PHOTOCATALYTIC HYDROGEN GENERATION FROM ORGANIC MATERIALS AND PHOTODECOMPOSITION OF WATER

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Photocatalytic hydrogen generation from water has attracted a great deal of attention during the past decade. Although a large number of homogeneous and heterogeneous systems were studied, quantum yields are insufficient for successful applications of solar energy conversions. Testing and studying of novel systems are necessary for the development of practical systems. Several systems were found to be potentially catalytic in these investigations.

The much simpler material copper (II) chloride has been found to be an effective catalyst for photodehydrogenation of alcohols. It was found that the rate of hydrogen production initially increases with the increase of ethanol concentration and then decreases. When the ethanol concentration is very high, little hydrogen is produced and the photolysed solution was found to contain acetaldehyde and copper (I) chloride.

Aldehydes and organic acid also photogenerate hydrogen with this catalyst. Other systems studied and the results obtained are given below:

Photocatalyst	Organic materials
Copper (II) chloride	Glucose and cane sugar
Copper (II) bromide	Ethanol and manitol
Samarium (III) chloride	Ethanol, formaldehyde, and isopropyl alcohol

Europium (III) chloride	Ethanol, methanol, formaldehyde, and isopropyl alcohol
Iron (III) chloride	Ethanol, methanol, isopropyl alcohol, sucrose and manitol
Iron (II) chloride	Ethanol
Iron (II) sulphate	Ethanol
Iron (III) sulphate	Ethanol