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Paper 6 final revision

Food tests

Food group	Reagent	Original colour	+ve result	Safety precaution
Starch	Iodine	Yellowish brown	Blue black	Eye goggles – lab coat – gloves
Reducing sugar	Benedict's (Needs heating)	Blue	Green – yellow – orange – red (from least to highest conc.)	Heating in a water bath
Protein	Biuret	Blue	Purple	Eye goggles – lab coat – gloves
Fat (Lipids)	Ethanol + water (Emulsion test)	Clear solution	White suspension	Eye goggles – lab coat – gloves
Vitamin C	DCPIP	Blue	Colourless	Eye goggles – lab coat – gloves

NB: Adding amylase to starch:

1. Turns the positive iodine test into negative (starch digested)

2. Turns a negative Benedict's test into positive (maltose/glucose are produced)

Factors affecting enzyme action:

1. Temperature (idea of K.E & rate of collisions) 2. pH

3. Enzyme conc. (increases with increasing enzyme conc.)

4. Substrate conc. (increases with increasing substrate conc.)

5. S.A (increases with increasing S.A)

NB: Very high temperature & extremes of pH causes denaturing of enzymes

Making tables

1. Draw the table with a pencil & a ruler with at least 2 columns.

2. Left side: variable changed (ex: Temp.) – Right side: variable measured (ex: time)

3. Write down the name of the variables in the headings & include the units

4. Put the data in the table (without units)

NB: If time is given in min & sec (ex: 1:20), it should be converted into seconds (80).

Describing graphs

- Find a relation between the variable changed on the x-axis & the variable measured on the y-axis (ex: when the temperature increases, the rate of reaction …….).
- If the graph is made of different parts (phases), describe each phase separately. (ex: increased then decreased, increased slowly then rapidly, ……).
- Use figures from the graph in your answer (ex: increased to reach a peak of …… at ……..).

Take care:
Never mention a scientific explanation in a description question. (ex: Because enzyme was denatured).

Making graphs

1. Choice of axis:

   - X-axis: Variable changed
   - Y-axis: Variable measured

2. Labeling the axes including the units

3. Scale:

   - Start from the zero
   - Adjust the scale so that the graph fills more than half of the page (divide the biggest number by the number of big squares)

4. Plots (x or Ѳ)

5. Join the points (smooth curve – line of best fit – bar chart – histogram)

6. Line of best fit sometimes means that you should choose the best way to join the points with

NB: Read the question carefully to know exactly what you should plot on the graph (which variables from the table)

NB: Use a key in case of plotting data for 2 categories on the same grid

NB: Do not extend the graph to the zero unless it has a point at zero

NB: Use a break if it's impossible to apply a suitable scale (last option)

Anomalous results

- This is a wrong result that happened because of a certain error
- It appears as a different result from the others in a table or an off point on the graph (not with the trend of the graph)
- It can be excluded by: Repeating the experiment for more reliability

Drawing question

NB: Take care if the question stated that you should draw the whole figure or part of it

1. Size: more than ½ the space provided

2. Outline: Clear, shape (circular/oval/irregular) sharp pencil & no shading

3. Details: Number & proportions of layers

NB: Take care if the question stated that you should not draw individual cells, you only need to draw an outline for the diagram.

NB: A dark line (shaded) should be made as a layer (double lines) in your drawing (ex: cell wall)

4. Labels: 1 or 2 with a line (no arrows)

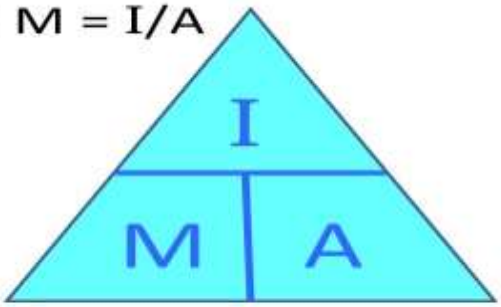
Magnification

- The size of an image of an object compared to its actual size.
- Calculated using the formula M = I/A

I = size of image

A = actual size of object

M = magnification



BUT you must remember to convert values to the same unit FIRST

Cm to mm: X 10	**mm to cm: / 10**
Mm to um: X 1000	**um to mm: / 1000**

Unit for magnification is X …….

NB: Read the question well as it sometimes states that you need to draw a line AB on your drawing & measure it.

NB: Read the question well as it sometimes states that you need to give your answer approximated to …. decimal places or to the nearest whole number.

It's better to record your measurements in mm instead of cm.

Do not forget to write down the unit in the answer.

Comparing 2 figures or diagrams

Look at the following features **(they should be visible in the diagrams):**

Size: Large – Small

Shape: Rounded – Oval – Bean shaped – Elongated – Broad – Irregular

Colour: Dark – Pale

Number: More – Less (Count if possible)

Wall (fruit or vessel): Thick – Thin

Lumen (vessel): Wide – Narrow

Designing experiments

1. List the variables at the beginning (draft):

- Variable changed: The factor stated in the question to be under investigation "the effect of ……." (ex: Temp. – conc. of enzyme – pH – ……..)
  Use 5 different samples where you will be applying a range of different values
  You should describe the way you will change this factor;
  Temp: Water bath / Heater
  pH: pH Buffer
  Humidity: Plastic bag & Fan
  Light intensity: Distance from the light source
- Variable measured: The factor stated in the question to be measured "on the ……."
- Variables controlled: All other variables (ex: Time of the exp. – Volume of solution – Volume of indicator – Number of seeds – Type of plant – Size of potato disc – Mass of fruit – Volume of water – Type of soil – ……..)
- Record the results in a table & plot the results on a graph
- Repeat the exp. several (3) times & take average results for making it more reliable
- Safety precautions: Wear gloves/lab coat/eye goggles – Heat/boil in a water bath
- Make a control exp. (to be described)

Control experiment

Repeat the experiment under the same conditions without the factor under investigation, it's done to make sure that the changes that took place are because of the factor under investigation & by comparing it with the results produced.

Ex: Enzymes exp ……. Use a boiled enzyme or distilled water

Transpiration exp …….. Use a plant without leaves

List of common controlled (fixed) variables

Aim: To make a fair test for fair comparison

Read the question well:

- If "should be kept constant" …….. write down any controlled variable
- If "was kept constant" …….. you should write down something already mentioned in the question that it was controlled"

List: Time of the exp. – Volume of solution – Volume of indicator – Number of seeds – Type of plant – Size of potato disc – Mass of fruit – Volume of water – Type of soil – Temp. – conc. of enzyme – pH)

Errors & improvements

Error	Improvement
Any variable that was not controlled in the exp.	Control this variable
Using the same syringe / dropper causes contamination of samples	Use different syringe / dropper
Judging colour by eye	Use a colourimeter
Monitoring more than one sample at the same time	Do each one separately (one at a time)
Counting bubbles / time for rising discs	Use a gas syringe to measure the volume of gas accurately
Measuring length instead of mass	Measuring mass is better for comparison
Using final length instead of change	Calculating the change is better for comparison
Lamp causes overheating of the plant	Use water bath to avoid overheating
No mixing or stirring	Stir with a glass rod to uniformly distribute heat / mix contents thoroughly
Exp. was not repeated several times to take average results	Repeat several times & take average results to be more reliable
No control exp.	Make a control exp. (describe it)

Aim of doing certain procedures

- Water bath: Control temp. / Adjust temp. / prevent overheating
- Separate droppers or glass rods: Avoid contamination of samples
- Waiting for some time: Samples in test tubes (surrounded by water bath) reach the desired temp. / Samples uniformly mixed together well
- Calculating change or % change: For better comparison

Some important points

- Independent variable = variable changed - Dependant variable = variable measured
- % change = $\frac{\text{new} - \text{initial}}{\text{Initial}} \times 100$
- Average = $\frac{\text{Sum of all numbers}}{\text{Their number}}$
- While reading the question, use a pencil to underline changed, measured & controlled variables as well as sources of error

Some important safety precautions

- Wear gloves to protect your skin from chemicals
- Wear eye goggles to protect your eyes from chemicals
- Cut on a surface to avoid cutting your finger
- Avoid exercise in very hot conditions & use a suitable footwear