WJEC Wales Biology A Level

SP 1.5: Simple extraction of DNA from living material

Practical notes

Introduction

DNA carries genetic information as **genes**. DNA molecules are packaged into thread-like structures known as **chromosomes**.

Strawberries are a good specimen for DNA extraction as they have **large genomes**, containing up to **eight** copies of each chromosome. The DNA extracted is visible as white clumps.

Equipment

- Strawberry
- Acetic-orcein stain
- 10 cm^3 detergent
- 100 cm^3 water
- 90% ethanol
- Table salt
- 2× 250 cm^3 beakers
- Mesh strainer
- Glass rod
- Scalpel
- Resealable plastic bag

Risk assessment

Hazard	Risk	Precaution	Emergency
Broken glass	Cuts	Keep glassware away from the edge of the desk	Dispose of broken glassware carefully; elevate cuts and apply pressure; do not remove glass from cuts; seek medical assistance
Scalpel	Cuts	Direction of cut away from the body; do not attempt to change blade; keep scalpel away from the edge of the desk	Elevate cuts and apply pressure; wash minor cuts in cold water; seek medical assistance
Ethanol	Highly flammable	Make sure that there are no naked flames in the room	Put out small fires with a damp cloth; evacuate the building
	Irritation to respiratory	Do not directly inhale the ethanol; ensure the room	Seek medical assistance

	system	is well-ventilated	
Acetic orcein	Skin burns	Wear gloves when handling acetic orcein	Remove contaminated clothing; run the affected area under cold water; seek medical assistance
	Irritation to eyes	Wear safety goggles	Flood eye(s) with tap water; seek medical assistance

Method

1. **Chill** the **90% ethanol** in a freezer for two hours prior to the practical.
2. Using a scalpel, remove the **calyx** of the strawberry.
3. Place the strawberry into a plastic bag. Seal it and completely **crush** the strawberry. *This breaks the cells apart and increases the surface area exposed to the detergent.*
4. Mix **10 cm^3** detergent, **100 cm^3** water and **two pinches** of salt in a 250 cm^3 beaker.
5. Pour this solution into the plastic bag, reseal and gently mix with the crushed strawberry for **2 minutes**. *The detergent disrupts cellular and nuclear membranes, releasing DNA into solution. The salt helps the DNA to precipitate.*
6. **Filter** the mixture into a 250 cm^3 beaker using a mesh strainer.
7. Tilt the beaker **45°** and gently pour the **chilled** 90% ethanol down its **side**. *The ethanol is chilled to slow down the activity of enzymes which could break down the DNA.*
8. DNA is **insoluble** in ethanol so it forms **white clumps** where the ethanol layer meets the water layer (ethanol is **less dense** than water so floats on top).
9. Use a glass rod to **extract** the clumps of **DNA.**
10. Add a few drops of **acetic-orcein** to the sample. A **red-purple** colour indicates a positive test for DNA.