

Science of fireworks

Worksheet 1 Teacher's notes

1. Do you like fireworks? When was the last time you saw the fireworks display? When do people set off fireworks in your country?

students' own answers

2. Divide into two groups and prepare a short presentation about :

- ❖ 4th of July celebrations in the USA
- ❖ 5th of November celebrations in the UK

students' own answers

3. Watch a National Geographic film about fireworks:

<http://video.nationalgeographic.com/video/i-didnt-know-that/idkt-fireworks?source=relatedvideo>

Did you learn anything you didn't know?

students' own answers

4. Let's learn some more, find the answers to these questions:

- ❖ What are the fireworks made of ?

*oxidizers and fuel ,an aerial firework is normally formed as a **shell** that consists of four parts:*

- **Container** - Usually pasted paper and string formed into a cylinder
- **Stars** - Spheres, cubes or cylinders of a [sparkler](#)-like composition
- **Bursting charge** - [Firecracker](#)-like charge at the center of the shell
- **Fuse** - Provides a time delay so the shell explodes at the right altitude

- ❖ How do they explode?

A firework is ignited by lighting the main fuse. That simultaneously starts both the fast action fuse, which quickly carries the flame down to the lift charge, and the time delay fuse, which continues to burn upward toward the cardboard compartments containing the stars, even as the firework is hurtling skyward. Fireworks are classified as both a low and a high explosive. The initial lift charge that sends the firework into the sky is a low explosive. The burning charge undergoes rapid decomposition, but not detonation. The firework can be thought of as flying through the air powered by a fast burning wick. Where the wick ends, it meets the high explosive components of the firework. In this second stage there is an instantaneous detonation producing both a loud explosion and a bright flash of color.

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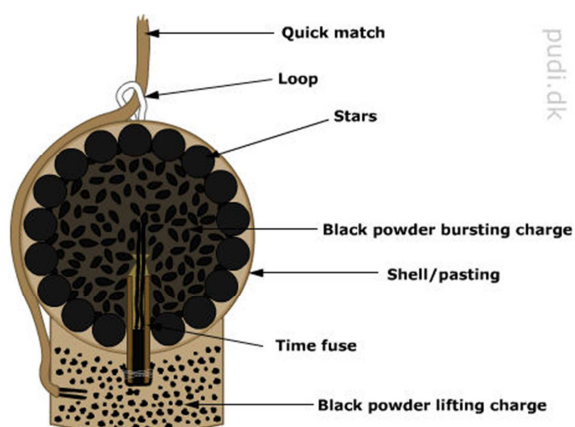
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❖ How are the colours created?

	Color	Compound	Wavelength (nm)
	red	strontium salts, lithium salts lithium carbonate, Li_2CO_3 = red strontium carbonate, SrCO_3 = bright red	652
	orange	calcium salts calcium chloride, CaCl_2	628
	yellow	sodium salts sodium chloride, NaCl	610-621
	green	barium compounds + chlorine producer barium chloride, BaCl_2	589
	blue	copper compounds + chlorine producer copper(I) chloride, CuCl	505-535
	purple	mixture of strontium (red) and copper (blue) compounds	420-460
	silver	burning aluminum, titanium, or magnesium	

5. Look at the aerial shell diagram and watch a film about fireworks :

http://www.youtube.com/watch?v=nPHegSull_M



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<http://www.instructables.com/id/How-to-Make-Fireworks/>

http://news.bbc.co.uk/cbbcnews/hi/newsid_4360000/newsid_4361500/4361562.stm

<http://science.howstuffworks.com/innovation/everyday-innovations/fireworks1.htm>

<http://scifun.chem.wisc.edu/chemweek/fireworks/fireworks.htm>

<http://chemistry.about.com/od/fireworkspyrotechnics/a/fireworkcolors.htm>

6. Listen to Katy Perry's song "Firework", look at the lyrics and underline all the words and expressions connected with today's lesson

<http://www.youtube.com/watch?v=QGJuMBdaqlw>

"Firework"

Do you ever feel like a plastic bag
Drifting through the wind, wanting to start again?
Do you ever feel, feel so paper thin
Like a house of cards, one blow from caving in?

Do you ever feel already buried deep six feet under?
Screams but no one seems to hear a thing
Do you know that there's still a chance for you
'Cause there's a spark in you?

You just gotta **ignite the light** and **let it shine**
Just own the night like the 4th of July

'Cause, baby, **you're a firework**
Come on, show 'em what you're worth
Make 'em go, "Aah, aah, aah"
As you shoot across the sky-y-y

Baby, you're a firework
Come on, let your colours burst
Make 'em go, "Aah, aah, aah"
You're gonna leave 'em all in awe, awe, awe

You don't have to feel like a wasted space
You're original, cannot be replaced
If you only knew what the future holds
After a hurricane comes a rainbow

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Maybe a reason why all the doors are closed
So you could open one that leads you to the perfect road
Like a lightning bolt, your heart will glow
And when it's time you'll know

**You just gotta ignite the light and let it shine
Just own the night like the 4th of July**

'Cause, baby, you're a firework
Come on, show 'em what you're worth
Make 'em go, "Aah, aah, aah"
As you shoot across the sky-y-y

Baby, you're a firework
Come on, let your colours burst
Make 'em go, "Aah, aah, aah"
You're gonna leave 'em all in awe, awe, awe

Boom, boom, boom
Even brighter than the moon, moon, moon
It's always been inside of you, you, you
And now it's time to let it through-ough-ough

'Cause, baby, you're a firework
Come on, show 'em what you're worth
Make 'em go, "Aah, aah, aah"
As you shoot across the sky-y-y

Baby, you're a firework
Come on, let your colours burst
Make 'em go, "Aah, aah, aah"
You're gonna leave 'em all in awe, awe, awe

Boom, boom, boom
Even brighter than the moon, moon, moon
Boom, boom, boom
Even brighter than the moon, moon, moon

<http://www.azlyrics.com/lyrics/katyperry/firework.html>