

# Transport Mechanisms through Cell Membranes

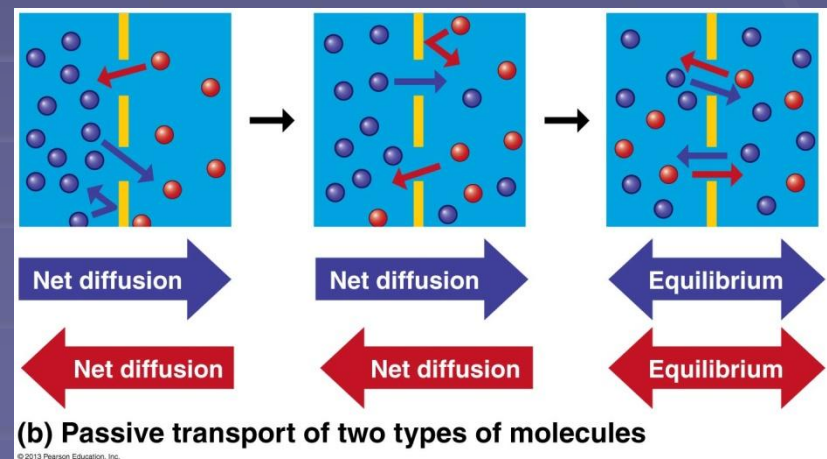
Passive vs. Active Transport

# Essential Questions

1. Define passive transport. (Related to Essential Skill 3-4)
2. Describe and give an example of diffusion. (Related to Essential Skill 3-4)
3. Compare and contrast diffusion and osmosis. (Related to Essential Skill 3-4)
4. Explain how facilitated diffusion differs from diffusion in general.

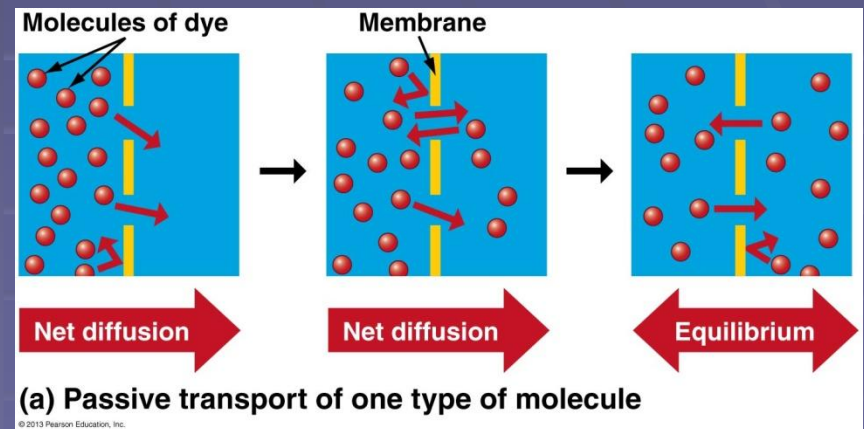
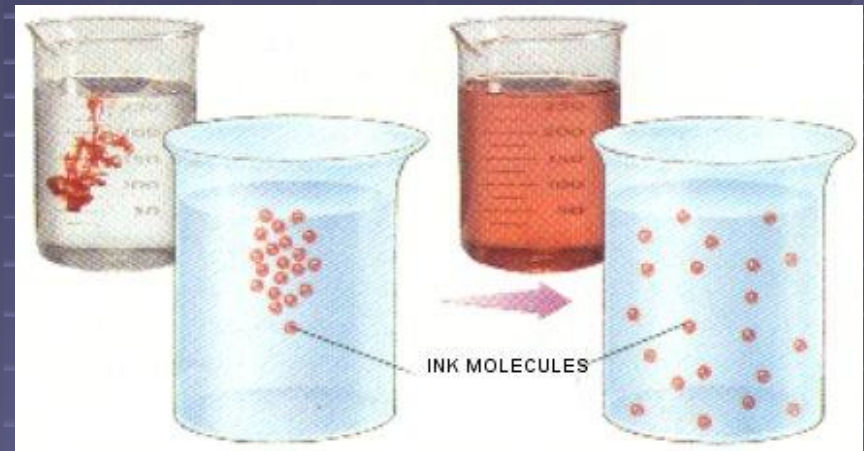
# Passive Transport

- Movement of molecules through the cell membrane
- Movement is **from high to low** concentrations
- Does NOT require energy.
- 3 Types of Passive Transport:
  - *Diffusion*
  - *Osmosis*
  - *Facilitated Diffusion*

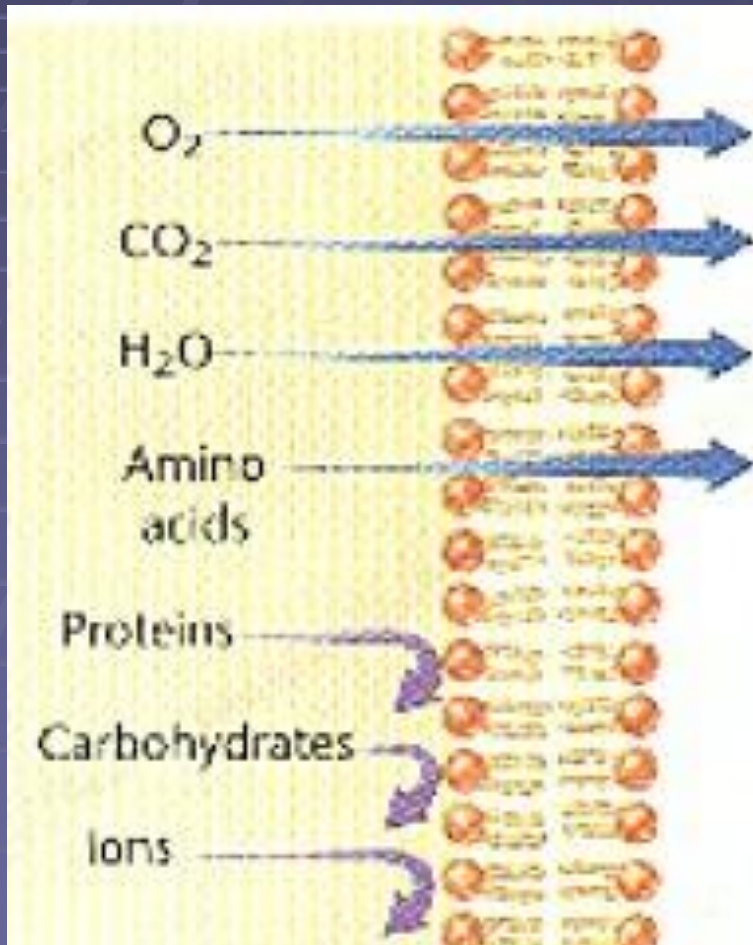


# 1. Diffusion

- Movement of molecules from high concentration to low concentration.
- Why can you smell popcorn from another room?
- Why does food coloring mix by itself?
- How does oxygen get into your blood?



# Selectively Permeable = cell membrane will only allow some things through!

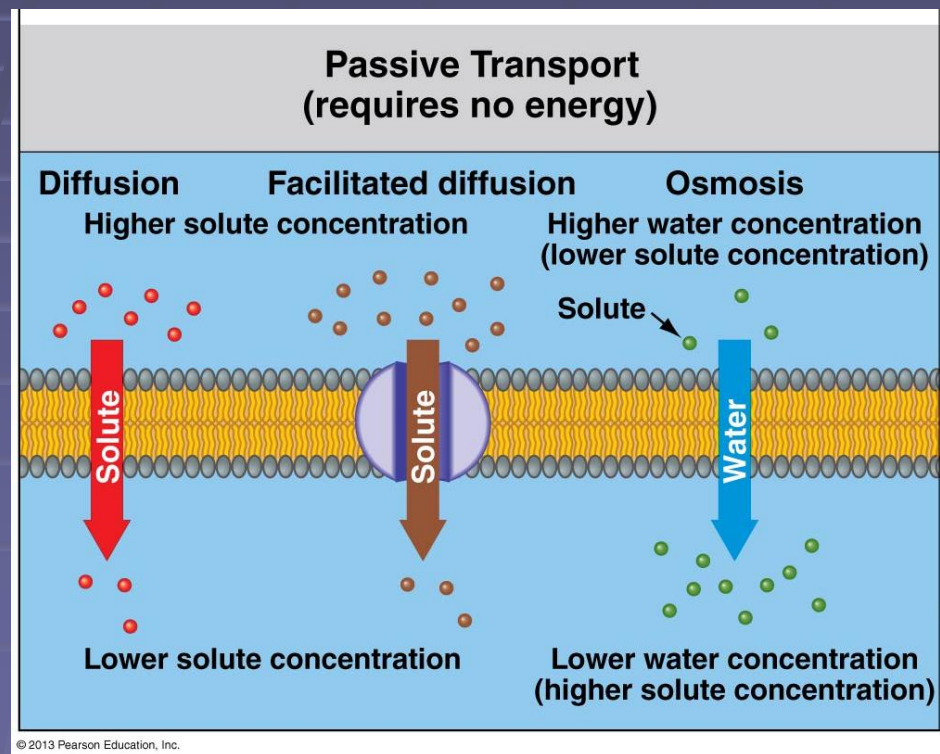


- Large macromolecules and charged ions can NOT get through the lipid bi-layer!!!



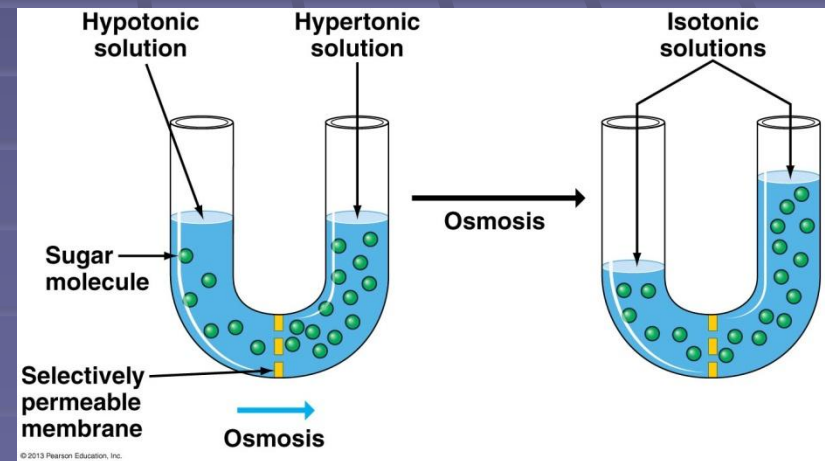
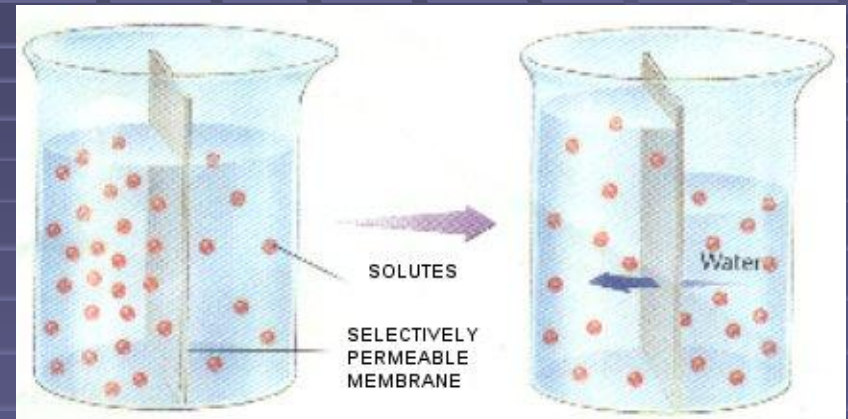
## 2. Facilitated Diffusion

- Diffusion with the help of “channel” proteins.
  - Usually because molecules are too big or have a charge and can not go through the membrane alone.

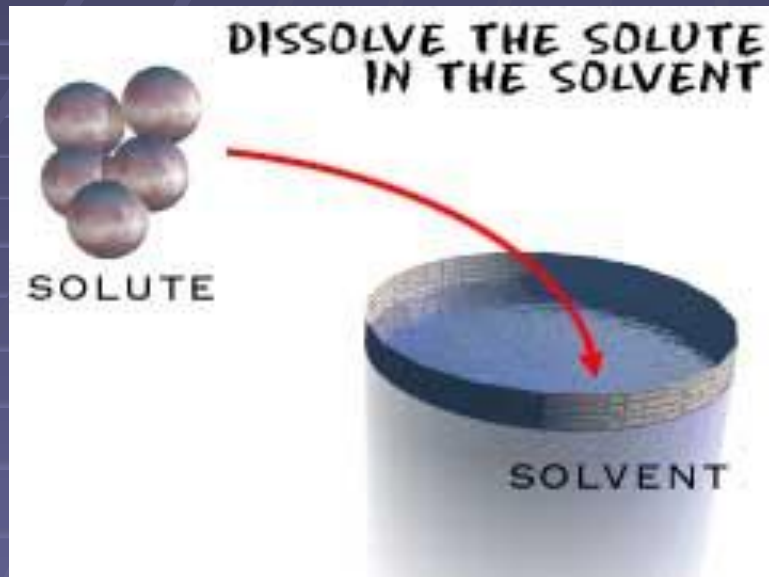


# 3. Osmosis

- Osmosis is the Diffusion of WATER!!!!
- Water moves from areas with more water to areas with less water
- Why do your fingers get wrinkles when you swim too long?
- Have you ever put salt on a slug???



# Solutions & Solutes



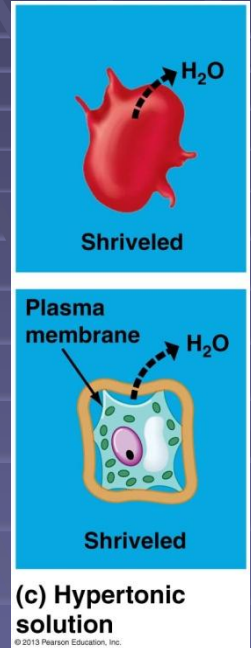
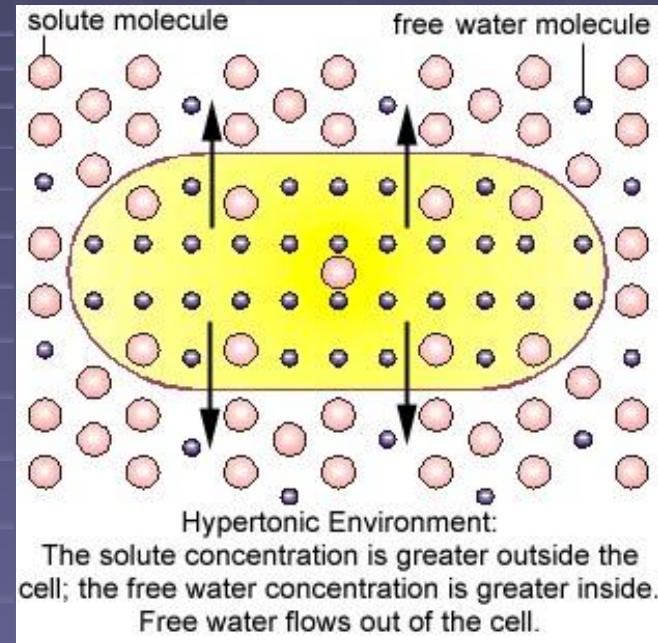
Solute + Solvent = Solution

- A solution is a liquid with another substance dissolved in it
  - Examples: salt water & sugar water
- A solute is the “stuff” that is dissolved in a solution
  - Examples: salt & sugar
- In osmosis we trace the movement of the water, not the solute

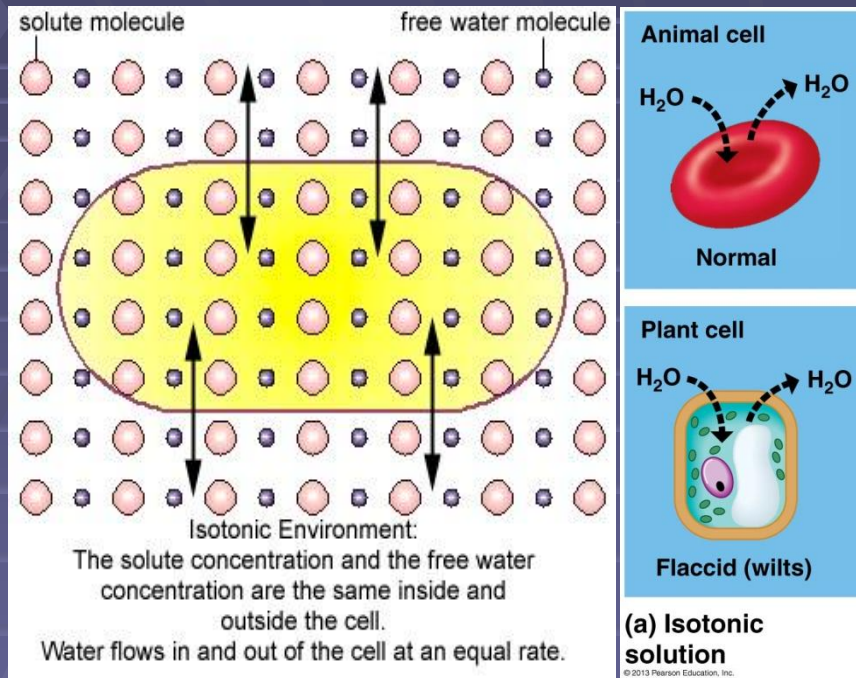


# Three Types of Osmosis

- **Hypertonic Environment**
  - Solutions that have MORE “stuff” and less water than the cell.
- Water will move OUT of cell.

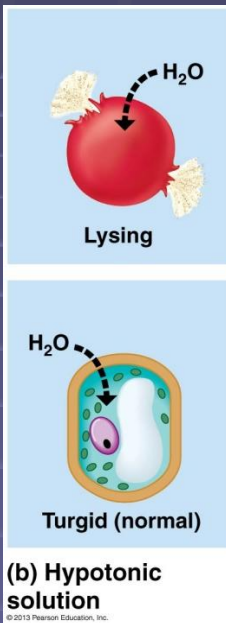
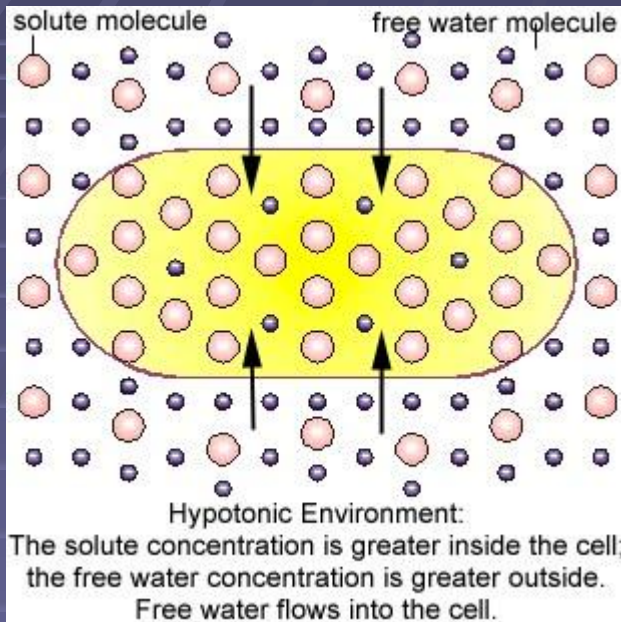


# Isotonic Environment



- Solution has the SAME amount of “stuff” and water as the cell.
- There is no net gain or loss of water from the cell.
  - Water moves equally in and out of the cell

# Hypotonic Environment



- Solution has LESS “stuff” and more water than the cell.
- Water will move INTO cell.

# ACTIVE TRANSPORT

# Essential Questions

1. Define active transport. (Related to Essential Skill 3-4)
2. Describe and give an example of a protein pump. (Related to Essential Skill 3-4)
3. Compare and contrast endocytosis and exocytosis. (Related to Essential Skill 3-4)
4. Explain how protein pumps differ from facilitated diffusion. (Related to Essential Skill 3-4)



# Active Transport

- Movement of molecules across the membrane **from low to high** concentration.
- Requires ENERGY.
- 3 Types of Active Transport:
  - *Protein PUMPS*
  - *Endocytosis*
  - *Exocytosis*



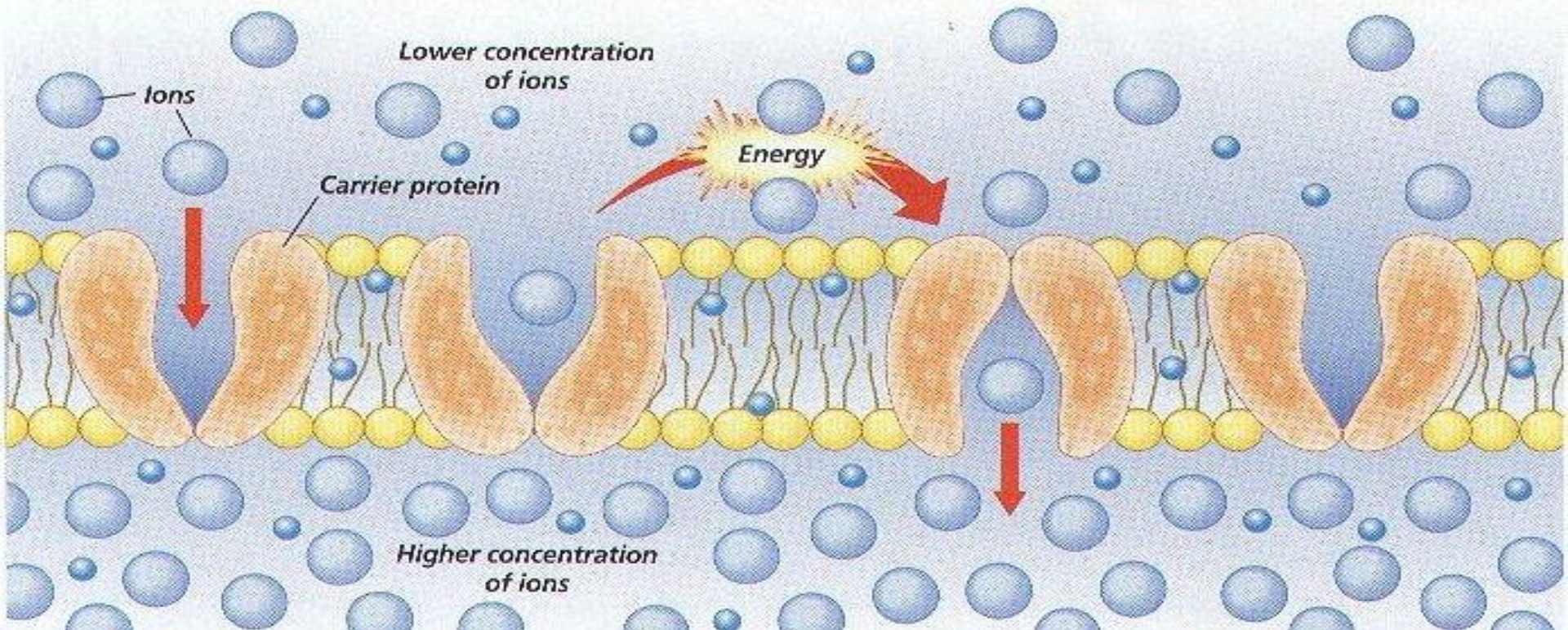
Riding a bicycle uphill = Active Transport analogy (NOT actual passive transport!)



# Protein “Pumps”

Proteins that “pump” or move molecules from Low concentration to High concentrations - requires energy.

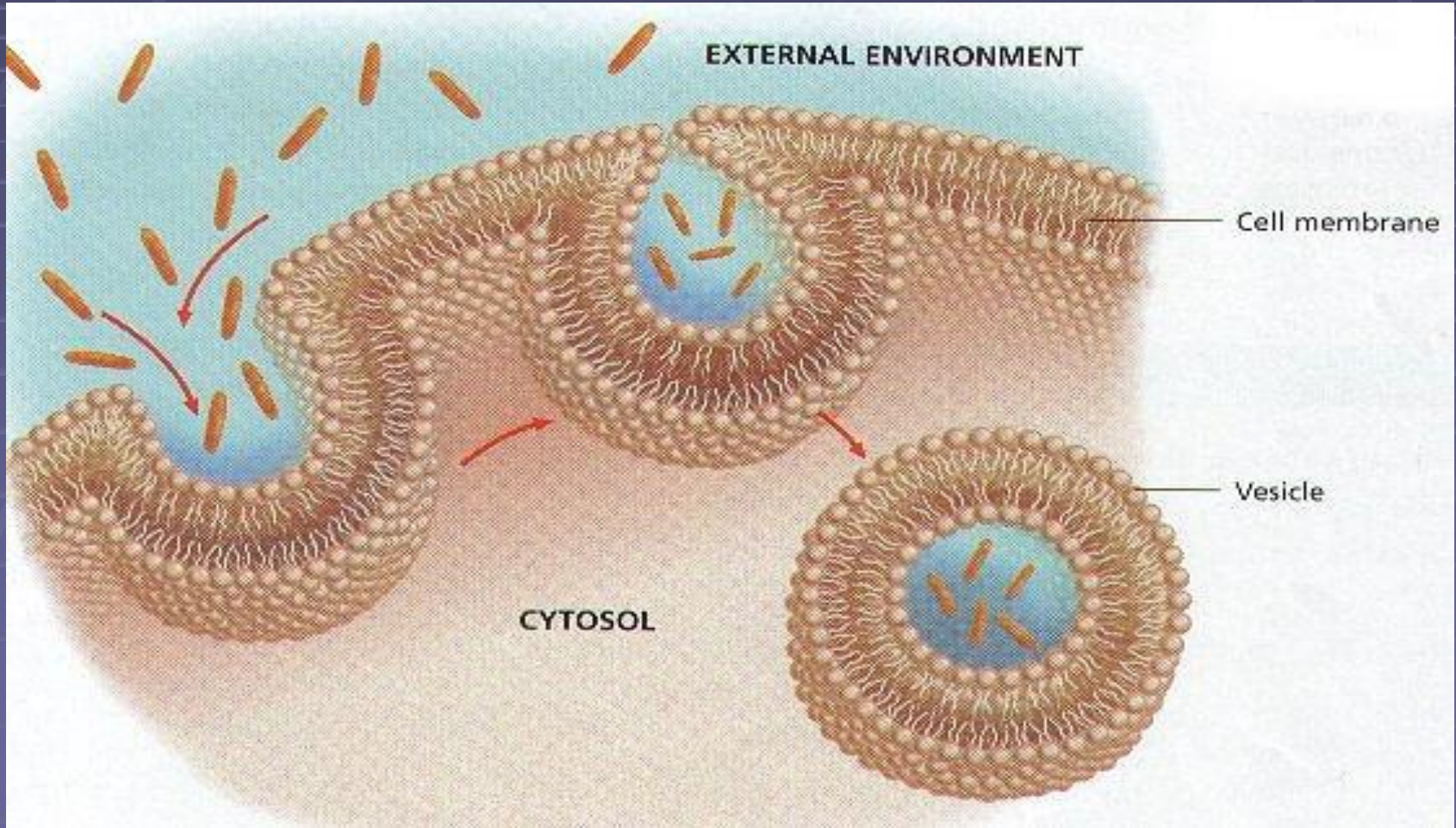
Carrier proteins are used in active transport to pick up ions or molecules from near the cell membrane, carry them across the membrane, and release them on the other side. Active transport requires energy.





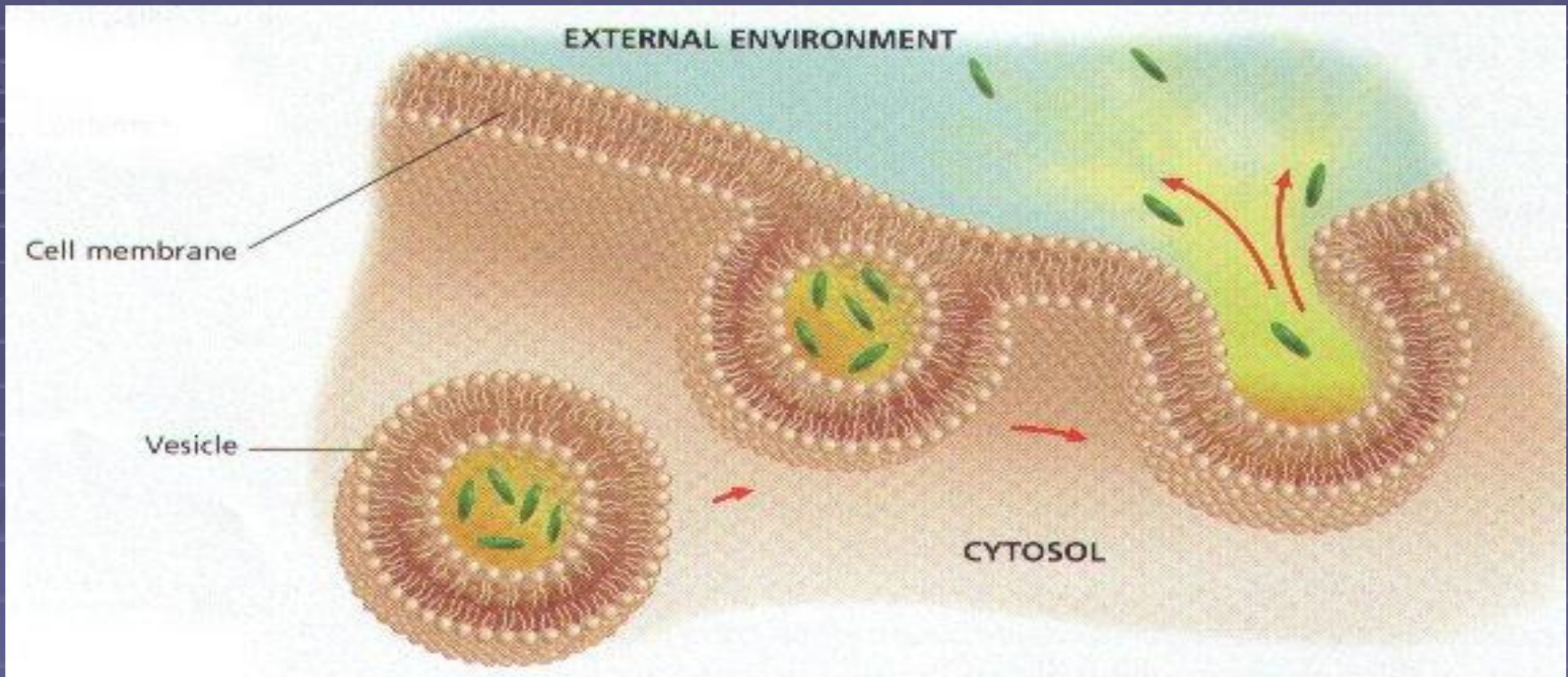
# Endocytosis

- Active transport of large particles INTO the cell, by surrounding them with the cell membrane.





# Exocytosis



- Active transport of substances OUT of the cell using the cell membrane – Exiting the cell

# Transport Analogy





# Concentration Mountain – how to remember

## Passive Transport

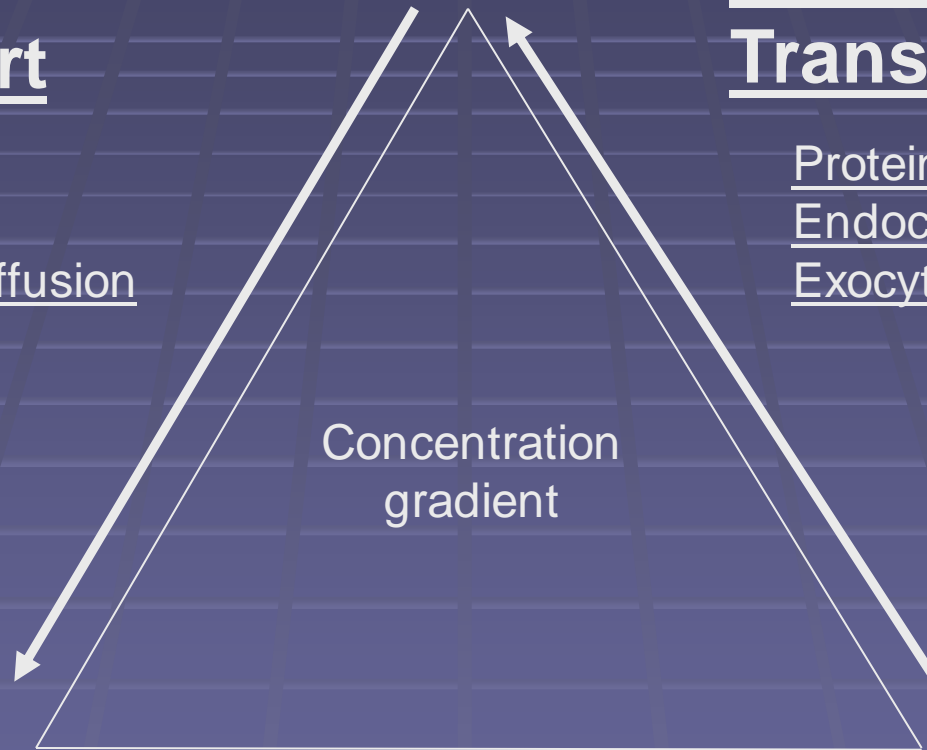
Diffusion  
Osmosis  
Facilitated Diffusion

No Energy

## Active Transport

Protein pumps  
Endocytosis  
Exocytosis

Uses Energy



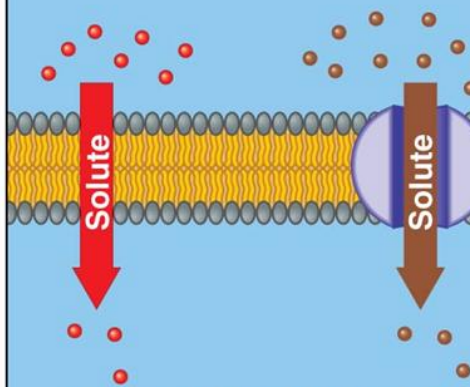
# Summary

## MEMBRANE TRANSPORT

### Passive Transport (requires no energy)

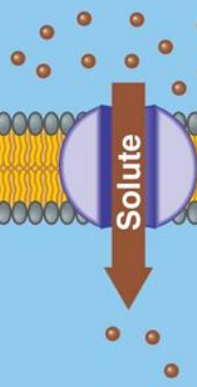
#### Diffusion

Higher solute concentration



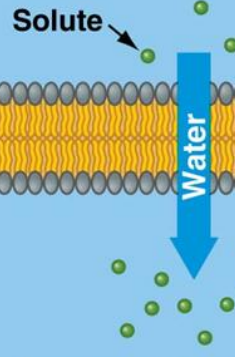
Lower solute concentration

#### Facilitated diffusion



#### Osmosis

Higher water concentration  
(lower solute concentration)

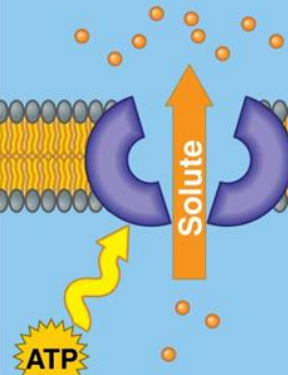


Lower water concentration  
(higher solute concentration)

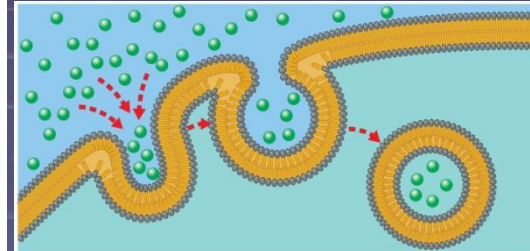
### Active Transport (requires energy)

#### Protein Pumps

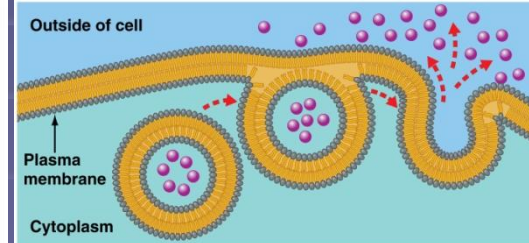
Higher solute concentration



Lower solute concentration



Endocytosis



Exocytosis