**Required practical revision Y13**

1. Bring in your prac file
2. Watch the video clips, writing down the main points (see tips)
3. Answer the questions
4. At the end of the Y12 practicals, complete the questions in T&T (green section) and check your answers

Required practicals good youtube clips

1. Effect of named variable on the rate of an enzyme-controlled reaction

<https://www.youtube.com/watch?v=A8Ts4V_osvo>

1. Mitosis

<https://www.youtube.com/watch?v=K2_FZRdjQH4>

1. Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue

<https://www.youtube.com/watch?v=k1O9jBHgsxs>

1. Investigation into the effect of a named variable on the permeability of cell-surface membranes

<https://www.youtube.com/watch?v=Hc3Mg0Yc7kI>

1. Dissection – heart

<https://www.youtube.com/watch?v=VCskwk9b1kk>

1. Use of aseptic techniques to investigate the effect of antimicrobial substances.

<https://www.youtube.com/watch?v=lGtWG28sKUg>

1. Chromatography

<https://www.youtube.com/watch?v=6sZBtANyuZ8>

1. Hill reaction

<https://www.youtube.com/watch?v=JBQANaPMGao>

1. Yeast respiration

<https://www.youtube.com/watch?v=h3dQ_H0ueN4>

1. Choice chambers – we used woodlice

<https://www.youtube.com/watch?v=FC_RPbMXGm0>

1. Calibration curve for unknown glucose solution – no clip available. All of the clips I can find are ones where the wrong type of Benedict’s solution is being used. We used the correct (‘quantitative Benedict’s) where the blue colour changes from blue to white and settles out (so the more colourless the solution, the more glucose is present – so you get higher transmission when using a colorimeter)
2. Ecology fieldwork <https://www.youtube.com/watch?v=9BtFuHwvBpk>

For each practical write down:

1. The overall aim of the experiment
2. The dependent, independent and control variables. Don’t use the word ‘amount’ but be more specific eg volume, mass, length of time
3. The outline method used. Any special techniques used and definitions eg ‘stain’
4. Hazards and control measures
5. How you would deal with the results, ie graphs (axes), and the form that the final results will take, eg water potential in kPa? A length in mm? a temperature?
6. The theory behind the experiment
7. Any ways that you could improve the reliability, accuracy, preciseness and validity (fairness) of the experiment
8. How did biological variability possibly affect the results?

Questions to do after you’ve watched each clip

1. *Effect of named variable on the rate of an enzyme-controlled reaction*
2. What is the purpose of a buffer? (2)
3. What is the purpose of a control? (1)
4. What is the advantage of using a water bath rather than a Bunsen / direct heating? (2)
5. What does ‘optimum’ temperature mean?
6. Why is it not possible to say exactly what the optimum temperature was on the clip that we watched?
7. *Mitosis*
8. Why are the root tips chosen for observation on mitosis? (1)
9. What is the purpose of the HCl? (1)
10. What is the purpose of the acetic orcein? (1)
11. Importance of thin layer of ‘squash’? (1)
12. How would you calculate the mitotic index? (2)
13. *Water potential determination*
14. Draw a sketch graph of the graph of water potential that you would need to use. Describe how you would use it to determine the water potential of your potato tissue. (4)
15. Calculate the % change in mass where the potato weighed 3.15g at the beginning and 3.5g at the end.(1)
16. Define what a calibration curve is (1)
17. Why did it not matter that she weighed the potato in the weighing boat? (1)
18. *Investigation into the effect of a named variable on the permeability of cell surface membranes*
19. What does a colorimeter measure? (1)
20. What filter would you use for a red-looking solution? (1)
21. Give one precaution you need to take with the cuvette to ensure valid results (1)
22. Draw a sketch graph to show what you would expect to see with increasing temperature (3)
23. Explain what is happening to the membrane as the temperature gets warmer (3)
24. What other factors might you change to give a similar shape graph?
25. *Dissection*
26. Give an example of a hazard and a control measure that you would need for this practical
27. *Aseptic technique and microbial growth*

6a) Define ‘aseptic technique’ (2)

b) Describe 3 measures taken to ensure aseptic technique (3)

c) What is a ‘bacterial lawn’? (1)

d) Why isn’t the lid sealed (with sellotape) all the way round the petri dish?(1)

e) Explain why the temperature used to incubate micro-organisms in schools is different to those in labs / hospital settings (3)

Answers

Enzyme

1a) To maintain constant pH;

1b) To show that any changes in the dependent variable (results) are due to changes in the independent variable (ie the factor that you changed);

1c) Even temperature throughout; known temperature;

1d) ‘optimum’ means the best, in this case the temp at which the reaction was fastest;

1e) The temperatures measured were 30, 40, 50’C, ie were 10 degrees apart so the optimum could have been anywhere between 31-49’. To find the optimum temp more accurately, you would then select some temps around the ‘optimum’ (ie 31-39’C) and test with smaller intervals;

Mitosis

2a) This is the part of the plant where the meristem is, ie the fastest dividing cells;

2b) We want to get the stain into the cells so we use HCl to make the cell membrane more permeable: the HCl denatures some of the membrane proteins;

2c) Acetic orcein stains chromosomes making them more visible to us;

2d) thin layer needed so that light is easily transmitted through the sample so we can see the cells: also cells are more clearly seen if they are in a single layer;

2e) Mitotic index is the proportion of cells undergoing mitosis out of the total. (This is useful in looking at cancerous tumours to see how they are responding to treatment, and guiding prognoses for survival). You can also work out how LONG a particular stage takes by counting how many are in a stage and taking into account the length of a complete cycle. Eg if 25/100 cells are in metaphase in a 6 hour cycle, how long does metaphase last? 25/100 is ¼. So ¼ of 6 hours is 1 hour 30 mins.

Water potential

3a) x-axis sucrose conc (mol dm-1), y-axis water potential. Water potential goes up as sucrose conc goes up; Description of how to get water potential - determine the sucrose conc where there is no change in mass for the cells (from your experiment graph); Start from this point on the x-axis and draw a straight line up to the best-fit line; Where it intersects, draw a line left towards the y-axis and read off the water potential value;

3b) 3.5 – 3.15 x 100 = 11%

3.15

3c) A calibration curve is made up of known values. You can use it to look up unknowns

3d) The mass of the weighing boat is a systematic error (ie, is consistent for all the samples), so can be ignored.

Cell membrane permeability

4a) A colorimeter measures either absorbance or transmission

4b) Red filter

4c) Don’t put your fingers on the side of the cuvette that the light passes through as fingerprints may affect transmission / absorbance thereby affecting validity (ie not a ‘fair test’)

4d) Graph should have x-axis as temp and y-axis as absorbance; line should go up gently; then steeply then level off

4e)The absorbance rises gently as the increase in kinetic energy of the phospholipid bilayer molecules allows pigment to leak out a little; when a certain temp is reached the proteins in the membrane denature leading to a much greater amount of leakage; the line levels off once most of the pigment has leaked out;

4f) pH; ethanol concentration;

Dissection

1. Hazard = Scalpel may cut you. Control measure= carry scalpel to desk in a container;

Aseptic technique and microbial growth

6a) aseptic technique means that precautions are taken to prevent contamination of the microbial culture by unwanted microbes, and to prevent infection of people by the microbes (2).

6b) 3 measures taken to ensure aseptic technique:

Equipment eg petri dish, pipette sterile

Neck of bottles containing agar / bacterial broth flamed

Cuts covered

Wash hands before, afterwards

Desk cleaned with disinfectant eg virkon

6c) A bacterial lawn is where bacteria grow in the agar (they end up all over it and in it)

6d) The lid is not sealed all the way round to make sure oxygen can get in so that conditions are aerobic (anaerobic conditions favour anaerobic bacterial growth, which are more frequently pathogenic)

6e) Optimum temp would be 38’C (fast growth, needed in hospital labs), but schools are limited to 20’C; this is because at 38’C the temp will favour the growth of more pathogenic bacteria and in schools the fast culture is not as urgent.