

Abstract Submitted
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Electric and Molecular Characteristics of Ion Channels RICHARD DESANTIS, APS — A galvanic cell's electrolyte is an insulator. A conductive electrolyte would quickly discharge a dry cell's voltage. Voltage-producing paths within an electrolyte can develop spontaneously. A voltage-producing path must bridge from the anode to the cathode, to export voltage out of the insulating electrolyte. Doubling cathode to anode distance does not decrease the cell's fixed output voltage. The fixed voltage indicates superconductor-like behavior. Gaps between voltage-producing molecules would isolate the anode from the cathode, preventing superconductor-like behavior. Gating activity within membrane protein complexes can prevent or allow voltage-producing paths. A voltage-producing path is a single molecule containing both anode and cathode reactants. Only combined anode-cathode reactions within a single molecule can produce the cell's fixed exterior voltage. While within the single molecule, atoms can relocate and react. In a lead acid cell, charging voltage raises the molecule's energy state. The extra energy allows Pb and PbO₂ to form during the molecule's collapse. For discharging, an external circuit provides an outlet for the molecule's voltage, which lowers the molecule's energy state to a level that permits PbSO₄ production.

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