

OKSIDASI DIBENZOTIOFENA UNTUK PENGHILANGAN SENYAWA SULFUR MENGGUNAKAN KATALIS ZnO-PASIR SILIKA BERMAGNET DARI PANTAI PARANGTRITIS

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INTISARI

Penelitian oksidasi dibenzotiofena untuk penghilangan senyawa sulfur (ODS-DBT) menggunakan katalis ZnO-Pasir silika bermagnet dari pantai Parangtritis (ZnO-PP) telah dilakukan. Penelitian dilakukan dengan tujuan mempelajari karakter katalis pasir silika bermagnet (PP) dan ZnO-PP serta mempelajari kondisi optimum aktivitas katalitik katalis ZnO-PP pada reaksi ODS-DBT melalui variasi temperatur dan waktu reaksi, serta volume H_2O_2 sebagai oksidan.

Katalis ZnO-PP dipreparasi dengan metode *blending solid-solid*. Hasil preparasi katalis ZnO-PP kemudian dikarakterisasi menggunakan SEM-EDX, FITR, XRD, TEM, dan SAA, serta diuji keasamaannya menggunakan metode gravimetri adsorpsi uap basa NH_3 . Aktivitas katalitik ZnO-PP dilakukan dengan variasi suhu sebesar 30, 40, 50, dan 60 °C. Pada kondisi variasi suhu optimum dilakukan variasi waktu selama 10, 20, 30, dan 40 menit, serta dilakukan variasi volume H_2O_2 sebesar 0,21; 0,42 dan 0,63 mL.

Katalis PP dan ZnO-PP mempunyai karakter kemagnetan yang dapat ditarik dengan magnet eksternal dan memiliki nilai total keasaman sebesar 1,48 dan 1,69 mmol/g. Hasil karakterisasi pada katalis ZnO-PP menunjukkan adanya karakter ZnO, SiO_2 , Fe_3O_4 , Al_2O_3 , dan Fe_2O_3 dengan morfologi katalis yang berbentuk heksagonal kubik. Aktivitas katalis ZnO-PP pada reaksi katalitik ODS-DBT optimum pada variasi temperatur dan waktu reaksi 60 °C dan 20 menit, serta volume H_2O_2 sebesar 0,42 mL dengan penurunan konsentrasi DBT sebesar 82,66%.

Kata kunci: dibenzotiofena, oksidasi desulfurisasi, pasir pantai Parangtritis, ZnO

OXIDATION OF DIBENZOTHIOPHENE FOR THE REMOVAL OF SULFUR COMPOUNDS USING A ZnO-MAGNETIC SILICA SAND CATALYST FROM PARANGTRITIS BEACH

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ABSTRACT

Research on the oxidation of dibenzothiophene to remove sulfur compounds (ODS-DBT) using a ZnO-magnetic silica sand catalyst from the Parangtritis coast (ZnO-PP) has been carried out. The research was conducted with the aim of studying the character of the magnetic silica sand from Parangtritis (PP) and ZnO-PP catalyst and studying the optimum conditions for the catalytic activity of ZnO-PP catalyst in the ODS-DBT reaction through variations in temperature and reaction time, as well as the volume of H₂O₂ as an oxidizing agent.

The ZnO-PP catalyst was prepared by solid-solid blending method. The results of the preparation of the ZnO-PP catalyst were then characterized using SEM-EDX, FITR, XRD, TEM, and SAA, and tested using the NH₃ alkaline vapor adsorption gravimetric method. The catalytic activity of ZnO-PP was carried out with temperature variations of 30, 40, 50, and 60 °C. Under conditions of optimum temperature variation, time variations were carried out for 10, 20, 30, and 40 minutes, and the volume of H₂O₂ was varied by 0.21; 0.42 and 0.63 mL.

The PP and ZnO-PP catalysts have magnetic characteristics that can be attracted by external magnet and have a total acidity of 1.48 and 1.69 mmol/g. The results of the characterization of the ZnO-PP catalyst showed the presence of ZnO, SiO₂, Fe₃O₄, Al₂O₃, and Fe₂O₃ characters with a cubic hexagonal shaped catalyst. The activity of ZnO-PP catalyst in the optimum ODS-DBT catalytic reaction at variations of temperature and reaction time of 60 °C and 20 minutes, and the volume of H₂O₂ is 0.42 mL with a DBT concentration reduction efficiency of 82.66%.

Keywords: dibenzothiophene, oxidative desulfurization, Parangtritis beach sand, ZnO