Lesson Title	Chemical Reactions using Fireworks
Length of Lesson	Approx. 1 – 1.5 hours
Created By	Lucas Pounders
Subject	Physical Science
Grade Level	9 – 12th Grade
State Standards	1A, 1C, 5A, 5C
DOK Level	2
DOK Application	Predict, Make Observations, Compare, Distinguish
National Standards	9-12: A (Inquiry);
Graduate Research Element	None

Student Learning Goal:
To establish an understanding of the different materials in chemical reactions used in fireworks to produce color. Also to allow students the ability to think about the possibilities of other applications to this topic.

State Standards:

Physical Science

1.a. Use appropriate laboratory safety symbols and procedures to design and conduct a scientific investigation. (DOK 2)

- Safety symbols and safety rules in all laboratory activities
- Proper use and care of the compound light microscope
- Accuracy and precision in using graduated cylinders, balances, beakers, thermometers, and rulers

1.c. Identify and apply components of scientific methods in classroom investigations. (DOK 3)

- Predicting, gathering data, drawing conclusions
- Recording outcomes and organizing data from a variety of sources (e.g., scientific articles, magazines, student experiments, etc.)
- Critically analyzing current investigations/problems using periodicals and scientific scenarios

5.a. Write chemical formulas for compounds comprising monatomic and polyatomic ions. (DOK 1)

5.c. Classify types of chemical reactions (e, g., composition, decomposition, single displacement, double displacement, combustion, acid/base reactions). (DOK 2)

National Standards

9-12: Physical Science: Chemical Reactions

*Various chemical reactions occur depending on the chemicals involved.

* "Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties."

Materials Needed (supplies, hand-outs, resources):

-Three types of colored fireworks (for the powder) along with ingredients.
-Pie pans
-Lighter

Lesson Performance Task/Assessment:
There will be a short quiz the following day outlining which colors are given off from which material included in the powder of the fireworks and why.

Lesson Relevance to Performance Task and Students:
Relevance to the performance task will be to demonstrate the differences in chemical reactions based on a visual aid.

Anticipatory Set/Capture Interest:
The anticipatory set will be to ask them what may happen when the certain materials are set on fire. This will then be followed by the demonstration of the various colors that come from setting them on fire.

Guided Practice:
This will be done by presenting them with the chemicals and asking them to predict the colors that will be produced from setting them on fire. The chemicals that will be demonstrated will be Magnesium (White), Copper (Green), Potassium Chloride (Purple).

Independent Practice:
Research of various chemical properties not used in class and the colors that they produce. The students will be asked to find a resource, whether it be a book or internet, to confirm their findings.

Remediation and/or Enrichment:
For students that are more visual and having a hard time understanding the concept you can give them a chemical reaction color and ask them to relate to to the chemical. For students ready to move on with more in depth knowledge of chemical reactions they can be asked to interpret chemical reaction equations. Follow students IEP.

Check(s) for Understanding:
Why do certain materials burn hotter and faster, while others burn cooler and slower?
Why do all materials not burn with the color?
What causes the color to be produced from the chemical reactions?

Closure:
Chemicals Reactions are used in various aspects of life for celebration, experimental purposes and medicinal purposes. It is important to understand the uses and possible

misuses of chemical reactions. The students will be given a "ticket" to the firework show as they enter class that day. At the end of class the students will be asked to write on the back of the ticket about what they have learned that day. This will be their "ticket" out of class.

Possible Alternate Subject Integrations:
Mathematics – burn rates of chemicals
History – the use of fireworks in historical events