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Tejraj M. Aminabhavi

Editor PPT

- Molecular transport, membrane-based separations, pervaporation, gas separation, electro dialysis, micro, ultra and nanofiltrations and reverse osmosis
- Controlled release polymeric micro/nanoparticles, transdermal patches and hydrogels for drugs, proteins, peptides, genes, and pesticides
- Molecular modeling on polymer surfaces, QASR and docking studies on small molecules, prediction of polymer blend compatibility, drug diffusion and gas transport
- Polyurethane coatings, polymer composites, heat resistant and conducting polymers
- Liquid state properties, polymer solution theories and metal complexation chemistry

Research Interests

- Reliance Life Sciences, Navi Mumbai (2007-2011)
- Bharath Heavy Electricals Limited (BHEL), Bangalore, India (2004-2007)
- Gujrat State Fertilizers Corporation, Vadodara, Gujarat, India (1996-2002)
- Texas Research Institute, Austin, Texas, USA (2006,2007 and 2008)

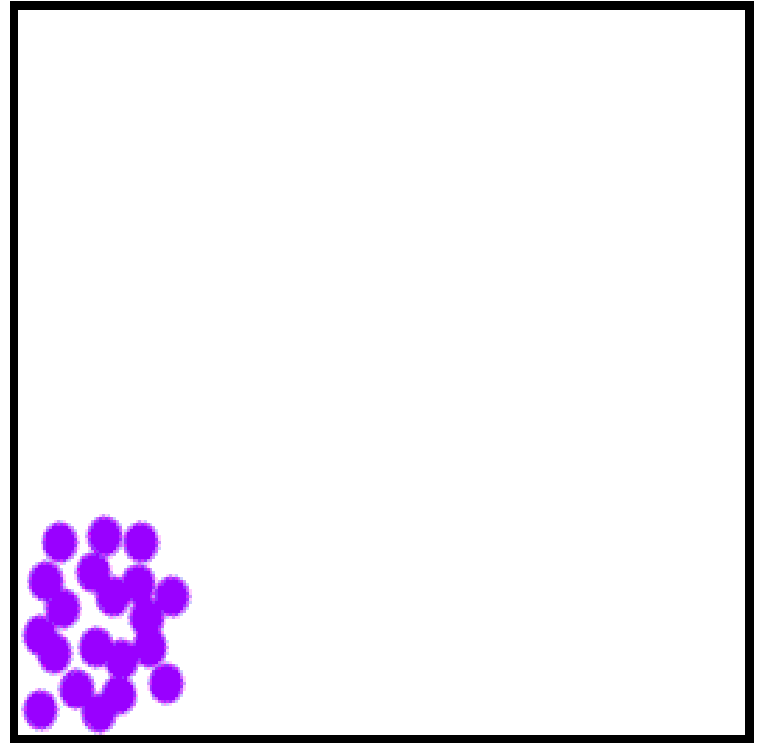
Industrial Consultancies

- CIPET Award for Research in the field of Polymer Science and Technology on “Polymers in Drug Delivery and Membrane Science” as Runner-up for the Fourth National Award (2014) under Technology Innovation by the Ministry of Fertilizers, Chemicals, and Petroleum, New Delhi, India
- 18th Nikkei Asia Prize, Japan received on 22nd May 2013 in Tokyo for the contributions in Applied Polymer Science under the category of Science, Technology and Innovation.
- Laureate of 22nd Kwarizmi International Award (KIA) from the Ministry of Science, Research and Technology, Iranian Research Organization for Science and Technology (IROST), Tehran, Iran for 2008-2009: Received from the President of Iran (Mahmoud Ahmadinejad) at Tehran on Feb. 9th 2009.
- Madurai Kamaraj University, Indian Science: Received from the Vice Chancellor (Professor P. Maradamutthu), Madurai Kamaraj University, Madurai (April, 2007)
- Listed as the 4th Most Productive Scientist of India by the National Institute of Science, Technology & Development Studies on “Status of India in Science and Technology as Reflected in its Publication Output in Scopus International Database” during 1996-2006.

Awards

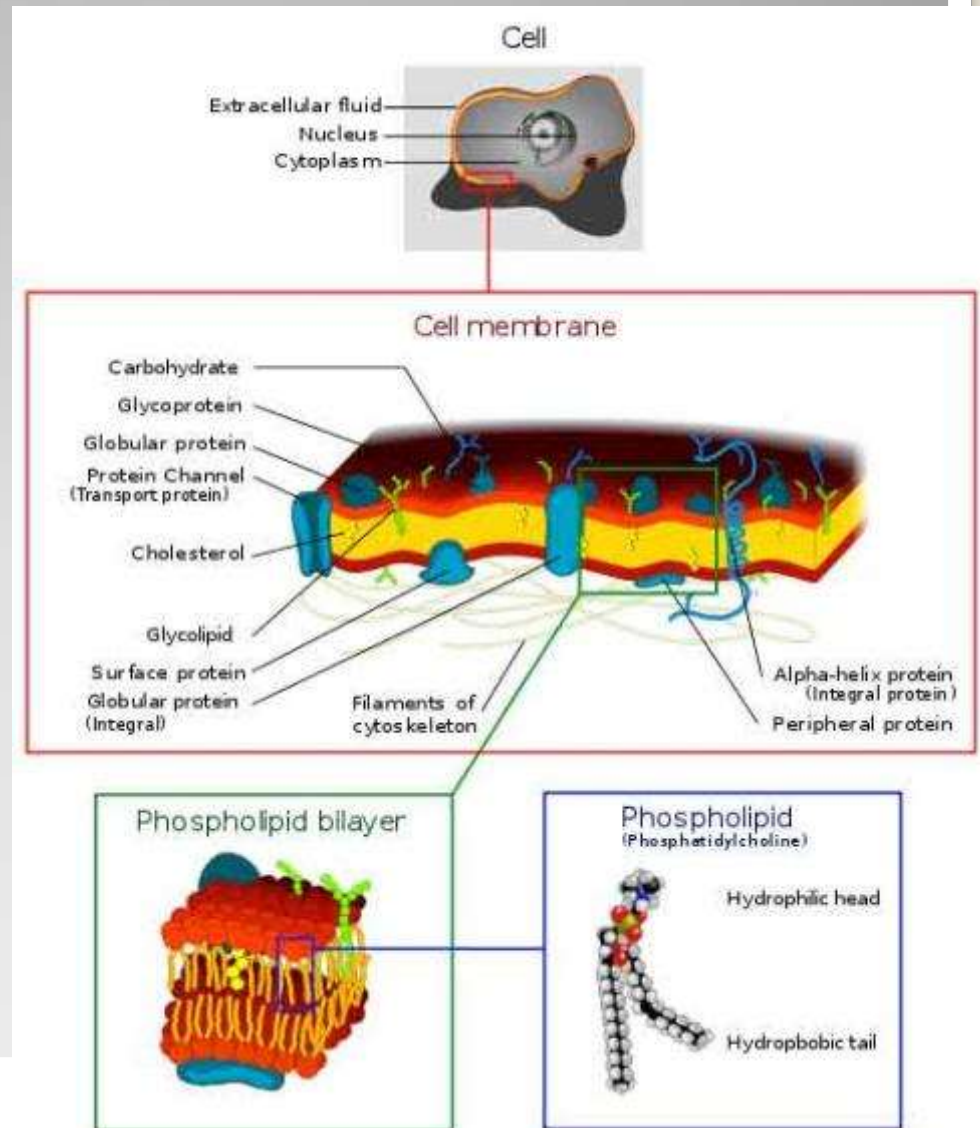
The Movement of Molecules:

Diffusion,
Osmosis &
Active Transport



Plasma Membrane

- Separates the cell from its environment.
- **Phospholipid** molecules oriented so that *hydrophilic* () heads directed outward and *hydrophobic* () tails directed inward.
- **Proteins** embedded in two layers of **phospholipids** (lipid bilayer).
- Membrane is **semi-permeable**.
Q: What does that mean?



Passive Transport

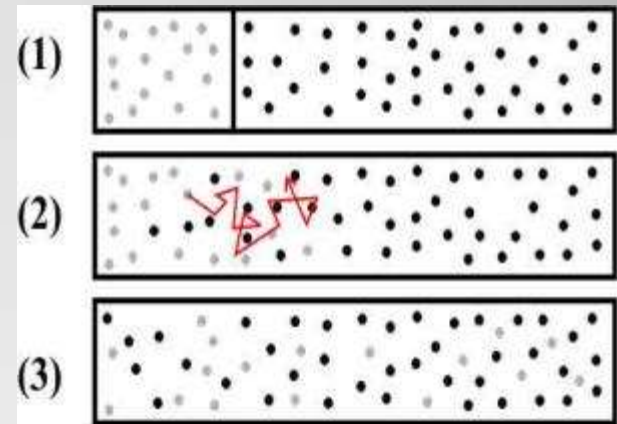
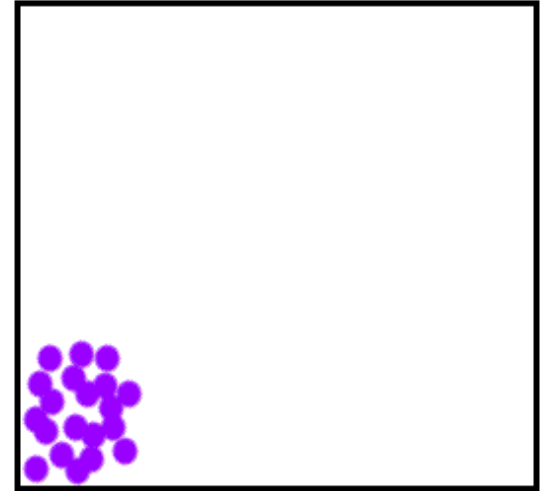
Primary function of plasma membrane → regulate movement of molecules entering or leaving cell.

Movement of molecules across plasma membrane requires energy.

Movement of molecules is passive if no energy sources of the *cell* are expended.

_____ = when molecules move down a concentration gradient, from a higher to a lower concentration.

Q: What type of things might affect the rate of diffusion?



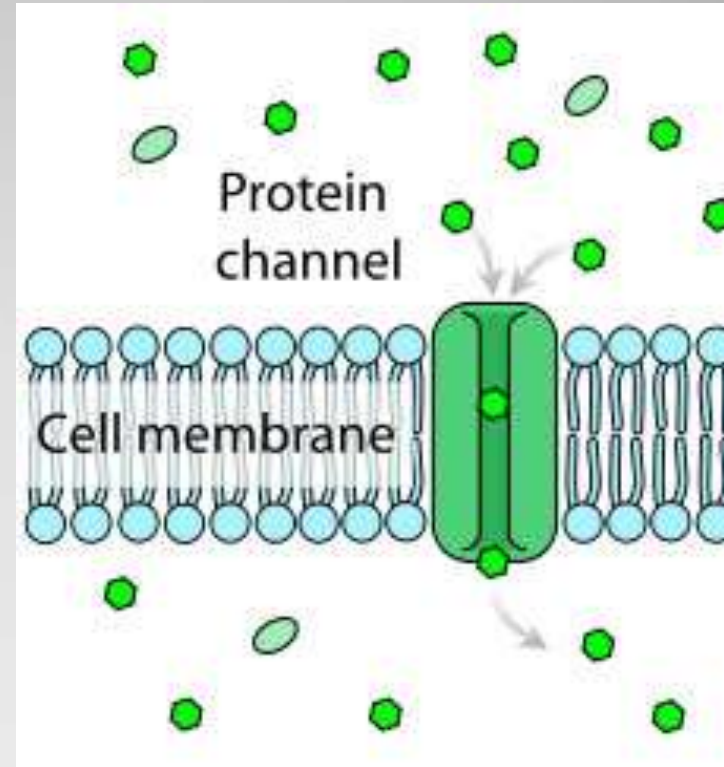
Passive Transport

Diffusion

Proteins assist in diffusion of molecules across plasma membrane.

Movement only occurs in the presence of a concentration gradient.

Some molecules move across the membrane more quickly if diffusion is facilitated by a carrier molecule.



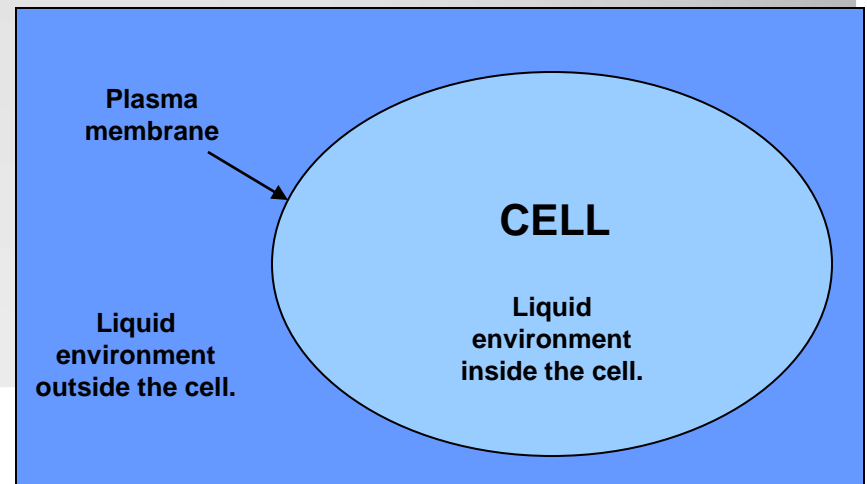
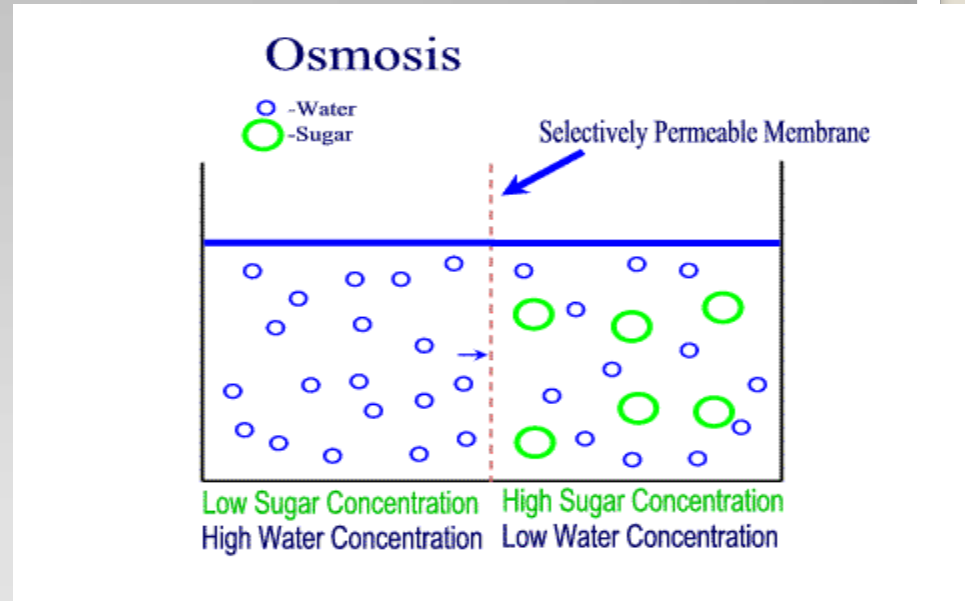
Passive Transport - Osmosis

*Q: Diffusion of **what** across the plasma membrane?*

Environment surrounding cells may contain amounts of dissolved substances (solutes) that are...

- equal to
- less than
- greater than

...those found within the cell.



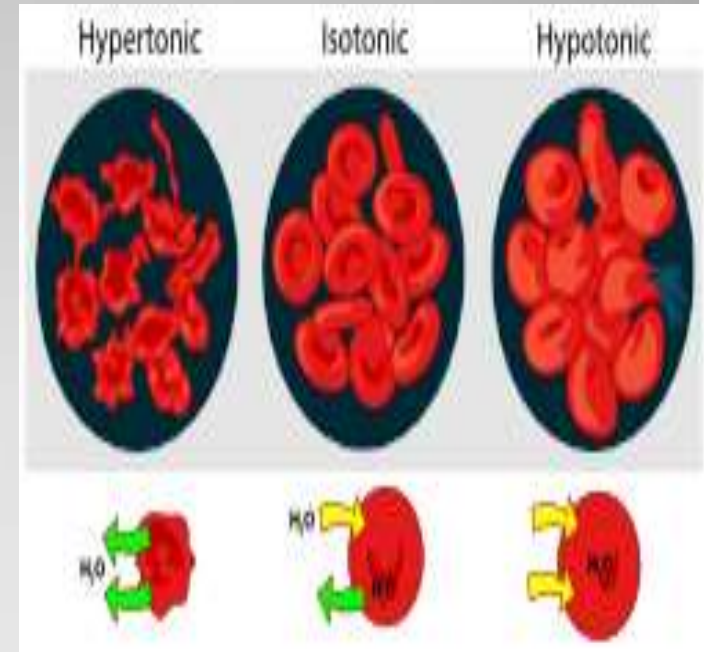
Passive Transport - Osmosis

Tonicity and Osmosis

_____ : equal concentration of a solute inside and outside of cell.

_____ : a higher concentration of solute.

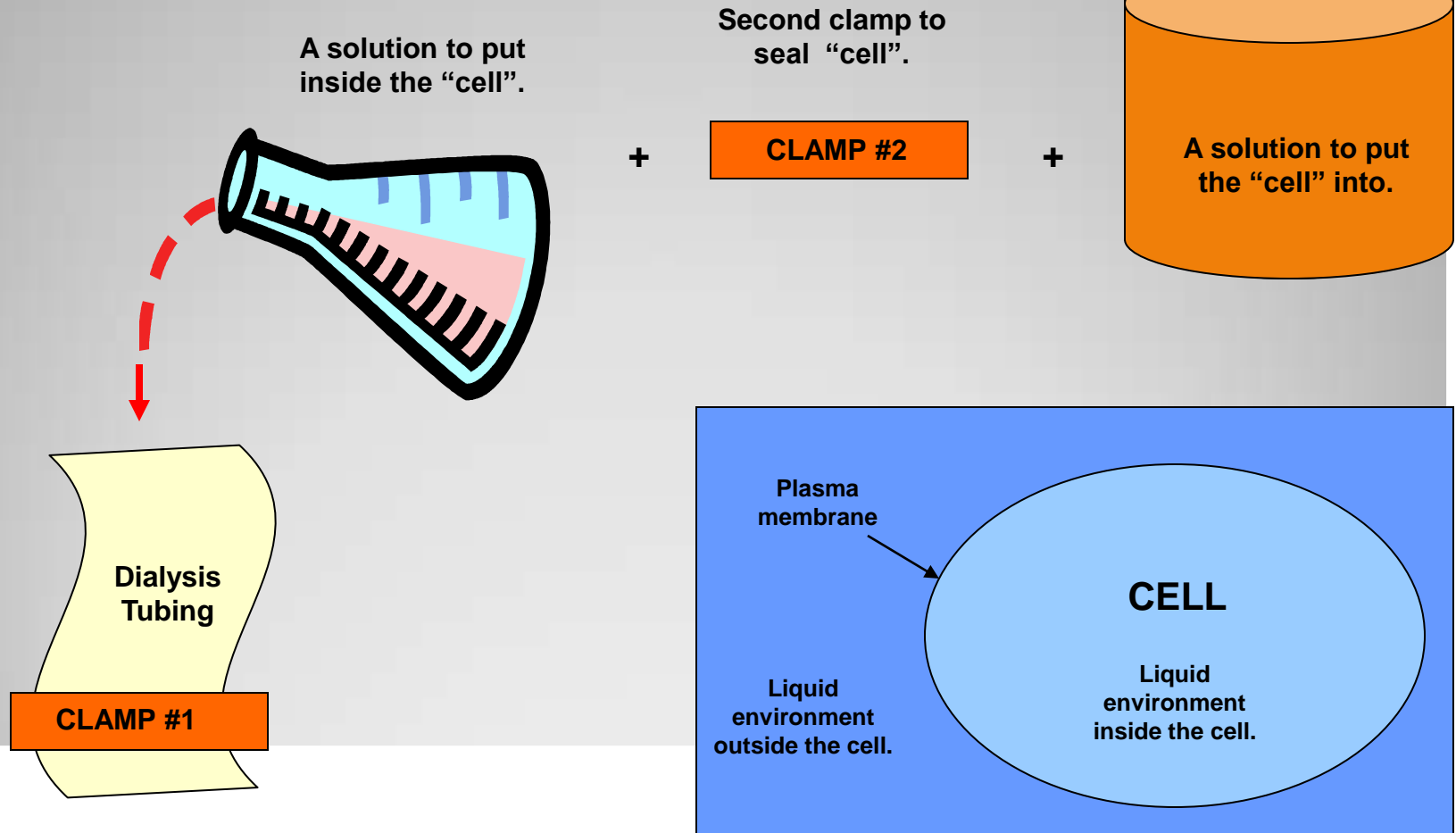
_____ : a lower concentration of solute.



Water will always move toward a hypertonic environment!!

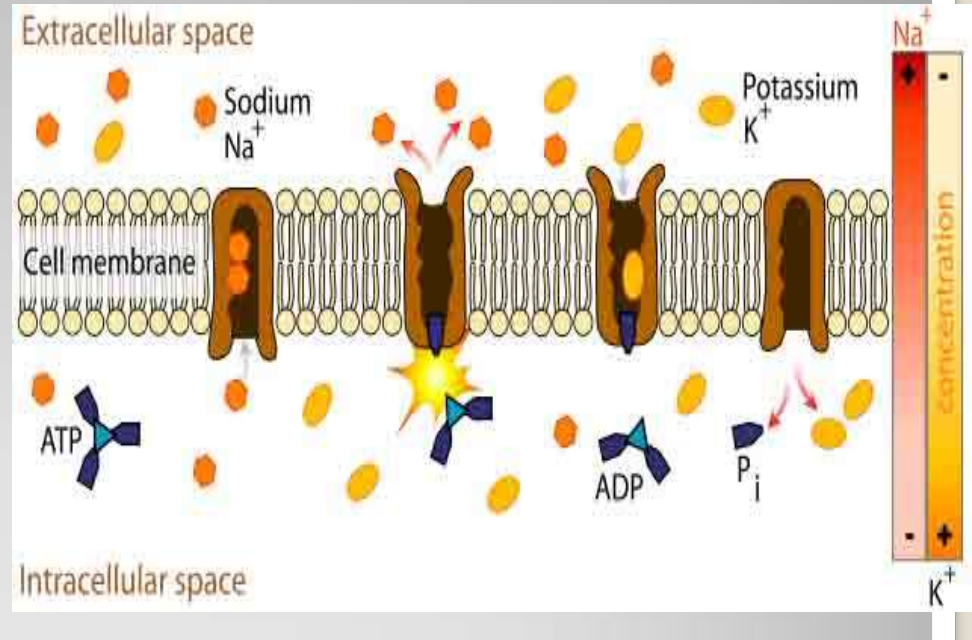
Passive Transport - Osmosis

Let's do some osmosis problems, to practice our knowledge.



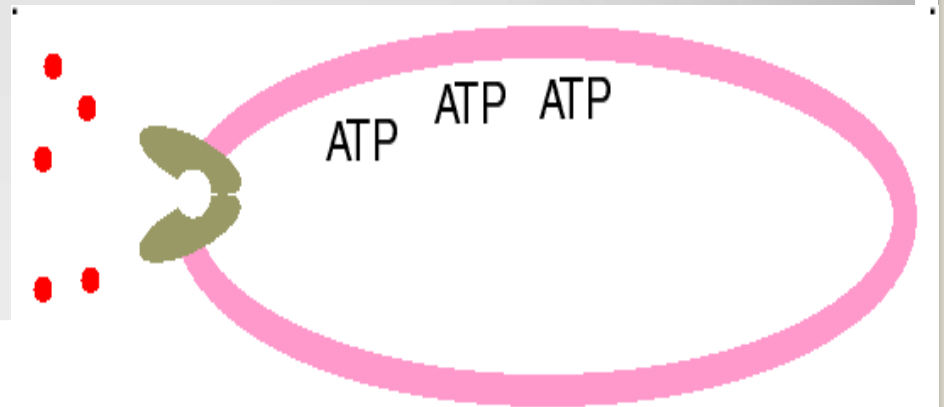
Transport

- How most molecules move across the plasma membrane.
- Analogous to a pump moving water uphill.
- Types of active transport are classified by type of energy used to drive molecules across membranes.



ATP Driven Active Transport

Energy from adenosine triphosphate (ATP) drives substances across the plasma membrane with aid of carrier molecules.



- **Signature of Editor**



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