



BETA SESSION

All scientific experiments must contain a *CONTROL* group and at least one *EXPERIMENTAL* group.

EXPERIMENTAL group: A group where the variable under consideration is present and changed from experiment to experiment.

CONTROL group: A group where the variable under consideration is either absent or it is not changed from experiment to experiment. The *CONTROL* is necessary so we have a baseline to compare against our various experiments...

Note that it is critical that only ONE variable be present and changed in each experiment. If we want to test 10 different variables: we need at least 10 different experiments. If we want to test one variable, but change it 10 times: we need at least 10 different experiments.

TASK β -1: Recall the list of variables and hypotheses from your ALPHA Session. For EACH of your hypotheses, answer the following:

- 1) How do you propose we manipulate the variable being tested in the *EXPERIMENTAL* group?
 - Example: If students decided *SULFATE CONCENTRATION* was a variable to be tested, and they had determined the variable should range from 5911 ± 991 mg/L. Do they:
 - 1) Do one experiment which is always @ 4920 mg/L, and another which is always @ 6902 mg/L? Or,
 - 2) Do one experiment at the mean concentration of 5911 mg/L? Or,
 - 3) Do multiple experiments, each at a different sulfate concentration ranging from 4920 – 6902 mg/L?
- 2) How do you propose we construct the *CONTROL*?
 - Example: In the hypothetical experiment above, *SULFATE CONCENTRATION* was the variable being tested. In the *CONTROL*, the variable (*SULFATE*) can't be "absent" since that would be unrealistic for Martian soils; instead, the students would have to make sure it was not changed from experiment to experiment. But if we want to maintain a stable concentration of sulfate as our *CONTROL*, what should that stable concentration be? 4920 mg/L, 5911 mg/L, 6902 mg/L, or something else?