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Synthesis and Identification of (8-and 9)–Membered Rings Via Alkylation Reactions

Dr . Nagham Mahmood Aljamali ^{1*}

1. Assistant Professor, Chemistry Department, College of Education, University of Kufa, Iraq.
[E-mail: Dr.Nagham_mj@yahoo.com]

In this paper, synthesis of compounds [1-7] were carried out using 8 – and 9 – membered hetero cycles which have two heteroatoms by using alkylation reactions.

All prepared compounds [1-7] have been characterized by using several chemical techniques such as, (H .NMR–spectra, (C.H.N)–analysis), FTIR–spectra and melting points.

Keyword: Eight Membered, Nine Membered, Heterocyclic, Hetero Atom.

1. INTRODUCTION: The chemistry of cyclic compounds has generated intensive scientific studies throughout the world , especially interest has been focused on the synthesis of macro biomolecule ,and variety of drugs such as : methyl seleno cystien , seleno cystien^(1,2). diazepam drugs⁽³⁾ ,valium drugs.

These compounds have displayed a broad spectrum of pharmacological activities such as anti protozoal^(4,5) ,anti-fungal^(6,7).

In the present study , synthesis of (diazonin , diazocane , selenthinin , selenthicine) cycles which are 8 – and 9 – membered rings with two heteroatoms (Se , S , N) as part of the portion in compounds [1-7] .

These compounds are interesting structural motifs in medicinal chemistry , in recent times , their structures have been widely used , some of these hetero cycles have been indentified as antitumour

a gents^(8,9), antibiotics , anti – HIV a gents^(10,11) , in organic synthesis and other applications⁽¹²⁻¹³⁾ . Synthesis of these compounds via alkylation reaction give good yield by this methods in this paper.

2. Experimental:

All chemical used were supplied from fluka and BDH – chemical company

All measurements were carried out by :

- 1) Melting points: electro thermal 9300 , melting point engineering LTD , U.K
- 2) FT . IR- spectra : fourrier transform infrared shimadzu 8300 – (FT . IR) , KBr disc was performed by CO.S.Q.C. Iraq
- 3) H.NMR-spectra and (C.H.N) – analysis : in center lab - Jordan .

3. Synthesis of compounds [1-3] :

To mixture of formaldehyde (15 ml , 40%) and sulphuric acid was added solution of 4- nitro

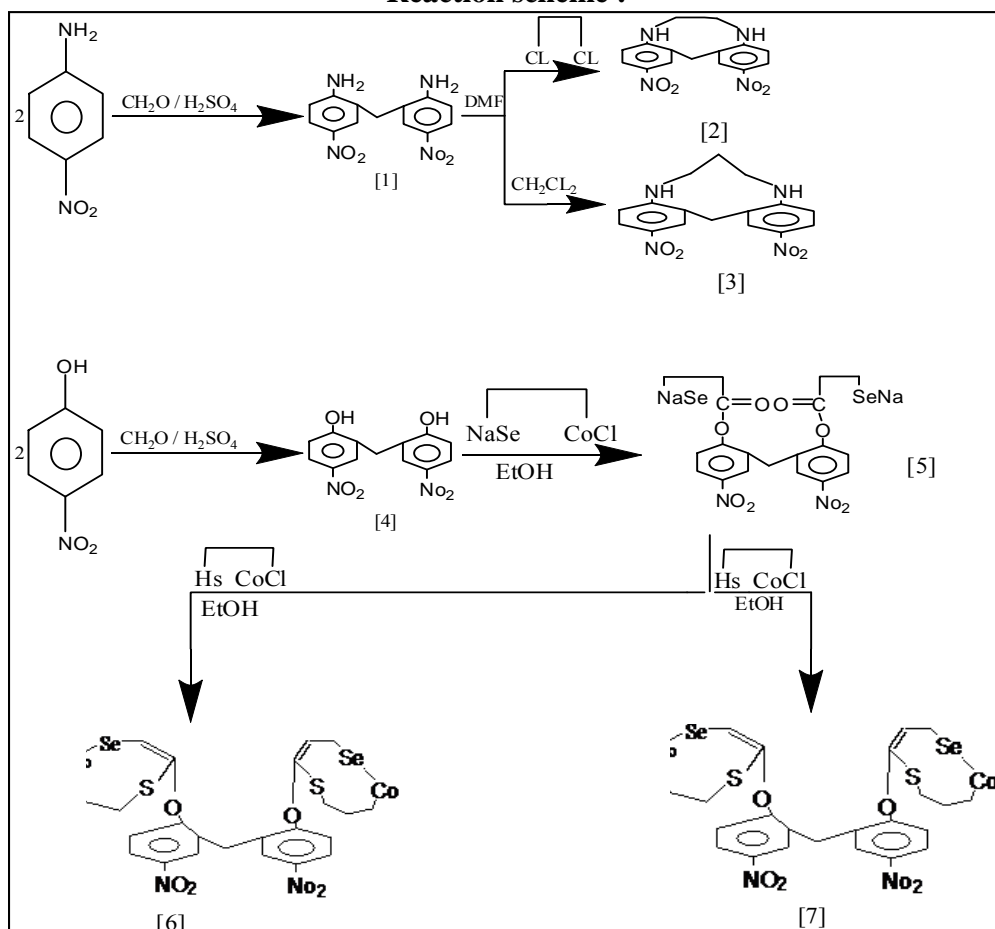
aniline (0.2 mole , 27.6 g) , the mixture was heated at 85°C for two hours , the precipitate was filtered off to give compound [1] , then (0.01 mole , 2.8 g) of compound [1] was reacted with one of (0.01 mole , 0.9 g of 1,2 – di chloro ethane , 0.01 mole , 0.85 g of dichloromethane) respectively under heating for (8 hours) , the precipitate was filtered off and recrystallized to give 85% of 9 – membered cycles of compound [2] and 82% 8 – membered cycles of compound [3] respectively .

4. Synthesis of compounds [4-7] :

The compound [4] was synthesized by reaction between (0.2 mole , 27.8 g) of 4 – nitro phenol with (15 ml of formaldehyde 40% and 25 ml

sulphuric acid 98%) under heating for four hours , the precipitate was formed and filtered off to give compound [4] , which (0.01 mole , 2.9 g) of it was reacted with (0.02 mole , 3.8 g) of sodium seleno propoyl chloride under heating , the precipitate was formed and filtered off to give compound [5] , (0.01 mole , 6.03 g) of compound [5] was reacted with one of (0.02 mole , 2.7 g of mercapto butoyl chloride , 0.02 mole , 2.4 g of mercapto propoyl chloride) respectively under heating for (8 ours) ^(8,9) , in alkali medium , the precipitate was formed and filtered off and recrystallized to yield 83% 9- membered cycle of compound [6] and 86% 8 – membered cycle of compound [7] respectively .

Reaction scheme :



5. Results and Discussion:

Mechanism of this reaction involved polymerization of two mole from p-nitro aniline via alkylation of ortho-position then cyclization reaction of compounds to produce high yield from compounds [1-7] due to reaction of dimer,

most of polymerization reaction give high products.

All formatted compounds [1-7] have been characterized by their melting points & spectroscopic methods (FT.IR-spectra, (C.H.N)-analysis, & H-NMR-spectra):

Table (1) : FT.IR data (cm⁻¹) of compounds [1-7]

Comp. No.	Structural formula	Name of compound	Functional group in every compound
[1]		2,2`-methylene bis(4-nitro aniline)	ν (-NH ₂) :3480 S
[2]		2,11-dinitro-6,7-dihydro -13H-dibenzo –diazonin	ν (-NH ₂) endo cyclic : 3290 M (C-N)endo cyclic: 1537S
[3]		2,11-dinitro-6,7-dihydro -12H-dibenzo –diazonin	ν (-NH ₂)endo cyclic : 3240 M (C-N)endo cyclic : 1540 S
[4]		2,2`-methylene bis(4-nitro phenol)	ν (-OH): 3510 S
[5]		2,2`-methylene- bis(4-nitro phenol sodium seleno propanoate).	ν (C=O) of ester : 1710 (CH ₂ -Se) : 1520
[6]		2,2`-methylene- bis {2-(4-nitro phenoxy)-1,5-selen thinin -6-one}.	(C-O-C) of ether : 1235 (Se-C=O) carbonyl of selenide : 1682 (C-S)endo cyclic :670
[7]		2,2`-methylene- bis {2-(4-nitro phenoxy)-1,5-selen thicine -6-one}.	(C-O-C) of ether : 1240 (Se-C=O) carbonyl of selenide : 1680 (C-S)endo cyclic :640

S=strong , M=medium , VS = very strong

5.1 FTIR –Spectra:

In FTIR –spectra ,the reaction is followed by appearance amino group (- NH₂) absorption band at (3480)cm⁻¹ in compound [1] , which disappear and other bands are appear at (3290 , 1537) cm⁻¹ due to (- NH endo cyclic , C-N endo cyclic) respectively in compound [2] and at (3240 , 1540) cm⁻¹ due to (- NH endo cyclic , C – N endo cyclic)⁽¹⁴⁻¹⁶⁾, respectively in compound [3].

While FT . IR – spectra of compound [4] is appear absorption band at (3510) cm⁻¹ due to hydroxyl⁽¹⁷⁾ group (- OH) of phenol in compound [4] , which also disappear and other bands are appear at (1710 , 1520) cm⁻¹ due to (O-C=O)⁽³⁾, carbonyl of ester , CH₂ -Se) respectively in compound [5] , at (1235 , 1682 , 670) cm⁻¹ due to (C–O–C) of ether , (Se–C=O) carbonyl of selenide , (C–S)^(18,19) endo cyclic) respectively in compound [6] , and at (1240 , 1680 , 640) cm⁻¹ due to (C–O–C) of ether ,(Se – C=O)^(1,2) carbonyl of selenide, (C – S)⁽¹⁹⁾ endo cyclic) respectively in compound [7] .

And other data of functional groups⁽¹⁹⁻²¹⁾, shown in the following , table(1) and some figures (1-4).

5.2 H.NMR – Spectra :

H.NMR – spectrum of compounds [1-7] showed :Singlet signal at δ 6.62 for protons of amine group (-NH₂) in compound [1] , which disappear and other signals are appear : signals at δ (3.8 , 4.28) for protons of ($\begin{matrix} \text{NH} \\ | \\ \text{NH} \end{matrix}$)⁽³⁾, endo cycle is compound [2] & at δ (3.9 ,4.4) for protons of ($\begin{matrix} \text{NH} \\ \diagdown \\ \text{NH} \end{matrix}$) endo cycle in compounds [3].

While the spectrum of compound [4] showed :Singlet signal at δ 10.43 for protons of hydroxyl group (-OH) in compound [4] , which also disappear & other signals are appear: signals at δ (3.6 , 3.9) for protons of (-CH₂CH₂-Se) in compound [5] , signals at δ (3.83 , 4.38 , 4.62) for

protons of { ($\begin{matrix} \text{Se} \\ | \\ \text{Se} \end{matrix}$) endo cycle , ($\begin{matrix} \text{S} \\ | \\ \text{S} \end{matrix}$) endo cycle⁽¹⁹⁾ } respectively in compound[6], and signals at

δ (4.10 , 4.40 , 4.70) for protons of{($\begin{matrix} \text{Se} \\ | \\ \text{Se} \end{matrix}$) endo cyclic , ($\begin{matrix} \text{S} \\ | \\ \text{S} \end{matrix}$) endo cyclic⁽¹⁹⁾ } respectively in compound[7] .

Other peaks⁽¹⁻³⁾, shown in the following , some figure (5-8) .

Table (2) :Melting points, M.F , & (C.H.N)- analysis of compounds [1-7]

Comp. No.	M.F	M.P C° (+2)	Calc./ Found C%	H %	N %
[1]	C ₁₃ H ₁₂ N ₄ O ₄	131	54.166 54.064	4.166 4.076	19.444 19.328
[2]	C ₁₅ H ₁₄ N ₄ O ₄	162	57.324 57.207	4.458 4.319	17.834 17.681
[3]	C ₁₄ H ₁₂ N ₄ O ₄	169	56.000 55.891	4.00 3.864	18.666 18.417
[4]	C ₁₃ H ₁₀ N ₂ O ₆	139	53.793 53.581	3.448 3.237	9.655 9.518
[5]	C ₁₉ H ₁₆ N ₂ O ₈ Se ₂ Na ₂	167	37.755 37.678	2.649 2.574	4.636 4.484
[6]	C ₂₇ H ₂₆ N ₂ O ₈ S ₂ Se ₂	192	44.510 44.387	3.571 3.409	3.846 3.702
[7]	C ₂₅ H ₂₂ N ₂ O ₈ S ₂ Se ₂	205	42.862 42.729	3.143 3.038	4.000 3.967

5.3 (C.H.N) – Analysis : It was found from compared the calculated data with experimentally data of these compounds , the results were compactable , the data of analysis , M.F , and melting points are listed in table (2) .

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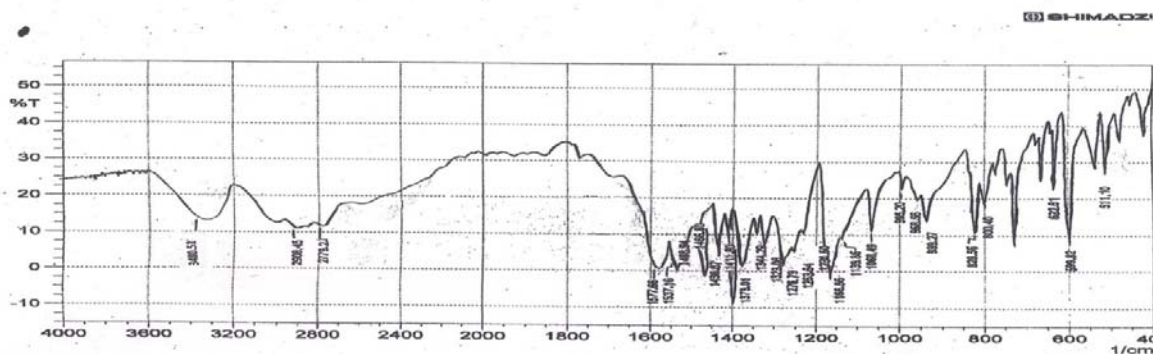


Fig (1) FT-IR Spectrum of compound [1]

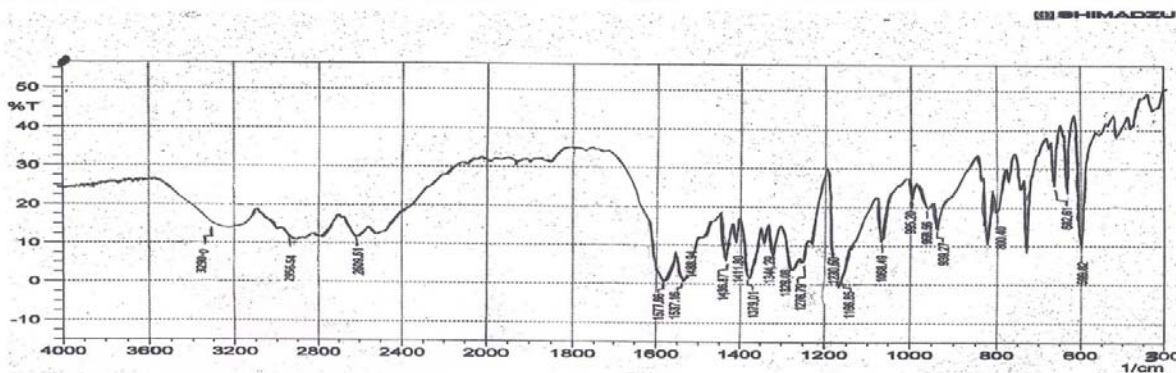


Fig (2) FT-IR Spectrum of compound [4]

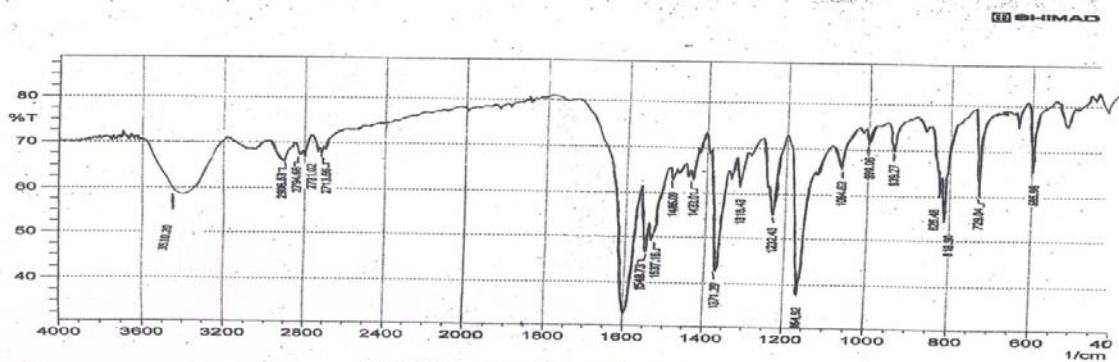


Fig (3) FT-IR Spectrum of compound [3]

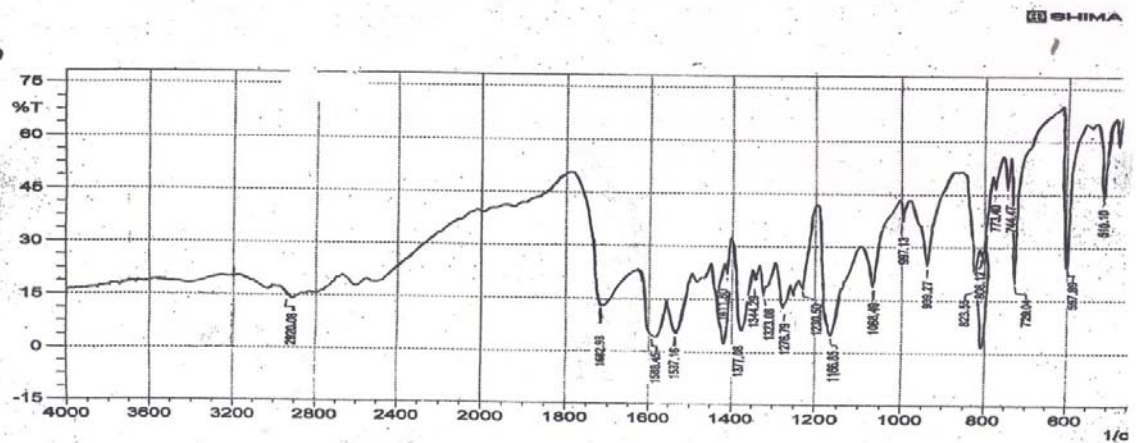


Fig (4) FT-IR Spectrum of compound (4)

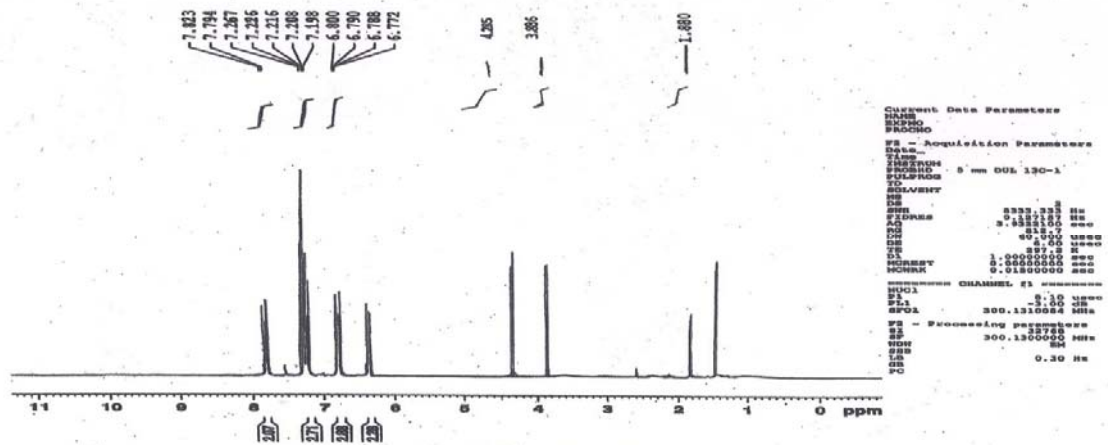


Fig (5) 1H-NMR -Spectrum of compound (2)

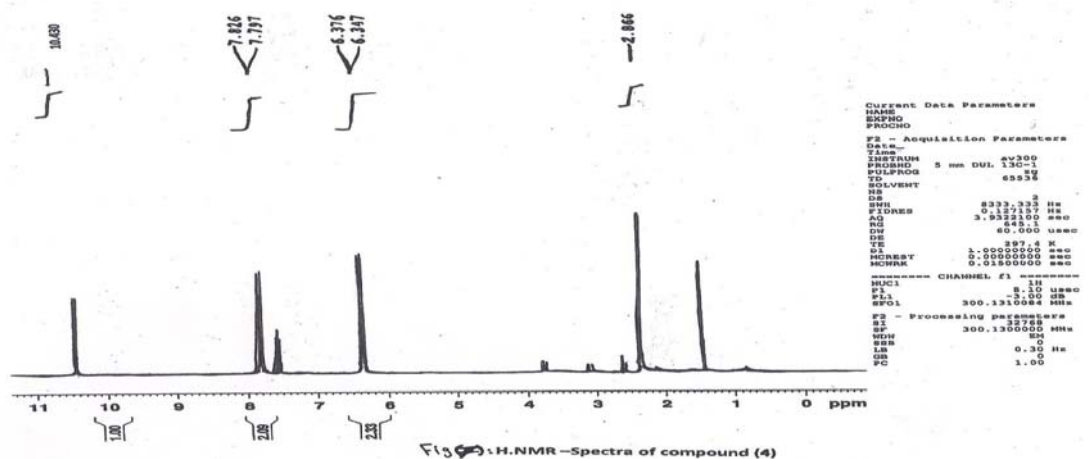


Fig (6) 1H-NMR -Spectra of compound (4)

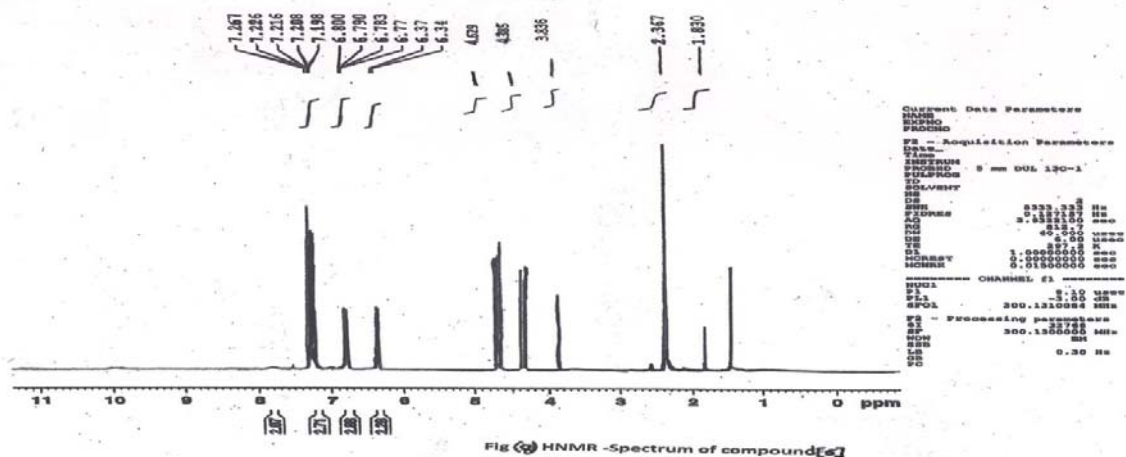


Fig 6c) ¹H NMR - Spectrum of compound 6c

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