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Photovoltaics: A Sun-Powered World

Guide for Curriculum Unit 12.04.07
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Photovoltaics (PV) is the process of transforming radiant energy into electrical energy. The Sun's energy, although not infinite, will outlive countless future generations, unlike fossil fuels which will be depleted within the next few hundred years. Photovoltaics has many applications already, from calculators to satellites. A myriad of research currently exists to further our knowledge of photovoltaic devices and their uses. Solar cells are now being inserted into roofing tiles. Soon we might see dedicated solar-cell-powered vehicles. Photovoltaics is an exciting field, one which students may be interested in pursuing if they knew a little bit more about it.

The goal of this unit is to give students a working knowledge of photovoltaics. The unit seeks to show connections among atomic structure and bonding, energy transformations, and electricity. Objectives include: describing the process of converting solar radiation to electricity using a crystalline silicon cell; measuring current and voltage of a PV cell; and determining how lighting and shading, the angle of the light source, wavelength, distance, and temperature affect PV cell performance.

This unit has been designed to be used in a ninth-grade physical science/chemistry course. The unit should follow a more in-depth unit on electricity. This prior knowledge will help students to understand the concepts in this unit. The unit also contains references to atomic structure, so a rudimentary knowledge of this is also suggested.

(Recommended for Physical Chemistry, grade 9; and Environmental Science, grades 9-12)