

●●● DIFFICULT

 8 - 13

 1 - 1½ HRS
*plus 2 days
to evaporate*



1 Learn about the work
of Marie Maynard Daly

2 Extract salt
from crisps

3 Discover the main
ingredients in crisps, and
how to separate them

STORIES IN CHEMISTRY

SERIOUSLY SALTY SNACKS

Illustration: Marie Maynard Daly



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INTRODUCTION

Marie Maynard Daly was the first African American woman to earn a PhD in chemistry.

She researched the link between heart health and cholesterol. She was interested in chemistry from an early age, mainly from reading her grandparents' book collection.

Her father dropped out of a chemistry degree for financial reasons, but her parents supported her through her education and she went on to earn a degree with distinction. Marie managed to earn a masters degree while working during the day as a laboratory assistant and studying by night.

Marie later established a scholarship for African American students at Queens College. Her work concentrated on links between cholesterol and heart health and made important discoveries on how heart attacks occur.



DID YOU KNOW?

Evaporating salty water quickly (e.g. in a hot oven) will result in smaller salt crystals than leaving the salty water to evaporate slowly over a long time at a lower temperature. This is because crystals grow in layers (like an onion). The longer the crystal takes to grow, the more layers of salt can be added, this results in larger crystals.



SAFETY

- **Avoid any known food allergens.**
- **Ask an adult to assist with heating the foil cake cases and ensure they are fully cooled before continuing with experiment.**
- **This activity should be supervised at all times.**

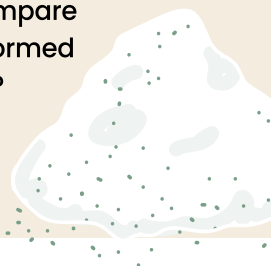
ACTIVITY

DISCOVER THE MAIN INGREDIENTS IN CRISPS, AND HOW TO SEPARATE THEM

To commemorate the work of Marie Maynard Daly and her research on high blood pressure, the experiment below will look for hidden salt in crisps and other snacks.

INSTRUCTIONS

1. Measure 25ml of cold water (2 tablespoons) into each of the three foil cake cases.
2. Add half a teaspoon of salt to a cake case marked 'salt' and stir gently to dissolve.
3. Gently wash all the crisps from one packet in the water of a second cake case. Shake any excess water back into the cake case before discarding the soggy crisp. Label the foil case.
4. Repeat with the other packet of crisps in the third cake case and label.
5. Place the 3 foil cake cases on an oven tray and ask an adult to heat them for 30 minutes at 170°C. Any liquid should evaporate, leaving a dry black 'ash'. Ask an adult to transfer the oven tray to a heatproof mat to cool.
6. Add 20ml (or one and a half tablespoons) of cold water to each cake case and ensure the ash is well mixed with the water.
7. Label 3 clean foil cake cases as before. Take each of the foil cake cases from step 6, and pour the contents through a coffee filter into the clean foil case. Allow all the liquid to drip through, then gently squeeze the coffee filter to transfer all the liquid to the new foil case.
8. Place the 3 new foil cake cases in a warm place for about 2 days to evaporate. Examine the contents. Can you see the salt crystals? Which crisp packet had the most salt in it, and how does that compare with the salt crystals formed from the 'salt' sample?



YOU WILL NEED

- 2 different 30g packets of crisps (ready salted or salt and vinegar work best)
- 6 foil cake cases (the type 6 packs of individual cakes come in)
- ½ teaspoon table salt
- 3 coffee filters
- Pencil
- Teaspoon
- Small measuring jug (or tablespoon)
- Oven tray
- Heatproof mat
- Access to an oven



WHAT'S HAPPENING?

Crisps contain 4 main ingredients – potato starch, fat, salt and flavouring. Washing the crisps in water dissolves the salt, but also small amounts of the other ingredients too.

Evaporating the water at this stage would leave a sticky mess of starch and oils at the bottom of the cake case! Cooking the cake cases in the oven boils all the water into steam (water boils at 100°C) and leaves any salt behind as tiny crystals (salt boils at 1,465°C!).

The high temperature also burns any starch and fats so they form a solid black 'ash'. This black ash doesn't dissolve in water, unlike the salt crystals, so it can be separated from the liquid by filtering through a coffee filter.

The salty water slowly evaporates in a warm place, leaving behind salt crystals.

