

## Answer on Question #57457 - Biology - Biochemistry

### Question:

How does energy get stored up when ions are prevented by biomembrane to moves across electrochemical gradient?

### Solution

The direction an ion moves by across a membrane is determined by the electrochemical gradient. An electrochemical gradient consist of the electrical component and the chemical component is produced by a different concentration of ions across the membrane. The combination of these factors determines the thermodynamically favourable direction for an ion's movement across a membrane.

$$\Delta G(x) = RT \ln \left( \frac{x_1}{x_2} \right) + zF\Delta V$$

Where z is an electrical charge of the species; F is the Faraday's constant, and  $\Delta V$  is the electric potential across the membrane.

When  $\Delta G$  is positive the transport is active, an addition of energy is needed to move a molecule up a concentration gradient. If  $\Delta G$  is negative, the transport is passive. It means that such molecules will pass through a membrane down their gradient via diffusion.

When ions are prevented to move across biomembrane in the direction of its electrochemical gradient, free energy of the process remains negative. It means that the high initial free energy value will be stored up until the membrane becomes permeable. Movement of ions across electrochemical gradient requires additional energy to be spent, and prevention of this process may be also equalized to energy storage.