


SYNTHESIS OF RED AZO DYES FROM CARDANOL
AND AROMATIC DIAMINE

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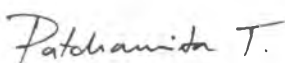
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พิมพ์พรรณณ์ แพ้บำรุง : การสังเคราะห์สีย้อมแอโซสีแดงจากคาร์ดานอลและแอโรแมติก ไดเอมีน. (SYNTHESIS OF RED AZO DYES FROM CARDANOL AND AROMATIC DIAMINE) อ.ที่ปรึกษาวิทยานิพนธ์หลัก : ผศ. ดร.พัชณิตา ธรรมรงค์กิจ, 102 หน้า.

งานวิจัยนี้ศึกษาการสังเคราะห์สีย้อมมอนอแอโซ และไดแอโซจากปฏิกิริยาควบคู่ ระหว่างคาร์ดานอล และเกลือไดแอโซเนียมของแอโรแมติกเอมีนชนิดต่างๆ และผลของการแปร ชนิดของแอโรแมติกเอมีนชนิดต่างๆ ที่มีต่อผลการการเกิดปฏิกิริยา สมบัติการละลาย และ สมบัติทางแสงของสีย้อมที่ได้ จากการทดลองพบว่า สีย้อมทุกตัวให้การละลายที่ดีเนื่องจากมี คาร์ดานอลเป็นองค์ประกอบในโมเลกุล และสีย้อมที่สังเคราะห์ได้พบว่าให้สีเหลือง หรือสีแดง โดยสีย้อมไดแอโซ 18 มีความสามารถในการละลายได้ดีในน้ำมันแก๊สโซลีน 91 และสารละลาย อินทรีย์อื่นๆ และเมื่อทดสอบสมบัติทางกายภาพของน้ำมันแก๊สโซลีน 91 ด้วยวิธีมาตรฐาน ASTM จะไม่ทำให้สมบัติของน้ำมันแก๊สโซลีนเปลี่ยนแปลงไป เมื่อนำสีย้อมไดแอโซสีแดง 18 บริสุทธิ์ที่ระดับความเข้มข้น 6 ส่วนในล้านส่วน หรือสีย้อมไดแอโซสีแดง 18 ที่ยังไม่ผ่านการทำให้ บริสุทธิ์ที่ระดับความเข้มข้น 18 ส่วนในล้านส่วนเติมในน้ำมันแก๊สโซลีน 91 และนำมาทดสอบ ความคงตัวของสีย้อมแอโซที่สังเคราะห์ได้ พบว่า สามารถมีความคงตัวอยู่ในน้ำมันแก๊สโซลีน เป็นระยะเวลาไม่ต่ำกว่า 3 เดือน ดังนั้นสีย้อมไดแอโซ 18 มีสมบัติที่สามารถนำมาใช้ประโยชน์ เป็นสีย้อมในน้ำมันแก๊สโซลีน 91 ในทางการค้าได้ ทั้งในรูปบริสุทธิ์และไม่ผ่านการทำให้บริสุทธิ์

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A series of monoazo and disazo dyes was synthesized by a coupling reaction of cardanol with a diazonium salt of various aromatic amines. Effect of the central aromatic moieties on the dye formation, solubility and photophysical behavior of the azo compounds was investigated. In all cases, the introduction of cardanol in the dye molecules was proved to be advantageous in giving dyes with satisfactory solubility. The resulting azo dyes appeared in yellow or red color. The selected red disazo dye **18** exhibited high solubility in gasoline 91 and common organic solvents. The ASTM test methods revealed that the physical properties of gasoline 91 were unaffected by the presence of the pure azo dye **18** at a concentration of 6 ppm or the crude of azo dye **18** at a concentration of 18 ppm. The red disazo dye **18** was found to be stable in gasoline 91 for at least 3 months. Therefore, it can be readily applied as dye for commercial gasoline 91 in both pure and crude forms.

Field of Study: Petrochemistry and Polymer science Student's Signature: *Pimpaporn Paebumrung*
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LIST OF ABBREVIATIONS

λ_{abs}	:	absorption wavelength
ASTM	:	American Society for Testing and Materials
calcd	:	calculated
$^{13}\text{C-NMR}$:	carbon-13 nuclear magnetic resonance spectroscopy
CNSL	:	cashew nut shell liquid
cP	:	centipoise
δ	:	chemical shift
CHCl_3	:	chloroform
J	:	coupling constant
$^{\circ}\text{C}$:	degree Celsius
$^{\circ}\text{F}$:	degree Fahrenheit
CDCl_3	:	deuterated chloroform
d	:	doublet (NMR)
dd	:	doublet of doublet (NMR)
ESI-MS	:	electrospray ionization-mass spectrometry
FBP	:	final boiling point
g	:	gram (s)
Hz	:	hertz (s)
h	:	hour (s)
IR	:	Infrared spectroscopy
IBP	:	initial boiling point
kPa	:	kilopascal
MS	:	mass spectrometry
MALDI-MS	:	matrix-assisted laser desorption ionization mass spectrometry
max	:	maximum
λ_{max}	:	maximum wavelength
CH_2Cl_2	:	methylene chloride
μL	:	microliter (s)

mg	:	milligram (s)
mL	:	milliliter (s)
mmol	:	millimole (s)
ϵ	:	molar absorptivity
ϵ_{\max}	:	molar absorptivity of maximum wavelength
m	:	multiplet (NMR)
nm	:	nanometer
NMR	:	nuclear magnetic resonance spectroscopy
obsd	:	observed
ppm	:	parts per million
$^1\text{H-NMR}$:	proton nuclear magnetic resonance spectroscopy
st	:	stretching vibration (IR)
TEA	:	triethylamine
t	:	triplet (NMR)
UV/Vis	:	ultraviolet and visible spectroscopy
cm^{-1}	:	unit of wavenumber (IR)