



## CELL THEORY

1. All organisms are made of cells.
2. Cells are the basic unit of organization
3. All cells come preexisting cells from.

Robert Hooke coined the term "CELL" after observing cork under a microscope

## 2 Major groups:

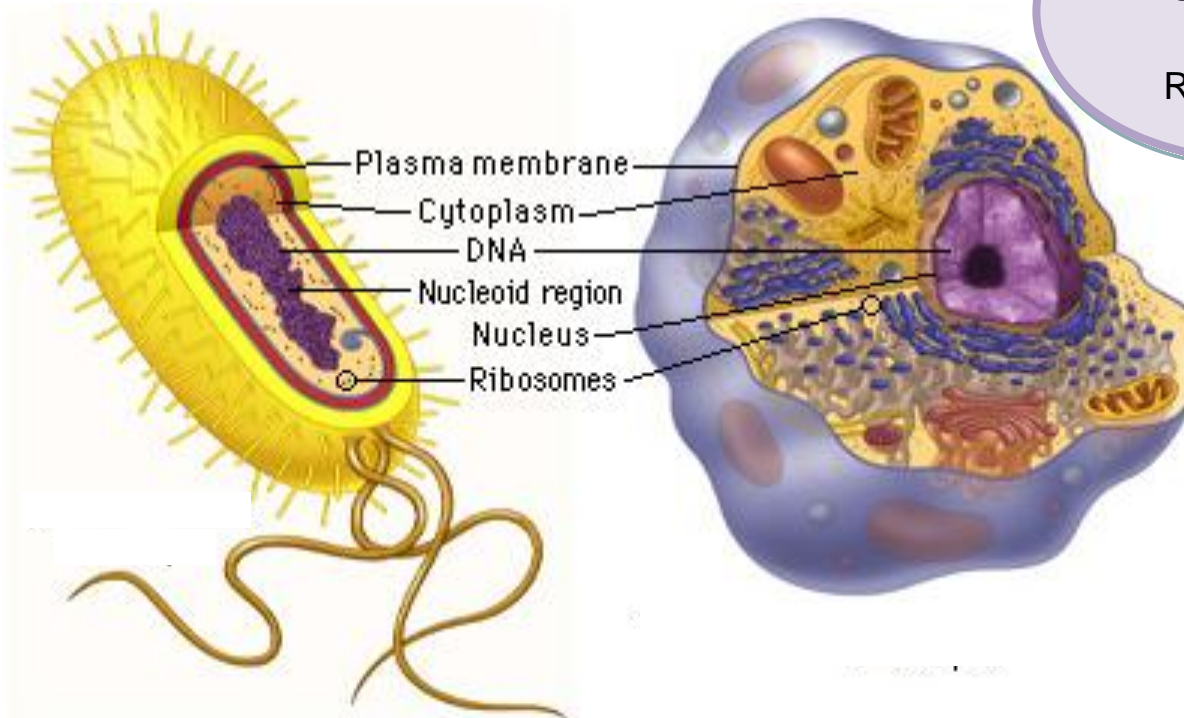
### Prokaryotes

Smaller  
No nucleus  
Organelles are not membrane-bound  
DNA is free floating  
Simple  
Ex: bacteria

### Eukaryotes

Typically larger  
Nucleus  
Membrane-bound organelles  
DNA contained within nucleus  
Complex  
Ex: plants, animals

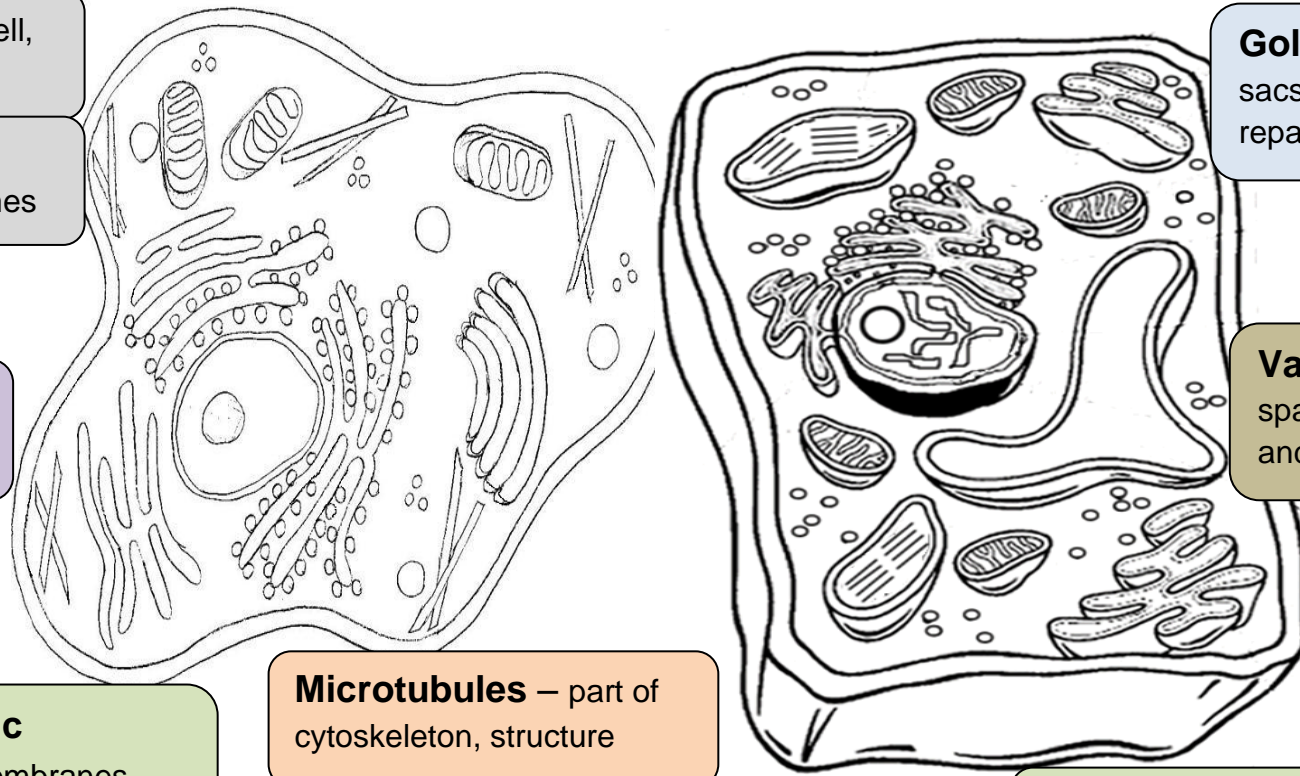
Cell membrane  
Cytoplasm  
DNA  
Ribosomes



"Pro" in prokaryotes – evolved first

"Eu" in eukaryotes – they have a true nucleus

# CELLS and their parts



**Nucleus** – brain of the cell, manages cell function

**Nucleolus** – inside the nucleus, produces ribosomes

**Ribosomes** – protein synthesis

**Smooth Endoplasmic Reticulum** – folded membranes, transport system, no ribosomes

**Rough Endoplasmic Reticulum** – folded membranes, transport system, with ribosomes

**Microtubules** – part of cytoskeleton, structure

**Mitochondria** – powerhouse; produces energy molecules from food

**Cell Membrane** – aka plasma membrane, boundary of cell, controls passage of materials

**Golgi** – membrane sacs, modify and repackage proteins

**Vacuole** – fluid filled space, stores food and/or wastes

**Chloroplast** – plants, site of photosynthesis, green pigment

**Cell Wall** – plants, provides structure and support

**Lysosome** – break down waste material

# Cell Transport

**Concentration** – the amount of dissolved substances in a solution



High concentration



Low concentration

Same amount of dissolved substance but different amounts of solution

**Concentration Gradient** – higher concentration in one area than another

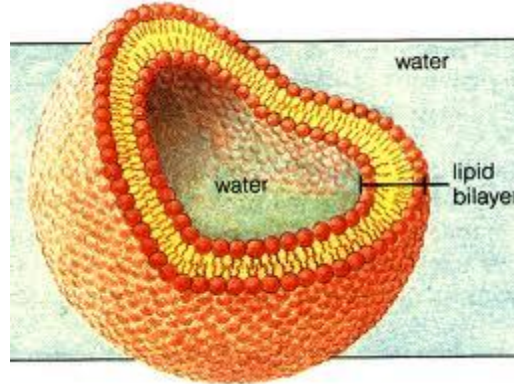


There will be a higher concentration of perfume in the immediate area where it was sprayed than anywhere else in



**Diffusion** – molecules spread out until there is an equal distribution

## Cell Membrane



### SELECTIVELY PERMEABLE

Only “select” things can “permeate” (come through) the barrier

The cell must be able to bring in nutrients and remove wastes – just like we do!

Transport = movement across a membrane

### PASSIVE

**NO ENERGY** –  
down a  
concentration  
gradient

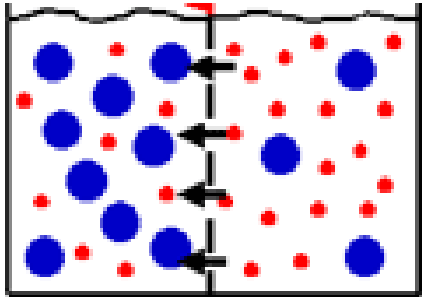
**Ex:**  
Osmosis  
Facilitated Diffusion

### ACTIVE

**REQUIRES ENERGY** –  
up a  
concentration  
gradient

## PASSIVE TRANSPORT

**OSMOSIS** – diffusion of water molecules across a membrane.

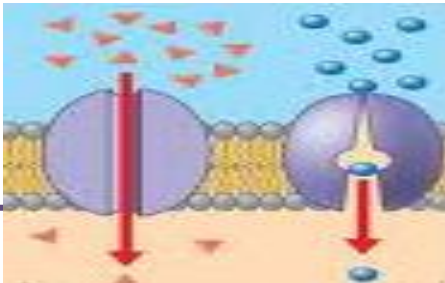


Only water molecules (red) are moving across the membrane.

**FACILITATED DIFFUSION** –  
“diffusion with help”

Some molecules cannot pass through the membrane, they need assistance.

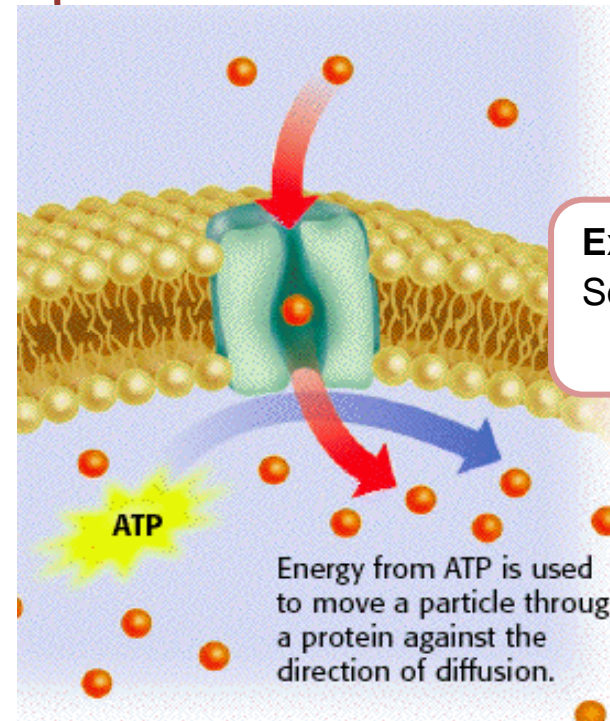
**Carrier Proteins** in the membrane allow these molecules to move across.



## ACTIVE TRANSPORT

**REQUIRES ENERGY!!**

Molecules are being moved across a membrane from a low concentration to a high concentration (up the gradient)

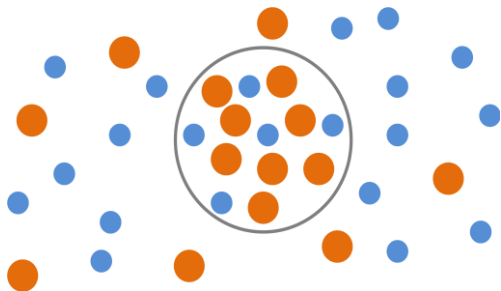


**Ex:**  
Sodium-Potassium  
pump

# Solution Concentrations

- Water
- Substance/material dissolved in water

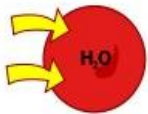
**HYPOTONIC SOLUTION –**  
Outside the cell has a lower concentration than inside the cell.



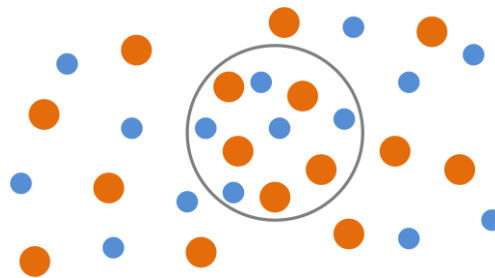
Water moves into the cell to equalize the concentrations.



Cell swells and may burst.



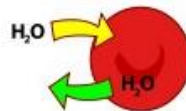
**ISOTONIC SOLUTION –**  
The concentrations are the same inside and outside the cell.



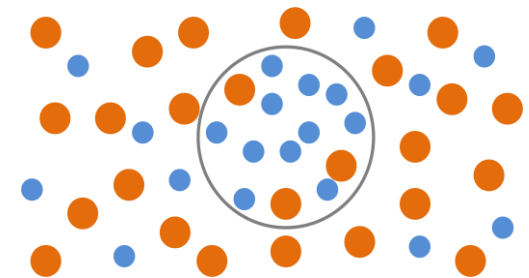
Water moves both in and out of the cell – concentrations are equal.



Cell remains the same



**HYPERTONIC SOLUTION –**  
Outside the cell has a higher concentration than inside the cell.



Water moves out of the cell to equalize the concentrations.



Cell may shrink

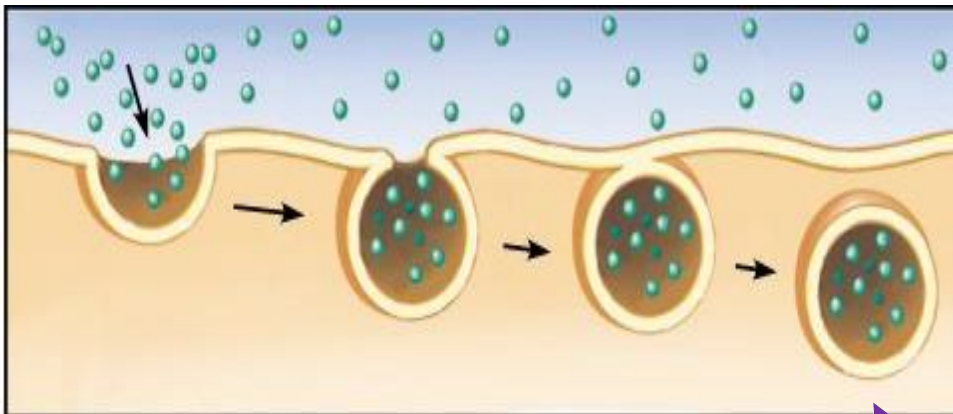


# Bulk Transport

Things that cannot pass through the membrane can be taken in or excreted through bulk transport.

## Endocytosis

Endo = means into (think entrance or enter)



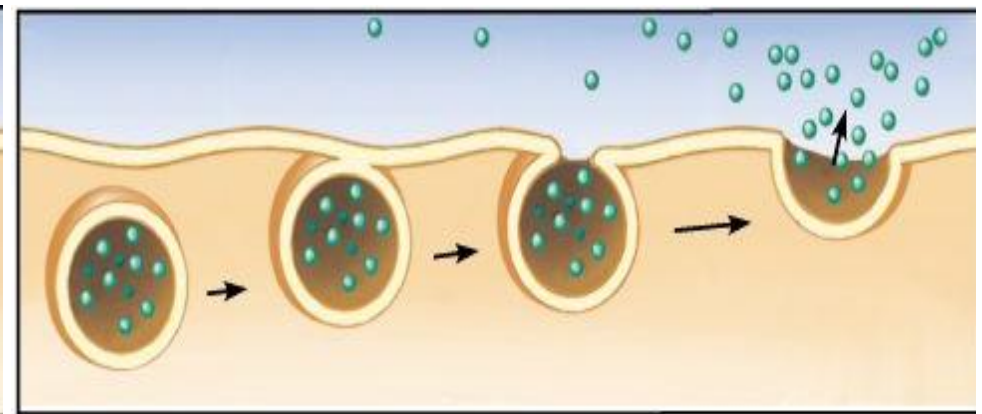
Membrane folds in creating a vesicle containing Materials.

**Pinocytosis** – endocytosis of liquid

**Phagocytosis** – endocytosis of solids

## Exocytosis

Exo = means out of (think exit or export)



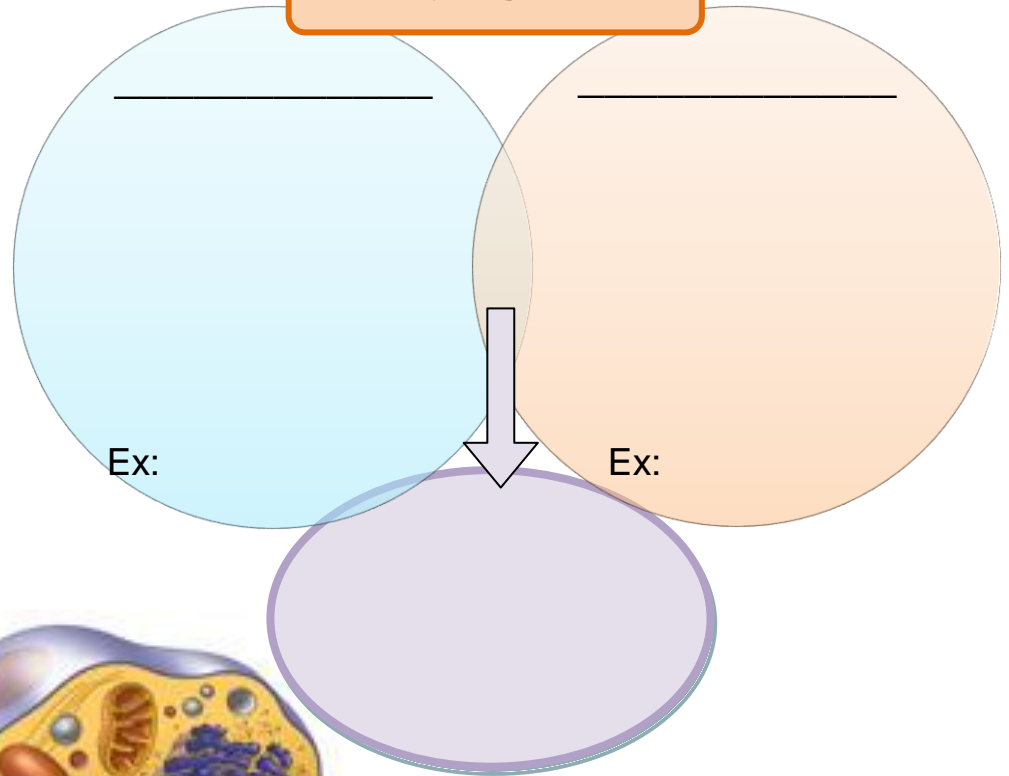
Vesicles containing materials fuse with the cell membrane, opening the vesicle and releasing the materials.

Note: this is **not** diffusion!

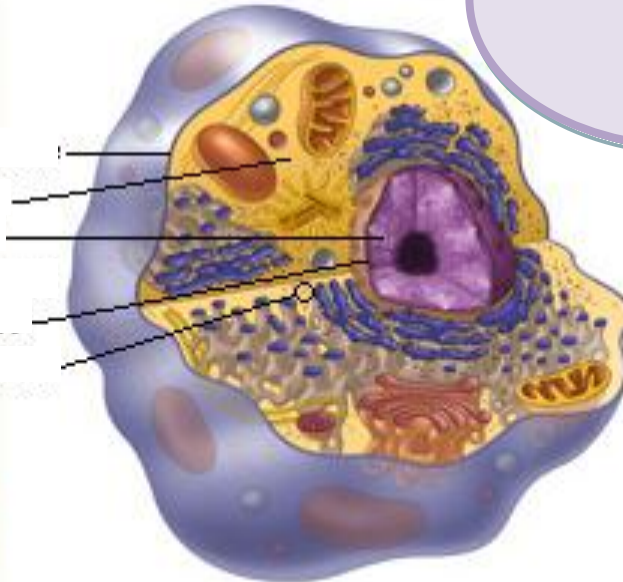
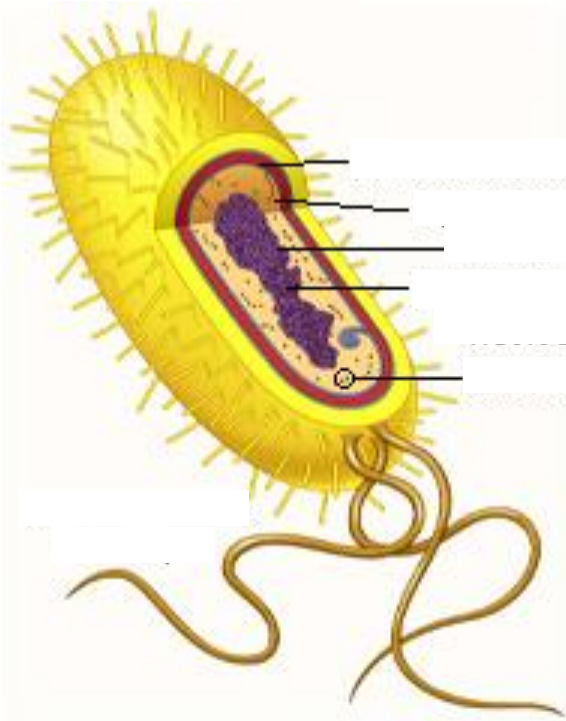
# CELL THEORY

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- 2.
- 3.

2 Major groups:



Robert Hooke coined the term



“Pro” in prokaryotes –

“Eu” in eukaryotes –

E

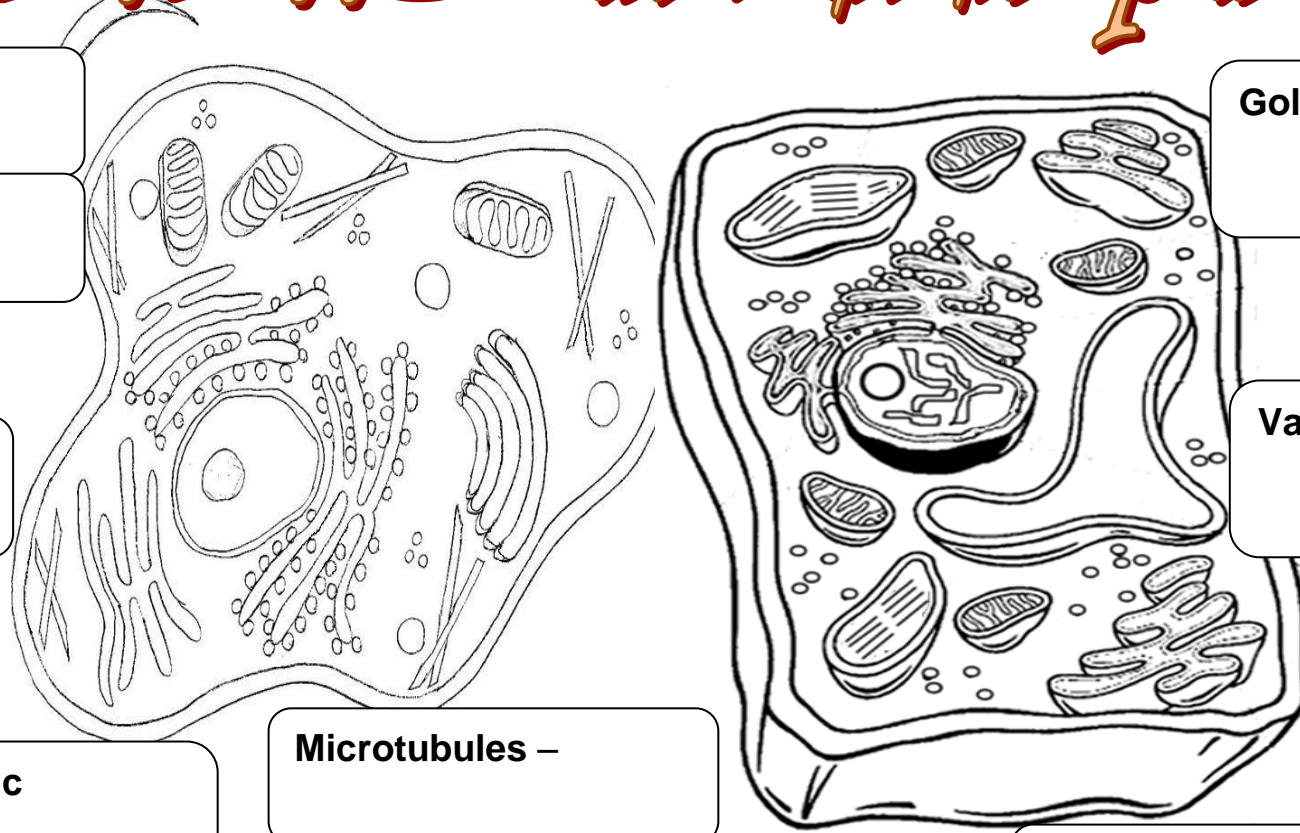
L

L

S



# CELLS and their parts



**Nucleus –**

**Nucleolus –**

**Ribosomes –**

**Smooth Endoplasmic Reticulum –**

**Rough Endoplasmic Reticulum –**

**Microtubules –**

**Mitochondria –**

**Cell Membrane –**

**Lysosome –**

**Golgi –**

**Vacuole –**

**Chloroplast –**

**Cell Wall –**

# Cell Transport

Concentration –



Same amount of dissolved substance  
but different amounts of solution

Concentration Gradient –

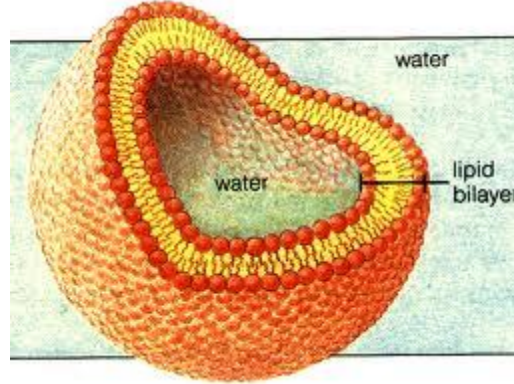


There will be a higher  
concentration of perfume in the  
immediate area where it was  
sprayed than anywhere else in

Diffusion –



Cell Membrane



SELECTIVELY PERMEABLE

The cell must be able to

Transport =

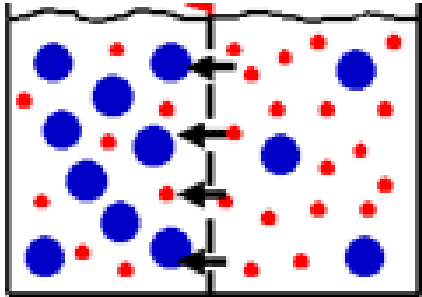
PASSIVE

Ex:

ACTIVE

## PASSIVE TRANSPORT

### OSMOSIS –

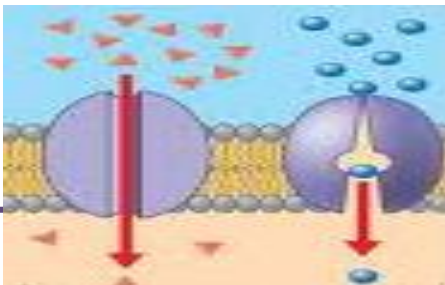


Only water molecules (red) are moving across the membrane.

### FACILITATED DIFFUSION –

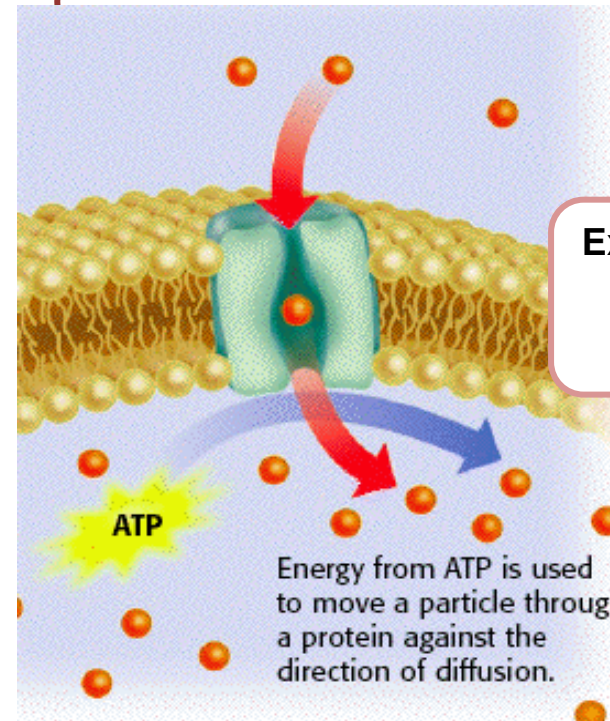
Some molecules cannot pass through the membrane, they need assistance.

#### Carrier Proteins



## ACTIVE TRANSPORT

Molecules are being moved



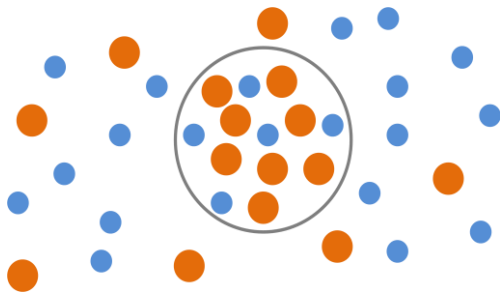
Ex:

Energy from ATP is used to move a particle through a protein against the direction of diffusion.

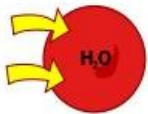
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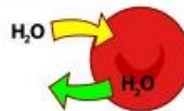
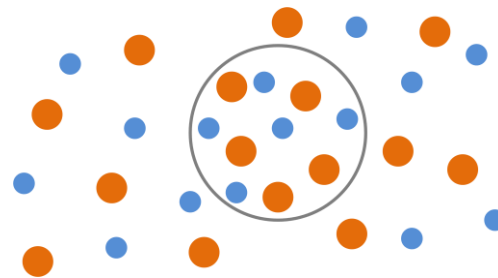
## HYPOTONIC SOLUTION –



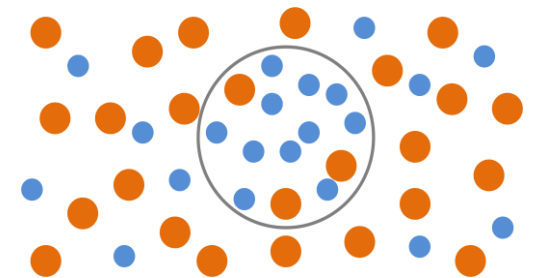
equalize the concentrations.



## ISOTONIC SOLUTION –



## HYPERTONIC SOLUTION –



equalize the concentrations.

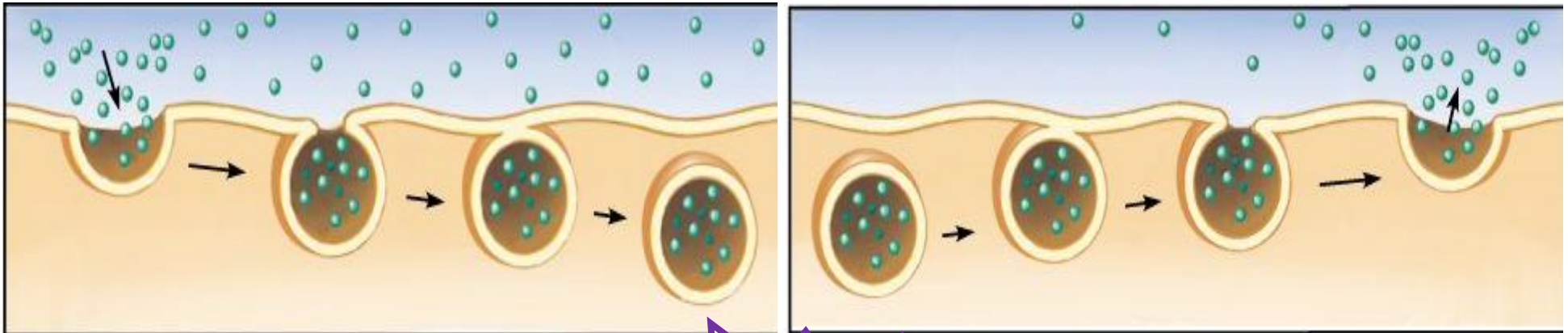


# Bulk Transport

Things that cannot pass through the membrane can be taken in or excreted through

## Endocytosis

## Exocytosis



Membrane folds in creating a

Vesicles containing materials

Pinocytosis –  
Phagocytosis –



















