

1.0 Introduction and Scope

The purpose of this document is to provide health and safety information for hydrogen sulphide (H₂S).

Hydrogen sulphide has the chemical formula H₂S with the chemical structure H-S-H. Hydrogen sulphide is a colourless, poisonous and flammable gas with the smell of rotten eggs.

The following generic Code of Practice (COP) applies to all work areas within the University of Alberta that use hydrogen sulphide gas or where hydrogen sulphide containing materials (e.g. materials from upstream oil and gas operations) are present. It outlines responsibilities, safe work procedure and training, personal protective equipment and emergency response procedure requirements. All work areas where hydrogen sulphide is used or may be present within the University of Alberta must implement the requirements identified in this COP.

2.0 Roles and Responsibilities

2.1 Supervisors

- Identify research projects and experiments that use hydrogen sulphide (H₂S) or where H₂S may be present
- Assess hazards associated with the use of hydrogen sulphide in the specific project or experiment
- Implement appropriate engineering controls
- Develop safe work procedures
- Provide the necessary personal protective equipment to address the identified hazards
- Implement emergency response procedures that provide clear instructions on actions to take in the event of an emergency
- Train all workers that work with hydrogen sulphide so they understand the hazards associated with the use of hydrogen sulphide and the safe work procedures
- Ensure others present in the laboratory are aware of hydrogen sulphide hazards and the emergency response procedure
- Provide portable gas detectors and ensure they are calibrated and maintained as per manufacturer's recommendations
- Maintain records of all training provided.

2.2 Laboratory Personnel

- All workers using hydrogen sulphide must participate in training and follow the established safe work procedures.

2.3 Department Heads

- Ensure the elements identified in this Code of Practice are implemented
- Approve safe work procedures.

2.4 Environment, Health and Safety

- Assists departments in the development of safe work procedures, training and other matters related to the health & safety of University staff and students
- Provide current regulatory information updates necessary for compliance with Occupational Health & Safety legislation
- Review laboratory-specific safe work procedures as required.

3.0 Uses of Hydrogen Sulphide

The most common place H₂S gas found on campus is in calibration gas canisters for multi-gas detectors. The gas canisters contain 25ppm per canister and pose very little hazard to the user. More concentrated H₂S gas cylinders can be found in analytical labs, especially environmental labs, which conduct analysis of metal ions. You may discover other sources of H₂S gas on campus that are used for organic synthesis or precursors to metal sulphides, but most laboratories will choose to work with a less dangerous alternative. These concentrated cylinders of H₂S are stored in their own enclosures with an independent exhaust and fire suppression system.

4.0 Hazard Assessment, Identification and Control

4.1 Health Hazards

Hydrogen sulphide has the chemical formula H₂S with the chemical structure H-S-H. Hydrogen sulphide is a colourless, poisonous and flammable gas with the smell similar to rotten eggs.

It can be detected by smell at very low concentrations ranging from 0.01 – 0.3 parts per million. Detection by odour is not reliable because at high concentrations (e.g. 100 ppm), hydrogen sulphide deadens a person's sense of smell thus make it non-detectable.

Hydrogen sulphide is very quickly absorbed into the lungs. Short term exposure may cause irritation of nose, throat, eyes and lungs. The Alberta Occupational Exposure Limit (O.E.L) is 10 parts per million (ppm) for 8 hours and 15 ppm as a ceiling limit. The immediately dangerous to life and health (IDLH) concentration of 100 ppm has been established by the National Institute for Occupational Safety and Health (NIOSH). Alberta Workplace Health and Safety has published a bulletin, CH029 – Hydrogen Sulphide¹, which outlines the health effects of exposure to hydrogen sulphide.

4.2 Hazard Assessment

Supervisors are required to conduct hazard assessment of the research project or experiment to identify specific hazards and implement appropriate control measures. The University's [Hazard Assessment Form](#) may be used to record the results of your hazard assessment.

¹ Work Safe Alberta (August, 2010), Workplace Health and Safety Bulletin - Hydrogen Sulphide at the Work Site. Retrieved from <https://work.alberta.ca/documents/WHS-PUB-CH029.pdf>.

4.3 Hazard Controls

4.3.1 Elimination/Substitution

- Use of hydrogen sulphide should be avoided whenever possible
- If possible, substitute other less hazardous chemicals
- In the case that hydrogen sulphide must be used, engineering, administrative, and PPE controls must be in place.

4.3.2 Engineering Controls

- Engineering controls e.g. appropriate ventilation such as a properly functioning fume hood, ventilated gas cabinet or another type of local exhaust enclosure must be used to protect workers from potential exposures to hydrogen sulphide.

4.3.3 Administrative Controls

4.3.3.1 Safe Work Procedures

- Develop laboratory-specific safe work procedures that address the use, handling, storage, disposal of hydrogen sulphide. Include emergency response actions to be undertaken and by whom in the event of an accidental release or exposure. A [blank safe work procedure template](#) is available on EHS website
- All unattended experiments must be approved by the supervisor or department head
- Working alone with hydrogen sulphide is not allowed.

4.3.3.2 Signage

- Clearly indicate on the hazard signage on the laboratory door that hydrogen sulphide gas is in use in the laboratory. Indicate emergency contact information during work hours and after hours. University's standard laboratory hazard signage can be requested from EHS by completing the [hazard sign order form](#)
- Clearly indicate the area within the laboratory where hydrogen sulphide gas is used.

4.3.3.3 Monitoring and Follow-Up

- Hydrogen sulphide detectors are required in all areas that use hydrogen sulphide. All workers performing experiments involving hydrogen sulphide gas must have personal detectors on them when working with hydrogen sulphide. The detectors must be maintained and calibrated on a regularly scheduled basis as per the manufacturer's recommendations
- Any high levels of hydrogen sulphide detected must be reported and a review should be completed to prevent future occurrences.

4.3.3.4 Prevention of a Release

- Procedures should be developed to prevent a release of hydrogen sulphide.

4.3.3.5 Site Contacts

- Site contacts must be listed on the safe work procedures, signage, and emergency procedures.

4.3.4 Personal Protective Equipment

- Appropriate personal protective equipment (PPE) (e.g. gloves, laboratory coat or coveralls, air-tight goggles (hydrogen sulphide gas is irritating to the eyes) must be available
- Engineering controls such as local exhaust ventilation must be the first option to control exposures to hydrogen sulphide. If that is not possible then a full-facepiece positive pressure supplied air respirator is required for work areas where hydrogen sulphide concentrations exceed the 8-hour OEL of 10 ppm or the ceiling OEL of 15 ppm. NIOSH allows the use of air-purifying respirators for hydrogen sulphide ONLY FOR ESCAPE purposes at concentrations above 10 ppm and below 100 ppm. Workers must undergo health evaluation and fit testing before respiratory protection can be used.

4.4 Emergency Procedures

4.4.1 Emergency Procedures

- Lab specific emergency response procedures must be in place prior to using hydrogen sulphide.

4.4.2 First Aid Procedures

- Lab specific first aid procedures must be in place prior to using hydrogen sulphide.

4.4.3 Decontamination Procedures

- Lab specific decontamination procedures must be in place prior to using hydrogen sulphide.

4.5 Waste Handling Practices

- All waste products should be packaged as hazardous chemical waste and a pick-up request put through Chematix.

5.0 Worker Training

All workers working with hydrogen sulfide must be trained in safe use, storage, and handling of hydrogen sulfide gas. The training will include but not limited to:

- Understanding of the hazards associated with the use of hydrogen sulfide gas and the information contained in the hazard assessment documents and safe work procedures and how the hazards will be managed
- Selection, use and maintenance of the required personal protective equipment
- How to use the control measures e.g. fume hood operation and use, monitoring of scrub solution.
- Emergency response procedures to follow in the event of an accidental leak or exposure
- Use and maintenance of the H₂S detectors
- Fire extinguisher use

6.0 Review

This document should be reviewed within 1 year for any changes based on feedback or regulatory requirements. Once reviewed annually, additional review may only be required once every 3 years.

7.0 References and Additional Information

Workplace Health and Safety Bulletin - Hydrogen Sulphide at the Work Site.

<https://work.alberta.ca/documents/WHS-PUB-CH029.pdf>.

Alberta Occupational Health and Safety Act, Regulations and Code.

<http://work.alberta.ca/occupational-health-safety/ohs-act-regulation-and-code.html>