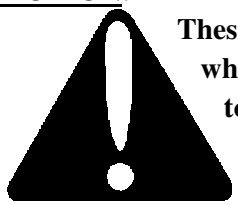
Lab: Why are cells so small?

Name _____
Date _____ Period _____

Pre-Lab Questions: Make predictions about the following:

a) Which agar block will take up more liquid within a given period of time - a larger block or smaller block? Explain.
b) In a given amount of time, will liquid move farther into a small agar block or into a larger agar block? Why?

CAUTION:



These agar blocks are made of phenolphthalein and sodium hydroxide (NaOH) which could be an irritant if ingested … be sure to wash your hands after touching the blocks.

Procedure:

1. Carefully plan, and then cut 4 agar blocks into regular cubes of 3 cm, 2 cm, 1 cm, and 0.5 cm on each side.
2. Place all the agar blocks in a beaker. (Wash your hands!)
3. Cover them with vinegar.
4. Let them sit for 10 minutes … conduct the calculations indicated in Table 1.
5. After 10 minutes, pour off the vinegar into a waste container (not down the sink) as directed by your teacher!
6. Rinse the agar blocks with tap water two times (pour waste down drain) to slow the rate of diffusion.
7. Slice the agar blocks in half (creating a cross-section) and make drawings for your data/results section.
8. Determine the volume of the colored area. Do this by measuring 1 side of the colored area and using this to sketch the amount of pink area compared to the amount of clear area. Include your sketches below!

Data/Results:

Table 1 – *Surface Area: Volume Calculations*

Cube size (cm)	**Surface area = L x W x # of sides (cm^2)**	**Volume = L x W x H (cm^3)**	**Surface : Volume whole # : 1 ratio**
3			**: 1**
2			**: 1**
1			**: 1**
0.5			**: 1**

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Drawings:
Use a ruler to draw the cross section of each agar cube in color and full size after removal from the acid.

Table 2 – *Calculating Percent Diffusion*

Cube size (cm)	**Volume of pink area** (undiffused)	**Volume of clear area** (diffused)	**% Diffusion (Volume of uncolored area ÷ Volume of total cube)**
3			
2			
1			
0.5			

Analysis Questions:

1) Why are we doing this lab?
2) What do the agar blocks (cubes) represent?
3) What does the vinegar (clear liquid cubes are placed in) represent?
4) What evidence is there that vinegar diffuses into the blocks?
5) Was there any evidence that something was moving into or diffusing out of the blocks? Please explain.
6) Which block had the greatest surface area: volume ratio?
7) What happens to the surface area: volume ratio as a cell grows?
8) What happens to the surface area: volume ratio when cells divide?

Concluding Statements

Please wrap up the lab findings in a short paragraph. Include the following:

1. Explain why the growth rate of a cell slows down as it gets larger? Relate this to surface area to volume ratio.
2. Why are cells so small, or in other words, why do cells divide rather than just grow bigger?