

Edexcel IAL Biology A Level

Core Practical 13

Investigate the rate of growth of microorganisms in a liquid culture, taking into account the safe and ethical use of organisms.



A colorimeter or light sensor with data logger can be used to measure the **rate of growth** of microorganisms like yeast. As a yeast population grows the broth they live in becomes **more cloudy** due to the presence of **more microorganisms**. This **increase in turbidness means less light passes through the culture**, so by monitoring the light passing through the culture across a 24 hour period their growth can be estimated.

Equipment list

- Bench disinfectant
- Bunsen burner
- Colorimeter
- 0.5% glucose solution
- Cuvettes
- Measuring cylinders
- Conical flask
- Pipettes
- Yeast culture
- Magnetic stirrer
- Weighing scales

Method

1. Before starting the experiment disinfect the workbench, this helps to prevent contamination when preparing the yeast culture.
2. Fill a 500 cm³ conical flask with 250 cm³ of the glucose solution and then weigh out 1.25g of yeast and add it to the flask along with a magnetic stirring flea that enables you to **constantly and evenly stir the culture**.
3. Place the flask on the magnetic stirrer base and stopper the flask with some cotton wool secured with a covering of aluminium foil.
4. The flask can be incubated at room temperature.

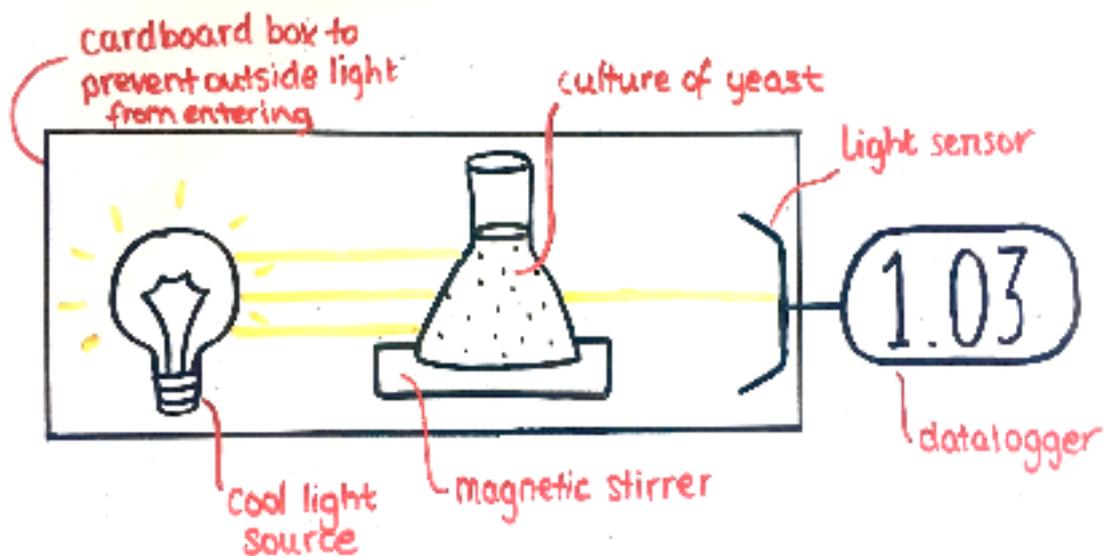
Measuring growth: Method 1 - Colorimetry

1. Use a pipette to fill a cuvette with the 0.5% glucose solution and take a colorimetry reading to set the reference absorbance of the colorimeter to zero.
2. Once the yeast sample has been prepared, use a sterile pipette to transfer 4 cm³ of the culture into a cuvette and take an absorbance reading, recording the age of the culture in minutes and its absorbance in a table.
3. Repeat steps 1 and 2 at the following ages of the culture: 30 minutes, 1 hour, 90 minutes, 2 hours, 5 hours, 8 hours, 11 hours.



Measuring growth: Method 1 - Light Sensor with Datalogger

1. Set up the apparatus as shown.



2. Leave the datalogger to continuously record absorbance readings for 12 hours.

Risk assessment

Risk	Hazard	Precaution
Liquids	Spillage that could cause surfaces to be slippery leading to an accident	Wipe up any liquid spillages as soon as they occur Put lids on bottles and put them away once used
Glassware	Cuts from sharp objects	Take care when handling glass objects Keep away from edge of desk
Yeast	May cause an allergic reaction. Contamination of yeast with other microorganisms could occur.	Wear gloves when handling to avoid skin contact, if it gets on skin rinse thoroughly with cold water Use aseptic techniques throughout Give the culture to the lab technician to destroy after the experiment Wear eye protection
Disinfectant	May cause an allergic reaction.	Avoid skin contact and allow it to soak into the workbench before carrying out the experiment



Results table

Age of yeast culture (hours)	Absorbance reading
0.5	
1	
1.5	
2	
5	
8	
11	

Graph

The shape of the graph would show the exponential growth of the yeast culture.

