

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

الآية

(وَيَسْأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ أَمْرِ رَبِّي وَمَا أُوتِيتُمْ
مِّنَ الْعِلْمِ إِلَّا قَلِيلًا)

صدق الله العظيم

سورة الإسراء: الآية (85)

Dedication

To soul my father

To my mother

Grand father

And

Sisters

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First of all thanks to **ALLAH, Almighty**

I deeply indebted to my supervisor **Dr. Adil Elhaj Ahmed** for his supervision, guidance, support and help.

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ABSTRACT

In this work, the catalytic activity of indium incorporated silica from rice husk ash (RHA-In) was studied for the liquid phase Friedel-Crafts benzylation of naphthalene (NA) in

presence of cyclohexane as solvent using benzyl chloride ($\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$) as benzylating agent. Reaction temperature and reactants molar ratios were the only factors considered in this study to investigate the catalytic performance of RHA-In catalyst. The reaction temperature was varied from 70 to 90 °C, whereas the different BC/NA molar ratios used in this study were 1:1, 1:2, 1:3 and 2:1. The total reaction time was fixed at 3 hours for all reaction trials.

RHA-In catalyst was found to exhibit very high efficiency for this reaction for the selective production of 1-benzyl naphthalene (1-BNA) as the major product (> 80 %) and 2-benzyl naphthalene (2-BNA) as the minor product (< 20%). The activity of the catalyst was found to increase with increasing reaction temperature and BC/NA molar ratio. At the optimum reaction conditions (80 °C, 0.2g wt of catalyst and 1:3 BC/NA molar ratio) the maximum percentage of BC conversion obtained was > 99%, whereas the highest registered selectivity for 1-benzyl naphthalene (1-BNA) product was \approx 83%. The formation of benzyl naphthalene products (BNA) is explained by the electrophilic attack of benzyl cation ($\text{C}_6\text{H}_5\text{CH}_2^+$) on the naphthalene ring whose formation is facilitated by the activity of the catalyst. The benzylation reaction was observed not to proceed in the absence of the catalyst or over RHA-SiO₂ support. RHA-In was found reusable for this reaction several times without any significant change in its catalytic performance. It was also found that the RHA-In catalyst did not show any sensitivity to moisture.

في هذه الدراسة هي النشاط المحفز للحفاز في تفاعل فرايدل كرافت في الوسط السائل لبنزايلا النافثلين باستخدام السايكلوهكسان كمذيب وتم التفاعل في درجة حراره ما بين 70-90 درجة مئوية باستخدام كلوريد البنزايلا كدليل بنزايلا علي العامل الحفاز ونسب مولييه مختلفه من النافثلين لكلوريد البنزايلا (1:1 , 1:2 , 1:3 و 2:1) مول من النافثلين لكلوريد البنزايلا واستمر لمدة 3 ساعات في جميع ظروف التفاعل.

وجد ان المحفز يحفز بكفاءه وبشكل انتقائي الي 1-بنزايلا نافثلين اكثر من 2-بنزايلا نافثلين وان تحويل كلوريد البنزايلا لنواتج النافثلين بنزايلا تعتمد الي حد كبير علي ظروف التفاعل ونشاطية المحفز في ظل ظروف التفاعل (عند 80 0 م , 0.2 جم وزنه من المحفز و 1:3 نسبه مولييه من كلوريد البنزايلا للنافثلين مول باستخدام السايكلوهكسان كمذيب لمدة 3 ساعات) لوحظ ان تحويل النسبه الاقصي من كلوريد البنزايلا بنسبه اكثر من 99% الي نافثلين بنزايلا باستخدام جهاز الغاز كروماتوغرافي , وانتقائية الناتج 1- نافثلين بنزايلا بنسبه اكثر من 83% كنتاج رئيسي وتم الحصول علي البقيه كنتاج ثانوي بتحليل الناتج باستخدام جهاز الغاز كروماتوغرافي ذو الكتله وقد درست ايضا " بنزايلا النافثلين في درجة حراره 80 0 م باستخدام كلوريد البنزايلا كدليل بنزايلا بنسبه 1:3 للنافثلين باستخدام المحفز اعطي تحويل بنسبه اكثر من 83% وبدون استخدام المحفز واستخدامه بالسيليكا لم يعطي نتيجته ولوحظ ايضا " ان هناك لا توجد اي انتقائية للنواتج. وجد ايضا " ان تشكل اوتكون البنزايلا نافثلين هي التي توضح هجوم الموجبيه للالكترونات من البنزايلا علي حلقة النافثلين التي يتم تسهيلها وتنشيطها بالمحفز . وجد ان المحفز اضافته لتنشيطه لم تظهر عليه اي حساسيه للرطوبه مما يجعله عالي الكفاءه لاعداد النفثالين بنزايلا واعادة استخدامه لتفاعل البنزايلا عدة مرات دون اي تغير كبير في نشاطه وانتقائيته.

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