

FIRE



Stay safe by keeping campfires under control.

Do You Know?

Forest fires require the same things that campfires do. In a forest fire, powerful gusts of wind provide the oxygen, lightning is often the heat source, and trees are the fuel.

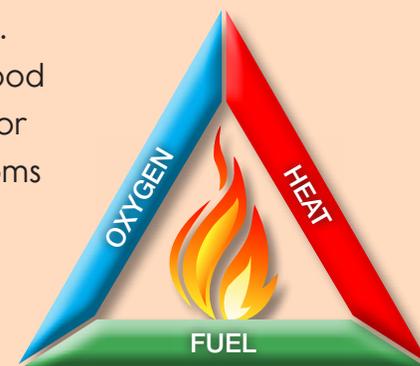
CAMPFIRE CHEMISTRY

What do hot dogs and marshmallows have in common? You can cook them over a campfire!

To make a campfire, you need oxygen, heat, and fuel. Oxygen is easy to find—it's in the air. For heat, you need matches to start a flame. And for fuel, you can gather firewood.

A chemical change starts when the firewood is heated. The wood releases compounds made of hydrogen, carbon, and oxygen into the air. This combination is what smoke is made of. When the temperature reaches about 260°C (500°F), the molecules in the wood break down, and the atoms combine with oxygen in the air. The atoms rearrange to create new products—mainly water, carbon dioxide, and other gases. This process also releases heat, which helps the fire grow. As carbon atoms from the wood heat up, they release light and create the flame.

After a fire, all that's left is ash. The atoms that were in the wood still exist—none were created or destroyed. But most of the atoms were released into the air.



A fire needs oxygen, heat, and fuel. If you remove any of those ingredients, the fire will die out.

RAINBOW OF FIRE

Are flames always orange? No! The flame color depends on the fuel being burned. Scientists can create flames of different colors by adding different chemicals to fires.

As a fire burns, atoms from the fuel release heat and light energy. Different elements produce different *wavelengths* of light. Our eyes see the flames as different colors, depending on the elements in the fuel.

Burning firewood creates orange flames. Burning *cesium chloride*, a kind of salt, creates purple flames. And when the cleaning product borax (sodium borate) burns, it looks light green.



FLAME COLORS

Chemical	Flame Color
Calcium Chloride	Red 
Cesium Chloride	Purple 
Copper Chloride	Blue 
Lithium Chloride	Pink 
Magnesium Sulfate	White 
Sodium Borate	Light Green 
Sodium Chloride	Orange 

Do You Know?

Burning baking soda releases *carbon dioxide*—just as many fire extinguishers do. This chemical can be used to smother grease fires.



Putting Out the Flames

A fire will die out when it runs out of fuel. But it's not always safe to let a fire burn that long. Instead, firefighters often use water to put out fires. Water cools the fire down, and without heat, the fire dies.

But be careful—water can make some fires worse. Water and oil don't mix, so throwing water on a grease fire will only *spread* the flames. And pouring water on an electrical fire can electrocute you! Use a fire extinguisher for these kinds of fires. Spraying the fuel with the fire extinguisher smothers the fire safely and keeps it from getting oxygen.

