothermic process, that is an inference.
- You would use the first observation to answer the question of whether or not the dissolving is exothermic or endothermic.
- But you would get less points for answer 2