

DEDICATION

This thesis is dedicated to

My Parents

Acknowledgments

I begin this dedication in the name of Alah who uplifted me until I completed this research essay. I would also like to express my sincere gratitude to the following people for their contribution in making this research project possible:

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Abbreviations

CW	Continuous Wave
PMMA	Polymer, poly Methyl Methacrylate
ASE	Amplified Spontaneous Emission
Laser radiation	Light amplification by stimulated emission of
ICT	Intramolecular Charge Transfer
TICT	Twisted Intramolecular Charge Transfer
au	arbitrary unit
abs	absorbance
TFA	Tetra Fluoro Acetic acid

Flu	fluorescence
C	concentration
Nd:YAG	neodymium-doped yttrium aluminium garnet
Ps	pico second

Abstract

This research was carried out to study the possibility of using the beet dyes as a laser gain medium.

Also the pH effect on the light absorption by beet dyes was studied and the dyes solution was separated using HPLC-absorption and HPLC fluorescence techniques to get information about the number of the components present in the dye solution and both techniques give the same result indicating the presence of four components.

The dye solutions were pumped by He-Ne flash laser and the fluorescence efficiency was displayed by (usb 2000 spectrophotometer detector).

The fluorescence quantum yield was determined by the comparative method with rhodamine b as an organic dye standard, the value of the fluorescence quantum yield was found about (0.14) and the fluorescence quantum yield was developed until reached about (0.323).

The increasing of fluorescence quantum yield of dye solution as a result of increasing the viscosity of solvent was observed clearly.

The study concluded the beet dyes are so sensitive to fluorescence and it is very suitable to be used as a laser gain medium.

خلاصة البحث

أجريت هذه الدراسة لمعرفة مدى قابلية استخدام أصباغ البنجر كوسط مستهدف لإنتاج الليزر

كما تمت دراسة أثر الأس الهيدروجيني السالب على امتصاص الضوء لأصباغ البنجر وكذلك تم

فصل محلول الصبغة لمعرفة عدد مكوناته بواسطة كل من تقنية كروماتوغرافيا الضغط العالي

الموصولة بكاشف الامتصاص الضوئي (في منطقة الضوء المرئي) و كروماتوغرافيا الضغط

العالي الموصولة بكاشف الفلورة ,حيث وجد إن محلول الأصباغ المستخلصة يحتوى على أربعة

مكونات وكانت النتائج متطابقة في كل من الكاشفين

تم تعريض محاليل الأصباغ لمصدر ليزر لمبة الهليوم والنيون وتم إظهار كفاءة الفلورة باستخدام

جهاز القياس الضوئي (2000) الموصول بجهاز الحاسوب

تم تقدير ناتج حاصل الفلورة باستخدام طريقة المقارنة مع صبغة الرودامين ب كمادة قياسية

حيث وجد ان ناتج حاصل الفلورة يساوى (0.14) كما تم تطويره بواسطة زيادة لزوجة المذيب

.(حتى تم الحصول على ناتج حاصل فلورة يساوى 0.323)

.الزيادة فى ناتج حاصل الفلورة كنتيجة للزيادة فى لزوجة المذيب تمت ملاحظتها بوضوح تام

الدراسة أثبتت أن أصباغ البنجر عالية الحساسية تجاه الفلورة وهى مناسبة للاستخدام كوسط

.لإنتاج الليزر

