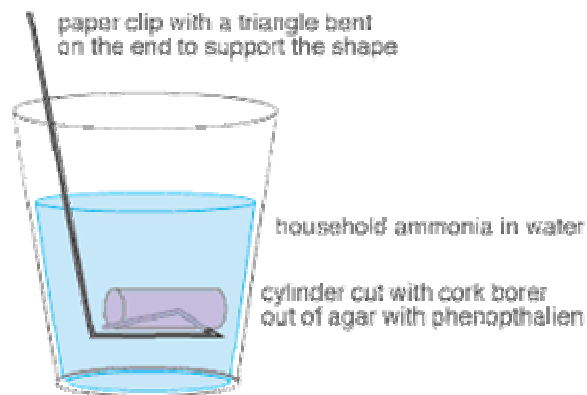


## Effect of Surface Area to Volume and Rate of Diffusion

This lab will explore the relationship between Surface area to volume ratio and the rate of diffusion. In most living things diffusion is the mechanism used to get material from an area of high concentration to an area of low concentration. The shape and size plays a large role in the rate at which material can come into or out of the cell.

### Materials:

1. Cup of Agar with Phenolphthalein
2. Small beaker or container to hold Ammonia solution
3. Ammonia Solution
4. Small Platform made of paperclip and tap as shown below.



### Procedures:

1. Remove the agar from the cup by taking a knife and running it around the inside of the cup to loosen it.
2. Turn the cup upside down to release it onto a paper towel.
3. Cut a 10 mm cube using a razor blade. Calculate the volume and surface area.
4. Place this cube into the ammonia solution as shown above for exactly 1 minute.
5. Quickly remove the cube from the solution and cut it in half and measure exactly how much penetration happened.
6. Recalculate the undiffused volume
7. Calculate the % of diffusion by subtraction the two volumes and taking that total and dividing by the original volume.
8. Make at least three shapes with different SA/V ratios.
9. Repeat the steps as above.

## Formulas:

Cube:

Area = L x W for each side

Volume = L x W x H

Cylinder

Volume =  $\pi r^2 \times h$

Area =  $2\pi r \times h + \pi r^2 \times 2$

Triangular prism

Volume =  $\frac{1}{2} b \times h \times \text{length}$

Area =  $\frac{1}{2} b \times h \times 2 + L \times W$  for each side