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High catalytic performances of Aquivion® PFSA, a reusable solid perfluorosulfonic acid polymer, in the biphasic glycosylation of glucose with fatty alcohols

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PURPOSE OF THE ABSTRACT

The catalytic performances of Aquivion PFSA, a solid super acid, were investigated in the catalytic glycosylation of glucose with fatty alcohols. Four main criteria were considered to evaluate the catalytic performances of Aquivion PFSA (1) the selectivity of the reaction, (2) the Turn Over Frequency, (3) the reactor productivity and (4) the catalyst stability/recycling. To shed light on the catalytic performances of Aquivion PFSA, it was systematically compare to H2SO4 which is industrially employed in such reaction. We discovered that Aquivion PFSA surpassed the catalytic performances of H2SO4 in terms of activity, selectivity and reactor productivity. Particularly, Aquivion PFSA selectively converted glucose to alkyl polyglucosides (DP = 1.2) with 85% yield which corresponded to a reactor productivity as high as 477 kg/m3/h. Conversely to H2SO4, Aquivion PFSA was also capable of selectively producing alkyl polyglucosides directly from glucose syrup, a cheap source of glucose. This result was ascribed to the amphiphilic nature of Aquivion PFSA which facilitated the Pickering-like emulsification of the biphasic reaction medium. Finally, owing to its high chemical and mechanical properties, Aquivion PFSA was highly stable under our working conditions and was recycled at least 10 times without obvious loss of its catalytic performances.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Alkyl polyglycosides | Biphasic catalysis | Acid catalysis | Aquivion® PFSA

BIBLIOGRAPHY