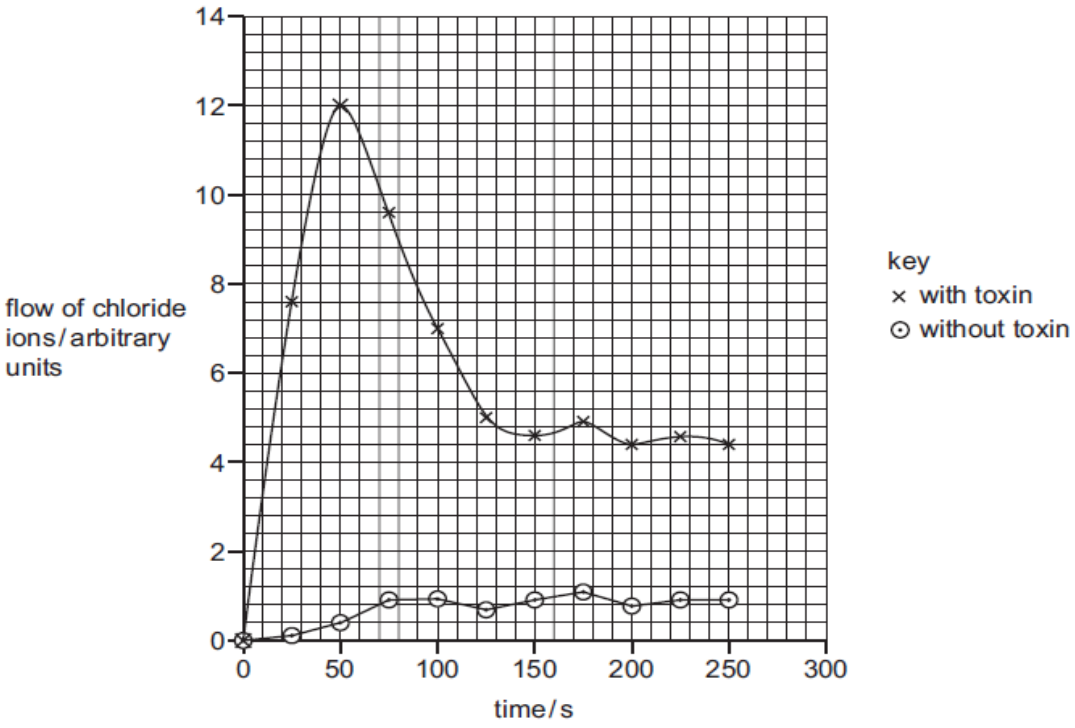
Q1 – (i) : Many years ago scientists discovered that *V. cholerae* secretes a toxin. Figure shows the results of an experiment to measure the flow of chloride ions out of human cells with and without the toxin.



Calculate the difference in flow of chloride ions between the cells with the toxin and the cells without the toxin at 50 seconds.

Show your working and state the units in your answer.

(ii): Use the data in Fig. 2.2 to describe the effect of the toxin on the flow of chloride ions.

out of the cells.

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(iii): Chloride ions cannot move out of cells by simple diffusion.

Suggest **and** describe how chloride ions could move out of cells.

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Q2: Some students investigated osmosis in raw potato sticks.

Define the term *osmosis*.

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Q3: The students measured the mass of four of the potato sticks using an electronic balance.

Figure shows an electronic balance.

The students left each potato stick in one of four different liquids for 5 hours:

- distilled water
- 0.1 mol per dm3 sodium chloride solution
- 0.5 mol per dm3 sodium chloride solution
- 1.0 mol per dm3 sodium chloride solution.

After 5 hours they measured the mass again and calculated the change in mass.

(i) Predict which of the liquids would cause the largest decrease in mass of a Potato stick.

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(ii): The students dried the potato sticks with paper towels before putting them on the electronic balance.

Suggest why.

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Q4: After the experiment the students noticed that the potato stick with the lowest mass was soft and floppy.

Explain why the potato stick had become soft and floppy.

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Q5: The students followed the same experimental procedure with boiled potato sticks and found no overall change in mass in any of the solutions.

Suggest why the mass of the boiled potato sticks remained the same.

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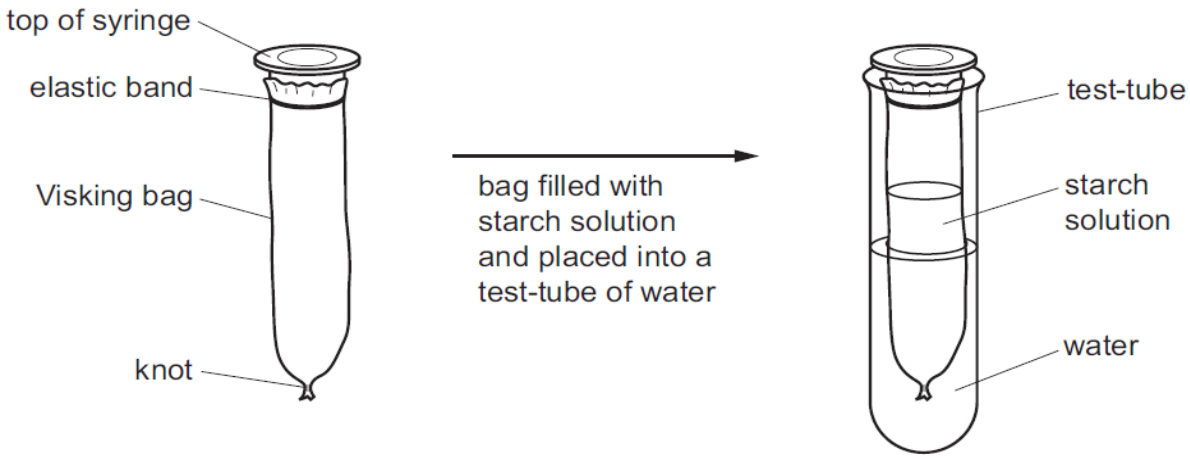
Q6: A student investigated the diffusion of substances through Visking tubing, an artificial membrane which has some of the properties of cell membranes.

The student made a bag of Visking tubing as shown in Figure.



The student added some iodine solution to the water in the test-tube.

After 30 minutes at room temperature, the contents of the Visking bag were stained blue-black, but the water outside remained a yellow colour.

(i) Explain these results.

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(ii) State **three** factors that influence the movement of molecules through membranes.

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2 .....

3 .....

Q7: Penicillin was discovered in 1928 by Alexander Fleming.

Name the type of microorganism that produces the antibiotic penicillin.

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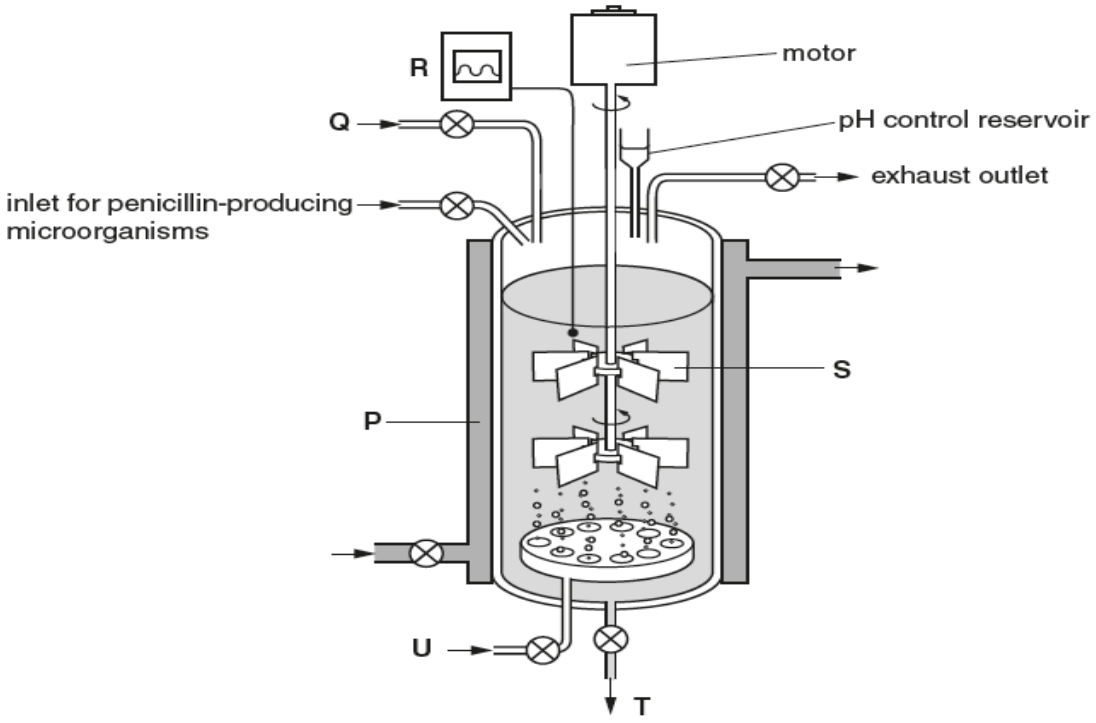
Q8: Penicillin is produced commercially in fermenters as shown in Figure.



(i) Describe how a fermenter can be sterilised.

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(ii): Table shows some names of the parts of the fermenter and their functions.

Complete Table.

One row has been done for you.

letter from Fig. 1.1	name	function
	water jacket	
S		
	nutrient inlet	
R		
	air supply	
T	outlet	allows collection of the liquid containing penicillin after fermentation

Q9: Describe what happens to the liquid containing penicillin after it is collected from the fermenter.

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