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Photogalvanic conversion of solar energy into electrical energy by using NaLS–xylose–methylene blue system

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ABSTRACT

Photogalvanic cells having different surfactants, reductants and photosensitizers have been tried to get the better electrical output and storage capacity. Through literature survey shows that system having NaLs as a surfactant, xylose as a reductant and methylene blue as a photosensitizer has not been explored to get the required results and achievements so the efforts have been made by the system in photogalvanic cell to get better electrical output (i.e. photopotential 834 mV, photocurrent 90 μA, power and power at power point are 75.06 μW and 32.72 μW) and also good storage capacity i.e. 55 min in dark. The observed conversion efficiency and fill factor for this is 0.31%, 0.363%. The effect of different parameter like pH, diffusion length on electrical output of the cell was also studied and tentative mechanism for the generation of photocurrent was also purposed.

1. Introduction

The rapid usage of fossil fuels cannot continue indefinitely earth's finite supply exhausts, we are therefore confirmed with the problem of planning our energy strategies and solar energy due to its abundance in availability, essentially non-polluting, hazard free nature it stand out as the brightest long range promises towards meeting the continually increasing demand of energy.

Solar energy can be converted into many forms i.e. electrical energy, hydraulic potential energy, in the form of chemical bond etc. Solar cells convert solar energy directly into electrical energy. Photogalvanic solar cells are based on such photochemical reaction, which give rise to high energy products on excitation by a photon. These energy rich products loose energy electrochemically which lead to generation of electricity. The photogalvanic cells working on "*photogalvanic effect*" which was observed by Robinowitch [1].

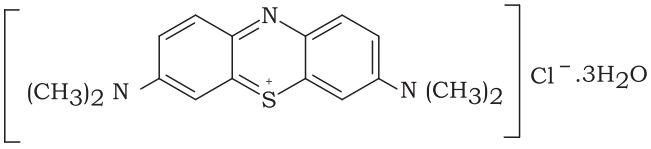
Gangotri and Meena [2] have reported use of reductant and photo sensitizer in photogalvanic cell where as Gangotri et al. [3] has reported the effect of micelles on the performance and conversion efficiency of photogalvanic cells.

Gangotri and Jagrti [4] has reported use of surfactant in photogalvanic cell for better conversion and good storage capacity, Gangotri and Pramila [5] reported uses of micelles in photogalvanic cells whereas Genwa and Genwa [6] reported the comparative study of using different surfactants in photo galvanic cell.

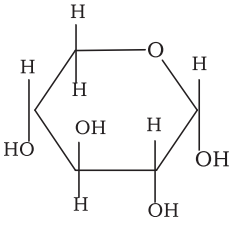
2. Experimental

2.1. Structure of the compounds used

(A) Methylene blue



(B) D(+) xylose



(C) Dodecyl sulfate, sodium salt (sodium lauryl sulfate)

$CH_3(CH_2)_{11}OSO_3^-Na^+$

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