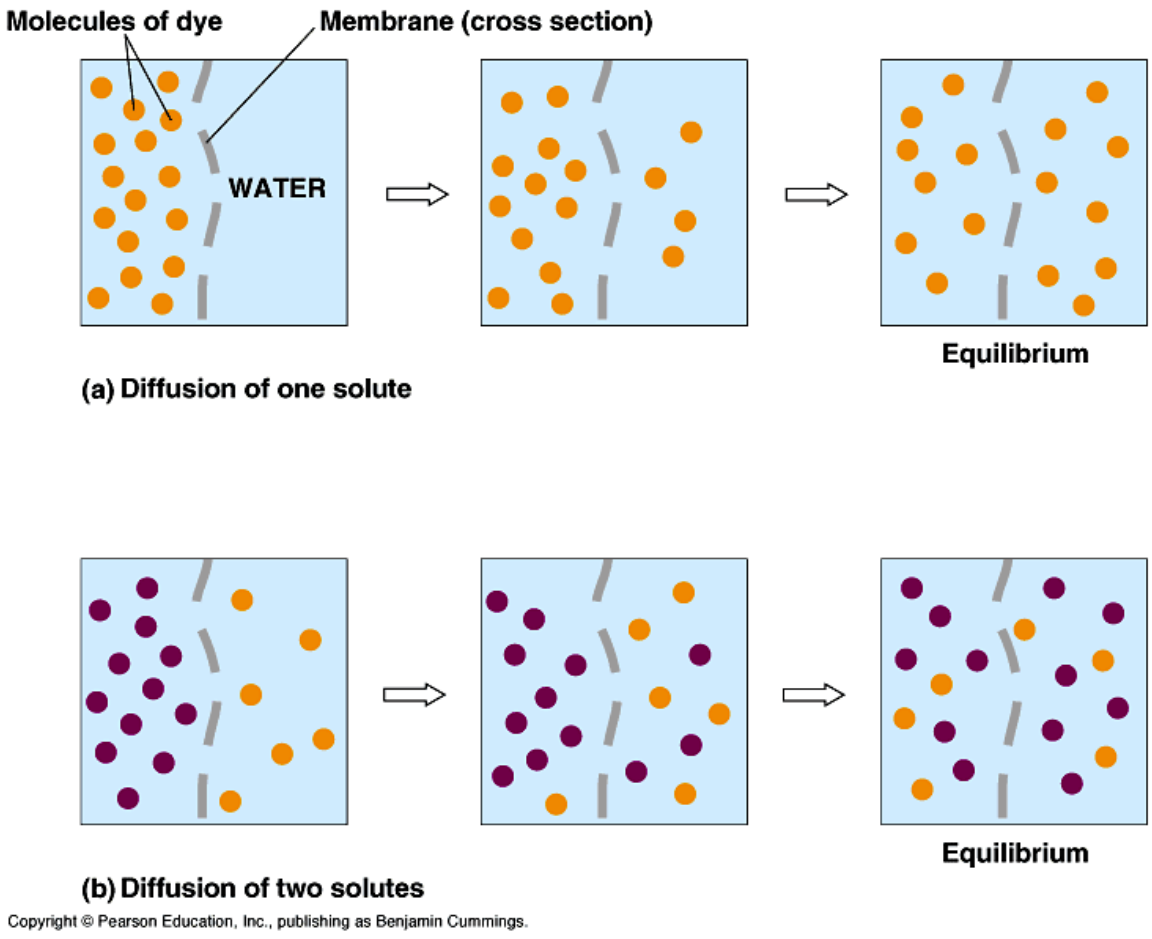
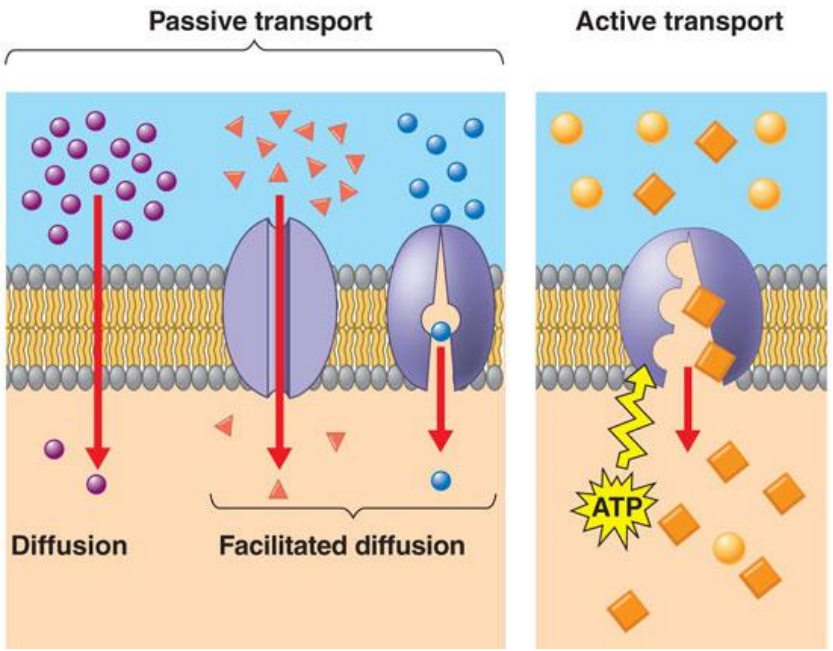
Transport through a membrane by Diffusion

- *Diffusion is the movement of molecules from an area of high concentration to that of a lower concentration*
- *If the concentration of CO_2 or O_2 is too high on one side of the membrane, then the molecules would not freely be able to move from an area of high concentration to an area of low concentration*



- ***Passive*** *– by diffusion or osmosis (if water)*
  - *No energy is needed.*
  - *Driven by concentration gradient*
- ***Facilitated Diffusion*** *– movement across a membrane with the help of carrier proteins.*
  - *No energy is needed*
  - *Still driven by the concentration*

- ***Active transport*** *– energy is needed to go from an area of low concentration to a more concentrated area*



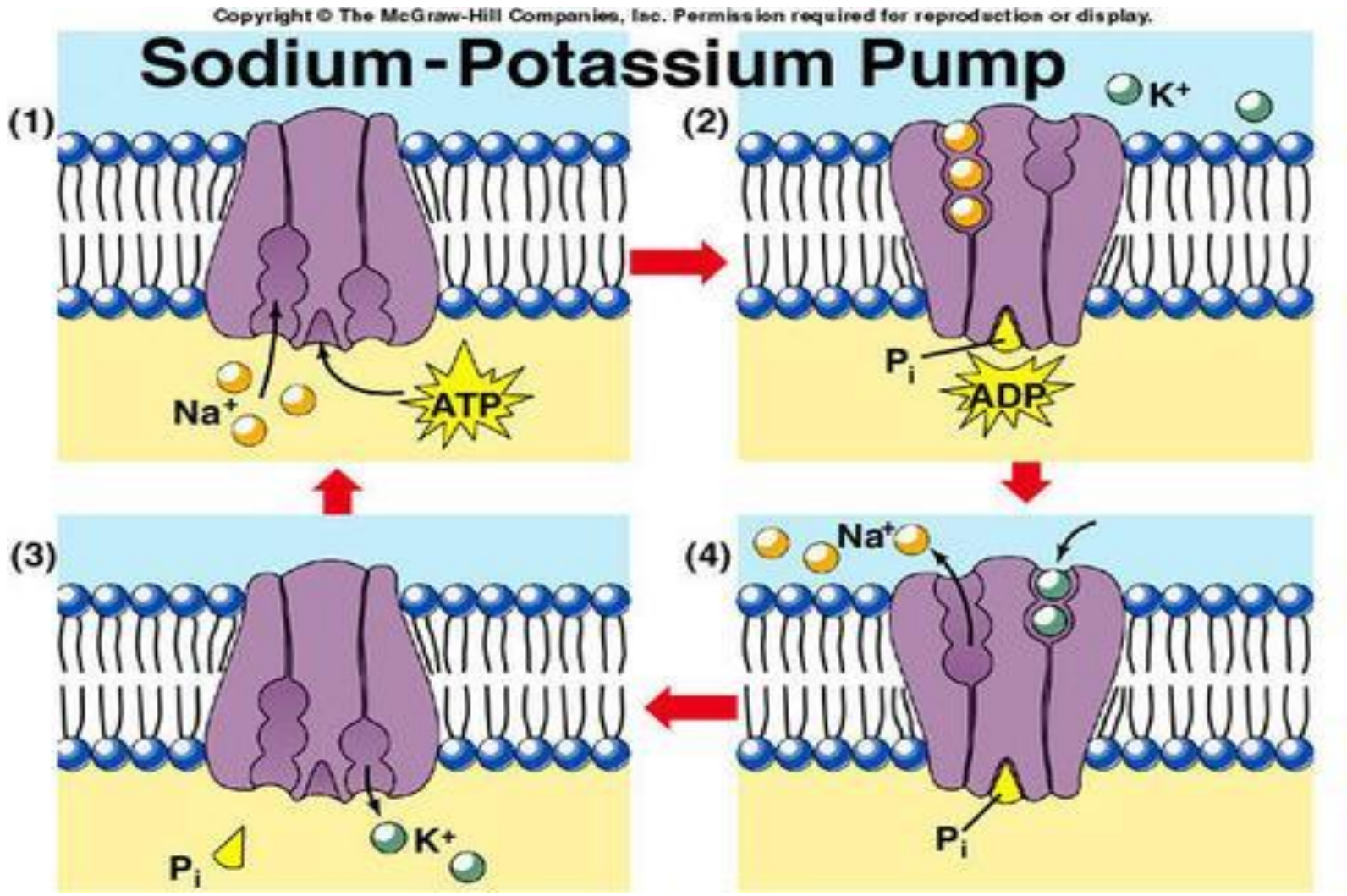
Some animals can produce a potassium ion concentration inside their cells that is twenty times greater than that of their environment. This ion concentration gradient is maintained by the plasma membrane

- **Part A:** Identify the process in the cell membrane that produces this difference in concentration.
  The process is **active transport** *(needs energy).*

- **Part B:** Explain the process that occurs as the cell produces the ion concentration gradient.

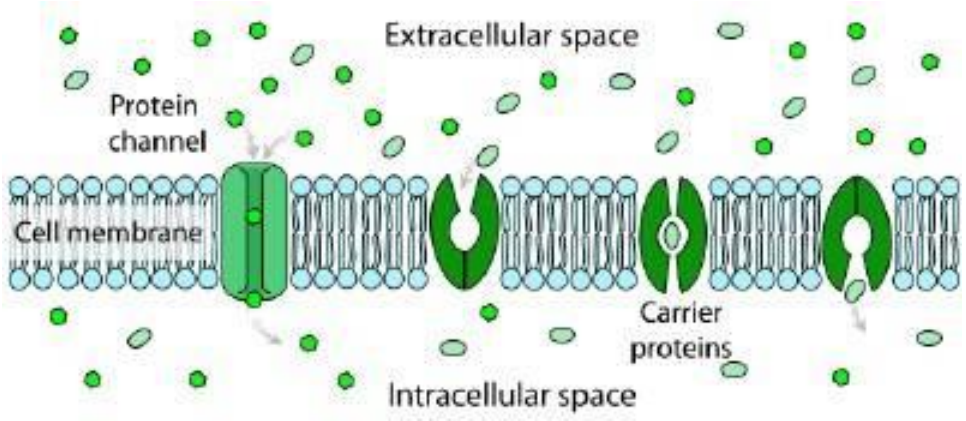
There are specialized proteins in the cell membrane that act like "pumps with a toll". These ***pumps use ATP*** *(small packets of energy) to power their transport of* Na^+ *out of a cell, and* K^+ *into the cell. Because different numbers of* ***sodium ions*** *and* ***potassium ions*** *are pumped back and forth,* ***it creates an electrical gradient where one side of the cell is more positive than the other side***

Sodium-Potassium Pump



Part C: Compare the process of potassium ion transport to another mechanism that moves material across the plasma membrane.

- *Active transport is **specific** and also uses energy, which is the key distinction, as opposed to facilitated diffusion which is also **specific** to a molecule (or ion) but does not require energy. An example would be glucose is too big to pass through the cell membrane on its own, but can do so the with help of a specific protein.*



Membrane proteins combine specifically and temporarily with molecules or ions being transported across the cell membrane. In which transport mechanism do membrane proteins require energy to perform this function?

A. osmosis
b. diffusion
c. active transport
d. facilitated diffusion

c. active transport

Passive and Active Transport

Carbon dioxide and glucose are two molecules that can cross a muscle cell membrane. How does the process that transports glucose molecules across the membrane differ from the process that transports carbon dioxide molecules?

A. The transport of glucose requires energy.

B. The transport of glucose requires membrane proteins.

C. The transport of glucose requires pores in the cell membrane.

D. The transport of glucose requires a concentration gradient opposed to the direction of flow.

B. The transport of glucose requires membrane proteins.

Passive and Active Transport

A sodium-potassium pump within a cell membrane requires energy to move sodium and potassium ions into or out of a cell. The movement of glucose into or out of a cell does not require energy. Which statement **best** describes the movement of these materials across a cell membrane?

A) Sodium and potassium ions move by active transport, and glucose moves by osmosis.

B) Sodium and potassium ions move by active transport, and glucose moves by facilitated diffusion.

C) Sodium and potassium ions move by facilitated diffusion, and glucose moves by osmosis.

D) Sodium and potassium ions move by facilitated diffusion, and glucose moves by active transport.

B) Sodium and potassium ions move by active transport, and glucose moves by facilitated diffusion.

Passive and Active Transport