

## Pengaruh waktu kalsinasi terhadap karakteristik kimia dan fisika pada aktivasi kaolin sebagai bahan baku pembuatan zeolit = Effects of calcination time towards chemical and physical characteristics of kaolin activation as zeolites raw material.

Herninta Fadhilah Novrianti, author

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### Abstrak

Penelitian ini dilakukan untuk mengetahui pengaruh waktu kalsinasi terhadap karakteristik kimia dan fisik dari kaolin alam. Kaolin sebagai bahan baku pembuatan zeolit untuk katalis hydrocracking minyak bumi diaktivasi menggunakan larutan asam sulfat dengan variasi konsentrasi 1, 5, dan 10 M untuk meningkatkan kadar SiO<sub>2</sub> dan menurunkan kadar pengotor, seperti K<sub>2</sub>O, CaO, dan TiO<sub>2</sub>. Sampel kaolin dari berbagai daerah juga dikalsinasi dengan variasi waktu selama 10, 30, 45, 60, 90, 100, 120, 180, 240, 300, dan 900 menit pada range suhu kalsinasi 500-800 °C. Sampel kaolin dikarakterisasi menggunakan XRF, FTIR, SEM, dan BET. Hasil percobaan menunjukkan adanya pengaruh dari variasi konsentrasi larutan media pertukaran ion yang digunakan. Terdapat kenaikan kadar SiO<sub>2</sub> seiring bertambahnya konsentrasi asam sulfat hingga mencapai 87,46% pada konsentrasi 10 M. Perubahan morfologi kaolin menjadi metakaolin pada pengamatan SEM serta hilangnya gugus-gugus khas kaolinit pada pengamatan FTIR tidak dipengaruhi waktu kalsinasi. Sedangkan peningkatan waktu kalsinasi akan meningkatkan luas permukaan kaolin.

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The goal of this study is to understand the effects of calcination time on chemical and physical characteristics of kaolin. Kaolin is used as a raw material for zeolites synthesis as petroleum catalysts support to modify the structure of hydrocarbon compounds into lighter fractions. Kaolin was treated using sulfuric acid 1, 5, and 10 M solution with the aim to increase its SiO<sub>2</sub> content and decrease the impurities of kaolin, specifically K<sub>2</sub>O, CaO, dan TiO<sub>2</sub>. Kaolin samples from different regions were converted into metakaolin in order to increase its reactivity and properties through the calcination process for 10, 30, 45, 60, 90, 100, 120, 180, 240, 300, dan 900 minutes at temperatures range of 500-800 °C. Samples were characterized using XRF, FTIR, SEM, and BET. Treated kaolin produces an increase in SiO<sub>2</sub> levels to reach 87,46% at a concentration of 10 M sulfuric acid solution. Changes in morphology of kaolin to metakaolin on SEM observations and loss of typical kaolinite groups on FTIR observation were not affected by calcination time. However, increase in calcination time will increase the surface area of kaolin and also its reactivity. Calcined kaolin produces an optimum surface area at the time of calcination for 120 minutes with a 52% increase compared to the raw kaolin.