MAKE Science AWESOME

Marc Wileman

Make Science Awesome

Mad Marc
(Wileman)

So many people have been asking for extra fun experiments that you can do with 'stuff' you've already got and I'm honoured to bring you 'Make Science Awesome'

Let's get started!

Mad Marc

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WARNING: (legal type stuff)

WARNING No 1:

You and your child may Make Science Awesome.

WARNING No 2:

All these experiments are reasonably low risk however things can (and will) sometimes go wrong! Please follow the instructions carefully, make sure you have an adult on hand to help out and note that I or Sublime Science expressly disclaim all liability for any occurrence, including, but not limited to, damage, injury or death which might arise as consequences of the use of any experiment(s) listed or described here. Therefore, you assume all the liability and use these science experiment projects at your own risk!

Mad Marc Says: Get a sane and sensible adult to help you - get stuck in - have a go and enjoy doing it!

INTRODUCTION:

What's it all about?

So many awesome folks have asked for even more fun experiments that you can do with 'stuff' that they've already got and I'm honoured to be able to share Make Science Awesome with you!

Who wrote this thing?

Hi! I'm Mad Marc (Marc Wileman on more sensible occasions!) and I founded Sublime Science to show children just how awesome science can be!

I'm best known as that guy who faced the Dragons on Dragons' Den, firing smoke rings and making slime!

I'm proud to say we've made science awesome for more than 500,000 kids and have even received the Queen's Award from Her Majesty the Queen!

Enough about me - Let's get started!

1. Spinning CD

Make sure you don't use a really crucial CD for this experiment as it may get scratched. Not only is your Spinning CD great fun it even looks a little like a UFO too!

What do I need:

- A CD (only use one that you don't mind getting damaged!)
- Maybe even a vinyl record too (optional)
- Lollipop stick
- String

How do I do it?

STEP1 - Tie your string around your lollipop stick.

STEP2 - Thread your string through your CD.

STEP3 - Lift your string into the air and notice how your CD just 'hangs'.

STEP4 - Give your CD a spin. Is that a UFO?!?

STEP5 - What would happen if you repeated this experiment with a vinyl record instead of a CD?

WARNING: Be very careful if you use a record as awesome as 'The Dark Side of the Moon'!

What's going on?

Did you notice that when you swung your Spinning CD from side to side the CD stayed flat?

This all comes down to something called 'angular momentum'. You can just think of this in the same way as 'normal' momentum. If you have a ball rolling along on a flat surface it will continue to roll until the friction with the ground slows it down.

Angular momentum works just the same way but with things spinning rather than travelling in a straight line.

More Fun Please - Experiment like a real scientist!

- Could you make your own spinning object out of card?
- What shape would work best? Does it have to be circular? What about a triangular shape?
- How about adding some weight to the edges of one of your spinning objects with some Blu-Tac, how does that change things?

2. Cleaning Coins

This experiment is disgustingly fun but might just make you think twice the next time you fancy having a taste of a fizzy drink. Let's get started!

What do I need?

- Some copper coins
- Cola
- Glass
- Blue-Tac
- Patience (not too much needed!)

How do I do it?

STEP1 - When you're out and about collect up some copper coins. The older and dirtier the better.

STEP2 - Pour out a glass of your cola.

STEP3 - Cover one side of each coin with Blu-Tac but leave the other side open.

STEP4 - Pop your coins into your glass of coke.

STEP5 - Sit back and wait but you should be able to see a difference in the colour of your coins within about an hour.

What's going on?

If you put some copper coins in a glass of water for a couple of days would that make them clean?

Nope! So we know that it's something within the cola that's causing the change but what? Well, cola is acidic. It's actually the acid within the cola that's reacting with the rust on the surface of our coins and causing them to return to their original shiny selves.

Our cola contains phosphoric acid which is why cola is acidic. The acid reacts with the oxide rusty coating that has covered our coins and returns them back to almost as good as new.

More Fun Please - Experiment like a real scientist!

- Does using diet or regular cola make any difference?
- What about testing out different brands of cola?
- Does it have to be cola that we use?
- What about giving vinegar or lemon juice a try?

3. See Through Cola

Even if our last experiment didn't make you think twice this experiment might just change the amount of fizzy drinks you drink for the rest of your life.

We'll learn a little bit about chemistry too!

What do I need?

- Bottle of cola
- Glass of milk
- Plate or bowl
- Patience (harder to find than milk or cola!)

How do I do it?

STEP1 - Put the bottle of cola onto a plate and open it up.

STEP2 - Fill up the remaining gap at the top of the bottle with milk.

STEP3 - Watch in disgusted amazement as it bubbles over.

STEP4 - Pop the lid back on your bottle and mix your milk and cola together by turning the bottle over a few times.

STEP5 - Sit back and relax and wait as it takes several hours for the coke to get fairly see through and several days for it to go completely see through.

What's going on?

It's absolutely disgusting isn't it. Is it going to make you think twice before you have your next fizzy drink?

The chemical reaction is caused by the fact that the cola is acidic. Cola is acidic because it contains phosphoric acid.

It's the acidic property that causes the reaction between the proteins within the milk and the cola. The two combine together and leave you with a see through bottle of 'cola'.

More Fun Please! - Experiment like a real scientist!

- Test out different brands of cola, what difference does that make?
- Does warming up either the cola or the milk (or both) speed up or slow down the chemical reaction?

4. Milk Rocks

When I say 'Milk Rocks' I mean it literally. You can turn milk into a rock hard substance and best of all I'm guessing you already have everything that you need.

What do I need:

- Microwave or hob to heat your milk (Adult to help out).
- 1 pint of milk
- White vinegar
- Bowl, glass and a spoon
- Paper towels
- Dish cloth, elastic band (optional)

How do I do it?

STEP1 - Get an adult to help out with warming your glass of milk so that it's warm but not boiling. Then pour your milk into your mixing bowl.

STEP2 - Add around 3 tablespoons of white vinegar into your bowl and stir it together.

STEP3 - Immediately your milk will start to change from a liquid to a weird gooey substance.

STEP4 - Make a little strainer with a dish cloth, elastic band and a glass. Pour your mixture through your strainer to separate the solid bit from your milk.

STEP5 - Use a paper towel to really dry out your 'solid milk' as best as you can.

STEP6 - Leave your gooey mess on a windowsill to dry out for a couple of days until you get your milk rock.

What's going on?

Unbelievable that you can make rock-solid milk, right!?! This stuff was like plastic but before plastic was invented and now you've made your own, which is awesome.

Our vinegar is an acid and by adding acid to our milk we're separating out the casein that's always within milk from the rest of the milk. A big component of milk is just water and by separating out an ingredient called casein and getting it to dry we can turn our milk (or at least part of our milk) rock hard. When casein is allowed to dry it turns rock hard and you get your very own milk rock.

More Fun Please - Experiment like a real scientist!

- What type of milk works best? Full-fat? Skimmed?
- Does it have to be vinegar that you use? Could it be another acid? What about brown vinegar? What about lemon juice?
- You could get creative with food colouring or glitter to create a super-cool milk rock.

5. Bicarb Bath Bombs

Bicarb Bath Bombs are absolutely brilliant and just about the only science experiment where after making a big old mess your bath bombs will actually help you to get clean!

What do I need:

- Mixing bowl & spoon
- Bowl of water
- Bicarbonate of soda
- Citric acid
- Vegetable oil
- Food colouring (optional)

How do I do it?

STEP1 - Add half a cup (or half a mug!) of bicarbonate of soda to your mixing bowl.

STEP2 - Add 5 teaspoons of citric acid to your bowl too.

STEP3 - Add a splash of food colouring (be careful if you are going to use your bath bombs in your bath as you don't want it to stain).

STEP4 - Add 3 teaspoons of vegetable oil.

STEP5 - Get stick in and mix it all togther. It'll take a few minutes of mixing to transform your mixture into your very own bath bombs.

STEP6 - Leave your bath bombs out to set or just pop them in your bath!

What's going on?

We now know that it's possible to do a disgusting science experiment that actually helps you to get clean which is pretty awesome but how does it actually work?

Your Bicarb Bath Bombs are awesome fun and the perfect example of the classic 'acid + alkali' reaction! Your citric acid is an 'acid' (of course!) your bicarbonate of soda is an 'alkali'. When you mix an acid and an alkali together you get a chemical reaction that releases bubbles of carbon dioxide out into your bath.

More Fun Please - Experiment like a real scientist!

- What are the best proportions of citric acid, bicarbonate of soda and vegetable oil to make the perfect bath bombs?
- Test out making 2 bath bombs with different proportions of ingredients and see which makes the most fizz in a bowl of water.
- Experiment with different temperature water. Which do you think will work best, hot or cold?

6. Salt Dough

Not only is this Salt Dough stuff completely disgusting but it's absolutely addictive to play with and a phenomenal way to learn about physical reactions too.

What do I need:

- Salt
- Plain flour
- Vegetable oil
- Spoons
- Mixing bowl
- Glass of water
- Food colouring (optional)

How do I do it?

STEP1 - Add 500g of plain flour to your mixing bowl.

STEP2 - Add 250g of salt to your mixing bowl.

STEP3 - Add 3 teaspoons of oil too.

STEP4 - Add a splash of food colouring to your glass of water.

STEP5 - Add around 200 ml (just add a little at a time) of your coloured water to your mixture.

STEP6 - Get stuck in and knead the salt dough together. Be warned, mixing your Salt Dough is a messy process.

STEP7 - Enjoy playing with your very own salt dough!

What's going on?

Hope you're loving your Salt Dough!?! When we added our plain flour and salt together did you notice how they could be mixed together but those two substances didn't really combine.

This changed when we added the water and oil and kneaded it all together. That's when we really combined our ingredients in what is known as a physical reaction.

There's not really a chemical reaction between the ingredients but what's happened is more significant than just mixing. It's a good indicator that a physical reaction has taken place when it would be very difficult to 'undo' the process and get back to the separate ingredients that we started with.

More Fun Please - Experiment like a real scientist!

- What are the perfect proportions of each of the ingredients to add to make the perfect Salt Dough.
- How does changing the quantity of each of the ingredients change your Salt Dough?

7. Dancing Raisins

This experiment is both unbelievably simple and fairly mesmerising and as it's an edible experiment you can even have yourself a little snack too.

What do I need:

- Raisins or sultanas
- Lemonade
- Glass

How do I do it?

STEP1 - Pour yourself a glass of lemonade, being careful to pour it at an angle to try and preserve the fizz.

STEP2 - Add in a handful of raisins.

STEP3 - Sit back and relax and watch them 'dance' - they genuinely dance far better than I can but that's not hard!

STEP4 - Keep an eye on how long they dance for. Are they slowing down or speeding up?

STEP5 - What happens if you add more raisins into your lemonade?

STEP6 - Does the temperature of your lemonade make any difference? Get an adult to help out and experiment to find out!

What's going on?

Your dancing raisins are pretty addictive to watch, right? You've got to stop watching them though because we need to figure out what's going on.

When we first put our raisins into our lemonade they sink to the bottom because they are more dense than lemonade. Our lemonade is carbonated, like most fizzy drinks, and it's those bubbles of carbon dioxide that are grabbing onto our raisins and pulling them up to the top of the glass.

At the top the carbon dioxide gets released out into the world. Without the carbon dioxide bubbles to pull them up the raisins fall back to the bottom once again.

More Fun Please - Experiment like a real scientist!

- Do you have to use raisins for this experiment?
- What else could you try? Could you put some pasta pieces into your drink?
- Could you use different fizzy drinks? Do diet fizzy drinks make a difference?

8. Scientastic Sherbet

Scientastic sherbet is absolutely delicious and an awesome way to get thinking about chemical reactions.

What do I need:

- Bicarbonate of soda
- Citric acid
- Icing sugar
- Cup
- Lollipop stick

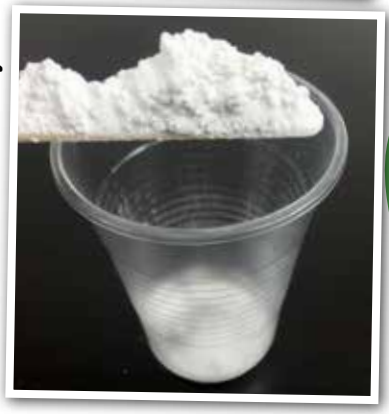
How do I do it?

STEP1 - Add a pea-sized amount of bicarbonate of soda to your cup.

WARNING: This is an edible experiment but, of course, you have to make sure that you're able to eat all of the ingredients in your sweets.

STEP2 - Add around half a lollipop stick of citric acid to your cup.

STEP3 - Add 3 sticks of icing sugar to your cup.



STEP4 - Make absolutely sure to mix it all together.

STEP5 - Have a taste! Can you feel those bubbles?

STEP6 - If you want to see exactly what's happening in your mouth then make yourself another cup of Scientific Sherbet and add some water and watch it bubble.

What's going on?

Did your sherbet taste delicious? How does it work? Those bubbles being formed in your mouth are bubbles of carbon dioxide.

This experiment is an edible example of the classic 'acid +base' reaction. Our citric acid is our acid and our bicarbonate of soda is the alkali (or base).

When the saliva in your mouth helps them to mix together we get a chemical reaction that creates the bubbles of carbon dioxide that you can taste in your mouth.

More Fun Please - Experiment like a real scientist!

- What else could you try? As we're eating it we need to make sure than we only use food! Could you try lemon juice?
- What are the perfect proportions of each of the ingredients to make the most fizz and to make the best taste?

9. Spool Science

In this experiment we'll be making a terrific toy that's fun to make and an awesome way to learn about forces. I'm guessing you might well have everything you need so let's get cracking.

What do I need:

- A spool
- An elastic band
- Pencil
- Piece of a toothpick, kebab skewer or lollipop stick

How do I do it?

STEP1 - Thread your elastic band through the middle of your spool.

STEP2 - Put your piece of kebab stick on one side of your spool to act as a stopper.

STEP3 - Add some Blu-Tac to secure your kebab stick in place.

STEP3 - Slide your pencil through the other side of your elastic band and you're ready to go.

STEP4 - To power your Spool twist your pencil round about 10 or 20 times.

STEP5 - Place your contraption down on your desk and let it go!

What's going on?

This thing is awesome, right?!? Could you feel that you had to put in a little bit of effort to twist your pencil around?

Every time you twisted it around and put in that little bit of effort you were adding a little bit of energy that was being stored in your elastic band.

That energy is stored as potential energy inside your elastic band. When you let go, this potential energy is transferred into kinetic energy and your spool goes flying across your desk.

More Fun Please - Experiment like a real scientist!

- What's the optimal number of times to twist your pencil round to make your spool go furthest?
- What happens if you try using a thicker elastic band?
- Does using two elastic bands work better or worse?
- How about using a longer or shorter pencil?

10. Giant Bubbles

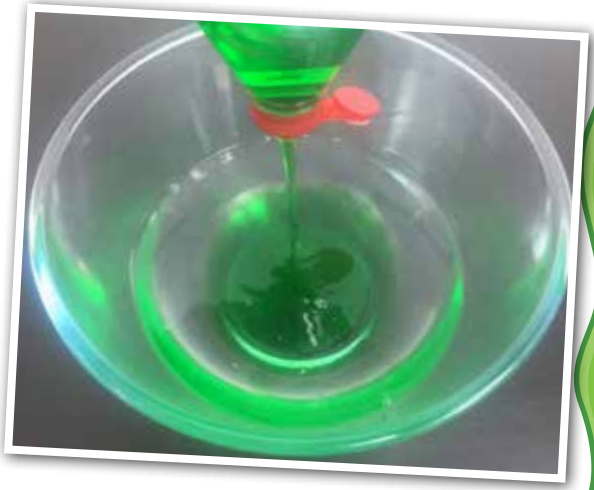
If regular bubbles are awesome then surely Giant Bubbles must be extra awesome?! Only one way to find out, let's get started.

What do I need:

- Washing up liquid
- Glass of water
- 2 wooden spoons
- Mixing bowl
- Some string
- A key or a washer

How do I do it?

STEP1 - The first step is to add a splash of washing up liquid to a pint of water to make your bubble mixture.



STEP2 - Next we will make your giant bubble blower. Thread your string through your key and attach it to your two wooden spoons so that it forms a triangle shape.

STEP3 - The best place to make your giant bubbles is outside.

STEP4 - Submerge your giant bubble maker into your bubbles mixture. Lift your bubble blower up and swing it slowly and smoothly to make yourself a giant bubble.

What's going on?

These giant bubbles are addictive, aren't they?! But how do your giant bubbles actually work? In many ways the Giant Bubbles work the exact same way that regular bubbles do. We've got a thin layer of soap wrapping up a block of air.

As you look through your giant bubble maker you'll see a triangle shape but when you make your giant bubbles they are still sphere shaped.

This is because the spherical shape is special as it has no corners and so the air pressure inside and outside can be exactly the same.

More Fun Please - Experiment like a real scientist!

- What's the perfect combination of ingredients to make the perfect giant bubble?
- How big can you make your giant bubbles?
- Try running along and see if you can make a bubble worm? (You'll definitely need to do this outside!)

11. Square Bubble

I know...I know...I said that nearly all bubbles are spherical. Nearly all of them are but not this one. In this experiment we'll be making a square bubble!

What do I need:

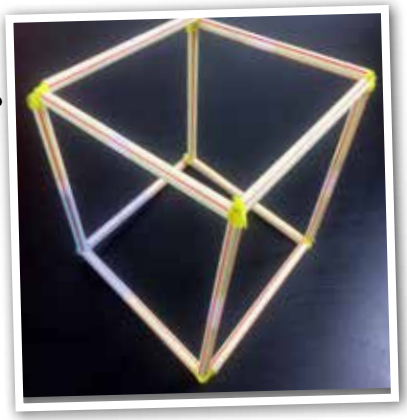
- Washing up liquid and water
- Bucket or large container
- 8 pipe cleaners
- 12 Straws
- Scissors

How do I do it?

STEP1 - First thing is to make our square bubble maker. Take a pipe cleaner and bend and twist it round to make a 'corner shape' as shown.

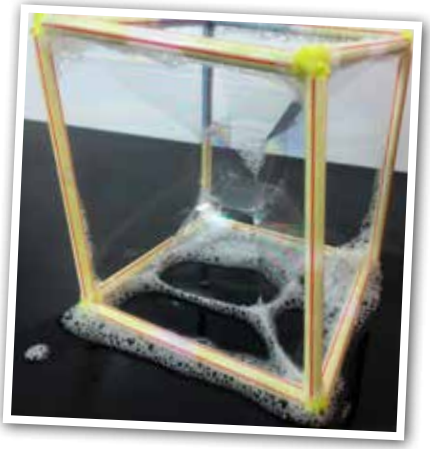
WARNING: Make sure that you don't make your square bubble maker too big, make sure it can fit in your bucket!

STEP2 - Get an adult to help out chopping all of your straws in half.



STEP3 - Slide your 'half straws' over your pipe cleaner 'corner shape' to make one corner of your cube.

STEP4 - Repeat this process to build out your straw cube framework.



STEP5 - Submerge your bubbler-maker into your bubble mixture. Lift it out and give it a little shake and you should see a wondrous site, a square bubble!

What's going on?

Doesn't look like it's possible, does it? Looks sort of mystical and out of this world but it's actually all to do with pressure.

A bubble film forms between each of the sides of the cube framework. This means that you can have a square bubble in the centre where the pressure is close enough to equal to make it work.

More Fun Please - Experiment like a real scientist!

- Try not to play with your bubble for too long!?
- Would other shapes be possible? Could you make a triangle bubble?
- Try using a straw to blow a 'normal' bubble inside the square bubble, why does that work?

Don't Let The Fun Stop!

I hope you loved the book but let's keep the fun going!

Claim your FREE digital copy of "Don't Eat Your Slime" - it's 5 star reviewed on Amazon & packed full of more awesome experiments. Grab your copy FREE at:

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