

1. **DESCRIPTION:** This event will focus on Soil Chemistry related to Environmental Chemistry.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

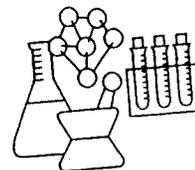
2. **EVENT PARAMETERS/CONSTRUCTION:**

a. **Students may bring:**

- i. A non-programmable calculator and a pencil.
- ii. Each student may bring one 8.5" X 11" sheet of paper with handwritten notes on both sides.

b. **Supervisors will provide:**

- i. Instrumentation to analyze environmental chemicals.
- ii. Chemicals.
- iii. Whatever other laboratory ware may be necessary.
- iv. Standardized curves to interpret the results from the analysis.
- v. Event supervisors will be expected to instruct students in the use of the provided instrumentation.



- c. **Safety Requirements:** Students **must bring and wear** the following or they will not be allowed to participate: close-toed shoes, OSHA-approved chemical splash goggles with indirect vents, pants or skirts that cover the legs to the ankles and a lab coat or apron that reaches below the knees. Gloves are optional. Students who unsafely remove their safety clothing/glasses or are observed handling any of the material or equipment in a hazardous/unsafe manner (e.g., tasting or touching chemicals or flushing solids down a drain and not rinsing them into a designated waste container provided by the supervisor) will be disqualified from the event.

3. **THE COMPETITION:** This event will consist of a series of experiments and questions at stations or a single bench on these Environmental Chemistry topics:

- a. This year the students will be expected to use the instruments and/or chemicals the event supervisor provides to analyze soil and/or "digested" soil samples. Actual hazardous materials may not be used, but experiments to simulate the presence of hazardous materials are permitted.
- b. Students will be expected to use the results of analyzed soil to make recommendations to obtain maximum yield for different types of plants in different areas of the garden.
- c. Students will be expected to know the chemical formulas of the 3 main components of NPK fertilizer.
- d. Students will be expected to know which chemicals are absolutely necessary, which are vital, and which chemicals need to be present in trace quantities.
- e. Given the main mass components of a pesticide, students will be expected to identify if the mass spectrograph of a purified sample from a soil sample is that pesticide.

4. **SAMPLE QUESTIONS:** Students may be given several different soil or "digested" soil samples with probes and/or chemicals and asked to determine what fertilizer/chemicals should be added to give the highest yield of tomatoes, or lettuce, or corn. Or students might be asked to analyze the samples for presence/absence of trace minerals or contaminants. Students may be given a mass spec of a pure substance and the main components of a pesticide and asked if the pesticide is present.

5. **SCORING:** Points will be awarded for correct answers and/or proper technique. Time may be limited at each station, but time will not be used as a tiebreaker or for scoring. All ties will be broken by a predetermined event supervisor selected question.

RECOMMENDED RESOURCES: Science Olympiad Website and CPCD at www.soinc.org