

Recovery of Dodecanol from Alkyl Polyglycosides using Solvent Extraction

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Abstract

Dodecanol, known as lauryl alcohol, is commonly used in production of Alkylpolyglycosides (APG) by reacting the dextrose with an excess of dodecanol in the presence of an acid catalyst. After the reaction ended, the challenging part, which is the purification step, to separate unreacted dodecanol from APG to ensure the final product meets an industrial specification which requires less than 5% of the dodecanol residue. Current separation methods i.e. evaporation, and distillation, require high energy and could deteriorate the product quality if it is not operated carefully. The recovered dodecanol will be sent back then to the process stream to reduce the alcohol consumption in the APG production. In this research, the extraction process was chosen as an alternative way in which it can separate the unreacted dodecanol without compromising the quality of the final product. The study investigates the effect of a solvent matrix, temperature, and agitation for the extraction of dodecanol using water as a solvent and ethanol, propanol and toluene as a solvent matrix. The composition ratio of sample: solvent: matrix was fixed to 10:10:10. The extraction temperature was manipulated between 60°C and 80°C and agitation speed at 5 and 7 rpm. In addition, the extraction was also subjected to the ultrasonic frequency set at 9 Hz for 30 minutes and using toluene as a matrix solvent. Results show that lower temperature and stirrer speed produced higher extraction yield. Solvent matrix toluene leads to the highest extraction yield of 15.02 w/w%. Applying ultrasonic during the extraction process increased the extraction yield to 30 w/w%, indicating that the ultrasonic has intensified the extraction process. In conclusion, the excess of dodecanol in the alkyl polyglycoside sample can be separated via the extraction process. This potential allows an alternative separation method at a low investment cost, energy saving, and eventually meeting the APG's product specifications requirement.

Keywords: Solvent extraction; Dodecanol recovery; APG purification; Ultrasonic extraction.