

Science – Year 5/6B Summer 2

Revision Block B

Sensational Science

Session 1

Resource Pack

Explanation card – Diet Coke and Mentos investigation

What is the physical reaction that causes such extreme results?

Essentially what is happening in this experiment is that the carbon dioxide (bubbles or 'fizz') in the Diet Coke is combining with the small dimples found on the surface of Mentos sweets.

When you open a bottle of soda the liquid contains a large amount of carbon dioxide that is waiting to escape the liquid in the form of bubbles. Dropping something into the Diet Coke simply speeds up this process – it breaks up the surface tension of the liquid and allows bubbles to form on the surface area of the Mentos. The surface area of a Mentos sweet is very large due to its dimples, which in turn allows a large amount of bubbles to form.

Why are Diet Coke and Mentos the best combination?

Low surface tension helps bubbles to grow quickly and it has been noted that the surface tension in water containing the sweetener aspartame is lower than in sugary water – this is why Diet Coke creates a more extreme reaction. There is also a suggestion that the *gum arabic* ingredient in Mentos sweets is a surfactant that further reduces surface tension in the liquid. Additionally, Mentos sweets are quite dense and sink fast which quickly creates bubbles that create further bubbles as they rise up through the liquid.

<https://www.newscientist.com/article/dn14114-science-of-mentos-diet-coke-explosions-explained/>

Explanation card – tarnished coins and various liquids investigation

What is the 'tarnish' on copper coins?

When copper reacts with oxygen, a thin layer of corrosion forms on the surface. This chemical reaction creates copper oxide and only occurs on the surface of the coin, creating the appearance of a dull, dark coating over the metal. In the case of copper, this layer is called *patina*.

Why does the copper oxide 'disappear' when put in certain liquids and mixtures?

When you put copper coins in certain liquids or mixtures a chemical reaction removes the copper oxide.

What happens if you don't wash the coins once you've taken them out of the lemon juice or salt & vinegar mixture?

If you don't wash certain liquids or mixtures off the coins, a blue-green layer forms on them. This is because the vinegar & salt mixture or lemon juice speed up the reaction between copper and oxygen in the air, forming copper oxide - which is a blue-green colour. This is the same effect that you see on the Empire State Building.

Why does the 'clean' screw or nail become coated in a copper coloured substance?

When the copper oxide is broken down it forms copper acetate, which is soluble and dissolves into the liquid, producing copper ions. When the screw/nail is put into the liquid, the copper ions are attracted to the iron in the screw/nail and build up, until a thin copper coating forms.

investigations (after Goldsworthy and Feasy, 1997)

Stick filled in sticky-notes on the blank boxes to help organise thoughts – the sticky-notes can be moved as the investigation plan progresses

Enquiry question:	
Thing I could change/vary	Thing I could observe or measure

Ensuring my test is fair	
I will change	
I will observe	

I will keep these things the same

Predicting

**What I think will
have the greatest
overall reaction
with the coins**

**What I think will
have the lowest
overall reaction
with the coins**

Results and patterns

Liquid/mixture	What I observed

Results and patterns

Liquid/mixture	What I observed

Key ingredient of liquids/mixtures

<i>Liquid/mixture</i>	<i>Key 'active' ingredient</i>
Vinegar	Acetic acid
Lemon juice	Citric & ascorbic acid
Coke	Phosphoric acid
Water	Mix of naturally occurring minerals (generally a neutral liquid)
Baking powder	Bicarbonate (alkaline when mixed with water)

Homework

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Test out the following liquids to see what effect they have on tarnished copper coins: mouth wash, milk, ketchup, orange juice

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