



Membrane Transport

ENE-2.E.1

Passive transport is the net movement of molecules from high concentration to low concentration without the direct input of metabolic energy.

ENE-2.E.2

Passive transport plays a primary role in the import of materials and the export of wastes.



Membrane Transport

ENE-2.E.3

Active transport requires the direct input of energy to move molecules from regions of low concentration to regions of high concentration.

ENE-2.F.1

The selective permeability of membranes allows for the formation of concentration gradients of solutes across the membrane.



Membrane Transport

ENE-2.F.2

The processes of endocytosis and exocytosis require energy to move large molecules into and out of cells—

- a. In exocytosis, internal vesicles fuse with the plasma membrane and secrete large macromolecules out of the cell.
- b. In endocytosis, the cell takes in macromolecules and particulate matter by forming new vesicles derived from the plasma membrane.



**Passive transport moves
substances...**

- A. From high to high concentration**
- B. From high to low concentration**
- C. From low to low concentration**
- D. From low to high concentration**

AP BIO INSTA-REVIEW

TOPIC

2.6

Passive transport moves substances...

B. From high to low concentration



Passive transport does not require ATP so it moves down its concentration gradient. This means that substances will move from high to low concentration.

AP BIO INSTA-REVIEW

TOPIC

2.6



Passive transport requires...

- A. Energy input**
- B. No energy input**

**Passive transport
requires...**

B. No energy input



**Passive transport does not
require any ATP input as the
substance moves down its
concentration gradient from high
to low concentration.**

AP BIO INSTA-REVIEW

TOPIC

2.6



Provide an example of passive transport

AP BIO INSTA-REVIEW

TOPIC

2.6

**Provide an example of
passive transport**



**Movement of water from hypotonic
environment to hypertonic
environment**

**Movement of glucose from blood to
extracellular fluid after a meal.**

Note: additional examples apply

AP BIO INSTA-REVIEW

TOPIC

2.6



What are the two types of passive transport?

What are the two types of passive transport?



Simple diffusion – does not require a membrane protein for transport

Facilitated diffusion – requires a transport protein



Active transport requires...

- A. Energy**
- B. Transport protein**
- C. Both energy & transport protein**
- D. Neither energy nor transport protein**

**Active transport
requires...**

**C. Both energy &
transport protein**



Active transport involves substances from moving from a low concentration to a high concentration. Due to the substance moving against its concentration gradient, the movement requires an input of energy.

AP BIO INSTA-REVIEW

TOPIC

2.6



**Why does the active transport
required energy & transport
protein?**

Why does the active transport required energy & transport protein?



Active transport is AGAINST the concentration gradient. This means that substances go from low concentration to high concentration. Imagine being at the bottom of a hill on a bike and you gotta get to the top of the hill... you gotta put some energy since you are from



**Process of exporting materials
with vesicles?**

- A. Endocytosis**
- B. Exocytosis**
- C. Facilitated Transport**
- D. Simple Diffusion**

Process of exporting materials with vesicles?

B. Exocytosis



Since there is a substance being exported, this process is called exocytosis. An easy way to remember this is that EXocytosis involves materials EXiting the cell.



Where are the proteins made for export by exocytosis?

- A. Golgi**
- B. Nucleus**
- C. Ribosome**
- D. Rough ER**

Where are the proteins made for export by exocytosis?

D. Rough ER



Proteins for secretion are made in the rough ER. The rough ER has membrane studded with ribosomes. Ribosomes synthesize proteins and since they are on a membrane, they made proteins for secretion (or membrane proteins)

AP BIO INSTA-REVIEW

TOPIC

2.6



Describe the pathway for a protein to be exported.

AP BIO INSTA-REVIEW

TOPIC

2.6

Describe the pathway for a protein to be exported.



Rough ER

Vesicle

Golgi bodies/apparatus

Vesicle

Plasma Membrane

AP BIO INSTA-REVIEW

TOPIC

2.6



Describe the process of receptor-mediated endocytosis

**Describe the process of
receptor-mediated
endocytosis**



**A ligand (signaling molecule)
binds to a receptor protein.
After signal transduction, the
membrane undergoes
invagination to create a “pit”
that forms the vesicle.**



What does the product of phagocytosis bind to?

- A. Endoplasmic Reticulum**
- B. Lysosome**
- C. Nucleus**
- D. Mitochondria**

What does the product of phagocytosis bind to?

B. Lysosome



Phagocytosis is cellular eating. The pseudopods surround the food particle creating the food vacuole which fuses with the lysosome for digestion.



Amount of ATP used to move
30 moles of glucose down
concentration gradient

- A. **0** moles ATP
- B. **15** moles ATP
- C. **30** moles ATP
- D. **60** moles ATP

AP BIO INSTA-REVIEW

TOPIC

2.6

Amount of ATP used to move **30** moles of glucose down concentration gradient

A. **0** moles ATP



This was a "trick" question. The glucose is moving down its concentration gradient which is **PASSIVE** transport. Passive transport does **NOT** require ATP.



**What type of movement requires
no energy, down concentration
gradient**

- A. Active transport**
- B. Passive transport**

AP BIO INSTA-REVIEW

TOPIC

2.6

What type of movement requires no energy, down concentration gradient

B. Passive transport



Passive transport does not require any ATP as the material is moving down its concentration gradient. The substances are moving from high concentration to low concentration.

AP BIO INSTA-REVIEW

TOPIC

2.6



What is the difference between facilitated transport and simple diffusion?

What is the difference between facilitated transport and simple diffusion?



Facilitated transport requires a transport protein.

Simple diffusion does not require a protein and passes directly through the plasma membrane.

Both are passive transport and do NOT require an input of ATP.

AP BIO INSTA-REVIEW

TOPIC

2.6



**Identify two components of
active transport**

AP BIO INSTA-REVIEW

TOPIC

2.6

**Identify two components
of active transport**



**Active transport moves materials
against the concentration gradient.**

Active transport requires use of ATP

**Active transport requires a transport
protein (traditionally a carrier
protein)**

AP BIO INSTA-REVIEW

TOPIC

2.6



**Move glucose from GI tract into
blood supply.**

Identify type of transport used.

- A. Active**
- B. Facilitated**
- C. Simple**

AP BIO INSTA-REVIEW

TOPIC

2.6

Move glucose from GI tract into blood supply. Identify type of transport used.

B. Facilitated



Glucose is a polar substance.

Due to its polar nature, it requires assistance to cross the membrane. If a protein is helping material to cross the membrane, this is considered facilitated diffusion.



**Movement of oxygen from alveoli (lungs) into blood supply
Identify type of transport used.**

- A. Active**
- B. Facilitated**
- C. Simple**

AP BIO INSTA-REVIEW

TOPIC

2.6

Movement of oxygen from alveoli (lungs) into blood supply. Identify type of transport used.



C. Simple

Oxygen is small and nonpolar. This means that it is able to cross the plasma membrane without assistance. In addition, in the lungs the oxygen will be entering the blood supply so it will be moving down its concentration gradient.



**Sodium/potassium pump moving
3 Na⁺ out and 2 K⁺ into
neuron (nervous cell)**

Identify type of transport used.

- A. Active**
- B. Facilitated**
- C. Simple**

AP BIO INSTA-REVIEW

TOPIC

2.6

Sodium/potassium pump moving **3** Na^+ out and **2** K^+ into neuron (nervous cell). Identify type of transport used.

A. Active



Sodium and potassium are charged which means they are polar. They are being "pumped" which means it is going against its concentration gradient which describes active transport.



Secretion of proteins from rough ER is done by

- A. Exocytosis**
- B. Facilitated Transport**
- C. Simple Diffusion**

AP BIO INSTA-REVIEW

TOPIC

2.6



Secretion of proteins from rough ER is done by

A. Exocytosis

EXocytosis is the process of materials EXiting the cell. After the materials are made in the rough ER, they are sorted and modified in the Golgi, then released by fusing with the plasma membrane.

AP BIO INSTA-REVIEW

TOPIC

2.6



Identify and describe the three types of endocytosis.

Identify and describe the three types of endocytosis.



Endocytosis is bulk transport across the plasma membrane.

Phagocytosis – cellular eating, pseudopodia surround “food” to be engulfed by the cell

Pinocytosis – cellular drinking, cell “gulps” extracellular fluid and solutes it contains

Receptor-Mediated Endocytosis – ligand binds to receptor causing invagination to move material across membrane



Pathway to exocytosis

A. Rough ER \Rightarrow Golgi \Rightarrow Membrane

**B. Rough ER \Rightarrow Lysosome \Rightarrow
Membrane**

**C. Smooth ER \Rightarrow Golgi \Rightarrow
Membrane**

**D. Smooth ER \Rightarrow Lysosome \Rightarrow
Membrane**

Pathway to exocytosis

**A. Rough ER \Rightarrow Golgi \Rightarrow
Membrane**



The materials are synthesized by the ribosomes on the rough ER membrane. The materials are sorted and modified by the Golgi bodies. The materials are secreted by the transport vesicles fuses with the membrane.



Pathway of phagocytosis

A. Membrane \Rightarrow Golgi \Rightarrow Rough ER

B. Membrane \Rightarrow Golgi \Rightarrow Smooth
ER

C. Membrane \Rightarrow Lysosome

D. Membrane \Rightarrow Rough ER

Pathway of phagocytosis

C. Membrane →
Lysosome



Phagocytosis is cellular eating. After the food vacuole is formed from the phagocytosis, it will fuse with the lysosome for digestion.