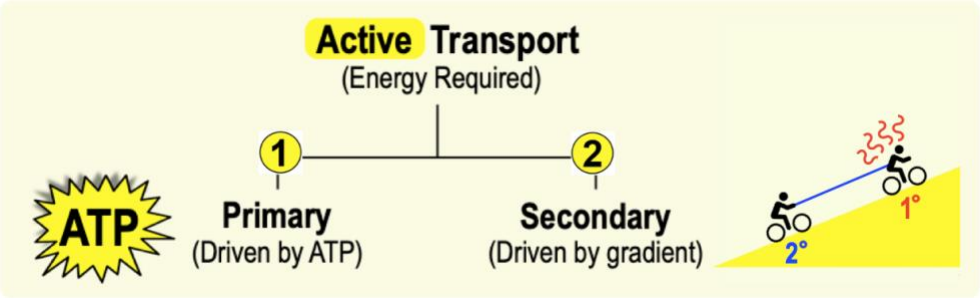
CONCEPT: ACTIVE TRANSPORT

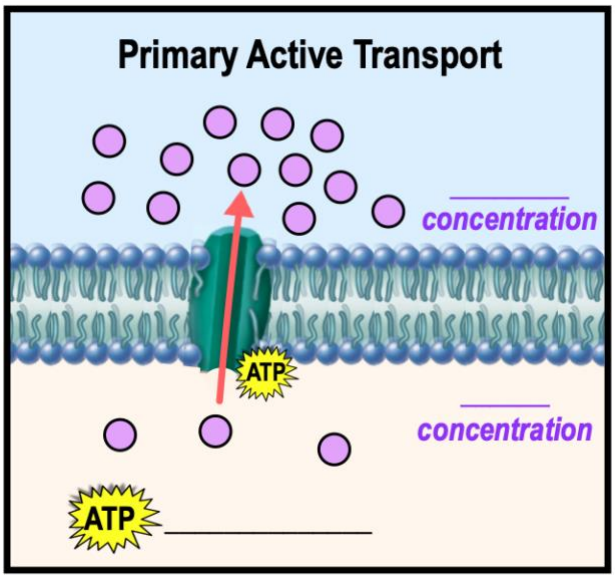
- _____ types of *active* transport that *require* _____ since molecules are transported *against* their gradient.

1. _____ **Active Transport**: directly driven by energy source (such as _____ *hydrolysis*).
2. _____ **Active Transport**: directly driven by another molecule's *concentration* _____.



Primary Active Transport

- **Primary Active Transport**: an _____-driven process transporting molecules *against* their concentration gradient.
  - □ Directly driven by energy derived from ATP *hydrolysis*.
  - □ Used to *generate* & *maintain* important concentration _____ for cell survival.



EXAMPLE: What is the main difference between active transport and facilitated diffusion?

a) Facilitated diffusion uses proteins, but active transport does not.
b) Active transport uses ATP to power transport, but facilitated diffusion does not.
c) Active transport occurs across the plasma membrane, but facilitated diffusion does not.
d) Active transport and facilitated diffusion both use proteins to move substances against their concentration gradient.

CONCEPT: ACTIVE TRANSPORT

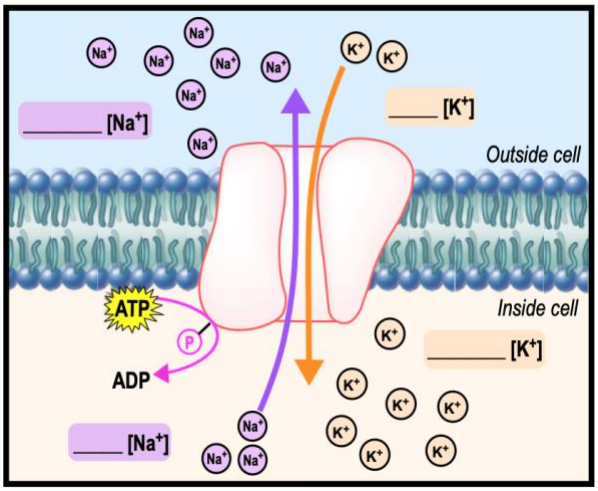
PRACTICE: The force driving simple diffusion is _____, while the energy source for active transport is _____.

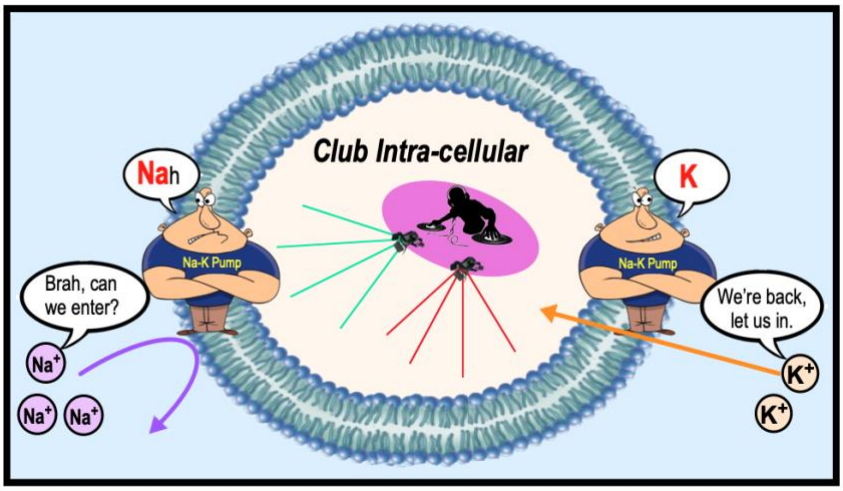
a) a concentration gradient; ADP.
b) a concentration gradient; ATP hydrolysis.
c) transmembrane pumps; an electrochemical gradient.
d) phosphorylated carrier proteins; ATP.

Primary Active Transport: Na^+/K^+ Pump

●An example of _____ active transport that moves Na^+ & K^+ ions in *opposite* directions (antiporter).

□ ____ _____ ions are *exported* while ____ _____ ions are *imported* (pump-K+-in).





PRACTICE: A sodium-potassium pump _____.

a) Transports 3 potassium ions out of a cell and 2 sodium ions into a cell and produces a molecule of ATP.
b) Transports 3 sodium ions out of a cell and 2 potassium ions into a cell using energy from ATP hydrolysis.
c) Transports 3 potassium ions out of a cell and 2 sodium ions into a cell using energy from ATP hydrolysis.
d) Transports 3 sodium ions out of a cell and 2 potassium ions into a cell and generates an ATP in each cycle.

PRACTICE: Which of the following defines the type of transport by the sodium-potassium pump?

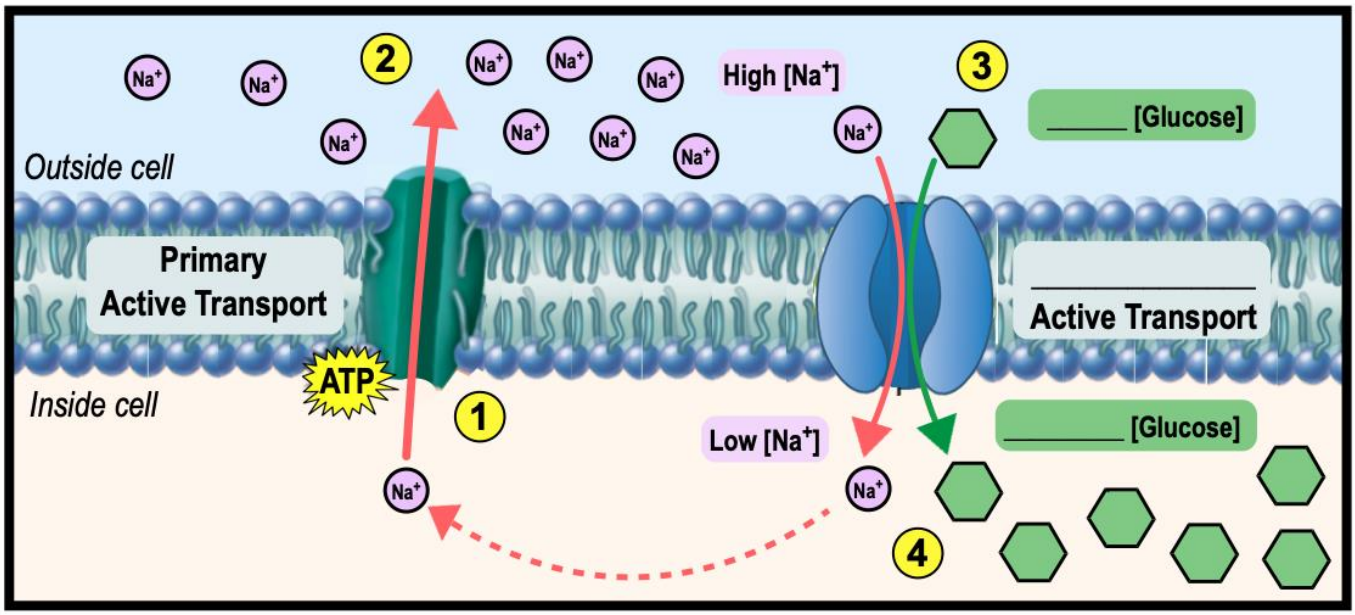
a) Active transport through a symporter.
b) Passive transport through a symporter.
c) Active transport through an antiporter.
d) Passive transport through an antiporter.

CONCEPT: ACTIVE TRANSPORT

Secondary Active Transport

- *Recall: Secondary active transport* is directly driven by a *concentration* _____ instead of *ATP hydrolysis*.
  - □ HOWEVER, its indirectly driven by **P**rimary **A**ctive **T**ransport (since concentration gradients are *built* by **PAT**).
- _____ steps to **Na^+-Glucose** *Secondary Active Transport*:
  1. **Na^+** is transported *against* its concentration gradient using _____ *active transport.*
  2. *Higher* concentration of **Na^+** is generated on the _____ of the cell.
  3. **Glucose** has a *higher* concentration _____ the cell than outside.
  4. **Na^+** transportation _____ its gradient "*powers*" **Glucose** transport _____ its gradient.

EXAMPLE: The Sodium-Glucose Cotransporter.



PRACTICE: How are primary and secondary active transport related?

a) They both use ATP to move molecules.

b) Primary active transport establishes a concentration gradient, but secondary active transport doesn't.

c) Secondary active transport uses the concentration gradient established by primary active transport.

d) Primary active transport moves one molecule, but secondary active transport moves two.

e) None of the above.