Aluminium chloride incorporated micro porous ZSM-13 isomerization catalyst: Synthesis characterization and application

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Catalysts based on Zeolites brought revolution in oil refining and petrochemical production in recent years due to their size selectivity and gained much research interest all over the world. The most well known and widely used zeolite is ZSM-5 (pores: 0.51 x 0.55 nm, 0.53 x 0.56 nm). ZSM-5 has been used successfully in aromatic isomerisation, methanol upgradation and many other reactions in organic chemistry. On the other hand anhydrous aluminium chloride has been found to have a high efficiency in isomerisation reactions due to its strong Lewis acidic nature. But application of this catalyst is limited due to its high corrosiveness. In our present work we have used ZSM-13, which has not been normally used for catalyst preparation as main matrix due to its high monobranching selectivity. And we have tried to increase its (ZSM-13) catalytic performance by modifying the micropores present in it with aluminium chloride impregnation, reducing corrosive nature of aluminium chloride. Three samples of aluminium chloride impregnated ZSM-13 containing 0.015, 0.025, 0.05 mol of anhydrous aluminium chloride have been synthesized by batch impregnation method and thoroughly characterized by XRD, FTIR, SEM, TEM, AFM and BET surface area analysis. Both XRD and FTIR analysis show that the pores present in the ZSM-13 sample is finely impregnated with aluminium chloride. The SEM images of the samples show the surface morphology. Comparison shows that pure ZSM-13 has some morphological change on the surface after impregnation with aluminium chloride. The TEM image of pure ZSM-13 shows the micro pores present in it. The specific surface area of ZSM-13 has been increased after aluminium chloride incorporation. This is very significant since the isomerisation reaction is very much sensitive to specific surface area. All the three samples synthesized show very high conversion capacity of normal alkanes like n-hexane, n-octane compared to pure ZSM-13. This is due to the increase in activity of the active sites present in pure ZSM-13 after incorporation of aluminium chloride. This enhanced performance of aluminium chloride impregnated ZSM-13 also clearly indicates that pores present in ZSM-13 have not been blocked by anhydrous aluminium chloride. Leaching test of the catalysts shows that aluminium chloride is not leached out from any catalyst surface. Thus the aluminium chloride impregnated ZSM-13 sample is found to be very promising hydroisomerization catalyst and can be very safely used for practical purpose.

Biography

Abhishek Dhar is a Junior Research Fellow in the Department of Chemical Technology, University of Calcutta. He is doing his research on the preparation of hydroisomerisation catalyst of n-alkane. He qualified CSIR-NET and GATE exams and published 2 research papers in international journals and presented papers in 4 international conferences.

Discovery of novel anti-cancer activity against HeLa cell lines by virtual screening and MTT assay

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Elimination of superfluous or mutated somatic cells is provided by various mechanisms including apoptosis. Deregulation of apoptotic signalling pathways may contribute to oncogenesis. Aspartate specific cysteine proteases, termed caspases are the key effector molecules in apoptosis. In the present research, a novel screening approach has been utilized to screen nearly 1400 drugs available from Drug Bank database. After validating the docking protocol, molecular docking software like Molegro Virtual Docking (MVD) was utilized to test the underlying efficacy of these programs towards predicting the binding affinities of studied compounds. A consensus scoring and ranking retrieved top 3 drugs viz. Olmesartan, Telmisartan and Atorvastin which were examined for anti-proliferative effects against carcinoma of cervix, HeLa cell line using MTT assay.

Keywords: Apoptosis, Caspase, Docking, Cancer, Hela cells, MTT assay.

Biography

G. Ratnavalli is a research scholar at the Department of Pharmaceutical Biotechnology, SRM University looking for the discovery of anti-cancer activity by virtual screening and MTT assay for the development of anti-cancer drugs. She qualified CSIR-NET (JRF) and participated in several conferences.