**1.4 Membrane Transport**

**Essential idea:** Membranes control the composition of cells by active and passive transport.

**Nature of science:** Experimental design—accurate quantitative measurement in osmosis experiments are essential.

**Understandings:**

• Particles move across membranes by simple diffusion, facilitated diffusion, osmosis and active transport.

• The fluidity of membranes allows materials to be taken into cells by endocytosis or released by exocytosis. Vesicles move materials within cells.

**Applications and skills:**

• Application: Structure and function of sodium–potassium pumps for active transport and potassium channels for facilitated diffusion in axons.

• Application: Tissues or organs to be used in medical procedures must be bathed in a solution with the same osmolarity as the cytoplasm to prevent osmosis.

• Skill: Estimation of osmolarity in tissues by bathing samples in hypotonic and hypertonic solutions. (Practical 2)

**Diffusion and Osmosis**

Watch this:

<http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_diffusion_works.html>

<http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_osmosis_works.html>

*Define:*

**Diffusion**

**Osmosis**

*What needs to be present for both diffusion and osmosis to occur?*

**Passive Transport**

*Complete the table for the 3 types of passive transport:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Method of Transport** | **Through which part of membrane** | **Direction of movement** | **Energy required** | **Example of substances** |
| **Diffusion** |  |  |  |  |
| **Osmosis** |  |  |  |  |
| **Facilitated diffusion** |  |  |  |  |

*Try this past paper question:*

(a) Define osmosis.

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....................................................................................................................................(1)

(b) Outline how transport occurs across membranes by facilitated diffusion.

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....................................................................................................................................(2)

(c) Explain how the properties of phospholipids help to maintain the structure of cell membranes.

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....................................................................................................................................(3)

(Total 6 marks)

Go to:<http://www.teachersdomain.org/asset/tdc02_int_membraneweb/>

*Click on each of the substances in turn to find out how it crosses the membrane.*

*Complete the table:*

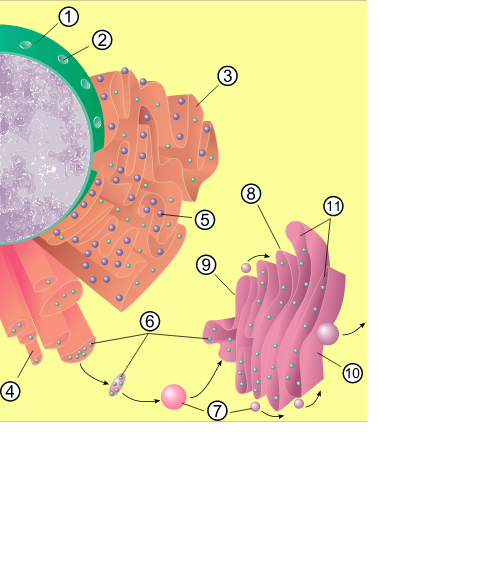
|  |  |  |
| --- | --- | --- |
| **Name of Substance** | **Method of Transport** | **Explanation** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Active Transport**

*Complete the table:*

|  |  |
| --- | --- |
| Energy required? |  |
| Type of substances moved |  |
| Examples of substance moved |  |
| Direction of movement |  |

**2.4.7 Vesicles and The Endomembrane System**



*Identify structures 1 - 11 and explain the role of the endomembrane system:*

*Watch the animation at:*

<http://www.phschool.com/science/biology_place/biocoach/cells/endoreview2.html>

*Fill in the blanks:*

Proteins destined for secretion are made on \_\_\_\_\_\_\_\_\_\_\_\_\_\_ bound to the \_\_\_\_\_\_\_\_.

The proteins move through the endomembrane system and are dispatched from the trans face of the \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in transport \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that move through the cytoplasm and then fuse with the \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ releasing the protein to the outside of the cell. Examples of secretory proteins are collagen, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and digestive enzymes of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and intestine.

*Watch:*

<http://highered.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::535::535::/sites/dl/free/0072437316/120068/bio02.swf::Endocytosis%20and%20Exocytosis>

*and*

<http://bcs.whfreeman.com/thelifewire8e/content/cat_040/0504003.html>

*Complete the table:*

|  |  |  |
| --- | --- | --- |
| **Type of bulk transport** | **Description/definition** | **Examples** |
| **Phagocytosis** |  |  |
| **Pinocytosis** |  |  |
| **Receptor mediated endocytosis** |  |  |
| **Endocytosis** |  |  |

*Define:*

**Endocytosis**

**Exocytosis**

*Explain the meanings of the following:*

**Secretory vesicles**

**Invagination**

*Describe and explain the role of bulk transport in the following situations.*

*A diagram might help.*

**Amoeba nutrition**

**Hormone production**

*(a) Outline how vesicles are used to transport materials secreted by a cell. (6)*

*(b) Draw a labelled diagram to show the structure of a membrane.(5)*

*(c) Describe the process of endocytosis.(5)*