

CT State Community College,
Tunxis Campus

**CHEMICAL HYGIENE
PLAN**

2023-24

Summary

Authority

This Plan is intended to comply with OSHA Rules and Regulations 29 CFR 1910, available <https://www.osha.gov/laws-regs/regulations/standardnumber/1910>. It is also intended to comply with *NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals, 2019 ed.* and *NFPA 30 Flammable and Combustible Liquids Code 202 ed.* Additional standards have been established by the National Science Teachers Association and The American Chemical Society and these have been incorporated where necessary.

The CEO of CT State Community College Tunxis Campus has ultimate responsibility for chemical hygiene within the institution and must, with other administrators, the director of facilities, as well as faculty and staff, provide continuing support for institutional chemical hygiene.

Purpose

The Provisions of the Chemical Hygiene Plan shall be capable of protecting employees from health hazards associated with hazardous chemicals in the laboratory, and capable of keeping exposures below limits specified by OSHA. The Chemical Hygiene Plan shall be available to employees.

Instruction

All staff who are subject to provisions of this Plan shall receive training on compliance with requirements and knowledge of this Plan as well as proper procedures for safeguarding chemical hazards.

Physical Facilities

For the purpose of this plan, the total science laboratory area is 5610 ft² and the total stockroom area is 2120 ft². The laboratory units are sprinklered. Each laboratory unit has two exits.

The dental laboratories and clinic occupy a total area of xxx ft²

The NAPA rating of this Laboratory is **Class B (Moderate Fire Hazard)** and the total quantity of flammable liquids stored in the laboratories and stockrooms shall not exceed 600 gal or more than 800 gal of flammable and combustible liquids combined.

Science Laboratory Capacity

The National Science Teachers Association (NSTA) recommends that teacher-to-student ratios in science laboratories not exceed 1:24. They also recommend that the square footage in science laboratories not fall below 45 ft² /student. The American Chemical Society recommends that the area for each student be within the limits of 35-50 ft²/student. Additionally, there should be no less than 3 ft of linear bench space/student for general chemistry and 4.5 ft for organic chemistry. They also recommend that general chemistry laboratories be limited to 25 students and organic chemistry laboratories be limited to 20 students for each instructor. NFPA regulations require students to work in laboratories only under supervision of an instructor. In calculating the maximum number of students in each laboratory primary consideration was given to the space required for each student at the central student benches. The laboratory benches along the outside walls of each laboratory are designed for laboratory resources and do not provide sufficient gas, air, water and electrical utilities nor do they provide adequate bench space because of the overhead cabinets for student experimental stations.

Accordingly, the **Maximum number of students** in each laboratory should be:

Room 6-131, 1250 ft² By: 20 students

Room 6-137, 1250 ft² Biology: 20 students

Room 6-139, 1250 ft² Microbiology: 20 students

Room 6-147, 1250 ft² Chemistry 20 students general chemistry, 20 students organic chemistry, may not contain more than 60 gal flammable liquids nor more than 125 gal flammable and combustible liquids combined within a safety storage cabinet nor additionally a like quantity outside a cabinet.

Room 6-148, 1250 ft² Chemistry 20 students, capacities as above except this laboratory is not intended for organic students.

Room 6-156, 360 ft² Mini-Lab is not plumbed and shall not be used for experiments with chemicals or to store chemicals.

Supporting the laboratories are stock rooms and preparation rooms:

Biology:

Person responsible: Academic Associate, Labs

Room 6-132, 800 ft²

Room 6-133 200 ft²

Room 6-134, 200 ft²

Room 6-140, 200 ft²

Room 6-162, 200 ft² shall not be used for chemical storage.

Physics:

Persons responsible: Academic Associate, Labs

Room 6-140, 220 ft² shall not be used for chemical storage

Chemistry:

Persons responsible: Academic Associate, Labs

Room 6-144 225 ft² **primary chemical storage room**, may not contain more than 10 gal flammable liquids nor more than 20 gal flammable and combustible liquids within a safety storage cabinet and a like quantity outside of a storage cabinet.

Room 6-146 275 ft² **primary chemical preparation room**, may not contain more than 15 gal flammable liquids or more than 30 gal flammable and combustible liquids.

Dentistry:

Persons responsible: Program Coordinator, Dental Hygiene, Program Coordinator, Dental Assisting

Stockrooms and Work Areas

Each Stockroom or work area shall have one professional employee designated to be responsible for receiving, proper and secure storage, dispensing, and ultimate disposal of chemicals used in that stockroom; Safety Data Sheets for each chemical under their supervision are available online. These are freely available to any employee who uses these chemicals or who requests access. Designated stockroom personnel shall also ensure that any safety equipment needed for safe handling and dispensing of chemicals is available and serviceable.

Designated stockroom personnel are responsible for inventory and oversight of such areas.

Safety Equipment

Each laboratory shall have the following equipment:

- (a) Fume hood, with an airflow indicator installed. The exhaust duct must exit *not less than 7 ft above the roof surface*. Checked annually, tagged to verify.
- (b) Safety shower.
- (c) Eye wash fountain, checked monthly by third-party company, tagged to verify.
- (d) A fire extinguisher located by each exit. The approved fire extinguisher is carbon dioxide; in an emergency, a dry power type may be used. Liquid-type extinguishers are **not** approved and shall not be available in the laboratory area.
- (e) Fire blanket, which may be located adjunct to the laboratory, provided the location is clear.
- (f) Adequate sinks, suitable for cleaning glassware and washing hands is mandatory

Access to all safety equipment must be clear at all times. No equipment or supplies may be stored which hinders access to any safety equipment.

Maintenance

All safety equipment is to be checked regularly and noted in a bound log maintained by the Chemical Hygiene Officer.

- (a) Fume hood: annual inspection which is to include adequate air flow (face velocity), sealed duct work, motor, and fan and belt assemblies. This shall include a visual inspection of the hood interior, sash and air-flow indicator. Periodic maintenance work is to be scheduled at this time. A sign shall be affixed to each hood containing the following information: (a) inspection interval; (b) last inspection date; (c) average face velocity; (d) location of fan that serves the hood; (e) inspector's name. August is recommended.
- (b) Safety shower: monthly test for operation.
- (c) Eye wash fountain: monthly test for operation.
- (d) Fire extinguishers: as required by local regulations and after each use.
- (e) A fire blanket shall be located within easy access from the laboratory.

Chemical Storage, Handling, and Waste Disposal

When ordering chemicals, safety hazards shall be determined and this information transmitted to those responsible for receipt, storage, usage and disposal.

Secure storage will be provided for all chemicals. Each stockroom shall be under the control of one person.

Receiving, transporting, unpacking and dispensing of chemicals shall be done only by trained personnel.

MSDS shall be maintained for all chemicals and shall be readily available to staff.

No more than 600 gallons of Class I flammable liquids (flash point $<100^{\circ}$ F) nor 800 gallons including combustible liquids (flash point $>100^{\circ}$ F) may be used or stored in the laboratories, including quantities in storage cabinets and safety cans. Flammable and combustible liquids shall be stored in the containers supplied by the manufacturer or in appropriate safety cans; the maximum capacity of storage containers for flammable liquids shall be 1 gal. Flammable liquids may not be transferred to glass containers larger than 1 pt, nor combustible liquids to containers larger than 1 gal.

Neither more than 12 gas cylinders containing oxygen or flammable gas, nor 6 gas cylinders containing liquefied flammable gas may be used or stored in the laboratory work areas, excluding lecture bottles. The total number of gas cylinders, including lecture bottles, shall not exceed 40 cylinders.

Each refrigerator, freezer, or cooler shall be prominently labeled to indicate whether it is or is not suitable for storing flammable liquids. The labels shall read either:

Do not store flammable solvents in this refrigerator

Or:

Notice: This is not an explosion-proof refrigerator, but it has been designed to permit safe storage of materials producing flammable vapors. Containers should be well-stoppered or tightly closed.

Or, the appropriate manufacturer's label for explosion-proof refrigerators.

Containers of materials that may become hazardous upon prolonged storage shall be dated when first opened. At the end of six months, the material shall be evaluated or tested for continued safe use. Material found to be safe may be redated and retained for an additional six-month period. All other material shall be safely discarded.

Some chemicals require special rules:

Allergens, *e.g.*, isocyanates, and bichromates, shall be handled with gloves.

Embryotoxins, *e.g.*, lead compounds, and formamide, shall be handled, if by fecund women, only with gloves and only in a hood.

Chemicals of moderate chronic or high acute toxicity, *e.g.*, hydrofluoric acid, hydrogen cyanide, shall have inventory records of the amounts on hand, amounts used, and names of workers involved.

Acid storage shall be in approved cabinets. Nitric acid shall be stored separately from other acids. Oxidizing agents shall not be stored in proximity to flammable nor combustible chemicals.

Disposal of chemicals shall be into clearly marked containers in each laboratory unit and in compliance with OSHA requirements for the chemicals involved. No instructor shall schedule any experiment without prior establishment of appropriate disposal procedures. In general, laboratory manuals published after 1991 contain appropriate instructions for safe disposal. Where adequate guidelines are not specified, consult *National Research Council, Prudent Practices for Disposal of Chemicals from Laboratories*, National Academy Press, Washington, D. C., 1983. Experiments that were once common may no longer be allowed, *e.g.*, carbon tetrachloride, at one time a common solvent, now may not be used in any experiment. Proposed experiments and disposal procedures are to be reviewed with the Chemical Hygiene Officer prior to implementation.

The waste containers shall be handled in accordance with OSHA requirements.

Waste acids and bases may only be discarded into laboratory drains connected to neutralization tanks. These tanks shall contain limestone neutralization chips (size 1 in to 3 in, >95% calcium carbonate) and shall be inspected annually. A grab sample of effluent water shall be obtained with the inspection and the pH determined and recorded.

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