

Define the following terms:

Reynolds number

Molality

Donnan equilibrium

Osmolality

Electrolytes

Colligative properties

Facilitated diffusion

Overton's rules

Fill in the blank

At low Reynolds numbers, _____ forces are more important than _____ forces. This relationship reverses itself at higher Reynolds numbers.

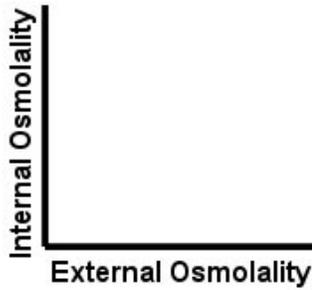
_____ moves ions with a concentration gradient faster than standard diffusion and does not require energy. The only way to move ions against a concentration gradient is _____, which requires ATP.

Reynolds numbers for an object moving through a fluid medium are calculated based on: 1) the viscosity of a fluid, 2) the size of the object, 3) the speed of the object moving through that fluid and 4) _____.

A hyperosmotic regulator maintains internal osmotic conditions _____ the surrounding water. _____ is an example of a hyperosmotic regulator.

The _____ describes the basic diffusion rate of something based on a diffusion constant, area and a concentration gradient.

The _____ allows you to calculate an electrical potential due to a concentrations gradient of ions.



On the axes to the left, draw and clearly label (as a,b,c and d) lines you would expect for the following:

- a. shark
- b. tuna (marine teleost)
- c. goldfish (freshwater teleost)
- d. intertidal copepod

Honeybees (about 1.5 cm long) fly at around 3.5 meters s^{-1} . A Boeing 747 (about 70 meters long) flies at around 260 meters s^{-1} . Therefore, the relative speed of each, expressed as body lengths moved per second, is 233 for the bee and 3.7 for the jet (proportionately, the bee is faster). Why don't we make jets that look and work like bees? Also, why is it bees can go at such a high relative speed while not being very aerodynamic?

What are hygroscopic substances and what type of organisms might use them in maintaining water balance?

What are the allometric patterns seen in mammals medullary thickness when comparing dry and moist environments? Relate this trend in kidney morphology back to nephron function. What, exactly, does a thicker medulla allow for and why is this adaptive?

If a 1.5 molar solution of $MgCl_2$ decreased the freezing point of water by 3.25 C° , what is the osmolarity of the solution? What would be the osmotic coefficient of $MgCl_2$?

What is the difference between tight and gap junctions? Based on their functional differences, where in the body might you expect to find each of them?

What are compensatory osmolytes? Give an example of an organism that uses them, describing the function they serve.

Compare and contrast the osmoregulation for a copepod (small marine invertebrate) and a kangaroo rat (desert mammal).