Microwave-assisted Conversion of Carbohydrates into 5-Hydroxymethylfurfural Catalyzed by ZnCl₂

Baohui Zheng, Zhijie Fang, Jie Cheng, and Yuhua Jiang

School of Chemical Engineering, Nanjing University of Science & Technology, Nanjing 210094, China

Reprint requests to Prof. Zhijie Fang. Fax: +86-2584314906. E-mail: zjfang@mail.njust.edu.cn

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A convenient system for producing 5-hydroxymethylfurfural (HMF) through dehydration of carbohydrates by microwave heating in the presence of ZnCl₂ was studied. The use of ZnCl₂ gave higher selectivity than other metal salts in the conversion of glucose. With ZnCl₂ as catalyst, sucrose could be utilized effectively. Under the conditions of microwave irradiation (300 W, 8 min), HMF yields were 54.6, 55.1, and 80.6 % from glucose, fructose and sucrose, whereas upon conventional oil bath heating (0.11 g mL⁻¹ sugar solution, weight ratio of ZnCl₂ to substrate = 1:4, 189 °C, 60 min) HMF yields from glucose, fructose and sucrose were only up to 37.7, 42.7, and 57.7 %, respectively.

Key words: Microwave-assisted Reaction, Degradation of Carbohydrate, 5-Hydroxymethylfurfural (HMF), Zinc Chloride