

بسم الله الرحمن الرحيم

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Dedication

***To mother and father, brothers
and sisters.***

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Acknowledgment

First of all our sincere thanks to Alla Almighty for helping me to complete this work. It is a pleasure to record my deep appreciation, and thanks to Dr. Adil Elhag Ahmed for his wise guidance, which helped me to present this project in this shape. I am very grateful to the staff of the Department of Chemistry –Sudan University of Science and Technology for all facilities. Thanks to my family for their continual support.

Abstract

Ferrite of different divalent transition metals were synthesized at normal condition using established co-precipitation methods by using simple salt precipitating from hot solution in temperature 90C as oxalate precipitate and followed by subsequent calcinations at about 700C to covert oxalate precipitate to oxide precipitate. The synthesized ferrite include Nickel ferrite (Ni-Fer),Cobalt ferrite (Co-Fer), Manganese ferrite (Mn-Fer),Copper ferrite (Cu-Fer),and Iron ferrite (Fe-Fer).This ferrite material were characterized by various spectroscopic technique such as Fourier transfer infrared spectroscopy FT-IR, powder X-ray diffraction (XRD) and X-ray florescence (XRF).

The FT-IR spectroscopic revealed the presence of Fe-O & M-O band of respected divalent cations in cubic spinel structure and absence or low level of impurities of residual precursors. The XRD illustrated that the structure of ferrite material are of cubic single spinel phase. The XRF analysis indicated the presence of the incorporated metallic species but their percentages were found not consistent with the empirical formula of normal spinel ferrite $M^{II}Fe_2O_4$.The deviation from normal spinels was assumed to be related to the XRF spectrometer or the use of low purity grade chemicals precursors.

ملخص البحث

تم تحضير مركبات الحديد (الفيرايث) والتي شملت نيكل فيرايث- مغنيسيوم فيرايث- كوبالت فيرايث- ونحاس فيرايث وحديد فيرايث. تحت ظروف قياسيه باستخدام طريقه الترسيب المشترك من ملحين بسيطين تم الترسيب من محالين مسخنه في درجه حراره 90 درجه مئوية علي هيئه اكسالات اولاً ثم تم حرقها في درجه حراره 700 م لتحويلها الي صورته اوكسيد. تم تشخيص هذه المركبات عن طريق تقنيات المطيافيه المختلفه مثل مطيافيه الاشعه تحت الحمراء ومطيافيه حيود الاشعه السينيه ومطيافيه فلوره الاشعه السينيه .

مطيافيه الاشعه تحت الحمراء اظهرت وجود روابط بين الحديد والاكسجين -والمعدن والاكسجين, كذلك اوضحت نتائج حيود الاشعه السينيه وجود الشكل الاسبائل البسيط, اكدت النتائج المتحصل عليها من طيف الاشعه السينيه المفلوره ويعزي $(M^nFe_2O_4)$ وجود حيود بسيط عن الصيغه الاساسيه لمركبات الفيرايث المختلفه هذه الاختلاف الطفيف الي جهاز الاشعه السينيه المفلوره وكذلك الي استخدام مواد تحتوي علي نسبته من الشوائب.

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