

## X. Earth Science

### Avoiding Mechanical, Electrical, and Other Hazards

Earth/space science is an applied science based on many concepts from chemistry and physics. Teachers should become familiar with the precautions in these disciplines found in chapters III through VII and XI. Because Earth/space science relies on remote sensing for observations and data collections, teachers must also be knowledgeable about the hazards inherent in the instruments used for these procedures.

#### A. Mechanical Hazards in Earth Science

1. **Disposal** – Do not flush sand, silt, clay, rocks, and other earth materials down the drain. These materials are not soluble in water and may clog the drain. Dispose of them in a trash can or other suitable receptacle.
2. **Force Measuring Devices** – Students must be careful when projecting objects (steel balls or marbles). The area should be clear of all obstacles. The devices are used mainly to illustrate laws of motion.  
▶ See Chapter IV.A, Eye Protection Concerns.
3. **Sling Psychrometer** – Care should be exercised in using this device. Be sure thermometers are securely fastened.
4. **Rocketry** – Take special care when launching a rocket.  
▶ See Chapter XI.H, Rocketry.
5. **Rocks and Minerals** --When using acids to test minerals, wear protective safety goggles and flush the sample with water after testing. Wear goggles and aprons when breaking up rock and mineral samples. When breaking up rocks and minerals, place the specimens in a heavy canvas bag, use the proper geologic hammer, and wear goggles.
6. **Stream Tables** – Be sure that adequate receptacles are available to catch water flow and that all hoses and tables are free of leaks. Use only electrical equipment designed for stream tables to reduce the risk of electrical shock.
7. **Wind Generating Devices** (Hair Blower, Electric Fan, etc.) – Take special care in using wind generating devices. As these devices are often used with water, they present a risk of electric shock. No one should disconnect, connect, or operate these devices with wet hands or while standing on a wet

#### EARTH/SPACE SCIENCE ACTIVITIES ARE SAFE WHEN . . .

- activities are selected and planned with student safety in mind.
- students are taught the appropriate use of equipment.
- protective equipment is available and used as necessary.
- care is taken in the selection and use of reagents.
- hazards are anticipated and cautions taken to ensure proper functioning of equipment.

floor. Devices having metal housings should be grounded.

## B. Electrical Hazards in Earth Science

Certain devices used in earth science present electrical hazards. These include batteries, power and extension cords, and various electrical equipment.

►See Chapter XI.B, Electrical Hazards.

## C. Light Hazards

### 1. Magnesium Ribbon

Students should not look directly at the flame when a magnesium ribbon is being burned. The extreme brightness can damage the eyes.

### 2. Sun

Radiation from the sun poses an immediate danger to the eye. Do not view the sun directly for any reason. The sun's radiation will be concentrated and burn the retina. This can cause partial or total blindness. Polaroid lenses, welder's goggles, sunglasses, smoked glass, fully exposed photographic film, tinted glasses, and pinholes are not safe for viewing the sun or an eclipse of the sun. Only by indirect methods can a solar eclipse be observed without risking damage to the eye. You may project an image of the sun onto a piece of paper after the image passes through a pinhole or telescope. Photographing an eclipse of the sun requires numerous precautions. Do not observe the sun through an unprotected camera viewfinder. Those interested in such photography are referred to Kodak publication AM-10, *Solar-Eclipse Photography for the Amateur*.



### 3. Telescopes and Binoculars

Eyepieces of shared telescopes and binoculars should be cleaned periodically to reduce the risk of the transmission of eye infections. Never observe the sun directly through a telescope or binoculars.

### 4. Ultraviolet Lamps

Special glasses (such as those coated with an ultraviolet absorbing film) should be used when examining mineral samples with an ultraviolet lamp. Only special goggles clearly designated for the purpose of absorbing ultraviolet light should be used.

►See Chapter XI.F.4, Radiation Hazards–Ultraviolet Radiation.

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## D. Field Studies

Earth/space science students are frequently involved in outdoor activities such as collecting, mapping, making weather observations, hydrologic studies, and using optical equipment.

►See Chapter VIII, Outdoor Safety – Field Studies.