MEDIUM | 7 – 12 | 1 HR

1. Learn about the work of Lilia Ann Abron
2. Turn salty water into fresh, clean water using a simple desalination process
3. Learn about boiling and condensing

STORIES IN CHEMISTRY

DESERT ISLAND DESALINATION

Illustration: Lilia Ann Abron

INTRODUCTION

Lilia Ann Abron is a chemical environmental engineer, specialising in drinking water projects, environmental pollutants and energy efficient building projects.

Lilia Ann did not come from a scientific family. Her father was a teacher and her mother worked as a typist. When she was growing up in Tennessee USA, racial segregation was common.

Abron enjoyed sciences at school, and originally wanted to study medicine, but found she was more talented at chemistry. When Lilia Ann went to university she was one of only two women in a large class of predominantly white male students. She gained a degree in sanitation engineering, which focusses on the maintaining of safe and clean drinking water supplies.

Lilia Ann Abron is the first African American woman to receive a PhD in chemical engineering and has won many scientific awards for her work ensuring safe drinking water and energy efficient housing in the USA and Africa.

DID YOU KNOW?

One of the most urgent challenges for a chemical environmental engineer in a disaster zone is to provide clean water.

Where the only water source is seawater, engineers can use a process called desalination to remove the salt from sea water to provide fresh, safe drinking water.

SAFETY

- **Take care using cookers. Always ask an adult for help.**
- **Allow equipment to cool fully before touching.**
- **Do not drink the salty water.**
- **This activity should be supervised by adults at all times.**

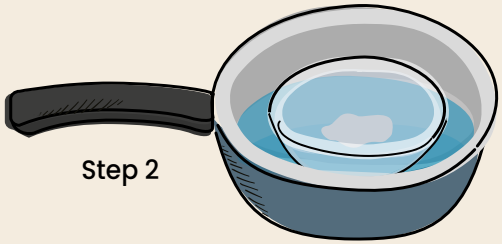
ACTIVITY

USING A DESALINATION PROCESS, TURN SALTY WATER INTO FRESH, CLEAN WATER

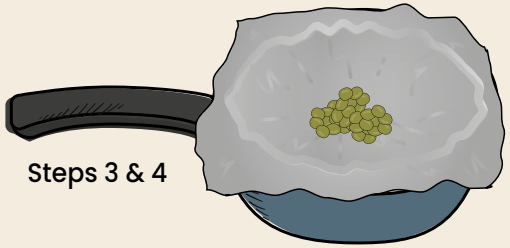
To commemorate the work of Lilia Ann Abron, the experiment below will look at desalination.

INSTRUCTIONS

1. In a measuring jug mix 10 teaspoons of salt with 250ml of water and 3 drops of blue food colouring. Pour this into the large deep saucepan.
2. Place a glass bowl into the large pan containing the blue salty water. The glass bowl should not float. If it does, remove a small amount of the salty liquid until the glass bowl sits on the bottom of the pan.
3. Cover the top of the pan with a large sheet of kitchen foil and make a dip in the centre of the foil over where the glass bowl is located underneath.
4. Place a handful of ice cubes or frozen peas into the dip in the centre of the foil.
5. Ask an adult to heat the pan on a cooker. When the pan comes to the boil, let the pan simmer gently for 10 minutes. Ask an adult to watch the pan to ensure it does not boil dry.
6. After the pan has simmered for 10 minutes, ask an adult to transfer it to a heatproof mat to cool. Allow to cool completely before touching.
7. Observe the glass bowl. There should be liquid in it. Is this liquid blue? Using a clean fingertip, dip it into the blue water in the pan. This should taste salty. Then use a fingertip to taste the water in the glass bowl. Does it taste salty? How do you think this water got into the glass bowl?



Step 2



Steps 3 & 4

YOU WILL NEED

- Table salt
- Blue food colouring
- Kitchen foil
- Ice cubes (or a handful of frozen peas)
- Measuring jug
- Teaspoon

- Large deep saucepan (your glass bowl should fit inside)
- Sturdy glass baking bowl (to fit inside the pan)
- Heatproof mat/board to rest hot pan whilst cooling

WHAT'S HAPPENING?

The boiling point of water (100°C) is much lower than the boiling point of salt (sodium chloride), which boils at 1,465°C. When the temperature reaches 100°C, the water contained within the blue mixture starts to boil and turns into steam. At this temperature, salt does not boil and remains behind in the pan. The blue water becomes saltier as water is gradually lost as steam, and you would eventually end up with dry blue salt crystals. The boiling point of the blue food colouring is also higher than 100°C, so it will remain in the pan as the water boils, which is why the fresh water in the bowl is clear.

The ice cubes cool the foil. As the steam rises, it meets the cold surface of the foil, where it cools and turns back into liquid water. This is called condensation. Droplets of water form on the foil, and drip down into the bowl beneath. The water is pure and clean, as all the salt and other impurities have been left behind in the pan.

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