**Effect of size (SA:Volume) on uptake by diffusion**

**You will need:**

Agar cubes soaked with phenolthalein – 2cm x 2cm, 1cm x 1cm, 0.5cm x 0.5 cm

(need 3 of each size for repeats)

Hydrochloric acid

100ml beaker

White tile

Ruler

Forceps

Scalpel

Stopclock

**Method:**

1. Cut out agar cubes according to the sizes above
2. Place a cube in a beaker and cover with the hydrochloric acid
3. Start the stop clock – time how long it takes all colour to go
4. Pour off the solution, rinse the cubes with a little water and blot dry
5. Repeat for different sized cubes and work out the average time after 3 repeats each (if time)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dimensions (mm) | Surface area | Volume  (mm3) | SA:volume | Test 1 | Test 2 | Test 3 | Av. time | Rate (mm/s-1) |
| 5 x 5 x 5 |  |  |  |  |  |  |  | 2.5/t |
| 10 x 10 x 10 |  |  |  |  |  |  |  | 5/t |
| 20 x 20 x 20 |  |  |  |  |  |  |  | 10/t |

**Draw a graph of SA:vol vs rate of diffusion**

**Conclusion:**

How does SA:Volume influence the rate of diffusion?

Why does SA:Volume limit a cell’s size?

Why do large multicellular organisms need transport systems?

Extension question: Why does a mouse have a higher heart rate that an elephant?