

**Author(s):** Eric Enache, Ronak Mehta

**License:** Unless otherwise noted, this material is made available under the terms of the **Creative Commons Attribution-ShareAlike 3.0 License**:  
<http://creativecommons.org/licenses/by-sa/3.0/>

**We have reviewed this material** in accordance with U.S. Copyright Law **and have tried to maximize your ability to use, share, and adapt it.** The citation key on the following slide provides information about how you may share and adapt this material.

Copyright holders of content included in this material should contact [open.michigan@umich.edu](mailto:open.michigan@umich.edu) with any questions, corrections, or clarification regarding the use of content.

For more information about **how to cite** these materials visit <http://open.umich.edu/education/about/terms-of-use>.

Any **medical information** in this material is intended to inform and educate and is **not a tool for self-diagnosis** or a replacement for medical evaluation, advice, diagnosis or treatment by a healthcare professional. Please speak to your physician if you have questions about your medical condition.

**Viewer discretion is advised:** Some medical content is graphic and may not be suitable for all viewers.

# Attribution Key

for more information see: <http://open.umich.edu/wiki/AttributionPolicy>

## Use + Share + Adapt

{ Content the copyright holder, author, or law permits you to use, share and adapt. }

-  **Public Domain – Government:** Works that are produced by the U.S. Government. (17 USC § 105)
-  **Public Domain – Expired:** Works that are no longer protected due to an expired copyright term.
-  **Public Domain – Self Dedicated:** Works that a copyright holder has dedicated to the public domain.
-  **Creative Commons – Zero Waiver**
-  **Creative Commons – Attribution License**
-  **Creative Commons – Attribution Share Alike License**
-  **Creative Commons – Attribution Noncommercial License**
-  **Creative Commons – Attribution Noncommercial Share Alike License**
-  **GNU – Free Documentation License**

## Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }

-  **Public Domain – Ineligible:** Works that are ineligible for copyright protection in the U.S. (17 USC § 102(b)) \*laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }

-  **Fair Use:** Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (17 USC § 107) \*laws in your jurisdiction may differ  
Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.  
To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.

## Playing with Fire Lesson Plan

So we're going to do some fire experiments and explain how it works. We'll also do some simple balancing equations and things of that sort.

1. Orbitals and element properties as well as periodic trends may also come into play.

This video is really fun and explains a lot as an introduction to the lesson.

<http://vimeo.com/40271657>

These are the chemicals we'll need for some of the color demos:

<http://chemistry.about.com/cs/howtos/a/aa052703a.htm>

- Lithium Chloride
- Strontium Chloride or Strontium Nitrate
- Calcium Chloride (a bleaching powder)
- Sodium Chloride (table salt)
- Borax
- Copper Sulfate or Boric Acid
- Copper Chloride
- 3 parts Potassium Sulfate
- 1 part Potassium Nitrate (saltpeter)
- Potassium Chloride
- Magnesium Sulfate (Epsom salts)

We'll also need a significant amount of methanol and matches/a lighter.

Link to the kit

[https://store.sciencebuddies.org/Phys\\_p058/SBD-5239-KIT/Colored-Fire-Kit.aspx?sbid=21983394](https://store.sciencebuddies.org/Phys_p058/SBD-5239-KIT/Colored-Fire-Kit.aspx?sbid=21983394)

### Lesson Plan

1. Introduce periodic table of elements, quick review on this, use poster as reference. If they don't know basics (proton, electron, neutron) go over that.

Transition into video about fire and what fire really is.

2. Show video and elaborate that different color flames are also possible. (video says yellow color comes from burning of carbon, but that's not how it works with our chemicals, so we need to explain this)

3. Do demonstration. Get the students involved throughout the demonstration by asking them to describe and note down any observations. Talk about set up, concepts in the experiment, how to predict results.

4. Get students to make the conclusion that transition metals will create colored flames when burned. Have them speculate as to why this is true? (what do transition metals all have in common)

[http://thewolfstone.com/Pyro/pprclf\\_ColoredFlames.html](http://thewolfstone.com/Pyro/pprclf_ColoredFlames.html)

[http://thewolfstone.com/Pyro/pmamat\\_PyroMaterials.html#BoricAcid](http://thewolfstone.com/Pyro/pmamat_PyroMaterials.html#BoricAcid)