CHEMICAL STORAGE OF LIGHT ENERGY BY CATALYTIC SPLITTING OF WATER
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Research is in progress on hydrogen and oxygen generation from water irradiated by visible light. The process requires the presence of two redox catalysts: Pt as a mediator for hydrogen production, and RuO₂ as a mediator for oxygen production. The performance of the novel catalytic systems developed in our laboratory for the production of hydrogen and/or oxygen from visible light irradiated water was tested. The hydrogen formation rates and yields are strongly influenced by the platinum concentration and reached a maximum value at 10⁻⁵-10⁻⁶ M Pt at pH 5 or in an unbuffered water solution. Favorable hydrogen production is also obtained by raising the reaction temperature and increasing the photosensitizer concentration. The effectiveness of our catalytic system was shown by obtaining the same production rates and yields by using solutions made with triple distilled water, deionized water or tap water.

Preliminary results indicate that a system containing the coupled redox catalyst Pt-RuO₂ is active in cyclic splitting of water and simultaneous production of hydrogen and oxygen.

HETEROGENIZATION OF THE WATER SOLUBLE NOBLE METAL POLYMER CATALYST SYSTEM
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The recently developed method for the preparation of a colloidal, water soluble, noble metal polymer catalyst was used for the preparation of insoluble, noble metal, catalyst systems. A water solution of a monomer bearing coordinating groups and noble metal ions was agitated with an insoluble carrier, as a polymer, a semiconductor powder or an inorganic compound for a few hours and then irradiated with ionizing radiation. The product of this treatment is an insoluble catalyst system containing finely dispersed noble metal which is not leached out during catalytic reaction. The catalyst system is easily separated from the reaction media. The catalytic potential of this system was tested in photocatalytic splitting of water in hydrogen and oxygen and in room temperature hydrogenation reactions of organic compounds.

REFERENCE: