

Green Extraction of Patchoulol from Patchouli Leaves Using Ultrasound-Assisted Ionic Liquids

Authors : G. C. Jadeja, M. A. Desai, D. R. Bhatt, J. K. Parikh

Abstract : Green extraction techniques are fast paving ways into various industrial sectors due to the stringent governmental regulations leading to the banning of toxic chemicals' usage and also due to the increasing health/environmental awareness. The present work describes the ionic liquids based sonication method for selectively extracting patchoulol from the leaves of patchouli. 1-Butyl-3-methylimidazolium tetrafluoroborate ([Bmim]BF₄) and N,N,N',N',N'-Hexaethyl-butane-1,4-diammonium dibromide (dicationic ionic liquid - DIL) were selected for extraction. Ultrasound assisted ionic liquid extraction was employed considering concentration of ionic liquid (4-8 %, w/w), ultrasound power (50-150 W for [Bmim]BF₄ and 20-80 W for DIL), temperature (30-50 oC) and extraction time (30-50 min) as major parameters influencing the yield of patchoulol. Using the Taguchi method, the parameters were optimized and analysis of variance (ANOVA) was performed to find the most influential factor in the selected extraction method. In case of [Bmim]BF₄, the optimum conditions were found to be: 4 % (w/w) ionic liquid concentration, 50 W power, 30 oC temperature and extraction time of 30 min. The yield obtained under the optimum conditions was 3.99 mg/g. In case of DIL, the optimum conditions were obtained as 6 % (w/w) ionic liquid concentration, 80 W power, 30 oC temperature and extraction time of 40 min, for which the yield obtained was 4.03 mg/g. Temperature was found to be the most significant factor in both the cases. Extraction time was the insignificant parameter while extracting the product using [Bmim]BF₄ and in case of DIL, power was found to be the least significant factor affecting the process. Thus, a green method of recovering patchoulol is proposed.

Keywords : green extraction, ultrasound, patchoulol, ionic liquids

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