Surface area and volume using different volume agar cube lab report essay sample

Experimental method: agar jelly cubes are used as samples of cells. A big peace of 2% agar jelly (containing indicator phenolphthalein) is taken and cut in 5 (x2) different size cubes (with a wall length of 1, 2, 3, 4, and one rectangle 1x2x4 cm). Then, cubes surface area and volume are calculated and recorded into the table. After that, cubes are put into NaOH solution and kept there for a period of 10 minutes. When removed from the solution, cubes are dried with blotting paper and cut in half. The distance diffused by a NaOH solution is measured as it is dyed by an indicator in dark pink color. Finally, the experiment is replicated with 5 same size cubes.

Data collection and processing

4 cubes of a wall of 1, 2, 3 and 4 cm length and one rhomb 1x2x4 cm were cut. They were put into the excess of NaOH solution and kept there for 10min.

I repeated the experiment 2 times and the date was the same the second time as I used the same tools and the same method.

Conclusion and evaluation

The table 1 indicates that the rate of diffusion into 2% agar cubes does not depend on their size; no matter what was the size of the cube, NaOH travelled 0. 5 centimeters per 10 minutes, which means the rate is 0. 05cm/min. However, as the sizes of agar cubes were different, not in all of them the NaOH solution reached the center. Table 2 says that the higher the surface area to volume ratio the higher the diffused to possible distances ratio, and vice versa – the lower the surface area and volume ratio, the

smaller part of cube is diffused. Hence, the hypothesis was proved. Higher surface area and volume ratio belongs to the cube which is smaller, so diffusion is more effective when the cube is small rather than when it is big, which means, its surface area and volume ration is small. From the chart 1 it is easily seen, what whole cube is diffused then surface area and volume ratio is 6.

As cells in real life are not cube-formed, so I made an experiment also with rectangle with walls of 1x2x4. Its volume is equal to cube 2x2x2 (8cm3), but its surface area and volume ratio is bigger (3. 5 instead 3. 0); therefore, NaOH diffused to its center whereas into cube 2x2x2 – not. As it is essential to a cell to make diffusion as much successive as it could be, their size is of oblong form, not cube. In chart 1 it is showed, that diffusion reached 1. 0 when the surface area and volume ratio was 3. 5. Although these results could be generalized to real cells they should not be applied to all cells, for example, the speed of diffusion sometimes could be not constant as inner in the cell the pressure is higher because the density of organelles is higher there. A great improvement in this experiment’s method would be to use lots of different forms of agar jellies, for example, ball, star, rhomb, etc.

There might be some weaknesses and limitations while performing this experiment. First, the method might be erroneous due to the pH of water used to make agar cubes. Water used to make agar cubes might have been slightly basic or acidic and, therefore, alter the results by making agar cubes more basic or acidic before starting an experiment. Second, parts of cube which are closer to the center do not get colored as much as the pieces which are near the outer walls (because of the pressure and density) and it

might be hard to decide where the longest distance travelled by diffusion ends. To make measurements more accurate, only distance travelled by NaOH where pink color can be clearly seen should be counted. However, these weaknesses, possibly, are not very significant, as the results of 2 separate trials were identical.