



## SAFETY MATTERS

### RISK MANAGEMENT NEWSLETTER

IN THIS ISSUE

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## FIRE EXTINGUISHER SAFETY

**OBJECTIVE** To educate your organization on proper use of fire extinguishers to reduce risk for mild respiratory, skin, or eye irritation. Use in areas with poor air flow, use with intent to harm someone, or intentional inhalation of fire extinguishers can produce serious toxicity and would require medical evaluation.

TODAY'S PORTABLE FIRE EXTINGUISHERS are pressurized canisters that release a variety of fire suppressants including powders, gases, and water.

Most fire extinguishers should be operated using the PASS technique:

**P**ull out the safety pin

**A**im the extinguisher at the base of the fire

**S**queeze the handle

**S**weep the spray from side to side



**FIRE PREVENTION WEEK IS OCT. 9-15**





## TYPES OF FIRE EXTINGUISHERS

In the U.S., fires have five main classifications, and fire extinguisher ratings are based on the kind of fire they are intended to put out.

- Class A fires involve ordinary materials that easily burn, such as paper, cloth, and some plastics.
- Class B fires are from flammable liquids such as gasoline, non-cooking oils, solvents, and alcohols.
- Class C fires involve electrical equipment such as appliances, computers, and power tools that are plugged into a live/hot electrical outlet.

Typical household fires are usually class A, B, or C.

- Class D fires involve combustible metals such as lithium, titanium, and zirconium and are associated with manufacturing facilities.
- Class K fires are due to cooking oils and grease used in deep fat fryers in commercial kitchens.

This article will focus on portable fire extinguishers typically found in homes and offices.

## FIRE EXTINGUISHERS WITH MULTIPURPOSE DRY CHEMICAL

Many fire extinguishers release a fine powder. The most common is the multipurpose dry chemical type, which is used for Class A, B, and C fires. These contain monoammonium phosphate, which comes out as a yellow powder. The yellow color helps to distinguish it from other non-multipurpose extinguishers. Ordinary dry chemical extinguishers are used for Class B and C fires only. They often contain sodium bicarbonate (baking soda), which comes out as a white powder.

Inhalation of monoammonium phosphate and sodium bicarbonate can cause mild irritation to the nose, throat, and lungs and results in symptoms like shortness of breath and coughing. Dizziness and headache are also possible. These symptoms usually resolve quickly with fresh air. Ongoing minor irritation often improves after a steam treatment, such as a steamy shower.

**CASE STUDY** A school nurse called Poison Control because a child sprayed an ABC-rated fire extinguisher toward several students and teachers. Some of them had shortness of breath and coughing while others had nausea, headaches, or irritated eyes. Poison Control instructed the nurse to have everyone get fresh air and to rinse the eyes of anyone with redness or irritation. Poison Control determined that the extinguisher contained monoammonium phosphate and only mild, brief effects were anticipated. A follow-up call to the nurse was made later in the day, and the teachers and students were all okay.

People with lung conditions like asthma or someone deliberately sprayed at close range can have more serious respiratory effects and might need medical attention. Contact of these powders with the eyes, nose, throat, and skin can cause irritation, which should improve after rinsing the exposed area. Deliberate inhalation or ingestion can cause serious symptoms such as pneumonia, seizures, irregular heartbeat, and kidney failure. People with more than mild symptoms or anyone with a deliberate exposure should be managed in a health care facility.





## FIRE EXTINGUISHERS WITH CARBON DIOXIDE

Carbon dioxide (CO<sub>2</sub>) fire extinguishers are used for Class B and C fires. They emit pressurized CO<sub>2</sub> gas, which smothers the fire by blocking the oxygen that the fire needs. Unlike the dry chemical types, this nonflammable gas quickly evaporates leaving nothing behind. Because the gas is under pressure, pieces of dry ice (solid CO<sub>2</sub>) might be emitted. CO<sub>2</sub> is not to be confused with carbon monoxide. **Carbon monoxide** is a very toxic gas that is generated by burning fuels and can be produced by faulty gas appliances, car exhaust, and fires. CO<sub>2</sub> is a naturally occurring gas and is part of the air we breathe. CO<sub>2</sub> is also found in carbonated beverages.

Toxicity from inhaled CO<sub>2</sub> only occurs with very high concentrations. In most situations, there is enough oxygen in the area to prevent toxicity. However, toxicity can occur if a CO<sub>2</sub> extinguisher is used in a small, poorly ventilated area. Inhalation of concentrated CO<sub>2</sub> causes the same symptoms as not having enough oxygen, including difficulty breathing, dizziness, and loss of consciousness. Anyone exposed to concentrated CO<sub>2</sub> should seek fresh air immediately. Medical attention would be needed for effects that do not resolve quickly or for anyone who loses consciousness. Direct contact of the skin with the pressurized CO<sub>2</sub> can cause frostbite. The damage to the skin can be limited to mild redness, but blisters are also possible. Damage to the eyes can also occur with direct exposure.

If you suspect someone has inhaled spray from a fire extinguisher, get them to fresh air immediately. Exposure of the eyes or skin to any of the dry chemical fire extinguishers should be treated by immediate rinsing of the affected areas. After this initial treatment has been performed, check the **webPOISONCONTROL**<sup>®</sup> online tool for guidance or call Poison Control at 1-800-222-1222.

## RESOURCES

Karen D. Dominguez, PharmD  
Certified Specialist in Poison Information

<https://www.poison.org/articles/fire-extinguisher-safety-184>

<https://www.statesystemsinc.com/blog/fire-extinguisher-cleanup>



## FOR MORE INFORMATION

**Outreach materials and educational programs. U.S. Fire Administration; [accessed 27 Sept. 2021].**

**Evacuation plans. Washington DC: US Occupational Safety and Health Administration; [accessed 27 Sept. 2021].**

## REFERENCES

**Sahin C, Aysal BK, Karagoz H, Eren F, Ulkur E. A reason to be careful about frostbite injury: carbon dioxide fire extinguisher failure. Burns 2013;39(4):e39-40.**

**Senthilkumaran S, Meenakshisundaram R, Balamurgan N, SathyaPrabhu K, Karthikeyan V, Thirumalainkolundusubramanian P. Fire extinguisher: an imminent threat or an eminent danger? Am J Emerg Med 2012;30:515e3-5.**

**Lin CJ, Chen HH, Chang KS, Hsu CY, Chen YC, Wu CJ. Metabolic disarray after fire extinguisher powder ingestion. Kidney Int 2009;75:993-4.**

*This California Schools JPA Safety Matters fact sheet is not intended to be exhaustive. The discussion and best practices suggested herein should not be regarded as legal advice. Readers should pursue legal counsel or contact their insurance providers to gain more exhaustive advice.*





# SIGN-IN SHEET

## FIRE EXTINGUISHER SAFETY

Trainer: \_\_\_\_\_ Trainer's Signature: \_\_\_\_\_

Date: \_\_\_\_\_ Organization: \_\_\_\_\_ Department: \_\_\_\_\_

### Class Participants:

Name: _____	Signature: _____
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