

Dedication

To my parent,
husband ,
brothers and sister.

Acknowledgement

Praise to strength to who gave me health and pursues this project, and thanks to Dr. ADil Elhaj and Dr. Issa for his guidance, that helped to present this research in this shape and gratitude are also are extended to the technical staff of Sudan University of sciences and technology, to Ustaz. Omer Adam Omer, Awad allah Babiker and Mohamed Eisawai from International University Of Africa for technical support.

Abstract

The objectives of this research is to prepare, characterize Ni, Co, Fe – ferrite catalyst and to study the catalytic activity of the synthesized catalyst for the Friedel-crafts benzylation reaction of toluene with benzyl chloride. Three transition metals ferrites Ni, Co, Fe –ferrite were prepared and were characterized by spectroscopic techniques such as Fourier transform infrared spectroscopy (FTIR) and atomic absorption spectroscopy (AAS) and the catalytic activity of the synthesized transition metals ferrites heterogeneous catalyst for the Friedel-Crafts benzylation reaction of toluene with benzyl chloride were studied. The activity results showed that the highest conversion of benzyl chloride is 99.94% at 80 °C and 20 min reaction time, while the selectivity of para –benzyltoluene was 83.36% and ortho- benzyltoluene 16.6% in the same temperature and reaction time. However for the type and weight of catalyst, nickel ferrite in 0.1g weight was found to be the best one for high conversion of benzylchloride and high selectivity at the same temperature and reaction time. The molar ratio 5:1 the highest conversion yield of benzylchloride of 99.01% and highest selectivity of 67.22 % at 100 °C in 10 min reaction time and 0.1g weight of catalyst.

مستخلص البحث

هدفت الدراسة الي تحضير و تشخيص عوامل حفازة للعناصر الانتقالية النيكل ، الكوبلت، الحديد – فرايت، بالاضافة الي دراسة النشاط الحفزي للعوامل الحفازة المحضرة بالنسبة لتفاعل بنزلة فريدل - كرافت للتولين مع كلوريد البنزويل. تم تحضير ثلاث عوامل حفازة للعناصر النيكل، الكوبلت، الحديد- فرايت و تم تشخيص العوامل الحفازة المحضرة بالتقنيات المطيافية مثل مطيافية الاشعة تحت الحمراء و مطيافية الامتصاص الذري، كم تم دراسة النشاط الحفزي لهذه العوامل الحفازة المحضرة بدلالة درجة الحرارة و النسبة المولية ووزن العامل الحفاز و نوع العامل الحفاز. اوضحت النتائج المتحصل عليها ان اعلي نسبة تحول لكلوريد البنزويل 99.94% عند درجة حرارة 80⁰ م و زمن تفاعل 20 دقيقة، بينما انتقائية انتاج بارا- بنزويل تولين هي 83.35% وواورثو بنزويل تولين هي 16.6% وعند نفس درجة الحرارة و زمن التفاعل. بالاضافة الي نسبة ونوع العامل الحفاز وجد ان النيكل فرايت عند وزن 0.1g افضل العوامل الحفازة المحضرة لانه يعطي اعلي نسبة تحول و اعلي انتقائية عند نفس درجة الحرارة و زمن التفاعل المذكور اعلاه. اعطت النسبة المولية 5:1 اعلي نسبة تحول لكلوريد البنزويل 99.01% و اعلي انتقائية 67.22% عند درجة حرارة 100⁰ م و زمن تفاعل 10 دقيقة اضافة الي 0.1g وزن العامل الحفاز.

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Abbreviations

Abbreviations	Meaning
TON	The turnover number
TOF	The turnover frequency
BASF	<i>Badische Anilin und Soda Fabrik</i>
L-DOPA	L-3,4-dihydroxyphenylalanine
SBA-15	Santa Barbara Amorphous type material
TPR	Temperature programmed reduction
RHA	Rice husk ash
DMDPM	Dimethyl diphenyl methane

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