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BIO 125

Physiology

Lab #2

Molecular Activity and Membrane Transport

In today's lab we will be looking at six different experiments such as diffusion through liquid and agar, demonstration of filtration, measurement of osmosis, measurement of differential permeability of sugar and starch, and the effects of tonicity on red blood cell through demonstration. My partner and I will be experimenting with a couple; the reset will be shared by classmates as a working team.

In lab one we will be diffusing through liquid this is where the movement of particles from higher to lower concentration. In this lab this procedure includes three Peri dishes with each containing 40 mL of 25° Celsius degree of water we will be used during potassium permanganate in each peri dish with just one drop of potassium permanganate into each dish we will be recording the measurement in diameter. We will record our first results and then record in five minutes as to which one was the largest in diameter and then repeat steps one through three for at degrees at 5° Celsius and 45° Celsius. In lab two we will be measuring the diffusion through agar. Here we will be using petri dishes that have been filled with agar. We will make two holes in each agar. In one hole we will place two drops of methylene blue and in the other hole we will place two drops of potassium permanganate. Then we will record time and immediately measure the diameter of each spot. We will start with time zero measurement. Measurements will be made in millimeters once every minute for 15 minutes then we will calculate the average. In lab three we will demonstrate filtration. Here we will fold three filter papers into cones and insert in three separate glass cones, each will be wet to make them stick to the glass. We will prepare

300 mL solutions of charcoal and water making one thick one medium thickness and one thin. We will record the mass of charcoal used in each preparation. We will be pouring 50 mL of each solution one at a time into each funnel. We will count the number of drops per minute, then count the number of drops per minute when the funnel is half filled. Lastly count the number of drops per minute when the funnel is nearly empty. We will repeat the procedure with the last remaining of 50 mL solution. In lab four we will measure osmosis. In this lab we will be using dialysis bags filled with sucrose solutions which will be securely closed. One bag will be filled with 25% sucrose solution and the other will be filled with 50% sucrose solution. Making sure each bag is tightly sealed. We will insert both bags into a beaker filled with distilled water making sure that the dialysis bags are fully submerged but not touching the bottom. We will give it five minutes for them to balance, we will then mark the fluid level of each class and record the time. We will record the fluid level of the glass tubes in milliliters every 15 minutes to 50 minutes if the fluid level rises to the top of the glass sooner than 15 minutes, we will record the time it took for it to get there and will be measured in milliliters from the equilibration line to the top of the glass. In lab five we will measure the differential permeability of sugar and starch. Here we will be also using a dialysis bag filled with one percent starch with 10% glucose solution. The dialysis bag will be tied on a glass rod over a beaker of distilled water. We will make sure that the bottom of the beaker is free of starch and or sugar. In 15 minutes, we will check the water for starch and sugar following this way: for starch we will add 10 drops of legal solution to five mL of water obtained from the beaker if reddish color equals no starch if navy blue color equals that starch is present. We will test for sugar by adding three amounts of Benedict solution to 5 mL of water obtained from the beaker it will be simmered at a low boil for five minutes if blue color equals no sugar if the color changes = sugar present meaning green little sugar, yellow moderate sugar, orange more sugar and red lots of sugar. We will test the beaker again at 30, 45 and 60 minutes. In lab six we will be visualizing the tonicity of red blood cells. Here we will have three separate test dupes labeled A, B, and C. A will be distilled water (hypotonic), B is

physiological saline – 0.85% NaCI (isotonic) and label C saltwater – 2.0% NaCI (hypertonic). Each test tube will have a small drop of blood. We will examine each slide under a high-dry lens of a compound microscope. Observing for A, hemolysis of cells in the hypotonic solution. B, maintenance of south size in the isotonic solution and in see the cremation of cells in the hypertonic solution. Each slide will be drawn as observation.

In lab one our results after we waited five minutes to record it showed that A, measured at 44.45 mm, b measuring at 38.1 mm and C measuring at 50.8 mm. Indicating that the largest measurement in diameter was dish C. Lab two results, when placed two drops of potassium permanganate the time recorded and measured at 0 minutes = 8 mm, at 1 min = 10 mm, at 3 minutes to 15 minutes there was no change measuring at 11 mm. When steps were repeated but this time using methylene blue, at 0 min = 8 mm, 1 min = 12 mm, 2 min to 4 min no change measuring 13 mm, and from 5 minutes to 15 min no change measuring 14 mm. This is showing us that the fastest diffusion rate is methylene blue from measuring 8 mm at 0 minutes to in just one minute measuring 12 mm. In lab three the results, was when we prepared 300 mL solution of charcoal and water making one thick at 3.19 g the medium 1.83 g and thin 0.30 g that was the record for 15 seconds drops per minute. We then counted drops per minute when the funnel was half filled thick had 132 drops medium 180 drops and thin 208 drops. We also counted drops per minute with the funnel is nearly empty thick was 92 drops, medium 96 drops and thin 128 drops. The charcoal did pass into filtrate which it was the thin one. Lab four results was what is the measurement of osmosis. Two dialysis bags were used, one filled with 25% sucrose solution and the other filled with 50% so close solution as well. Each bag was submerged into a beaker filled with water. We were allowed five minutes for them to equilibrate and started the timer. We had to measure in time of how long it took for the fluid level to rise to the top of the glass even if it took sooner than 15 minutes. The 25% sucrose rose to the top at five minutes leading to 50% of sucrose that rose at 45 minutes. 25% have the fastest osmosis rate. I believe it rose quicker because it weighed

less. The 25% weighed at 23.42 g leading to the 50% wing at 47.26 g. Lab five results, here we're using a dialysis bag with 1% starch – 10% glucose solution. We tested for starch first. The reddish color= no starch and it is the result it gave us. For testing for sugar blue color + no sugar it also gave us no sugar. The change of color depended on the dialysis bag. We waited 30, 45, to 60 minutes which resulted in no starch. After sitting in distilled water for 60 minutes we determined that sugar was moderately present as it turned into a yellow color. Regarding the permeability of the dialysis bag, we determined that sugar was present mixed in with distilled water. Lab six results was a demonstration to us where we needed to draw out what we had seen on the microscopic.

Out of all six labs, my partner and I did two. The rest were shared by our classmates. Both labs that we worked out we had questions. We knew our answers would be different from our other classmates. In diffusion through liquid, we discussed the differences from where our hand was placed above the peri dishes as that made a difference in gravity. The closer we were to the peri dish the smaller the impact vs. the higher the drop bigger the impact. Another lab we both discussed was measurement of osmosis. Here we definitely struggled as to where we should fill the beaker with water or how much of the solution needs to be in the dialysis bag. I believe we made lots of errors here because we didn’t mark where the equilibrate and weigh the bags after we were done with the experiment. Another than these two we both had great discussions and outcomes.

In conclusion, these labs were lots of fun, very hands on even if we had to share answers with other classmates. The purpose of these labs was to get familiarized with osmosis, diffusion and differential permeability. We also took a look at filtration and tonicity on cells.