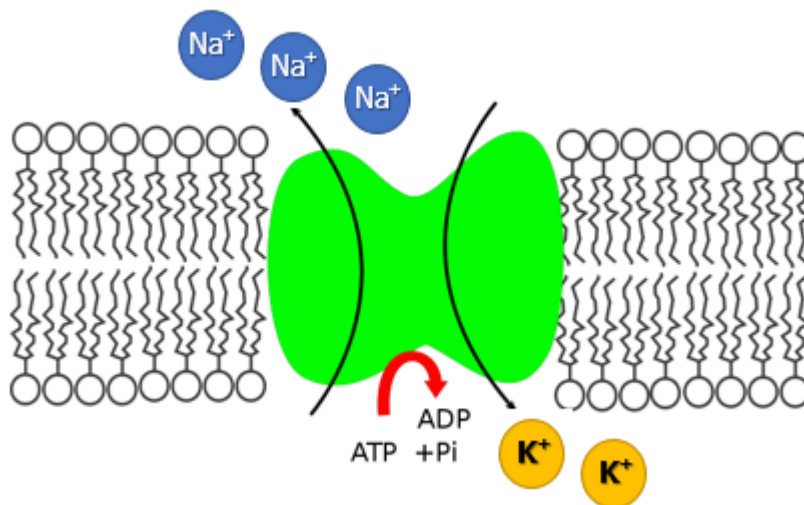


11.2.2

Primary Active Transport

Primary active transport can move solutes, such as ions, against their concentration gradient. This process requires a carrier protein that is much like the proteins involved in carrier-mediated diffusion mentioned above. However, in this case, the carrier has a site for the binding of ATP, which provides the energy to move the solute against its gradient. These transport systems can move one or multiple ions across the membrane. One of the most important active transport systems is the **Na-K ATPase** (see figure below). This system moves sodium out of the cell and moves potassium into the cell. Each cycle of the pump moves three sodium ions out of and two potassium ions into the cell. The Na-K ATPase pump exists in two different conformational states: an E1 form, where the binding sites for the ions face intracellularly and an E2 form, where the binding sites face the extracellularly.



Sodium Potassium- ATPase pumps. Image created at BYU-Idaho by MG 2013

Three Na^+ ions are moved out of the cell in exchange for two K^+ ions with the aid of ATP. In addition to the Na-K ATPase pump other types of ATPase pumps exist as well, these include the H-K pump, Ca pump (SERCA), H pump, and MDR (multidrug- resistance transporters).





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