

Edexcel A Biology A-Level

Core Practical 13

Investigate the effects of temperature on the development of organisms (such as seedling growth rate, brine shrimp hatch rates).



Changes in average temperature have been recorded via use of **ice cores, peat bogs, dendrochronology** etc. This type of **climate change** is caused by the **greenhouse effect** - the increase in **greenhouse gases** such as methane, water vapour etc. in the atmosphere causing increased absorption of **infrared** light and increasing average temperature. Climate change has many effects - melting of the polar ice caps, increased incidence of natural disasters etc. - but one of those could be **changes to morphology, number and distribution of organisms**.

Equipment

- Brine shrimp egg cysts
- Sea salt
- De-chlorinated water
- Salt water
- Beakers
- Water bath
- Stirring rod
- Magnifying glass
- Forceps
- Pipette
- Bright light
- Refrigerator
- Graph paper

Method

1. Place 2g of **sea salt** into a beaker containing 100 cm of **dechlorinated water**. Stir with the stirring rod until the salt **completely dissolves**.
2. Put some eggs onto a sheet of paper.
3. Wet a piece of graph paper in **salt water**. Place it face-down onto the sheet of paper so it picks up some **eggs**.
4. Observe the graph paper under a microscope and count out **40 eggs**.
5. Remove the rest of the eggs/the paper so there are only 40 eggs there.
6. Place the graph paper **upside-down** into the beaker and leave for 3 minutes/until **all eggs have detached into the water**.
7. **Incubate** the beaker at a **set temperature** (between about 5 and 35 degrees Celsius - this mimics the conditions in the wild) for **24 hours**.
8. Remove the beaker from the incubator.





- Shine a **bright light** on the beaker. Any hatched larvae will swim **towards the light** and can then be **removed** with a pipette.
- Return the beaker to the incubator and **repeatedly remove** and **count hatched larvae**.
- Repeat all steps at a **range of temperatures**.

Nb: treat the shrimps, eggs and larvae responsibly and **ethically** for the duration of the experiment and release them into salt water when it is completed.

Risk Assessment

Hazard	Risk	Safety Precaution	In emergency	Risk Level
Broken glass	Cuts from sharp object	Take care when handling glassware; keep away from edge of desk	Elevate cuts; apply pressure; do not remove glass from wound; seek medical assistance	Low
Hot liquids	Scalding	Handle with care; use tongs to remove boiling tubes from water bath; wear eye protection	Run burn under cold water; seek medical assistance	Low
Biohazard	Contamination	Use disinfectant; wash hands with soap after handling	Seek assistance	Low

Graph

- Plot a graph of **temperature against hatched larvae**.

Conclusion

- As the **temperature increases, the number of shrimp hatched increases**, up to an optimum of about 25 degrees Celsius.
- After the optimum temperature, as **temperature increases, number of shrimp hatched will decrease**.
- This indicates that as climate change increases temperature of sea water, the **development of brine shrimps will decrease**.



Modification

The method can be modified to measure the effect of climate change on **seedling** growth rate. Optimum temperature for seedlings depends on the species, but they show a similar pattern of **increase in growth up to an optimum temperature** (as rate of photosynthesis increases) and then decrease (as water loss will increase and crenation may occur). This indicates that plants are similarly **vulnerable to climate change**.

