33 - Explosions

Whether it's a giant fireball at the end of an ACTION MOVIE, or FIREWORKS lighting up the night skies on New Years Eve or the Fourth of July, or just someone dropping MENTOS into a bottle of COCA COLA on Youtube – people love watching things… EXPLODE!!!

Many years ago, early humans were terrified by the explosions found in nature. But as humans got smarter, they learned to use them to their advantage. Today we use explosions big and small for many things. Big explosions help demolish buildings that need to be torn down; while mini-explosions cause car engines to start or popcorn to pop. YUM!

Turns out, there's explosive potential all around us. Fortunately, most of the things you encounter everyday are made up of very stable molecules. This means they don't hold a lot of potential energy, so they aren't explosive. BUT, there are plenty of unstable substances in the world. If you combine them with a trigger – like the heat of a flame – that energy will be released in an instant. The important thing for kids to know is to be safe around flammable materials, never play with fire, and always get a grownup if they sense danger.

Questions we answer on today's episode include:

1. What makes things explode?

2. What are some ways we've learned to control explosions safely?

3. Why do some things like a firework blow up with a bang?

4. What property is released during an explosion?

5. Which everyday items are unstable enough they can be explosive?

Grow Their Mind

How were fireworks invented? Around 800 AD, medieval Chinese alchemists were searching for the secret to eternal life. One day, they mixed a special blend of powders and the mixture exploded!

So, what happened? All explosions depend on one very specific type of energy… 'Potential Energy.' Potential energy is energy that is stored up but has yet to be released. As it turns out, there's potential energy hiding in the chemical bonds that hold ALL matter together. When these bonds are broken, the potential energy gets transformed into other forms of energy.

In the case of the Chinese chemists, they'd stumbled upon a combination of sulfur, charcoal, and potassium nitrate that - when ignited - went BOOM! What they didn't know is they had accidentally invented gunpowder -- the basic ingredient of fireworks. It wasn't long before they were loading the mixture into hollow bamboo tubes, creating the forerunner of the fireworks we know today.

Activity: Exploding Lunch Bag

An adult should help with this. This experiment releases potential energy to cause a plastic bag to explode. You'll need:

One small (sandwich size) zip-lock bag – freezer bags work best.
Baking soda
Warm water
Vinegar
Measuring cup
A tissue
Do this outside, in an empty bathtub, or at least the kitchen sink.
Put 1/4 cup of warm water into the bag.
Add 1/2 cup of vinegar to the water in the bag.
Put 3 teaspoons of baking soda into the middle of the tissue
Wrap the the baking soda up in the tissue by folding the tissue around it. The tissue is important - putting the baking soda in the tissue buys you some time.
You will have to work fast now – partially zip the bag closed but leave enough space to add the baking soda packet. Put the tissue with the baking soda into the bag and quickly zip the bag completely closed.
Put the bag in the sink or down on the ground (outside) and step away quickly. The bag should begin expanding quickly and eventually explode.
This experiment creates a chemical reaction between the acid (vinegar) and base (baking soda), releasing their potential energy in the form of carbon dioxide. The carbon dioxide then stretches the bag to its breaking point, and BOOM!

Additional Resources

1. Check out explosive experiments for kids, there's tons of fun experiments you can do with at-home supplies.

2. Check out KiwiCo's Kid-Friendly experiments with the power of gas, many of these also delve into the world of explosions and potential energy.

Kid News

Cool Olympic News - breakdancing is one of four new sports, along with skateboarding, surfing and sport climbing, to be approved for inclusion at the 2024 Paris Olympic Games. Skateboarding, sport climbing and surfing have already been added to the program for the 2020 Tokyo Olympics, which will take place in 2021 after being postponed by a year because of the Coronavirus pandemic. But breakdancing will not appear until 2024. The athletic dancing style was in integral part of the emergence of hip-hop culture in the Bronx in the 1970's, and has endured and evolved over the decades. “Today is a historic occasion not only for b-boys and b-girls but for all dancers around the world,” said Shawn Tay, president of the World Dance Sport Federation (WDSF). More here!