e - ISSN - 2348 - 2184
Print ISSN - 2348 - 2176

AMERICAN JOURNAL OF BIOLOGICAL AND PHARMACEUTICAL RESEARCH

Journal homepage: www.mcmed.us/journal/ajbpr

SYNTHESIS OF HETEROATOMES CYCLES THROUGH CYCLIZATION REACTIONS

***Nagham and Mahmood Al –Jamali**

Assistant Professor, Department Chemistry, College of Education for Women, Kufa University, Iraq.

Article Info

Received 20/10/2013
Revised 10/11/2013
Accepted 12/11/2013

Key words:
Heteroatome Cycles, Intramolecular, Ncycle.

ABSTRACT

In the present work , ketones compounds have played an important role in synthesis of compounds 1-13 , a series of compounds(sulphur cycles, nitrogen cycle) prepared via cyclo addition reaction & converted to cyclic compounds which contain di heteroatoms like (S,N) in same cycle(seven memberrd ring ,.six memberd ring ,five memberd ring).The foramted compounds 1-13 have been investigated using several chemical techniques (^{1}H.NMR-Spectra ,FT.IR- Spectra ,(C.H.N) –analysis & melting points).

INTRODUCTION

In continuation of our previous work on the synthesis of hetero atoms cycles to obtain new uni & bicyclic compounds which have chemical & biological activities [1-5], sulphur, nitrogen, & oxygen containing heterocyclic compounds 1-3 have been used as ascaffoled to synthesize of pharmaceutical drugs & industrial applications In this paper, the compounds generally consist of 5, 6 & 7-membered saturated & unsaturated cycles & more than one hetero atom which may be similar or dissimilar [6-8]. A large number of heterocyclic compounds are essential to life such as alkaloids, antibiotics, essential amino acids, the vitamins haemoglobin the hormones 8-12. The mechanism of reactions involved, interaction of acetophenon or acetone with Bromine to produce Aryl halide or Alkyl halide, [8-12]. Which react with (sulphur- compounds, amine-compounds, carboxyl-compounds) to produce uni & bihetero cycles from hetero atoms [12-14].

MATERIALS AND METHODS

All chemicals used were supplied from Fluka& BDH - company, purity 99.5 %. All measurements were carried out 1 – Melting points: electro thermal 9300, melting point engineering LTD, U.K2 – FT. IR spectra: fourrier transform infrared shimadzu 8300 – (FT .IR), KBrdisc was performed by CO.S.Q.Iraq. 3 – H.NMR-spectra and (C.H.N) – analysis: in center lab – institute of earth and environmental science, al –byat university, Jordan.

Synthesis of compounds -1

The reaction of acetophenone (0.1 mole, 12g) with two molar equivalence of bromine (0.2 mole, 15.9 g) in acetone acid (90-100) C°, resulted in the formation 86% of compound 1.

Synthesis of compounds - 2-8

A mixture of compound 1 (o.1 mole , 27.7 gm) treated with equal molar quantity of one of {(0.1mole , 7.5 gm of thio urea),(0.1 mole , 4.60 gm of methylene diamine),(0.1 mole , 12.5 gm of O-mercapto aniline),(0.1 mole , 13.8 gm of Salicylic acid),(0.1 mole , 11 gm of benzene thiol)}, respectively ,under reflux for (3hrs) in presence of absolute ethanol , the precipitate was filtered , dried, & crystallized from absolute ethanol to produce (84,86,84, 87,85)% respectively from compounds 2,3,4,5,6. Treatment of compound 5 (0.1 mole 33.4gm) with ammonium thiocyanate (0.1 mole, 7.6 gm) in presence of anhydrous acetic acid & drops of pyridine to produce 85%

Corresponding Author
Dr. Nagham
Email:- dr.nagham_mj@yahoo.com

of compound 8. Treatment of compound 6 (0.1 mole, 30.6 gm) with (0.1 mole, 12.5 gm) of O-mercapto aniline in presence of ethanol to produce 87% of compound 7 [15, 16].

Synthesis of compounds - 9-11

The reaction of (0.1 mole, 5.8 gm) of acetone with (0.1 mole, 11gm) of benzene thiol in boiling ACOH/H2SO4 to produce 85% of compound 9, which reacts (0.1 mole, 16.6 gm) with bromine (0.1 mole, 15.9 gm) in presence of acetic acid to produce 87% of compound 10, which reacts (0.1 mole, 32.3 gm) with (0.1 mole, 8.3 gm) of 2-amino imidazole to yield 85% of compound 11 [17].

Synthesis of compounds - 12,13

The reaction of (0.1 mole , 12.5 gm) of O-mercapto aniline with two molar equivalence from one of {(0.2 mole , 11.6 gm of acetone),(0.2 mole , 24 gm of acetophenone)} in presence of iodine wth methyl cyanide at (25 C°) for (15 min) to produce (88,86)% respectively from compound 12,13 [18].

Table 1. (FT.IR)-data (cm^{-1}) of compounds -1-13

Comp. no.	$I.R_{(KBR)}$ (Important group)
1	(C-Br) :870
2	(C-N) endo cycle : 1436 ,(CH-S) :1417 , (C-S) endo cycle :663 ,(CH=C): 3070 ,(CH) , aliphatic :2920 .
3	(C-N) endocycle :1540 , (CH) aliphatic :2955 , (NH): 3320 , (C=N) imine group : 1620 .
4	(C-N) endo cycle :1548 ,(C=N) imine group :1645 ,(CH_2-S) :1433 , (C-S):682
5	(C-O-C): 1330 ,(-C=O) carbonyl of ketone :1720 ,(-C=O)carbonyl of carboxyl group :(1770) .
6	(CH_2-S) :1430 ,(-C=O) carbonyl of ketone :1725 .
7	(C=N) imine :1610 ,(CH_2-S):1420 , (-SH):2520 .
8	(NH-C=O)carbonyl of amide :1690 , (-C=O) carbonyl of ketone :1720 .
9	(CH_2-S):1415 , (-C=O) carbonyl of ketone :1725 , (CH) aliphatic :2970 .
10	(CH_2-S): 1420 ,(C-Br):860 ,(-C=O) carbonyl of ketone : 1720 .
11	(C=N) imine :1639 ,(C-N) endo cycle :1498 ,(CH=CH):3058 ,(CH_2-S) :1434, (C-S):634 .
12	(C=N) imine :1655 ,(C-S): 632 , (CH) aliphatic :2908 .
13	(C=N) imine : 1620 , (C-S):670 ,(CH) aliphatic :2960 .

Table 2. H.NMR-data (ʃ ppm) of compounds - 1-13

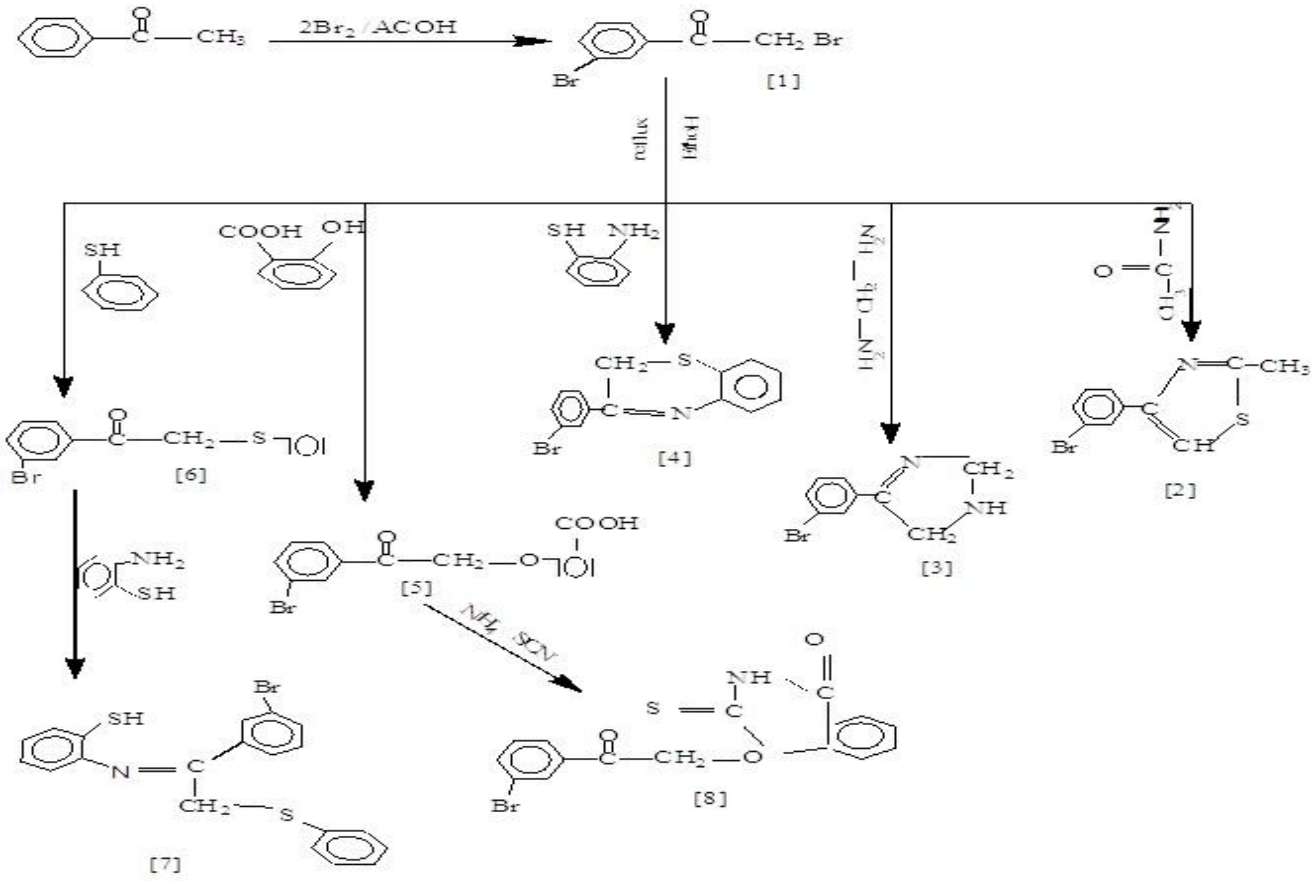
Comp. No.	$H.NMR_{(DMSO)}$ (Important peaks)
1	12.3 (2H, CH_2-C=O) protons of ketone .
2	5.43 (1H ,CH-S) proton of (CH) in cycle , 1.05 (3H , -CH_3) protons of methyl group.
3	3.2 (CH_2-NH) , 3.6 (N-CH_2)
4	5.14 (2H ,CH_2-S) .
5	12.3 (2H , CH_2-C=O) protons of ketone , 14.2 (H ,COOH) proton of carboxylic group .
6	12.7 (2H, CH_2-C=O) protons of ketone .
7	5.04 (2H, CH_2-S), 5.41 (1H , SH) .
8	10.2 (1H , -NH-C=O) proton of amide , 12.4 (2H,CH_2-C=O) proton of ketone .
9	12.2 (2H,CH_2-C=O) proton of ketone , 12-75 (3H, CH_3-C=O) ketone .
10	12.3 (2H, CH_2-C=O) proton of ketone , 12.90 (2H , CH_2-C=O) proton of ketone .
11	3.64 (2H, CH_2 –N) endocycle , 2.3 (CH=CH) endo cycle , 5.14 (2H , S-CH_2) .
12	1.21 (6H , $C(CH_3)_2$) , 1.02 (2H , CH_2), 1.05 (3H , CH_3) .
13	1.1 (CH_2) , 1.3 (C-CH_3)

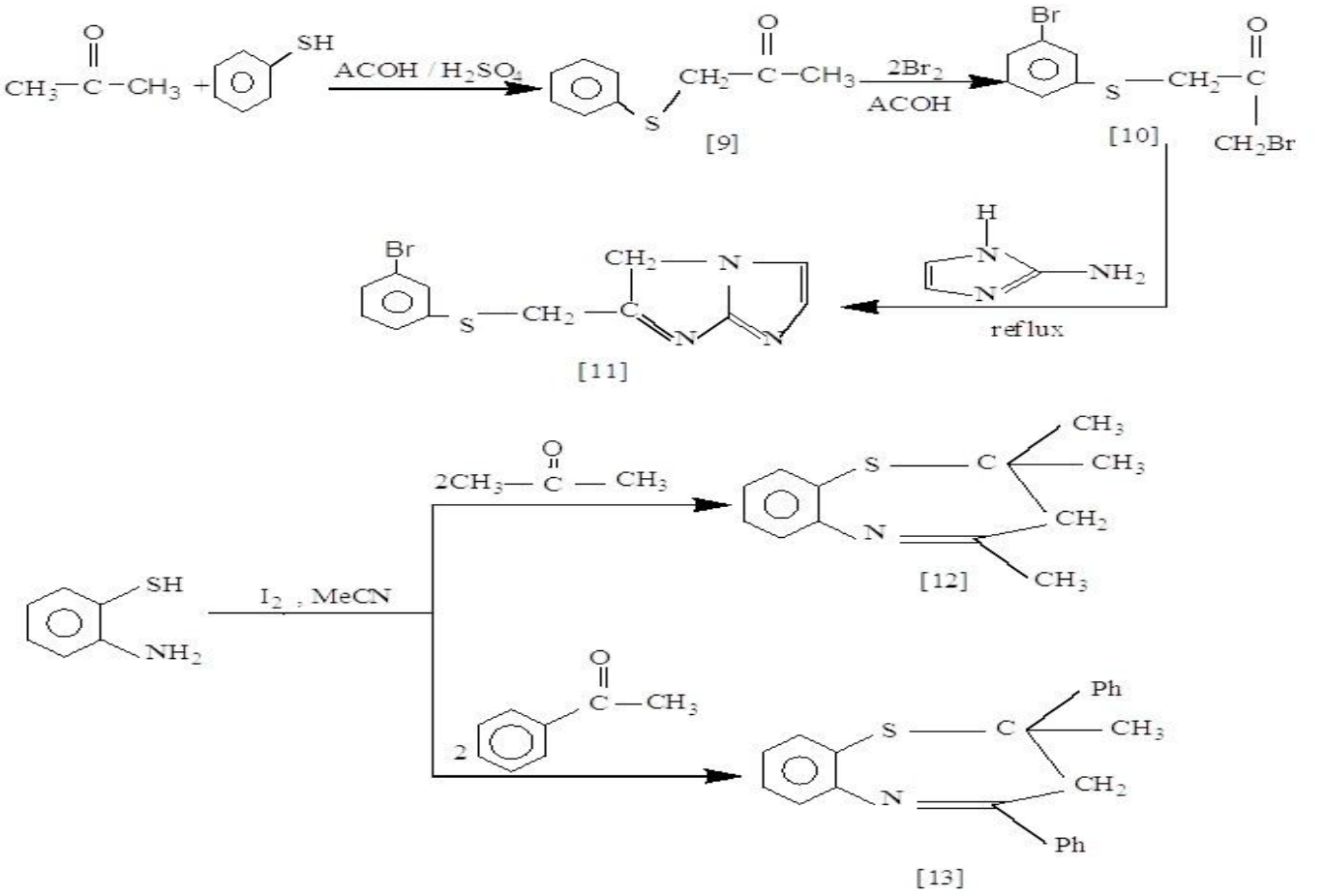
Table 3. physical properties & (C.H.N)- analysis of compounds -1-13

Comp.no.	M.F	M.P C°	Name of compounds	Calc. / found.		
				C%	H%	N%
1	$C_8H_6OBr_2$	170	1-(3- -bromophenyl)- 2- bromoethanone .	34.557 34.312	2.159 2.017	__ __
2	$C_{10}H_8NSBr$	190	2-methyl -4- (3- -bromo phenyl)-thiazole .	47.262 47.183	3.158 3.092	5.513 5.334
3	$C_9H_9N_2Br$	182	2-(3- -bromo phenyl)- imidazole .	48.452 48.268	3.140 3.201	12.56 12.43

4	$C_{14}H_{10}NSBr$	220	3-(3^{-} -bromo phenyl)-5,6-benzo -1,4- thiaine .	55.281 55.201	3.290 3.172	4.606 4.561
5	$C_{15}H_{11}O_4Br$	205	1-(2^{-} -benzoic)-2-(3^{-} -bromo phenyl) ethanone ether- .	53.747 53.692	3.284 3.192	__ __
6	$C_{14}H_{11}OSBr$	188	2-(3^{-} -bromo phenyl)-1-benzene sulphide – ethanone .	54.740 54.631	3.584 3.621	__ __
7	$C_{20}H_{16}NS_2Br$	198	1-(2^{-} -Mercaptobenzene)-2- (3^{-} -bromo phenyl)-2-(methyl phenyl sulphide)- imine .	57.985 57.814	3.874 3.745	3.382 3.401
8	$C_{16}H_{11}NO_3SBr$	250	1-(2^{-}-{3$^{=}$ -(bromo phenyl)-ethanone} -5,6-benzo-4-one-2- thione –oxazae .	50.941 50.873	2.918 2.841	3.714 3.662
9	$C_9H_{10}OS$	180	3-(phenyl sulphide) acetone .	65.060 65.01	6.024 6.110	__ __
10	$C_9H_8OSBr_2$	194	3-(3^{-} -bromophenylsulphide)-1- bromo acetone .	33.353 33.281	2.470 2.421	__ __
11	$C_{12}H_{10}N_3SBr$	240	5-(3^{-} -bromophenyl)- methyl sulphide -2,3-bi imidazole.	46.768 46.631	3.247 3.192	13.640 13.571
12	$C_{12}H_{15}NS$	225	2,3-benzo -7di methyl -5-methyl – 1,4-thiazepine .	70.243 70.152	7.317 7.242	6.829 6.761
13	$C_{22}H_{19}NS$	235	2,3-benzo-5,7-diphenyl -7-methyl -1,4-thiazepine .	80.243 80.142	5.775 5.623	4.255 4.162

SCHEME REACTION





RESULTS

All the synthesized compounds 1-13 have been characterized by their melting points and spectroscopic methods (FT.IR ,H.NMR spectrum, (C.H.N)-analysis) & melting points:Their FT.IR-Spectrum showed an absorption band at (870) cm^{-1} in compound 1 due to the (C-Br), which disappear & other bands are appear at (1436-1548) cm^{-1} for (C-N) endo cycle in compounds 2-4 & bands due to (C-S , C-NH , C-O , CH-NH , C=N imine group) in compounds 2-8, while the band of (-C=O) carbonyl of ketone in compounds 1,6,10 disappear & other bands[13-15] are appear at (1620-1655) cm^{-1} due to imine group (CH=N) , bands due to {(C-N) endo cycle ,(C-S)[16]endo cycle } in compounds 2-4 ,10-13 , new band (-N-C=O) amide group in cycle of compound 8 appeared , band due to (CH_2–S) appeared in compounds 6, 7, 9, & others bands are summarized in (Table 1).

DISCUSSION

Their H.NMR-Spectra showed signal at ∫ 12.3 due to proton of ketone in compound 1, which disappear & new signals appear at ∫(5.04-5.43) due to protons of (CH-S)[16] in compounds 2,4,7, 11, signals at ∫ (3.2–3.64) due to(CH_2–NH,CH_2–N) in compounds 3,11, signal at ∫ 10.2 due to amide group (-N-C=O) in compound 8, & other data of functional groups[16-18] show in the following , (Table 2).

Their (C.H.N)- analysis & melting points , it was found from compared the calculated data with experimentally data of these compounds ,the results were compactable , the data of analysis , M.F & melting points are listed in table 3.

CONCLUSION

Synthesis of cyclic compounds from thiacompounds, nitrogen compounds by using intra molecular reaction of these compounds in convertion these compounds to cyclic compounds.

ACKNOWLEDGMENT

I would like to express my thanks to Mr.Uodai.A. in Jordan for providing (C.H.N) element analytical , and H.NMR –spectra & melting points And express my thanks to(United Arabic Company) & (Zaidan Company of Chemical) for supplied some materials.

REFERENCES

1. Shridhar A, Keshavayya J, Joy H & Shoukat R. (2011). *International .Res.J of pure &Appl.Chem*, 1, 3, 119-129.
2. Parikh P, Hiren M & Dhrubo J. (2011). *International. J .Drug Develop& Res*, 3,248-255.
3. Nusrat B & Rabiul M. (2007). *Bang .J. pharm*, 2, 2, 81-87.
4. Parameswaran M, Thengungal K and Gopalakrish S. (2009). *Acta . Pharm*, 59, 159-170.
5. Khalid A & Hatem A. (2010). *Molecule*, 15, 3775-3815.
6. Baueyjee A, Vera W, Mora H, Laya M, Liadis B & Cabrera E. (2006). *J .Sci , Indust. Res*, 65, 299-308.
7. Gaber H & Bagley M. (2011). *European. J. Chem*, 2, 2, 214-222.
8. Hamada N & Essam M. (2011). *Molecule*, 16, 2304-2312.
9. Vinay V & Lakshika K. (2011). *I .J.Rps*, 1, 1, 17-27.
10. Elif K &Yildirim. (2010). *Turk .J. Chem*, 34, 859-867.
11. Nagaraj A & Sanjeeva C. (2008). *J.Iran .Chem .Soc* 5, 2, 262-267.
12. Serdar M, Nurhan G, Sengul A & Neslihan D. (2007). *Turk .J .Chem*, 31, 315-326.
13. Sachin L, Chetan M, Sauganna B & Sandip K. (2010). *Int. J. ChemSci & Appl*, 1, 1, 42-49.
14. Hassan M, Sherif A & Mohammed S. (2010). *J.K.A.U*, 22, 1, 177-191.
15. Suheel K, Kovvuri T, Appikonda V, Gudaparthi O & Dubey P. (2011). *Der. Pharm .Chem*, 3, 5, 113-122.
16. Nagham M Aljamali. (2012). *Asian.J.Exp.Chem*, 7, 1, 52-56.
17. Gholamhossein G, Aliakbar D, Vida T, Kazuma G and Hiroyki I. (2012). *Polyhedrone*, 31, 265-271.
18. Xueguang R, Lingyun W, Derong C, Yingcai L and Jie H. (2010). *Appl.Orgmet.Chem*, 25, 9-15.