

In this unit we will

1. Compare and group everyday materials according to their properties
2. Investigate the separation of materials, including filtration and evaporation
3. Explore how some materials will dissolve and what this means in terms of the particle model
4. Learn that some changes are reversible, while others are irreversible

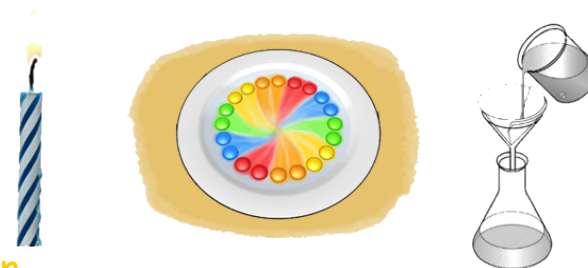
Science Skills that we will develop:

Explaining Science

1. I use complex science words correctly
2. I use a science model to describe and explain
3. I draw & annotate diagrams to help describe/explain

Designing Experiments

1. I use knowledge & understanding to make a hypothesis
2. I plan a reliable fair test
3. I plan to minimise risk & act on safety suggestions
4. I plan to collect repeat readings and calculate the mean



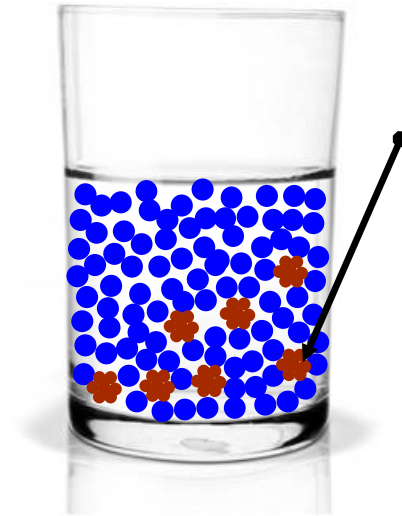
**Properties and
Changes of
Materials**

What can you remember about last week's lesson, in terms of how particles play a part in a solid dissolving in water?

These words might help:

solids liquids particles

moving smaller break apart



Today, you will be using what you have already observed, as well as what you understand about particles, to make a **hypothesis**. This is a prediction that is based on what you already know, backed up with some logical reasoning.

"I think that ... , **because**.... "

For example, *"I think that my mug of hot chocolate has got some dissolved particles in, because it has sugar in it, but there must also be some insoluble particles there, as it's opaque. If I filter the drink, I predict that there will be quite a lot of undissolved residue left in the filter paper."*

You might have already tasted the rainbow, but what do you actually know about Skittles?



Do you know what they are made of? Are they all the same? How are they different? Talk with your partner and share with the class.

You are going to add water to three sweets, but how you do this and what you want to investigate is entirely up to you.

1. Take five minutes to discuss this with your partner.



2. Before we carry out our experiments, let's share our ideas; listen carefully to what others have to say. What do they want to investigate, and how are they intending to do it? Are there any comparisons? Are there any fair tests?
3. Have you heard any ideas that you like? Do any of them make you want to change your own ideas? Discuss this with your partner and note down your final experiment on scrap paper.
4. Now to make your hypothesis: what you predict will happen? Why do you think this? You should be able to use what you know about **dissolving** and the **particle model** to help you give a logical explanation.

Science skills Designing Experiments	Me	Teacher
I can predict what will happen in my Skittles experiment with some explanation*		
I use my knowledge and understanding of the particle model to predict and explain what will happen in my Skittles experiment **		
I use my knowledge and understanding of the particle model to develop a hypothesis about what will happen in my Skittles experiment ***		

5. Write a brief **description** of what you will investigate and how you intend to do it. Then write a second paragraph for your **prediction or hypothesis**, which should include your reasons. Use the particle model if you can.

- I will investigate _____
- I predict that _____, because _____

6. Right, now get on with it!

7. Was your prediction accurate? Do the results support your hypothesis? If not, can you explain why?

So why did the colour of the Skittles spread outwards?

This happens because particles in liquids (and gases) are always moving and bouncing off each other, and will always move from more concentrated areas to less concentrated ones. Think about what happens when you first come out of the classroom into the playground - it doesn't take long for a class-full of children to spread out across the whole area of the yard. Sugar particles act in a very similar way when they dissolve in water and are 'set free' among the liquid water particles, which is why the coloured sugar coating of the Skittles moves outwards as it dissolves; the sugar particles are moving away from a concentrated area of sugar, to water that is less concentrated. **This is known as a concentration gradient.**

Now try this in groups of 4:

Arrange a ring of Skittles around the edge of a plate - you can decide on a pattern or just let it be random.



Now gently add warm water, pouring into the centre of the plate, so as not to disturb the ring, until all the sweets are in the water. Watch...



Can you explain what's happening?

The coloured sugar particles move away from the concentrated sugar sweets towards the middle of the plate, where it is pure water without any sugar. The colours don't mix, because each colour contains the same amount of sugar.



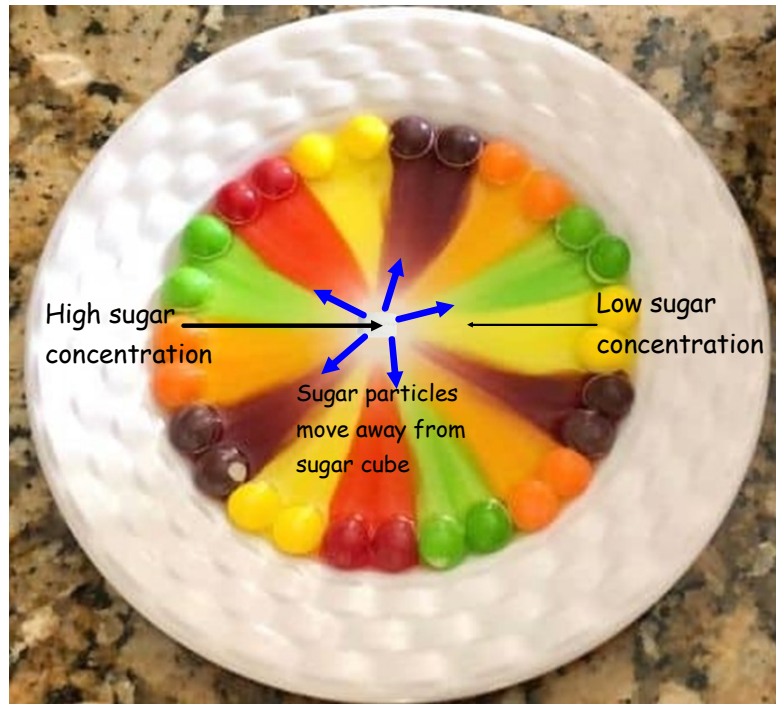
Don't disturb your rainbow! We have one last experiment.



You are going to place a sugar cube in the centre of the plate. What do you think will happen? Will the colours go into the sugar cube, or will they move away from it?



Can you use your knowledge of concentration gradients and the particle model to explain what you think?



Did you remember that particles always move along a concentration gradient?

The pure sugar that was dissolving from the sugar cube was **highly concentrated**, so of course moved **outwards**, pushing away the **less concentrated** coloured sugar rainbow of the Skittles.

