

Test Course

Laboratory Safety

Final Report - Answer Guide

Institution	SI Curriculum Development University
Session	Test Course
Course	Test Course
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Test Your Knowledge

Match each term with the best description.

⚡ Fire blanket

⚡ Fire extinguisher

⚡ Fume hood

⚡ Safety Data Sheet

⚡ Spill containment kit

Tightly woven fabric used to smother and extinguish a fire

Consists of absorbent material that can be ringed around a chemical spill until the spill can be neutralized

Device used to control small fires in an emergency situation

Provides chemical, physical, health, and safety information regarding chemical reagents and supplies

Area containing an exhaust fan to expel noxious fumes from a laboratory

1

2

3

4

5

Correct answers:

- 1 Fire blanket 2 Spill containment kit 3 Fire extinguisher
4 Safety Data Sheet 5 Fume hood

Label each image with the correct term.

⚡ Burner fuel

⚡ Eye-wash station

⚡ Fire extinguisher

⚡ First aid kit

⚡ Safety shower



1

2

3



4

5

Correct answers:

- 1 Safety shower 2 Eye-wash station 3 First aid kit 4 Burner fuel
5 Fire extinguisher

Categorize each statement as true or false.

True	False
1	2

Correct answers:

1

Always wear safety goggles, long shirts and pants, closed-toe shoes, and gloves when conducting experiments.

Neutralize acid spills using sodium bicarbonate.

Paper towels and water are a good substitute for a spill containment kit.

2

Conduct experiments in a small, closed-off room, with no ventilation or water.

Induce vomiting and drink copious amounts of water if chemicals are ingested.

Exploration

For the most part, items in the lab kit are safe for use around children and pets.

☐ True

☐ False



The laboratory kit contains ____.

- ☐ small items that can be choking hazards
- ☐ chemicals that can cause burns
- ☐ sharp objects that can cause cuts
- ☒ All of the above

✓

Eating, drinking, and smoking during an experiment are never allowed.

- ☒ True
- ☐ False

✓

To better protect the body from chemical spills, wear ____.

- ☐ long-sleeved shirts
- ☐ full-length pants
- ☐ closed-toe shoes
- ☒ All of the above

✓

At home, a ____ is the best substitute for a laboratory safety shower.

- ☐ water can
- ☐ bottle of water
- ☐ kitchen faucet
- ☒ bathroom shower

✓

A Safety Data Sheet contains information about first-aid procedures, required protective equipment, and health effects.

- ☒ True
- ☐ False

✓

After using loops, swabs, toothpicks, spreaders or any other equipment to transfer cultures, immerse the contaminated equipment in ____.

- ☐ pure bleach ✓
 - ☐ a strong acid
 - ☐ tap water
 - ☐ All of the above
-

Burns can occur when skin comes in contact with ____.

- ☐ acids
 - ☐ bases
 - ☐ acids and bases ✓
-

Most pieces of glassware are designed to be heated.

- ☐ True
 - ☐ False ✓
-

To test the smell of a substance, hold container 8-10 inches from your nose, gently fan vapors toward you with your hand, and inhale through your nose.

- ☐ True ✓
 - ☐ False
-

If any chemical in the kit has been ingested, you should ____.

- ☐ call the Poison Control Center
 - ☐ seek a physician
 - ☐ both call the Poison Control Center and seek a physician ✓
-

Exercise 1

Data Table 1: Lab Safety Equipment Alternatives
(SAMPLE ANSWER BELOW)

Shower or Sink	Paper Towels	Well-Ventilated Area	No Substitution
Eyewash station	Spill containment kit	Fume hood	First aid kit
Laboratory shower			Safety goggles
			Fire extinguisher
No sample answer	No sample answer	No sample answer	No sample answer

Exercise 2

Data Table 2: Sodium Hypochlorite SDS information
(SAMPLE ANSWER BELOW)

Items	SDS Information
Physical State	Thin liquid
Route of Exposure & Symptoms	Inhalation, eye contact, skin contact, ingestion: may cause eye redness, tearing, and burns, skin redness and burns, coughing, and burns to the GI and respiratory tracts, nausea, vomiting, and diarrhea
Protective Equipment	Safety goggles or face shield, rubber or neoprene gloves, long-sleeved shirt, and if respiratory irritation occurs then respirator should be worn.
First Aid Procedures	Call poison control center immediately for treatment advice. Eye Contact - Hold eye open and rinse slowly and gently with water for 15-20 minutes, remove contact lenses after the first 5 minutes and continue rinsing. Skin Contact - Take off contaminated clothing and rinse skin with water for 15-20 minutes. Inhalation - Move to fresh air and call doctor if breathing is affected. Ingestion - sip a glassful of water if able to swallow. Do not induce vomiting unless told to do so by poison control center.
Fire-fighting Measures	Use extinguishing methods appropriate to local circumstances and surrounding environment. Do not use water spray to fight fire.
Chemical Reactivity	Reactive with other household chemicals including toilet bowl cleaners, rust removers, acids, or products containing ammonia to produce hazardous irritating gases, such as chlorine and chlorinated compounds.
Safe Storage	Store away from children and pets, reclose cap tightly, store in upright, cool, dry area away from direct sunlight.
Safe Disposal	Dispose in accordance with federal, state, and local regulations. Do not contaminate food or feed by disposal of this product.
Environmental/ Ecotoxicity	Very toxic to aquatic life with long lasting effects. Do not allow product to enter storm drains, lakes, or streams.
Spill Cleanup Procedures	Absorb and containerize. Wash residual down to sanitary sewer after contacting sanitary treatment facility to determine ability to process washed-down material.

Exercise 3

What are small-scale techniques?

Very small quantities of chemicals are used.

List 5 precautions that must be taken before beginning an experiment.

Any 5 of the following are acceptable:

- Read all procedures
- Review SDS
- Complete emergency contact card
- Wear proper clothing, tie back hair
- Wash hands
- Wear safety gear and appropriate clothing
- Find a safe place to work
- Lock doors
- Keep kids and pets away
- Cover workspace
- Open window for ventilation
- Examine glassware before using

As indicated in the video, what common substance can be used to neutralize a spilled acid?

Baking soda

According to the video, why should a used chemical container never be refilled?

Chemicals may be contaminated, causing unexpected experimental results.

Certain glass objects are not meant to be heated and could shatter if exposed to a heat source. What two examples of heat-sensitive glassware are given in the video?

Graduated cylinders and flasks

Exercise 4

Data Table 3: Part 1 and Part 2 of the Safety Contract
Initial each part to agree. (SAMPLE ANSWER BELOW)

Part	Agreement
Part 1: It is impossible to control students' use of SI Science products, related kits, and students' work environments. The author(s) of SI Science content, the instructors and institutions that adopt it, and Science Interactive, Inc. - the publisher and producer of SI Science - authorize the use of these educational products only on the express condition that the purchasers and users accept full and complete responsibility for all and any liability related to their use of same. Please review this document several times until you are certain you understand and will fully abide by its terms.	I agree:Student's initials
Part 2: I am a responsible adult who has read, understands, and agrees to fully abide by all safety precautions prescribed in SI Science labs for laboratory work and for the use of SI Science kits. Accordingly, I recognize the inherent hazards	I agree:Student's initials

associated with science experimentation; I will always experiment in a safe and prudent manner; and I unconditionally accept full and complete responsibility for any and all liability related to my purchase and/or use of a science SI Science kit or any other science products or materials provided by Science Interactive, INC.

Competency Review

Chemicals in a lab kit may potentially cause ____ if mishandled or consumed.

- ☐ burns
- ☐ serious illness
- ☐ death
- ☒ All of the above

✓

When conducting experiments that include vigorous exercise, consult a physician first or ask a partner to assist in participating if you are unable to do so.

- ☒ True
- ☐ False

✓

The ____ should be contacted immediately if you or anyone accidentally consumes or comes in contact with a potentially toxic substance.

- ☒ National Chemical Toxicity Center
- ☐ National Poison Control Center
- ☐ American Poison Chemical Society
- ☐ American Toxic Chemical Center

✓

At the conclusion of experiments involving growing bacterial cultures, ____ should be added to the plates or tubes and everything should be soaked for ____.

- ☐ pure acid; 1 hour
- ☐ a base; 30 minutes
- ☒ pure bleach; 2 hours
- ☐ pure bleach; 15 minutes

When working with acids, always ____ to avoid chemical splattering.

- ☒ add acid to water
- ☐ add water to acid

Acid spills can be neutralized by adding ____.

- ☐ water
- ☒ baking soda
- ☐ more acid
- ☐ distilled water
- ☐ All of the above

Graduated cylinders and volumetric flasks are designed to be heated.

- ☐ True
- ☒ False

A ____ can be used to douse a fire.

- ☐ fire extinguisher
- ☐ safety shower
- ☐ fire blanket
- ☐ fire blanket and fire extinguisher
- ☒ All of the above

Chemicals may be returned to their containers after they have been dispensed.

- ☐ True
- ☒ False ✓

Normal eyeglasses may be worn to substitute for safety goggles.

- ☐ True
- ☒ False ✓

A ____ expels noxious fumes from a laboratory.

- ☐ fire blanket
- ☒ fume hood ✓
- ☐ spill containment kit
- ☐ All of the above

A sink faucet or hand-held shower wand are appropriate substitutes for an eyewash station.

- ☐ True ✓
- ☐ False

A Safety Data Sheet provides basic information about ____.

- ☐ health effects
- ☐ toxicity
- ☐ physical data
- ☐ safe disposal
- ☐ health effects and toxicity
- ☒ All of the above ✓

First-aid kits are best substituted by bandages and alcohol.

☐ True

☒ False



Extension Questions

Use the Internet to look up the SDS for hydrochloric acid and answer the following questions:

- List the potential acute health effects.**
- List the potential chronic health effects.**
- Identify the first aid measures for ingestion.**
- Record the flammability of the product.**
- Identify 3 chemicals that produce a potentially dangerous reaction with hydrochloric acid.**
- Describe how to handle small spills.**
- List the personal protection when working with the chemical.**

(SAMPLE ANSWER BELOW)

a. Very hazardous when in contact with skin, eyes, and if ingested. May produce tissue damage of the mucous membranes of eyes, mouth, and respiratory tract. Inflammation of the eyes may include redness, watering, and itching. Skin contact may result in burns or skin inflammation including itching, scaling, reddening, or blistering. Inhalation may result in severe irritation of the respiratory tract causing coughing, choking, or shortness of breath. Severe over-exposure may result in death.

b. May be toxic to kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, circulatory system, and teeth. Repeated or prolonged exposure can produce target organs damage, chronic eye irritation, severe skin irritation, frequent bronchial infection, and deterioration of health.

c. Do not induce vomiting unless directed to do so by a medical professional. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt, or waistband. Seek medical attention immediately.

d. Non-flammable

e. Calcium carbide, uranium phosphide, rubidium acetylene carbides, lithium silicide, magnesium boride, cesium acetylene carbide, cesium carbide, most metals, acetic anhydride, alcohols, hydrogen cyanide, aluminum-titanium alloys, 2-amino ethanol, ammonium hydroxide, calcium carbide, chlorosulfonic acid, fluorine, metal acetaldehydes, carbides, magnesium boride, mercuric sulfate, oleum, potassium permanganate, rubidium, sulfonic acid, vinyl acetate, silver perchlorate

f. Dilute with water and mop up, or absorb with an inert dry material, and then place in appropriate waste disposal containers. If necessary the spill can be neutralized with a dilute solution of sodium carbonate.

g. Face shield, full suit, vapor respirator, gloves, boots