Ionic Liquids as Bifunctional Cosolvents Enhanced CO2 Conversion Catalysed by NADH-Dependent Formate Dehydrogenase - DTU Orbit (25/02/2019)

**Ionic Liquids as Bifunctional Cosolvents Enhanced CO2 Conversion Catalysed by NADH-Dependent Formate Dehydrogenase**

Efficient CO2 conversion by formate dehydrogenase is limited by the low CO2 concentrations that can be reached in traditional buffers. The use of ionic liquids was proposed as a manner to increase CO2 concentration in the reaction system. It has been found, however, that the required cofactor (NADH) heavily degraded during the enzymatic reaction and that acidity was the main reason. Acidity, indeed, resulted in reduction of the conversion of CO2 into formic acid and contributed to overestimate the amount of formic acid produced when the progression of the reaction was followed by a decrease in NADH absorbance (method N). Stability of NADH and the mechanism of NADH degradation was investigated by UV, NMR and by DFT calculations. It was found that by selecting neutral–basic ionic liquids and by adjusting the concentration of the ionic liquid in the buffer, the concentration of NADH can be maintained in the reaction system with little loss. Conversion of CO2 to methanol in BmimBF4 (67.1%) was more than twice as compared with the conversion attained by the enzymatic reaction in phosphate buffer (24.3%).

**General information**

State: Published

Organisations: Department of Chemical and Biochemical Engineering, CERE – Center for Energy Ressources Engineering, Chinese Academy of Sciences


Number of pages: 13

Publication date: 2018

Peer-reviewed: Yes

**Publication information**

Journal: Catalysts

Volume: 8

Issue number: 8

Article number: 304

ISSN (Print): 2073-4344

Ratings:

BFI (2019): BFI-level 1

Web of Science (2019): Indexed yes

BFI (2018): BFI-level 1

Web of Science (2018): Indexed yes

BFI (2017): BFI-level 1

Scopus rating (2017): CiteScore 3.23 SJR 0.855 SNIP 0.954

Web of Science (2017): Impact factor 3.465

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 1

Scopus rating (2016): CiteScore 3.44 SJR 0.928 SNIP 1.212

Web of Science (2016): Impact factor 3.082

BFI (2015): BFI-level 1

Scopus rating (2015): CiteScore 3.45 SJR 1.054 SNIP 1.202

Web of Science (2015): Impact factor 2.964

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 1

Scopus rating (2014): CiteScore 2.17 SJR 0.682 SNIP 1.037

Web of Science (2014): Impact factor 2

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 0.53 SNIP 0.582

Scopus rating (2012): SJR 0.471 SNIP 0.355

Original language: English

Keywords: Ionic liquids, Formate dehydrogenase, NADH degradation, CO2 conversion

Electronic versions:

catalysts_08_00304.pdf

DOI:

10.3390/catal8080304

Source: Findit

Source-ID: 2438164352