Synthesis of new 9H-Carbazole derivatives

Suad M. Alaraji*, Ahmed W. Naser., Nahed M.Alsoultany
Department of Chemistry, College of Science, University of Baghdad, Baghdad, Iraq.

Abstract:
The aim of the present work is to synthesis of new 9-ethyl carbazole derivatives .The 3-acetyl-9-ethyl carbazole was achieved by the reaction of compound (1) with acetyl chloride in the presence of aluminum chloride to give compound (2). Reaction of compound (2) with a ppropriate aromatic aldehyde yielded 3-(3-Phenyl -1-Oxy propen-1-yl)9-Ethyl carbazole(3a-3h).The reaction of (3) with hydrazine hydrate gave 3-(5-aryl-4, 5-Dihydro-3-pyrozolyl)9-Ethyl carbazole(4a-4h). Also compound (3) reacted with phenyl hydrazine gave 3-(1-phenyl-5-aryl-4-pyrozoline-3-yl)9-Ethyl carbazole (5a-5h). The reaction of compound (3) with guanidine carbonate in presence of NaOH (40%) gave the 3-(2-amino-6-aryl-4-pyrimidinyl)9-Ethyl carbazole (6a-6h). The prepared compounds were conformed by TLC, FT-IR and some of them ^{1}H-NMR.
Keywords: Carbazole, guanidine, pyrozoline derivatives, pyrimidinyl derivatives .

تحضير مشتقات جديدة ل 9H -كاربازول

سعاد مصطفى الاعرجي، أحمد وحيد ناصر، ناهد محمود السلطاني
قسم الكيمياء، كلية العلوم، جامعة بغداد، بغداد، العراق

الخلاصة:
يتضمن البحث تحضير مشتقات جديدة من 9-أثيل كاربيزول ومن ثم تحضير 3-استيل -9-أثيل كاربيزول(2) عند تفاعل المركب (1) مع كلوريد الاستيل بوجود كلوريد الالمنيوم ليعطي مركب(2)وعند معاملة المركب (2)مع الديهايدات اروماتية مختلفة أعطى 3-(3-فنيل-1-اوكسي بروبين-1-يل)9-أثيل كاربيزول(3أ-3د) و يتفاعل المركب (3) مع هيدريت الهيدرازين أعطى مركب 3(5-اريل-4، 5-ثنائي-3-بايروزولين)9-أثيل كاربيزول(4أ-4د) وعند مفاعلة المركب (3) مع فنيل هيدرازين تعطي مشتق 3-(1-فنيل-5-أريل-4-بايروزولين-3-يل)9-أثيل كاربيزول (5أ-5د).وعند مفاعلة المركب (3)مع كاربونات كواندين بوجود 40% هيدروكسيد الصوديوم أعطى مشتق 3-(2-أمينو-6-أريل-4-بيرميدينيل)9-أثيل كاربيزول (6أ-6د).وتم استخدام تقنية طيف الاشعة تحت الحمراء وطيف الرنين النووي المغناطيسي وتقنية كروماتوغرافيا الطبقة الرقيقة في تشخيص المركبات المحضرة .

Introduction

Carbazoles and especially hetrocyclic compounds containing carbazole derivitives, are embodied in many neuturally occurring products [1–3] which displayed a broad spectrum of useful biological activities such as antitumor, antimitotic and antioxidance [4–6]. They are also widely used as building blocks for new organic materials [7–10] and play a very important role in electroactive and photoactive devices [11–14] .Therefore, a number of methodologies for the constraction of hetrocyclic containing carbazoles have been reported in recent years[15-19]. Most heterocycle containing carbazole reported in the literature comprise a common heterocyclic ring moiety fused with a carbazole ring such as pyrido carbazoles, pyrrolo carbazoles [20, 21], indolo carbazoles [22, 23], and synthetic analogues. However, there are very few reports

*Email:Kamoraahm@yahoo.com

in which the heterocyclic moiety is substituted with a carbazole unit. Hence the synthesis of such compounds is desirable [24, 25].On the other hand, the benzofuran derivatives are an important class of heterocyclic compounds that are known to posess important biological properties as antimicrobial

convulsant, anti- inflammatory, anti-tumor and anti fungal activities[26-28] .The aim of the present work is synthesis of new 9-ethyl carbazole derivatives at position 3.

Experimental:Material and Instrument

FT-IR spectra were recorded on [SHIMADZU] FT-IR 8400s Spectrophotometer; Solid samples were run in KBr disk, Liquid were run as smears. ^{1}H-NMR spectra were recorded on ultra shield 300 MHz with tetramethyl silane as internal Standard and DMSO as solvent melting points were determined in a [Gallen Kamp], melting point apparatus with Sample contained in open capillary glass tube in an electrically heated metal block apparatus. Thin Layer Chromatography [TLC] were performed on pre-coated plastic sheet with 0.25 mm layer of silica-gel F254. Spots were detected with iodine vapour.

General procedure for synthesis of 9-ethyl carbazole(1)[29]

Carbazole (20 g, 119.6 mmol), potassium hydroxide (20.13 g, 358.8 mmol) and bromoethane (39.1 g, 358.8 mmol) were dissolved in DMF (200 ml). The mixture was stirred during overnight at 60 ^{0}C.After pouring into brine, and washing, the mixture was extracted by methylene chloride. The organic extracts was dried with $MgSO_4$ and concentrated by rotary evaporation. Purification of solid residue by recrystallization in ethanol gave a white solid (20 g, 102.4 mmol, 85.6%).The purity of product was checked by TLC with ethyl acetate as eluent . FT-IR spectrum of 9-ethyl carbazole showed strong band at 3051cm^{-1} aromatic (C-H)Str. 1600 and 1620 cm^{-1} assigned to the aromatic stretching system (C=C) str . ^{1}H-NMR (300 MHz, CDCl3, δ): 8.08 - 8.12 (d, J =7.7 Hz, 2H), 7.44 - 7.50 (t, J = 7.5 Hz, 2H), 7.39 - 7.42 (d, J = 8.1 Hz, 2H), 7.19 - 7.25 (t, J = 6.5 Hz, 2H), 4.34 - 4.42 (q, J = 7.2 Hz, 2H)(-CH_2), 1.40 - 1.47 (t, J = 7.2 Hz, 3H)(-CH_3).

3- acetyl 9- ethyl carbazole (2)[30]

A mixture of ethyl carbazole (2 gm, 0.01mol), dichloro ethane (7 ml), aluminium chloride (4.6gm, 0.035 mol) was strring in (0-5 ^{0}C) . The solution of acetyl chloride (6.5 ml, 0.05mol) in dichloroethane (6ml) was added a drop wise over 30 min.Upon completion of the addition, the mixture was kept at (0-5 ^{0}C) for an additional 30 min.Then, the ice water bath was removed and warmed slowly to room temperature for another 30 min. then the mixture was poured into water. After separation, the organic layer was successively washed with saturated sodium carbonate solution and water for neutralization and dried over Na_2SO_4. Then, the solvent was completely evaporated under reduced pressure the residue was extracted with acetone (3x20ml).The combined acetone solution was kept in the refrigerator to maintain a tempreture of 0 ^{0}C for 12 hr. and, thereupon, the product was crystallized as a white solid. The purity of product was checked by TLC with benzene as eluent. FT-IR spectrum showed clear str. band(C=O) of at 1662 cm^{-1}. while the ^{1}H-NMR spectrum, (t, 1.40-1.47, CH_3), (q, 4.34-4.2, CH_2), (m, 8.08-8.12, Ar-H) and (s, 2.0-2.5, CH_3),as shown in figure 1.

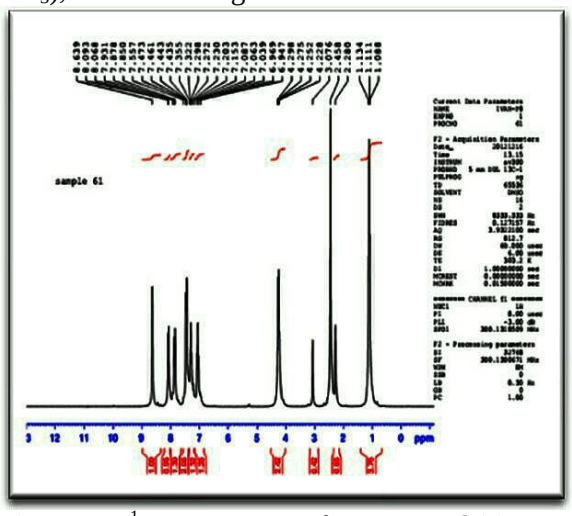


Figure 1- H^1-NMR spectrum for compound (2)

3-(3-phenyl-1-Oxy propen-1-yl)9-Ethyl carbazole(3a-3h):[31]

A mixture of (3gm, 0.013mol) 3-acetyl-9-ethyl carbazole and (1.56gm, 0.014mol) of appropriate aromatic aldehyde in (80 ml) of ethanol and (1.5 ml) of (1% NaOH) solution was refluxed for (5hr.). The reaction mixture was poured in cold water, the precipitate filtered off and recrystallized from Ethanol-Water (3:1) to give product 3a. The purity of product was checked by TLC with cyclohexane as eluent FT-IR spectra of these compounds showed (C=O) str. band at (1670-1685) cm^{-1} and (1608-1600) cm^{-1} aliphatic (C=C) str. Table 1- represents the physical data of prepared compounds (3a-3h). Characteristic bands of FT-IR spectra of compound (3a-3h) are listed in Table 2.

Table 1- Represent the physical data of compounds (3a-3h)

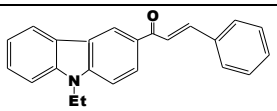
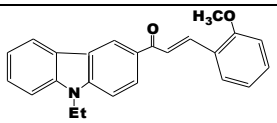
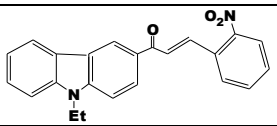
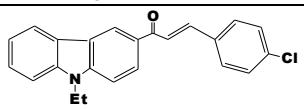
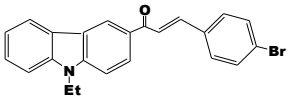
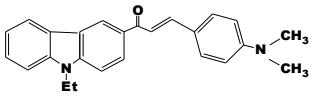
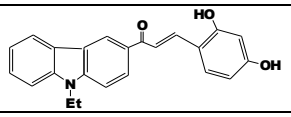
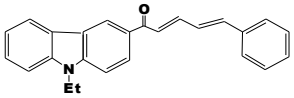
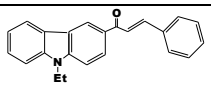
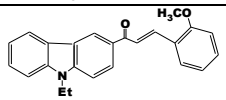
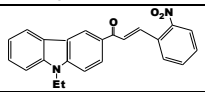
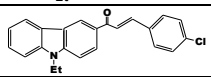
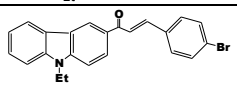
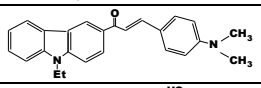
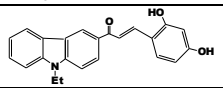
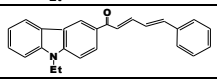
Comp. No.	Scientific name	M.P. ^{0}C	Yield %	Color of crystal	Chemistry structure
3a	3-(3-Phenyl-1-Oxy propen-1-yl)9-ethyl carbazole	110-112	43%	Yellow	
3b	3-(3-O-methoxy phenyl -1-oxy propen-1-yl)9-ethyl carbazole	97-99	51%	Yellow	
3c	3-(3-O-nitro phenyl -1-oxy propen-1-yl)9-ethyl carbazole	175-177	39%	Orange	
3d	3-(3-P-chloro phenyl -1-oxy propen-1-yl)9-ethyl carbazole	>240	37%	Yellowish -orange	
3e	3-(3-P-bromo phenyl -1-oxy propen -1-yl)9-ethyl carbazole	190-192	39%	Brown	
3f	3-(3-N, N-dimethyl amino phenyl-1-oxy propen -1-yl)9-ethyl carbazole	180-182	34%	Brown	
3g	3-(3-2, 4-dihydroxy phenyl -1-oxy propen -1-yl)9-ethyl carbazole	250-252	44%	Dark-brown	
3h	3-(5-phenyl-1-oxy pentadiene-1-yl)9-ethyl carbazole	250-252	50%	Dark-brown	

Table 2- Infrared absorption data for compound (3a-3h)

Comp. No.	Structure	FTIR spectral data Cm^{-1}				
		υ(C=O)	υ (C-H) aromatic	υ (C-H) olefinic	υ (C=C)	Other bands
3a		1675	3059	3028	1597	———
3b		1662	3059	3012	1589	-O-CH 2873
3c		1766	3047	2931	1477	(NO_2) 1334
3d		1651	3097	3051	1527	(C-Cl) 748
3e		1647	3051	2974	1539	(C-Br) 632
3f		1658	3051	2974	1597	(C-N) 1550
3g		1660	3126	2968	1573	(O-H) 3402
3h		1670	3051	2966	1593	———

3-(5-Aryl-4, 5-Dihydro-3-Pyrozolyl)9-Ethyl Carbazole(4a-4h)

To a solution of 3-(3-phenyl-1-Oxy propen-1-yl)9-ethyl carbazole (3a) (0.313gm, 0.001mol) in ethanol (20ml), hydrazine hydrate (50%)(0.4ml) was added the reaction mixture was refluxed for (5hr), after cooling the reaction mixture was acidified with glacial acetic acid . The formed precipitate was filtered and recrystallized from ethanol to give (4a-4h). The purity of product was checked by TLC with ethyl acetate as eluent .FT-IR of these compounds showed absorption at (1460-1585)cm^{-1} aromatic (C=C) str., (1597-1612)cm^{-1} (C=N) str. (1227-1258) cm^{-1} (C-N) str. Table(3) represent the physical data of compounds (4a-4h).Characteristic bands of FT-IR spectra of compounds (4a-4h) are listed in Table 4.

Table 3- Represent the physical data of compounds (4a-4h)

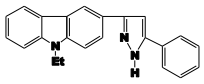
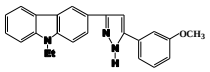
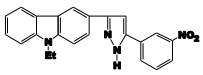
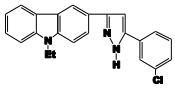
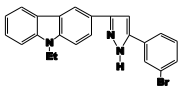
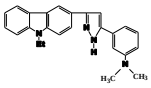
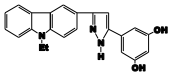
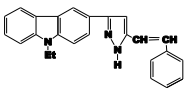
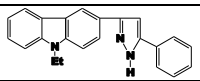
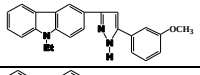
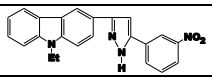
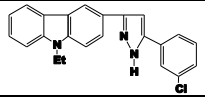
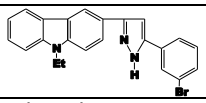
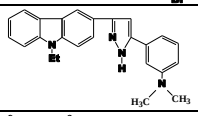
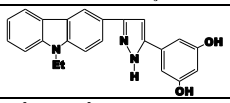
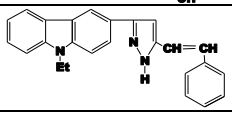
Comp No.	Scientific name	M.P. ^0C	Yield %	Color of crystal	Chemistry structure
4a	3-(-Aryl-4, 5-Dihydro-3-pyrozolyl)9-ethyl carbazole	190	60%	Brown	
4b	3-(5-O-methoxy phenyl-4, 5-Dihydro-3-pyrozolyl)9-ethyl carbazole	115	70%	Brown	
4c	3-(5-O-nitro phenyl-4, 5-Dihydro-3-pyrozolyl)9-ethyl carbazole	183	40%	Orange	
4d	3-(5-p-chloro phenyl-4, 5-Dihydro-3-pyrozolyl)9-ethyl carbazole	264	70%	Brown	
4e	3-(5-P-bromo phenyl-4, 5-Dihydro-3-pyrozolyl)9-ethyl carbazole	170	50%	Brown	
4f	3-(5-N, N-dimethyl phenyl-4, 5-Dihydro-3-pyrozolyl)9-ethyl carbazole	195-197	50%	Dark Brown	
4g	3-(5-2, 4-Dihydroxy phenyl-4, 5-dihydro-3-pyrozoly)9-ethyl carbazole	260	85%	Brown	
4h	3-(5-styren-4, 5-dihydro-3-pyrozolyl)9-ethyl carbazole	240	80%	Brown	

Table 4- Infrared absorption data for compound (4a-4h)

Comp. No.	Structure	FTIR spectral data Cm^{-1}					
		υ (C-H) aromatic	υ (C-H) aliphatic	υ (C=C)	υ (C=N)	υ (N-H)	Other bands
4a		3050	2950	1445	1570	3415	ــــ
4b		3060	2968	1432	1600	3400	C-O-C 1218
4c		3051	2879 2970	1432	1600	3409	(NO_2) 1336
4d		3010	2850 2924	1566	1616	3390	(C-Cl) 717

4e		**3043**	**2877**	**1516**	**1674**	**3452**	**(C-Br) 640**
4f		**3047**	**2928 2970**	**1485**	**1601**	**3417**	**(C-N) 1330**
4g		**3058**	**2873 2968**	**1483**	**1566**	**3413**	**(O-H) 3413**
4h		**3065**	**2930 2975**	**1483**	**1600**	**3395**	**——**

3-(1-Phenyl-5-Aryl-4-Pyrozoline-3-yl)9-Ethyl carbazole(5a-5h)

To a solution of 3-(3-phenyl-1-oxy propen-1-yl)9-ethyl carbazole (3a)(1.65gm, 0.005mol), phenyl hydrazine(0.83 gm, 0.007mol) in ethanol (80ml) and few drops of piperidine was added, then refluxed for (3hr.), after cooling the formed precipitate was filtered, dried and the purity of product was checked by TLC with chloroform as eluent, recrystallized from (ethanol-water) (3:1) to give (5a-5h), the following compounds showed absorption bands at (1460-1600) cm^{-1} aromatic (C=C) str. (1681-1682) cm^{-1} (C=N)str. and (1249-1355) cm^{-1} (C-N) str. Table (5) represent the physical data of compounds (5a-5h). Charecteristic bands of FT-IR spectra of compounds (5a-5h) are listed in Table 6.

Table 5- Represent the physical data of compounds (5a-5h)

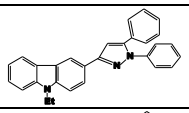
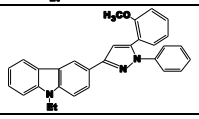
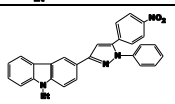
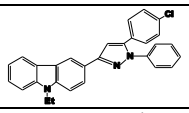
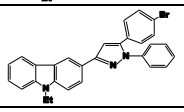
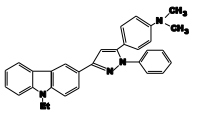
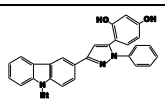
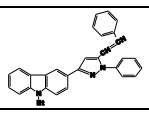
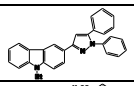
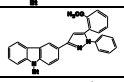
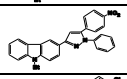
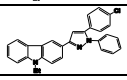
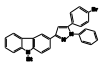
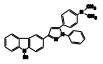
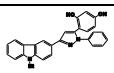
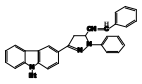
Comp No.	Scientific name	M.P. ^0C	Yield %	Color of crystal	Chemistry structure
5a	**3-(1-phenyl-5-aryl pyrozoline-3-yl)9-ethyl carbazole**	**160-162**	**28%**	**Brown**	
5b	**3-(1-phenyl-5-O-methoxy phenyl pyrozoline-3-yl)9-ethyl carbazole**	**130-132**	**42%**	**Brown**	
5c	**3-(1-phenyl-5-O-nitro phenyl pyrozolin-3-yl)9-ethyl carbazole**	**196-198**	**33%**	**Dark-brown**	
5d	**3-(1-phenyl-5-P-chloro phenyl pyrozoline-3-yl)9-ethyl carbazole**	**272**	**25%**	**Pale-brown**	
5e	**3-(1-phenyl-5-P-bromo phenyl pyrozolin-3-yl)9-ethyl carbazole**	**195**	**67%**	**Dark-brown**	
5f	**3-(1-phenyl-5-N, N-dimethyl amino phenyl pyrozolin-3-yl)9-ethyl carbazole**	**210-212**	**25%**	**Brown**	
5g	**3-(1-phenyl -5-2, 4-dihydroxy phenyl pyrozolin-3-yl)9-ethyl carbazole**	**150**	**58%**	**Dark-Brown**	
5h	**3-(1-phenyl-5-styrenyl pyrozolin-3-yl)9-ethyl carbazole**	**260**	**75%**	**Brown**	

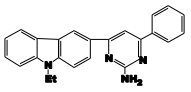
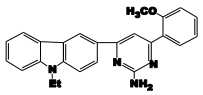
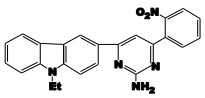
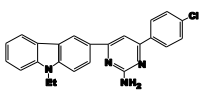
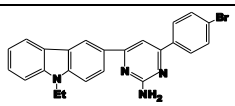
Table 6- Infrared absorption data for compound (5a-5h)

Comp. No.	Structure	FTIR spectral data Cm^{-1}				
		υ (C-H) aromatic	υ (C-H) aliphatic	υ (C=C)	υ (C=N)	Other bands
5a		3051	2947	1431	1550	———
5b		3020	2900	1400	1581	C-O-C 1245
5c		3030	2873 2974	1477	1612	(NO_2) 1338
5d		3029	2860	1477	1582	(C-Cl) 750
5e		3024	2819 2885	1485	1593	(C-Br) 640
5f		3047	2850 2974	1431	1581	(C-N) 1338
5g		3058	2840 2974	1479	1585	(O-H) 3419
5h		3056	2883	1479	1585	(C-H) Olifinic 2960

3-(2-Amino-6-Aryl-4-Pyrimidinyl)9-Ethyl carbazole (6a-6h)

To a refluxing mixture of (1.85gm, 0.005mol) of 3-(3-phenyl-1-Oxy propen-1-yl)9-ethyl carbazole and guanidine carbonate (0.54gm, 0.005mol) in ethanol (25ml), NaOH 40% (2.5ml) was added a portio wise through 3hr.Refluxing was continued for 6hr. The formed precipitate after colling was filtered, wash with cold ethanol, dried and the purity of product was checked by TLC with ethyl acetate as eluent. Recrystallized from DMF-water (3:1) to give (6a-6h), the following compounds showed absorption bands at (1458-1598) cm^{-1} aromatic (C=C) str. (1610) cm^{-1} (C=N) str. and (1234-1371) cm^{-1} (C-N) str. Table(7) represent the physical data of compounds (6a-6h). Characteristic bands of FTIR spectra of compounds (6a-6h) are listed in Table 8.

Table 7- Represent the physical data of compounds (6a-6h)

Comp. No.	Scientific name	M.P. ^0C	Yield %	Color of crystal	Chemistry structure
6a	3-(2-amino-6-phenyl-4-pyrimidinyl)9-ethyl carbazole	250-252	80%	Brown	
6b	3-(2-amino-6-O-methoxy phenyl-4-pyrimidinyl)9-ethyl carbazole	230	75%	Brown	
6c	3-(2-amino-6-O-nitro phenyl-4-pyrimidinyl)9-ethyl carbazole	234-236	50%	Orange	
6d	3-(2-amino-6-P-chloro phenyl-4-pyrimidinyl)9-ethyl carbazole	258-260	45%	Brown	
6e	3-(2-amino-6-P-bromo phenyl -4-pyrimidinyl)9-ethyl carbazole	220	60%	Dark-Brown	

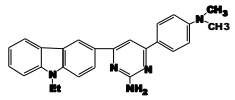
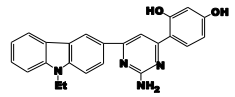
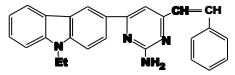
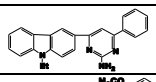
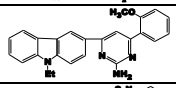
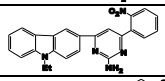
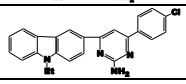
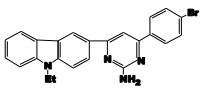
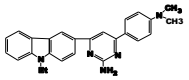
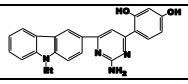
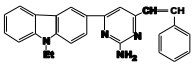
6f	**3-(2-amino-6-N, N-dimethyl amino phenyl-4-pyrimidinyl)9-ethyl carbazole**	**280**	**55%**	**Brown**	
6g	**3-(2-amino-6-2, 4-dihydroxy phenyl-4-pyrimidinyl)9-ethyl carbazole**	**266-268**	**40%**	**Pale-brown**	
6h	**3-(2-amino-6-styrenyl-4-pyrimidinyl)9-ethyl carbazole**	**275**	**50%**	**Orange**	

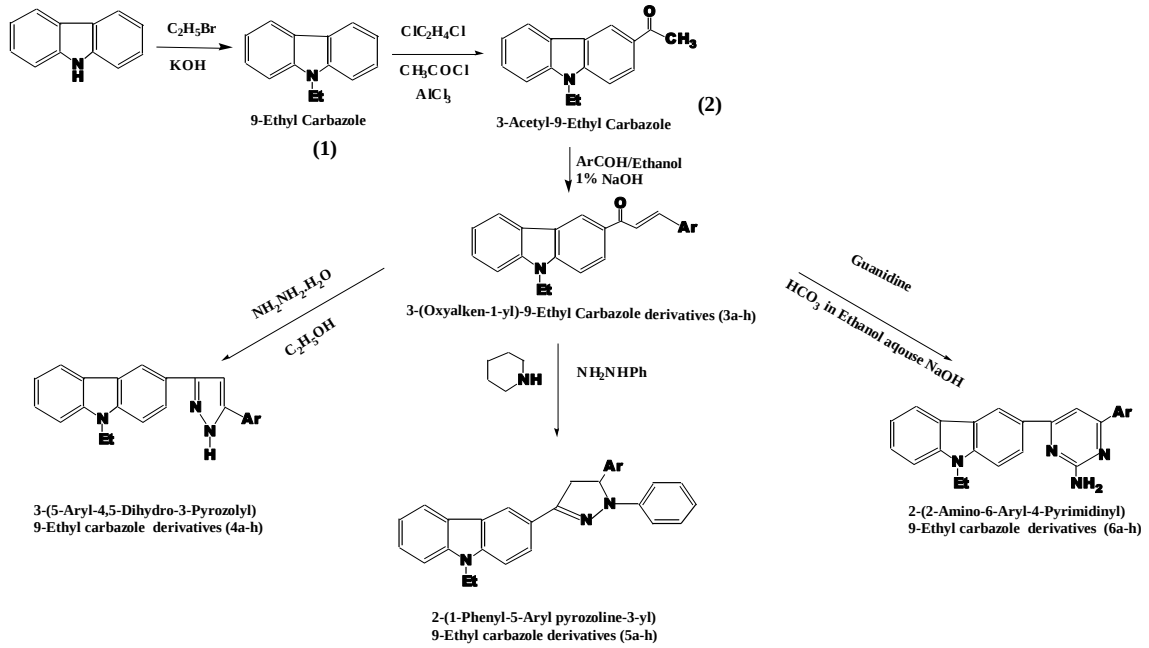
Table 8- Infrared absorption data for compound (6a-6h)

Comp. No.	**Structure**	**FTIR spectral data Cm^{-1}**				
		υ (C=C) aromatic	**υ (C=N)**	**υ (C-N)**	**υ (NH_2)**	**Other bands**
6a		**1485 1598**	**1610**	**1234 1371**	**3346 3375**	**———**
6b		**1454**	**1600**	**1396**	**3370**	**C-O-C 1230**
6c		**1479**	**1674**	**1375**	**3383**	**(NO_2) 1342**
6d		**1598**	**1620**	**1328**	**3411**	**(C-Cl) 750**
6e		**1473**	**1664**	**1348**	**3361**	**(C-Br) 690**
6f		**1598**	**1690**	**1336**	**3438**	**———**
6g		**1598**	**1625**	**1338**	**3415**	**(O-H) 3415**
6h		**1473**	**1664**	**1348**	**3423**	**(C-H) Olefinic 2960**

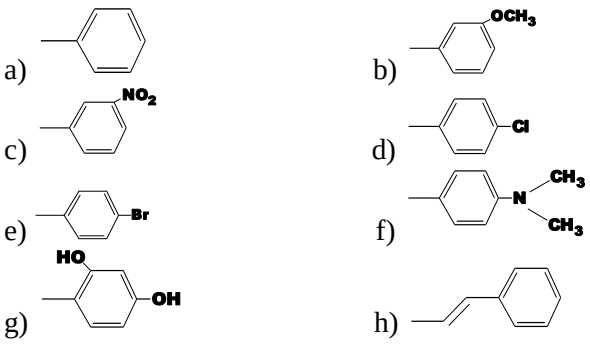
Result and Discussion

Carbazole was chosen as the starting material for the synthesis of all derivatives (1-6).9-ethyl carbazole (1) as shown in scheme (1) was prepared by the reaction of carbazole with alcoholic potassium hydroxide .the FT-IR spectrum of compound (1) showed the presence of (C-H aromatic) band at 3051cm^{-1} and 1620 cm^{-1} assigned to the aromatic stretching system (C=C) str., while the ^{1}H-NMR spectrum showed the following signals (t, 1.40-1.47, CH_3), (q, 4.34-4.2, CH_2) and (m, 8.08-8.12, Ar-H) . 3-Acetyl-9-ethyl carbazole(2) was obtained by reaction spectrum of compound(1) with acetyl chloride in presence of anhydrous aluminum chloride . The FT-IR spectrum of compound (2) showed weak bands at 3043 cm^{-1} aromatic (C-H) Str. 2873 cm^{-1}, 2931 cm^{-1} and 2970 cm^{-1} aliphatic (C-H) str. of (CH_3) acetyl group, the appearance of the characteristic absorption band at 1662 cm^{-1} which due to the carbonyl group, while the ^{1}H-NMR spectrum showed in figure 1, (t, 1.40-1.47, CH_3), (q, 4.34-4.2, CH_2), (m, 8.08-8.12, Ar-H) and (s, 2.0-2.5, CH_3).The condensation of compound (2) with a ppropriate aromatic aldehydes such as benzaldehyde, o-methoxy benzaldehyde, p-nitrobenzaldehyde, p-chloro benzaldehyde, p-bromo benzaldehyde, p-dimethyl amino benzaldehyde, 2, 4-dihydroxy benzaldehyde and cinnamyl aldehyde in presence of 1% NaOH afforded the corresponding oxypropene carbazole derivatives (3a-3h).The FT-IR spectrum, figure 2- shows the presence of C=O band at (1700-1660)cm^{-1} and C=C band at 1600 cm^{-1}, while the ^{1}H-NMR spectrum shown in figure 3, (t, 1.40-1.47, CH_3),

(q, 4.34-4.2, CH_2), (m, 8.08-8.12, Ar-H) and (s, 1.7-2.3, -CH=CH-). Table 1- represent the physical data of prepared compounds (3a-3h). Characteristic bands of FT-IR spectra of compound (3a-3h) are listed in Table 2. The cyclization of (3a-3h) with hydrazine hydrate, phenyl hydrazine and guanidine carbonate gave the corresponding pyrozolyl (4a-4h), pyrozoline (5a-5h) and pyrimidine (6a-6h) derivitavies respectively. The appearance of N-H streaching band and disappearance absorption band of a carbonyl group (figure 4, 5) was attributed to the formation of these derivatives .Interaction of (3a-3h) with hydrazine under suitable conditions give a variety of pyrazolines (4a-4h). The FT-IR spectra showed absorption bands for (C=N) at (1570-1647) cm^{-1} Table 3 represent the physical data of compounds (4a-4h). Characteristic bands of FT-IR spectra of compounds (4a-4h) are listed in Table 4. Phenyl hydrazine hydrate reacted with (3a-3h) in ethanol in the presence of piperidine giving N-phenyl pyrazoline (5a-5h). The FT-IR spectra showed absorption bands at (1550-1612) cm^{-1} (C=N). Table 5- represent the physical data of compounds (5a-5h).charecteristic bands of FT-IR spectra of compounds (5a-5h) are listed in Table 6. Reaction of (3a-h) with quinidine hydro carbonate in the presence of aqoues NaOH to give 2-amino pyrimidinyl (6a-6h). Table 7- represent the physical data of compounds (6a-6h). Characteristic bands of FTIR spectra of compounds (6a-6h) are listed in (Table 8):



Where (Ar) is:



Scheme (1)

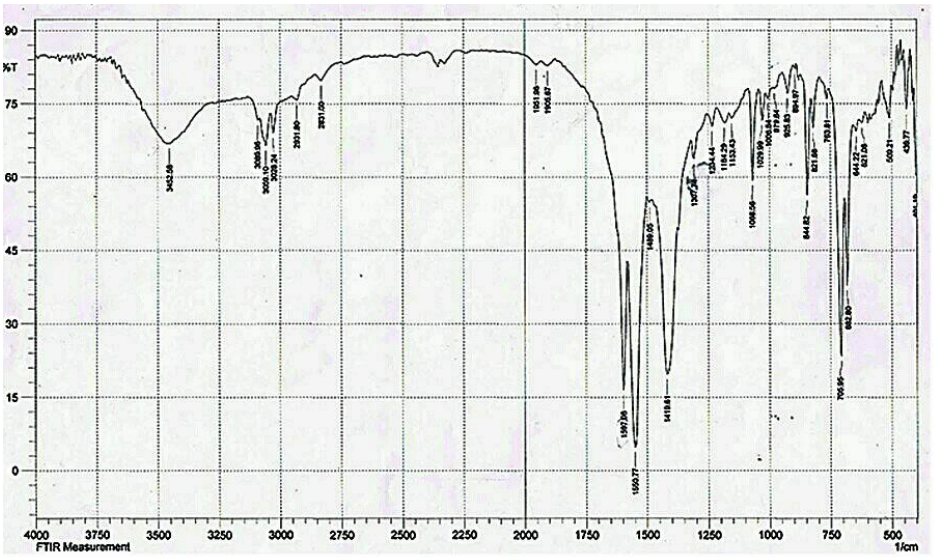


Figure 2- FT-IR spectrum for compound (3a)

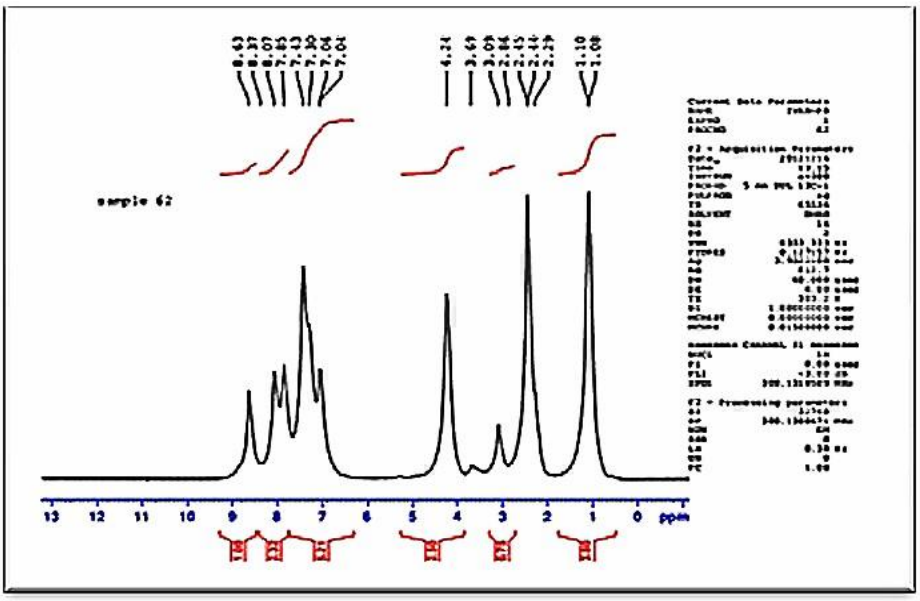


Figure 3- H^1-NMR spectrum for compound (3b)

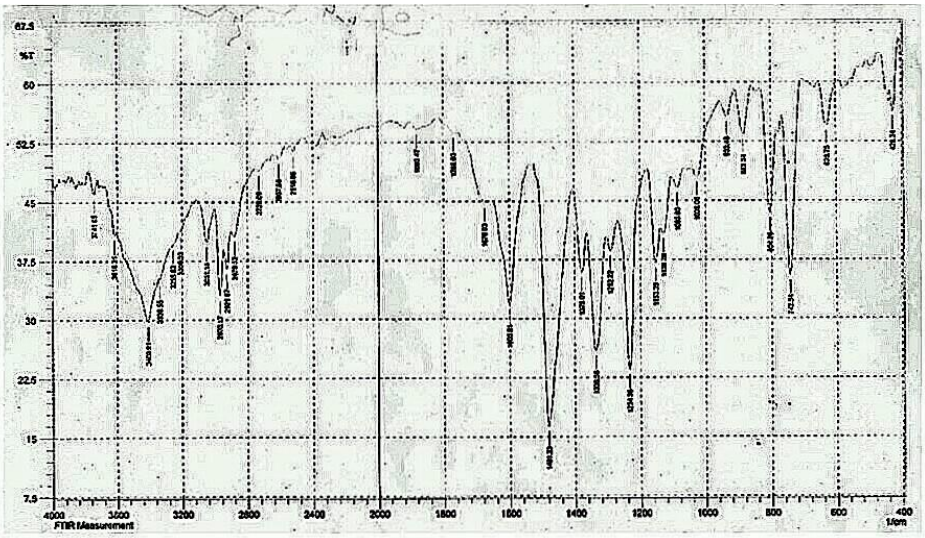


Figure 4- FT-IR spectrum for compound (4c)

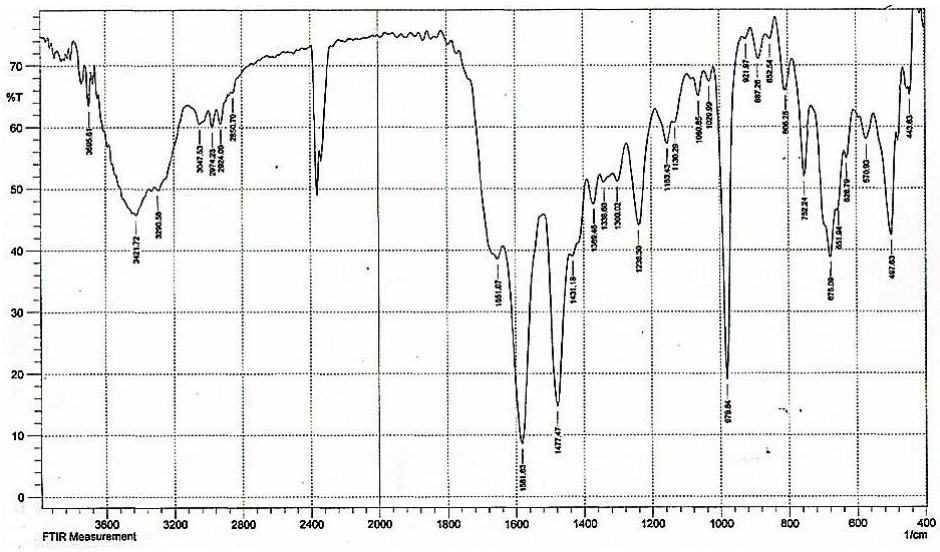


Figure 5- FT-IR spectrum for compound (5f)

References

1. Knolker H. and Reddy, K**. 2002**.Isolation and synthesis of biologically active carbazole alkaloids .*Chemical Reviews*.102, pp:4303-4428.
2. Grougent, R. and Magiatis, P. **2005**.The first pyrano [3, 2-b] indole alkaloid and other secondary metabolites from boronella konimbiensis. *Journal of Natural products*, 68, pp:1083-1086.
3. Prudhomme, M. **2003**.Rebeccamysin analogues as anti-cancer agents. *Journal of Medicinal Chemistry*, 38, pp:123-140.
4. Ling, Y. and Jiang, J**. 2006**. Anoval and facial synthesis of 3-(2-benzofuronyl) and 3, 6-Bis (2-benzofuronyl) carbazolederivatives. *Journal of Medicinal Chemistry*, 49, pp:6273-6282.
5. Tachibana, Y.and Ki, H. **2003**. 4a-(4-Nitro-benzyl)-2, 3, 4, 4a-tetrahydro-1H-carbazole.*Journal of Agricultural and Food Chemistry*, 51, pp:6461-6467.
6. Thomas, K.andLin, j. **2001**.Light-Emitting carbazole derivatives potential electroluminescent materials. *Journal of American Chemical Society*, 123, pp:9404-9411.
7. Boudreault, P. and Tao, Y. **2007**.Indium-Catalyzed annulation of 2-Aryl and 2-Heteoaryl indoles. *Journal of American Chemical Society*, 129, pp:9125-9136.
8. Friend, R. andMarks, R.**1 999**. Electroluminescence in conjucated polymers. *Nature*, 397, pp:121-128.
9. Gong, X. and Ba, G. **2002**.The nature of excited states in PVK:PBD polymeric host for organic light-emitting diodes. *Journal of Advanced Materials*, 14, pp:581-585.
10. Wakim, S. and Ta, Y. **2004**.Red organic light-emitting radical adducts of carbazole and Tris(2, 4, 6-trichloro tri phenyl)methyl radical that exihibit high thermal stability and electro chemicalamphotericity. *Chemical Mater*, 16, pp:4386-4388.
11. Dijken, A.andMon, A. **2004.**Carbazole compounds as host materials for triplet emitters in organic Light-Emitting Diodes polymer hosts for high-efficiency light emitting diodes. *Journal of American Chemical Society*, 126, pp:7718-7727.
12. Dhayalan, V. and Jagan R**. 2009**. A Versatile Synthesis of Annulated Carbazole Analogs Involving aDomino Reaction of Bromomethylindoles with Arenes/ Heteroarenes. *Journal of Organic Chemistry*, pp:531-546.
13. Baran A.G. **2010.**Synthesis and properties of 2, 7-phenylethenyl and benzoxazol-2-yl ethenyl N-ethyl carbazole derivatives. *Journal of Organic Chemistry*.46, pp:1185-1191.
14. Mark, Rand Bowman, W.**2007**.Radical reactions with 3H-quinazolin-4-ones. *Organic Biomolecular Chemistry*, 5, pp:103-113.
15. Mudadu, M. and Singh, A**. 2008**. Preparation and study of 1, 8-di(pyrid-2-yl) carbazoles. *Journal of Organic Chemistry*, 73, pp:6513-6520.
16. Yang, L.V, and Wanteo, G.**2010**. Synthesis of 3-(quinolin-2-yl) and 3, 6-Bis(quinolone-2-yl)-9H-carbazoles.*Journal of Organic Chemistry*, 6, pp:966-972.

17. Bennasar, M. and Roca, T. **2006**. Radical reactions with 3H-quinazolin-4-ones.*Journal of Organic Chemistry*, 71, pp:1746-1749.

18. Ferreira, I. and Kirsch, G. **2003**. Tandam palladium-catalyzed borylation and Suzuki coupling (BSC) to thieno carbazole precursors. *Tetrahedron Literature*, 44, pp:4327-4329.

19. Martin, A. and Prasad, K. **2006**. Synthesis and characterization of carbazole derivatives and their antimicrobial studies. *Acta Pharmaceutica Impact Factor*, 56, pp:79-86.

20. Janosik, T.andWahlstrom, N. **2008**. Azo-heterocycle based amino receptors. *Tetrahedron*, 64, pp:9159-9180.

21. Meervelt, L. and Gu, R. **2008**. Facial synthesis of noval indolo [3, 2-b] carbazole derivatives and a chromo genicsensing 5, 21-dihydro indolo[3, 2-b] carbazole. *Organic Biomolucular Chemistry*, 6, pp:2484-2487.

22. Meesala, R. and Nagarajan, R. **2006**. Synthesis of 3-(quinolin-2-yl) and 3, 6-Bis (quinolin-2-yl)-9H-carbazoles. *Tetrahedron Letters*., 47, pp:7557-7561.

23. Chaitanya, T. and Nagarajan, R. **2007**. Synthesis of 3-Chromenyl carbazoles, 3, 6-bis-(chromenyl) carbazoles and 3-quinolyl carbazoles. *Tetrahedron Letters*, 48, pp:2489-2492.

24. Benassi, R. and Rees, C.**1996**. Transition Metal-Catalyzed Synthesis of Furan Derivatives. *Comprehensive Heterocyclic Chemistry*, 1, pp:259-295.

25. Banskota, A and Tezuka, Y. **2000**. O-substituted derivatives of 2, 3-dihydro-2, 2-dimethyl - 7 - benzofuranol – cytotoxic activity and structural studies. *Journal of National Products*, 63, pp:1277-1279.

26. Alper-Hayat, S. and Aki, E. **2008**.QSAR modeling of benzoxazole derivatives as antimicrobial agents. *European Journal of Medicinal Chemistry*, 43, pp:2568-2578.

27. Dawood, K. and Ellithey, M. **2006**. Anoval and facile synthesis of 3-(2-benzofuronyl) and 3, 6-bis (2-benzofuronyl) carbazole derivatives. *Bioorganic Medical Chemistry*, 14, pp:3672-3680.

28. Kawasaki, K. and Aoyama, T. **2003**. Discovery of anoval class of orally active trypanocidal N-myristoyltransferase inhibitors. *Bioorganic & Medical chemistry Letters*, 13, pp:87-91.

29. Se Hun, K. and Sanghyuk, P**. 2011**. Highly efficient deep-blue emitting organic light emitting diode based on the multifunctional fluorescent molecule comprising covalently bonded carbazole and anthracene moieties. *The Royal Society of chemistry*, 1, pp:1-18.

30. Wantano, G. and Meiru, Z. **2011**. A noval and facile synthesis of 3-(2-benzofuroyl)and 3, 6-bis(2-benzofuroyl) carbazole derivatives. *Beilstein Journal of Organic Chemistry*, 7, pp:1533-1540.

31. Biresh, K. and Ritesh, P. **2011**. Antimicrobial activity of some noval pyrazoline derivatives. *Journal of Advanced Pharmacy Education*, 1, pp:243-250.