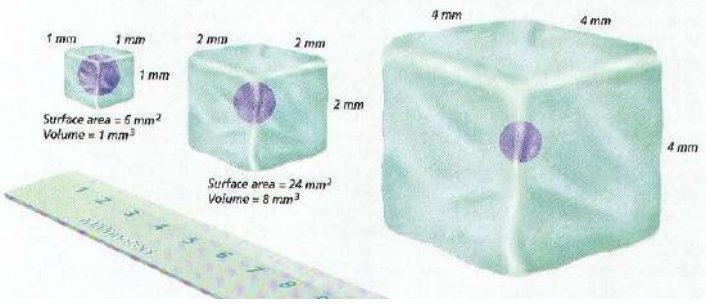
Name: _____ Per: _____ Date: _____

Cell Size Lab - Biology



Background:
When cells reach a certain size, their rate of growth slows down. They will eventually stop growing. Each of these cells divides into two smaller cells, which begin to grow. What causes this? An easy way to investigate such questions is to build models. A model is often thought of as a small copy of something larger. Here we will be making a larger model of something small.

When a cell becomes too large, it is no longer as efficient as it used to be. It now has a greater volume and it takes much longer for materials that enter the cell to reach the center of the cell. This concept will be demonstrated in the lab.

Purpose:
To build a model of a cell to understand why when cells reach a certain size they stop growing.

Materials:

- Block of phenolphthalein agar
- razor blade
- 0.1M HCl Solution
- 250ml beaker
- millimeter ruler
- paper towel
- MyChron Timer
- Nitrile Gloves
- Goggles

Procedure:

1. You will be given an agar block(s) of a certain size by your instructor.
2. Take your beaker and pour 100 ml of 0.1M HCl.
3. Drop your blocks into the beaker of HCl and begin timing.
4. After five minutes, remove the blocks.
5. Pat the blocks dry with paper towel carefully and immediately cut the blocks in half to measure the distance (in cm) across the inside block using a ruler.
   **Remember: 10 mm = 1 cm

6. Write the distance here: _____
7. Once you have all your data you may throw away your agar block, put the solution down the drain, and clean your lab equipment (rinse out and dry your beaker and carefully dry your razor blade)

Data:

You will need to fill in the data for your agar cubes. We will get the rest of the data from the class.

Agar Cube Data

Side of Cube	3 cm	2 cm	1 cm
Distance across colored area after 5 minutes (cm)			

Phenolphthalein Cube Drawings
Draw a sketch of each of the cubes – Your instructor can provide you with pictures of other groups' cubes.

3 cm cube	*2 cm Cube*	*1 cm Cube*

Results:

Phenolphthalein – Agar Cubes			
Side of cube (cm)	**3**	**2**	**1**
Total Surface Area (cm^2)	**54**	**24**	**6**
Volume (cm^3)	**27**	**8**	**1**
Surface area to Volume Ratio			
Colored Area Distance (cm)			
Volume Undiffused (cm^3)			
% Undiffusion			

**Your instructor will show you how to simplify the ratios.
**Volume Undiffused = Colored Area Distance X Colored Area Distance X Colored Area Distance
**% Diffusion = Volume Undiffused/Volume X 100

Questions:

1. What surrounds a cell and controls what enters or leaves?

2. Materials move into and out of a cell by what process?

3. What evidence is there that the HCl diffuses into the agar block?

4. Is diffusion more efficient (reach more places in a quicker amount of time) over short (small volume) or long distances (large volume)?

5. Look at your data table. Each block increased by 1 cm on each side. Which increases faster --- surface area or volume of a cell?

6. Did the HCl diffuse into each cube in the same amount? Why or why not?

7. If the agar blocks were living cells and the HCl were a "vital substance" that the cell needed, which block would be able to provide the material the quickest? Use evidence from the lab to support your answer.

8. When a cell's volume becomes too large for its surface area, what do the cells do?

9. **IMPORTANT – Why are organisms composed of small cells rather than large cells? (Reference Surface Area and Volume)**