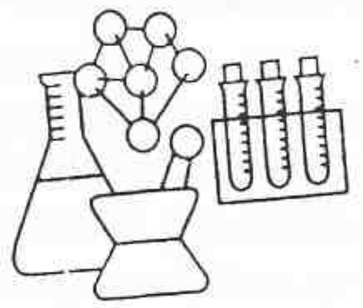
ENVIRONMENTAL CHEMISTRY

Read the General Rules in the manuals and on www.soinc.org as they apply to every event.

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:**
   a. **Students may** bring:
      i. A non-programmable calculator and a pencil/pen.
      ii. Each student may bring one 8.5" X 11" sheet of paper with handwritten notes on either or 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. 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 will 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.

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.

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 www.soinc.org
http://education.ti.com/educationportal/activityexchange/activity_list.do?cid=us

NATIONAL SCIENCE EDUCATION STANDARDS:

- Natural Environments may contain substances (e.g., radon or lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.
- Students should understand the risks associated with natural hazards, with chemical hazards (pollutants in air, water, soil, and food), with biological hazards, and with personal hazards.
- Causes of environmental degradation and resource depletion vary from region to region and from country to country.
- Risk analysis considers the type of hazard and estimates the # of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.
- Societal challenges often inspire questions for scientists' research, and social priorities often influence research priorities through the availability of funding for research.