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Synthesis of zeolite from sugarcane bagasse ash using cetyltrimethylammonium bromide as structure directing agent (Article)

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Abstract

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The purpose of this research is to synthesize zeolite from sugarcane bagasse ash using cetyltrimethylammonium bromide as structure directing agent. This research used cetyltrimethylammonium bromide surfactant to invent the high porosity, surface area, acidity and thermal stability of synthesized zeolite. The Silica was extracted by alkaline fusion using sodium hydroxide solution. The synthesis was conducted by hydrothermal process at 100 °C for 7 days, ageing process for 24 h and calcination at 500 °C for 5 h. The ratio of Si/Al (v/v) was 1, 15 and 25, meanwhile the concentration of cetyltrimethylammonium bromide was 5×10^{-4} M, 1×10^{-3} M and 1×10^{-2} M. The result showed all of product have strong absorbance at $950-1050 \text{ cm}^{-1}$ and $620-690 \text{ cm}^{-1}$, $420-460 \text{ cm}^{-1}$, double ring at $520-570 \text{ cm}^{-1}$, pore opening at $300-370 \text{ cm}^{-1}$. Vibration of -OH as silanol group or water was indicated by broad absorbance at $3400-3450 \text{ cm}^{-1}$. The diffractograms XRD showed that the product had high crystallinity. The composition of product on ratio Si/Al 1 with concentration of cetyltrimethylammonium 10^{-2} M is sodalite, the ratio Si/Al 15 and 25 are NaP1 and SiO₂ quartz and contain 12.23% and 12.19% of Si, 4.17% and 13.18% of Al, respectively. Observation on SEM revealed that the crystal produced using cetyltrimethylammonium bromide was more homogenous and regular in shape. © 2018, Gadjah Mada University. All rights reserved.

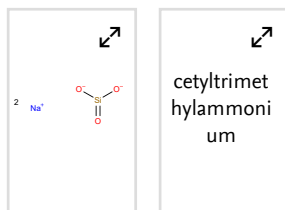
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Cetyltrimethylammonium bromide Sugarcane bagasse Surfactant Synthesis Zeolite

Funding details

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