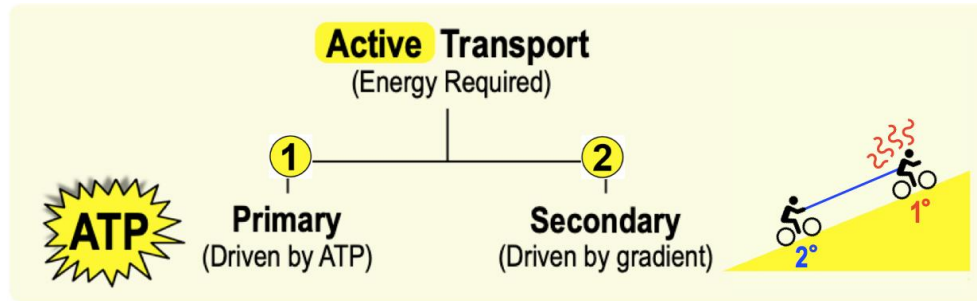


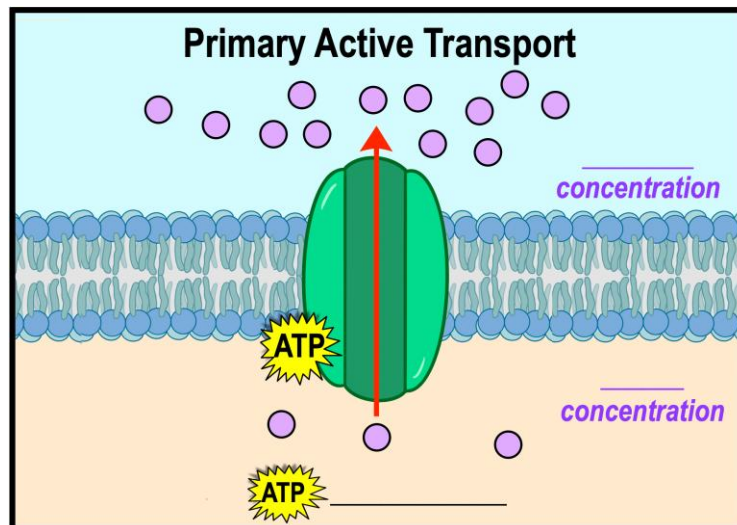
CONCEPT: ACTIVE TRANSPORT

- _____ 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?

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

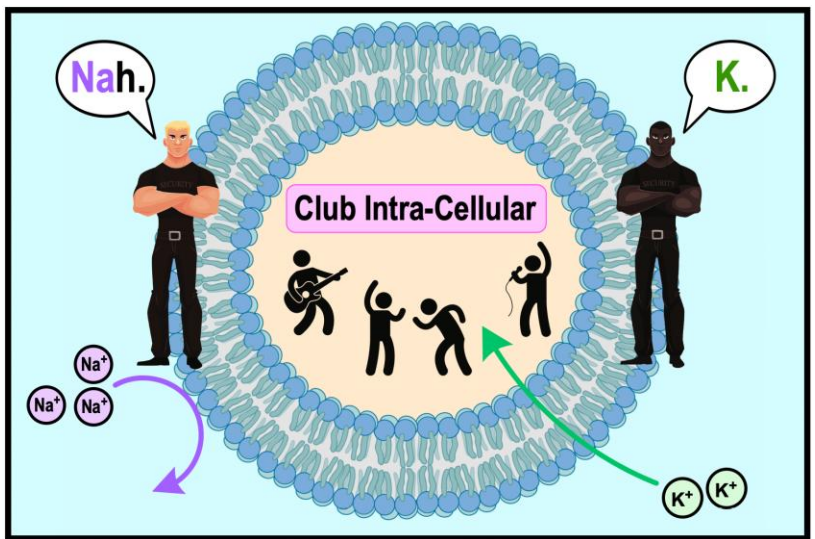
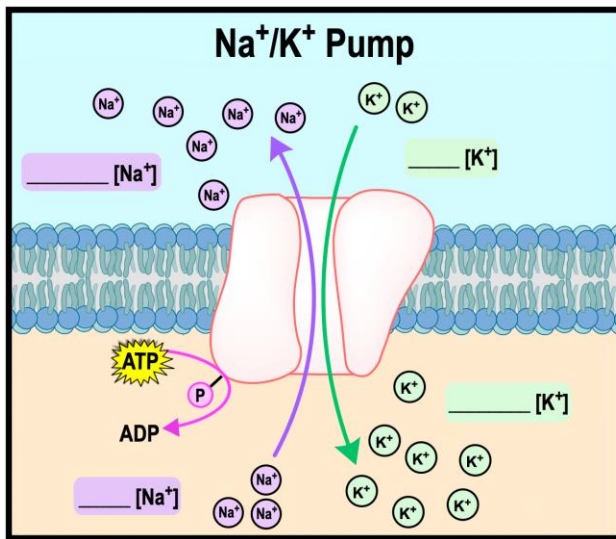
CONCEPT: ACTIVE TRANSPORT

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). 🍊



EXAMPLE: 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?

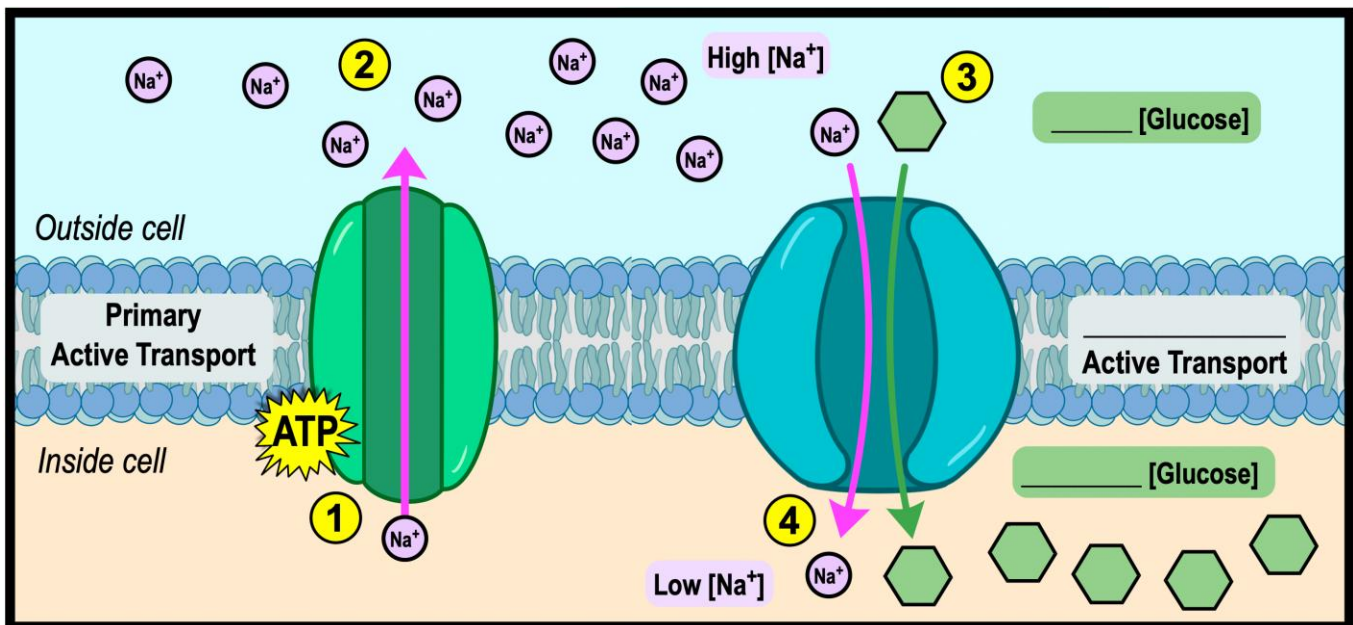
- a) Active transport through a symporter.
- b) Passive transport through a symporter.
- c) Active transport through an antiporter.
- d) Passive transport through an antiporter.

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 Primary Active Transport (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.