

**Science Safety in
Elementary Schools**

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Science safety in the elementary classroom is imperative and teaching children to conduct investigations appropriately and with safety in mind provides students with a foundation in good science practice.

Additional Resources:

<http://www.chemistar.com/Teacher/labsafplan2022802.pdf> (scroll down to a section on elementary science)

http://www.csss-science.org/downloads/scisaf_cal.pdf

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Chemicals in the Classroom

- Teachers are required to have access to the Material Safety Data Sheets (MSDS) for the chemicals stored in their classrooms.
- The MSDS forms should be housed in a central location, such as the nurse's office, for access by all campus staff.
- MSDS Information:
 - Includes the chemical properties of a substance.
 - Explains proper procedures for handling or working with a particular substance.
 - Includes physical data (melting point, boiling point, flash point etc.) and describes toxicity, health effects, first aid procedures in case of exposure, reactivity, safe storage, disposal, protective equipment, and spill/leak cleanup procedures.



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An MSDS describes the properties and potential safety hazards on a specific chemical substance. Information on this sheet includes toxicity, reactivity, storage, disposal, and physical data. MSDS sheets may be housed in a central location, such as the nurse's office or another administrative area. If needed, a photocopy can be made of certain MSDS sheets to be kept in the classroom.

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Safety Above All Else

Safety takes precedence over all else.
A safe environment must be provided
for every student and employee.

Source: Houston Independent School District's Core Ideology: Purpose, Strategic Intent, Goals, and Core Values, Primary Goal 3: Provide a Safe Environment.



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Safety first is one of the core values of the Houston Independent School District, and should also be considered in all settings where scientific investigations are being conducted.

Source: HISD's Core Ideology. <http://www.houstonisd.org/Page/32469>

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What Is TAC?

- TAC, or Texas Administrative Code, is a compilation of all state agency rules in Texas.
- One TAC category, Title 19, contains rules related specifically to education in Texas.
 - These rules cover the following.
 - Protective eye devices
 - Hazardous substances
 - School laboratory facilities



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TAC is an acronym for the Texas Administrative Code.

The TAC lists all of the rules, standards, and regulations that should be implemented in the state of Texas. Under the TAC category for education there are rules describing the use of protective eye devices, hazardous substances, and school laboratory facilities. Thus, the use of proper safety procedures in the science classroom falls under the jurisdiction of state law.

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What Is an MSDS?

An MSDS, or Materials Safety Data Sheet, is a description of properties and potential safety hazards of a specific chemical substance.

MATERIAL SAFETY DATA SHEET

MANUFACTURER: Home-Gearing Fiberglas Corp., Franklin, Ohio 43029
PHONE (800/NUMBER): 800-424-4300
PRODUCT DESCRIPTION: Trucoat Asphalt Division
DATE REEVALUATED: February 26, 1991
REVISIONS MADE: April 4, 1986

HEALTH (ACUTE/CHRONIC TOXICITY & IRRITATION DATA):
LD50 (RAT PO) (M): 1470-2400 MG
LD50 (RAT PO) (F): 4470-10400 MG
LD50 (RAT PO) (M): 1470-2400 MG
LD50 (RAT PO) (F): 4470-10400 MG

SECTION I - COMPONENT DATA

SECTION NUMBER	CHEMICAL NAME	CAS NUMBER	CONCENTRATION	HAZARD	REGULATORY	OTHER
1	Petrolene Asphalt	8002-424-4	100	None (Asphalt)	5 mg/m ³ 8-hr TWA (Asphalt Fumes)	None
2	Hydrogen Sulfide	Hydrogen Sulfide			1000, 50 ppm	10 Minute max.

SECTION II

PRECAUTIONS: Avoid Inhalation to Breathe Air. Irritation. If not breathing, administer artificial respiration.

SKIN CONTACT: IF THE PRODUCT IRRITATES THE SKIN, IMMEDIATELY WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS. IF OVEREXPOSURE OCCURS, WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS. IF THE SKIN IS IRRITATED, WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS. IF THE SKIN IS IRRITATED, WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS.

SECTION III - FIRE AND EXPLOSION DATA

FLASH POINT (°F): 400 for asphalt
BOILING POINT (°F): 300 for asphalt
FLAMMABLE LIMITS (LFL): LFL: Not determined
UFL: Not determined

SECTION IV - HEALTH HAZARD DATA

ACUTE TOXICITY: Irritation, skin contact, and eye contact.

HEALTH HAZARD CHARACTERIZATION: Irritation, skin contact, and eye contact.

ADDITIONAL INFORMATION: Contact product may contain asbestos. These with any chronic nose, throat, or lung irritation, cough, wheezing, or asthma. See Section VII for health hazards of Hydrogen Sulfide in confined spaces.

HAZARD STATEMENT: Irritation, skin contact, and eye contact.

PRECAUTIONS: Avoid Inhalation to Breathe Air. Irritation. If not breathing, administer artificial respiration.

SKIN CONTACT: IF THE PRODUCT IRRITATES THE SKIN, IMMEDIATELY WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS. IF OVEREXPOSURE OCCURS, WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS. IF THE SKIN IS IRRITATED, WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS. IF THE SKIN IS IRRITATED, WASH OR WIPED THE AREA IN WATER TO REMOVE EXCESS.

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What Is ANSI Z87.1?

- ANSI is the acronym for the American National Standards Institute.
- The ANSI Z87.1 standard sets forth requirements for the design, construction, testing, and use of eye protection devices, including standards for impact and penetration resistance.



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Safety First

- Safety is the first science objective for every elementary grade.
- Always follow your school and district guidelines.
- Focus on safety practices before, during and after classroom and field investigations.
- Every investigation conducted during the school year requires some safety considerations.



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Safety should be the first consideration when conducting science in the classroom. District and school guidelines should be followed and proper safety protocols should be followed before, during, and after the investigation. Different investigations will have different safety risks associated, but every investigation conducted requires some safety considerations.

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Science Safety Activity

- As a group, examine the cartoon on the next slide. Identify all potential safety hazards you see. Then, list those hazards on your recording sheet.
- You have 5 minutes to write down as many hazards as you can spot.
- After 5 minutes, discuss in a large group all the safety hazards in the cartoon.



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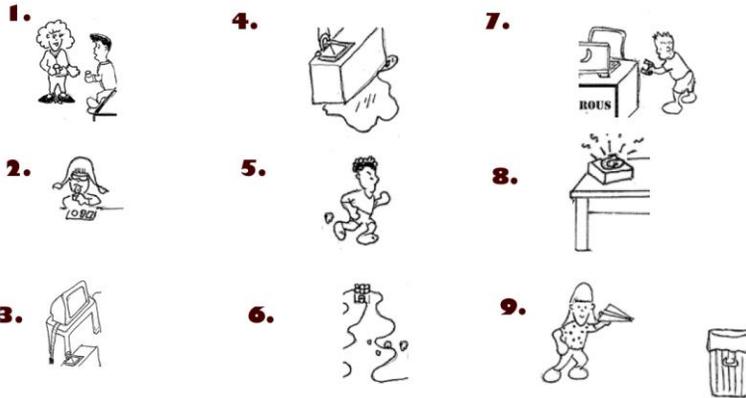
Science safety in the elementary classroom is not only a suggestion, it is a law.

To address safety considerations it is helpful to show students a picture of a science classroom and have them identify what is safe and what is unsafe. Students may also be asked to brainstorm possible safety hazards in their own classroom.

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Safety Activity Results: 1-9



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1. The teacher is inattentive and not supervising classroom, and also is holding a beverage when the consumption of food and drink are not allowed in the science classroom.
 2. Students should not ingest or inhale any of the substances they are working with unless specifically asked to.
 3. Heavy equipment is not secure.
 4. Spill on the classroom floor which poses a slipping hazard.
 5. Running in the science classroom.
 6. Electrical cords are in a high traffic area and could possible trip students.
 7. Magnets can damage electrical equipment and could be a safety issue.
 8. A burner is left on, potentially a burn or fire hazard.
 9. Throwing objects across the room is a safety hazard and could potentially harm a student.
-

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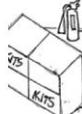
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Safety Activity Results: 10-18

10.



13.



16.



11.



14.



17.



12.



15.



18.



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10. Student is wrapped up in a loose electrical cord which poses a tripping hazard.
11. Student is inattentive and not sitting properly on stool.
12. Animals in the classroom should be handled with care and students should be supervised when around the animals.
13. Fire extinguishers should be in an easily accessible place in case of an emergency.
14. Chemicals should never be ingested as they may be potentially hazardous.
15. Stools in the aisle pose a tripping hazard.
16. Students climbing onto ledges or shelves to grab items poses a falling hazard, and could lead to heavy furniture falling on top of them.
17. First aid kits and other emergency supplies should be in an area where it can be accessed easily.
18. Students should use gloves, aprons, goggles, and other safety equipment when needed.

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Science Safety Posters

- Use symbols to remind students about safety policies during science investigations.
- Have students collaborate to create their own posters about safe practices and equipment.



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Science safety posters can be used to remind students of the different safety precautions that need to be considered when conducting an investigation. Children can create their own safety rules to encourage personal responsibility of safety practices. Teachers can then present explicit science rules in the form of science posters created by the students.

A complete set of large classroom and laboratory symbols, suitable for printing signs, may be found on BioEd Online at:

<http://www.bioedonline.org/library/supplemental-materials/classroom-and-laboratory-safety-signs/>

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Teacher Responsibilities

Teachers have three basic responsibilities (always follow school and district guidelines).

- Instruction
 - Provide developmentally appropriate and accurate instruction.
 - Exercise good judgment in planning and conducting investigations.
- Supervision
 - Never leave students unattended.
 - Monitor and act upon unsafe behavior.
- Maintenance
 - Use appropriate, well-maintained equipment.
 - Establish a regular inspection schedule for equipment and a review schedule for safety procedures.



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Safety involves instruction – how the investigation is designed. Teachers should consider potential safety risks when planning investigations to be used in the classroom.

Supervision is also an important factor providing a safe environment. It is the teacher's responsibility to monitor students and act upon any unsafe behavior that is observed.

Maintenance of equipment used in investigations is also important to ensure student safety. Equipment should be inspected for any flaws which might make them potentially unsafe for use. A regular inspection schedule can help to reduce the probability that a defective piece of equipment will be used in an investigation.

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Safety Equipment vs. Science Tools

- Safety equipment is for personal protection.
- Know in advance what safety equipment to use in a given situation and how to use that equipment appropriately.



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Safety equipment is used for personal protection only. It is important for teachers and student to know which equipment is appropriate for a given investigation and also know how to use the safety equipment.

When deciding which piece(s) of safety equipment to use, the best place to refer to is the horizontal alignment planning guide, also known as the HAPG. It gives specific details on what is needed per grade level for the classroom.

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Safety Equipment for the Classroom

- First aid kit (one per room)
- Fire extinguisher (one per room)
- Fire blanket (one per room)
- Eye/face wash (one per room)
- Safety gloves (gardening, latex, vinyl or nitrile, beginning in 4th grade, according to HAPG)
- Material Safety Data Sheets (one set per school)
- Lab aprons (one per student, beginning in 5th grade, according to HAPG)
- Approved safety goggles (one pair per student; frame should be stamped "Z87.1" to indicate approval by American National Standards Institute)
- Safety goggle disinfectant



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Some safety equipment should be found in every classroom, this includes a first aid kit, fire extinguisher, fire blanket, and eye wash. Safety gloves are also needed, though the specific type needed is not specified. Gardening gloves can be used for outdoors and latex gloves are typically used when handling various chemicals. If there are students with a latex allergy, vinyl or nitrile gloves may also be used.

Rubber aprons may also need to be used depending on the type of investigation being conducted. Plastic or rubber apron is recommended as a canvas apron can absorb some types of chemicals.

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Goggles

- When to Use
 - Use goggles if there is a chance of particles or projectiles hitting the face, such as when using sand or balls.
 - Use goggles to prevent eye injury from chemical splashes (chemical could be something as simple as vinegar).
- ANSI Z87.1
 - The frame of the safety goggles should be stamped “Z87.1” to indicate approval by American National Standards Institute.
- Cleaning alternatives
 - UV sterilization cabinet
 - Safety goggle disinfectant



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A pair of safety goggles is needed for each student. The American National Standards Institute designates the standards for safety use only goggles that are stamped “Z87.1” are approved for classroom use.

Impact glasses are not ideal for use as they do not prevent eye injury in case of chemical splashes. Safety goggles, which provide protection all around the eye, are a much better alternative.

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Safety Object Wall

Create a safety object wall to help students recognize when to use various pieces of safety equipment.



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A strategy that can be used to make safety an integral part of the classroom is creating a safety object wall. Images or actual safety equipment can be posted on a board and labeled appropriately. Have students discuss what the different safety equipment is used for and refer to the safety equipment wall as needed when conducting investigations.

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Safety Contracts

- Safety contracts emphasize appropriate, safe behaviors in the science classroom.
- Provide each student with a copy of the safety contract and an explanatory letter to take home. Have the contract signed by a parent or guardian. Keep this information on file.



Science
Grades 3-6
Safety Rules



1. Know the class emergency plan.
2. Follow the teachers written and oral instructions carefully. Ask questions if you do not understand what to do.
3. Do not taste, eat, drink, or inhale what you are told to do so.
4. Keep your hands away from your face and your hands of other science activities.
5. Always wear goggles when chemical risk of eye injury from flying objects.
6. Tell the teacher if you see something wrong.
7. Notify the teacher immediately if you see something wrong.

Sa

I have reviewed these safety rules and agree to follow these rules and any additional rules and/or teacher.

Student's Signature _____

Parent's Signature _____

Teacher's Signature _____

N

**NITSO ELEMENTARY SCIENCE
SAFETY CONTRACT**

I agree to -

- act in a responsible manner at all times in the laboratory.
- follow all instructions given by the teachers.
- use good housekeeping practices in the lab.
- know how to get help in an emergency (teacher, nurse, and principal).
- read each experiment carefully.
- wear goggles when needed.
- clean up spills right away.
- never taste or smell substances unless directed to do so by the teacher.
- handle sharp items carefully.
- handle all scientific tools correctly.
- put materials away when finished.
- wash hands of after each experiment.

Sign the appropriate spaces below and return to your teacher:

_____ have read and understood my teacher's safety rules, and I agree to abide by the safety regulations and any additional instructions, written or verbal, provided by the district and/or teacher.

Student Signature _____ Date _____

Parent Signature _____ Date _____



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Safety contracts can also be sent home with students and signed by the parent or guardian. In this way the student will have a sense of greater responsibility for their own actions in the classroom, and the contracts can be kept on file to remind students of their commitment to appropriate, safe behaviors in the science classroom.

Safety Contract Sources: Mesa Public Schools (AZ); Northside Independent School District (TX).

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Science Safety Notebooks

- Use a science notebook to facilitate student learning and encourage safe practices during science investigations.
- Include a safety section in students' science notebooks.
- Emphasize safety precautions in every investigation.



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A safety science notebook can be used to document safety procedures employed in the classroom. Or, have students include a safety section along with each investigation in their science notebooks, where they write down the safety precautions they used.

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Science Safety Resources

- *Safety in the Elementary Science Classroom Flipchart*
 - Available from the National Science Teachers Association at <http://www.nsta.org>.
- *Texas Safety Standards: Kindergarten Through Grade 12 Science*
 - Available from the Dana Center at <http://www.utdanacenter.org>.



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Safety in the Elementary Science Classroom Flipchart and *Texas Safety Standards: Kindergarten Through Grade 12 Science* are important resources to consider to gain more information on science classroom safety.

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