Fire Safety Basics

Introduction

Fire is a potential safety hazard in science labs. Understanding how a fire starts, the steps to take in the event of a fire, and the basic principles of using a fire extinguisher will greatly reduce the risk of injury due to a fire.

The Science of Fire

Fires need three components to start and to continue—fuel, oxygen, and heat. These components are commonly referred to as the fire triangle and are depicted in Figure 1.

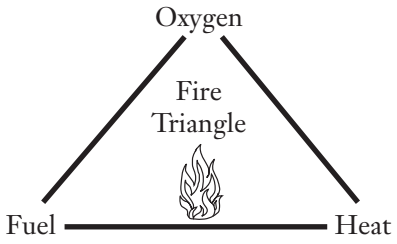

Figure 1.

Removing or disrupting one of the points of the triangle will prevent or extinguish a fire. For most fires, it is not the flammable liquid or solid that is burning, but rather the vapors from the material that are mixing with air and burning. Removing heat will reduce the amount of vapors (fuel) and extinguish the fire. Smothering the fire will reduce the amount of oxygen available and extinguish the fire.

Types of Fires

Fire professionals have established four different categories or classes of fire according to the type of materials that is burning.

***Class A fires* —** involve ordinary combustible solids such as paper, wood, cardboard, plastics, rubber and cloth.

***Class B fires* —** involve flammable or combustible liquids and gases such as gasoline, kerosene, alcohols, common organic solvents, and hydrogen gas.

***Class C fires* —** involve energized (plugged-in) electrical equipment such as hot plates, stirrers, lights, ovens, computers, appliances, and electrical switches.

***Class D fires* —** involve combustible metals which include water-reactive metals such as sodium, lithium, and potassium and flammable metals such as magnesium.

Some fires may be a combination of materials and classes. A 10–15 lb. ABC dry chemical fire extinguisher is the best choice for fighting most laboratory fires, except those involving class D reactive metals. Inspect fire extinguishers every month to make sure they are in good working order. Verify that the fire extinguishers are fully charged and have not been tampered with.

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Steps to Follow in the Event of a Fire

You are not required to fight a fire. If you have the slightest doubt about your safety, the safety of your students, or your ability to fight the fire—do not fight the fire—simply get out, start an evacuation of the building, and notify the fire department. Unfortunately, you have only a few seconds to make the *Fight* or *Flight* decision. Only fight the fire if the following mental checklist is followed:

F ***Find the fire*** and evaluate what is causing the fire and the source of the fuel. How large can it get? What danger does it present to you and your students?

I ***Inform the school and fire department.*** Pull the fire alarm or have a student pull the fire alarm to start the evacuation of the school and to notify the fire department. No fire is too small to evacuate the building.

R ***Restrict the fire.*** Use a readily available fire extinguisher or fire blanket to contain the fire. Another option is to remove the fuel source or potential new fuel sources. If all else fails, close the door (do not lock it) to restrict the air supply and contain the fire.

E ***Exit and evacuate.*** Always make sure an exit is easily accessible before attempting to put out the fire.

How to Use a Fire Extinguisher

Learn how and when to use a fire extinguisher before fighting a real fire. Annual safety training should include putting out a controlled fire with a hand-held fire extinguisher. To fight a fire, remember the word PASS.

P ***Pull the pin.*** Most fire extinguishers have a simple metal pin that prevents the fire extinguisher from accidentally being discharged. This pin is usually held on with a small plastic tie. Firmly grasp the pin loop and pull to remove the pin.

A ***Aim.*** Always aim low, at the base or front of the fire—the edge of the fire closest to you. This will allow the extinguishing material to flow over the fire and smother it. If you aim at the middle of the fire or the back of the fire, much of your extinguishing material will be wasted and the fire may be pushed closer to you.

S ***Squeeze the handle.*** This releases the extinguishing agent. Short bursts are much better than one long continuous squeeze. A little bit of extinguishing agent goes a long way. Always keep the fire extinguisher upright.

S ***Sweep.*** Sweep the fire extinguisher from side to side at the base of the fire. Better yet, apply short bursts of the fire extinguishing material to each outer front edge of the fire.

Move towards the fire, but always make sure an exit is easily accessible.

This *SafetyFax* contains only guidelines and recommendations and is not a comprehensive guide to fighting fires. Flinn Scientific highly recommends that every science instructor be properly trained by a firefighting professional on when and how to use a fire extinguisher.

Visit our website at http://labsafety.flinnsci.com/Chapter.aspx?ChapterId=111&UnitId=7 to view a demonstration of using a fire extinguisher.

This free safety training video is part of the Flinn Scientific Laboratory Safety Course-available on line to all instructors, anywhere and anytime. Thousands of science instructors across the country who have become "Flinn Safety Certified" recommend putting this motivational course at the top of your list of professional development opportunities!

Thank You for Your Support

Please continue to support our efforts to improve safety in science labs by ordering all of your science supplies and laboratory chemicals from Flinn Scientific.

The materials used in *Fire Safety Basics* are available from Flinn Scientific, Inc.

Catalog No.	Description
SE3006	Fire Blanket with Case
SE1034	ABC Dry Chemical 5-lb Fire Extinguisher
SE3001	ABC Dry Chemical 10-lb Fire Extinguisher
SE3004	Fire Extinguisher, Powder Class D

Consult the Flinn Scientific website for current prices.