

# Assessment Opportunity

## The Safe Use of Fertilizers

Student name: \_\_\_\_\_ Date: \_\_\_\_\_

This is an **Assessment Opportunity**, which is used to evaluate your work based on established criteria and to assign a mark. Your teacher will provide you with feedback and a mark.

| Unit | Unit title                     | Level/Mark |
|------|--------------------------------|------------|
| 1    | Chemicals in Consumer Products |            |

### Learning goals

Here are some learning goals for this unit. We are learning to...

- Describe ways in which hazardous materials enter the body and explain the importance of personal protective equipment.
- Describe ways in which workers can address safety issues in the workplace.
- Understand the Workplace Hazardous Materials Information System (WHMIS) for the identification and labelling of hazardous substances.
- Understand and explain the proper use, storage and disposal of consumer products.
- Explain the environmental impacts of household products and identify alternatives.

Now is your opportunity to demonstrate your learning. There are three (3) tasks in this assessment opportunity.

### Task Overview

In this unit you have learned about the impact and use of chemistry in consumer products, including chemicals that you may encounter both at home and at work. In the previous assessment you imagined that you were an employee of a large fertilizer production company. In this task, you will resume that role and consider the safety precautions needed to work in such a factory, as well as the impact of fertilizer production and use on the environment.

### Task 1: Understanding Safety Data Sheets

As you have learned, the production of fertilizers sometimes involves the use of sulfuric acid,  $\text{H}_2\text{SO}_4$ . Sulfuric acid, particularly in concentrated solutions, should be

handled with extreme caution as it can cause harm if used improperly. To understand the precautions that you should take when working with this chemical, you should first refer to the SDS, found here. Use the SDS to answer the following questions.

1. What is the hazard pictogram and signal word for sulfuric acid?
2. How should sulfuric acid be stored?
3. What first-aid measures should be taken if sulfuric acid gets onto your skin?
4. How should a small spill of sulfuric acid be cleaned up?
5. What personal protective equipment should be worn when handling sulfuric acid?
6. What are the following physical properties?
  - a. Physical state
  - b. Colour
  - c. Odour
  - d. pH

### **Task 2: Workplace and Product Labels**

In your day to day use of sulfuric acid you have transferred some of the solution to a smaller container. You know, based on WHMIS 2015, that you must create a workplace label for the new container.

1. Create a workplace label for sulfuric acid that has been transferred to a smaller container.
2. Describe a scenario when a workplace label would not be required.
3. The sulfuric acid that you use in the factory will eventually become fertilizer used in both the agricultural industry and at home. Examine the household label for a common fertilizer and answer the following questions:
  - a. What is the hazard symbol, signal word, and hazard statement for the product?
  - b. What are the storage and disposal recommendations?
  - c. What environmental precautions should be taken when using this product?
  - d. List three (3) precautions for use.
  - e. What is the product name?

### **Task 3: The Environmental Impacts of Fertilizers**

The production of fertilizers is one of the most important chemical processes in the history of humanity. You can thank the Haber-Bosch process, and subsequently fertilizers, for the food in your fridge and kitchen cupboards. This process, first en-

gineered by German chemist Fritz Haber and later perfected by Carl Bosch, is a chemical reaction between atmospheric nitrogen,  $N_2$ , and hydrogen gas,  $H_2$ , that produces ammonia, a key component of fertilizers. Prior to the production of ammonia, countries had to rely on manure and specific plants called legumes to provide the nitrogen necessary for plant growth. While the production of fertilizer has allowed farmers to feed the world and support the Earth's growing population, its use also has caused significant environmental damage. In this task you will be researching the environmental impacts of fertilizer use.

You will write a 2-3 paragraph report outlining the impact of fertilizer on the environment. Your report should include:

- A minimum of one paragraph discussing the impact of fertilizer use on the environment, including how fertilizer affects aquatic organisms (for example: habitat, survival, aquatic oxygen levels) and water quality.
- One paragraph describing and explaining green alternatives for fertilizer use. This could include agricultural practices or “green” chemical substitutes for fertilizer use.
- A list of any sources (i.e. websites) used to obtain information.