



## **Pervaporation study of Propionic Acid with Ethanol using heterogeneous catalyst in integrated Esterification-Pervaporation system**

**Anurag Tiwari<sup>1</sup>, Amit Keshav<sup>1</sup>, Shubhankar Bhowmick<sup>2</sup>**

<sup>1</sup>Department of Chemical Engineering, National Institute of Technology, Raipur (C.G.) India.

<sup>2</sup>Department of Mechanical Engineering, National Institute of Technology, Raipur (C.G.) India.

**Abstract:** Pervaporation can be used to enhance the yield of esterification reactions via selective removal of water from the product mixture. Esterification of propionic acid with ethanol over the ion exchange resin, Dowex 50Wx8-400 and sulfuric acid with and without pervaporation has been studied. Various parameters such as, catalyst loading (0.05 to 0.25 mL using H<sub>2</sub>SO<sub>4</sub> and 7.11 to 27.11 g using Dowex 50 Wx8-400), effect of molar ratio (1:1 to 1:2.5), and temperature (40 to 70°C) were analyzed. The change in standard enthalpy and entropy of the reaction under same condition were estimated to be 36.07 kJ mol<sup>-1</sup> and 127.53 J mol<sup>-1</sup> K<sup>-1</sup>. Characterization analysis of ion exchange resin was performed using scanning electron microscope (SEM-EDEX) and X-ray diffraction (XRD). Using pervaporation-assisted esterification 68% enhancement in the conversion of ethyl propionate was achieved.

**Keywords:** Dowex 50Wx8-400, pervaporation, batch esterification, propionic acid, ethanol.

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