Synthesis and Characterization of 1,3,4-Oxadiazoles Derived From 9-Fluorenone

RafidSaadDawood*

Received 29, November, 2012
Accepted 23, January, 2013

Abstract:

In the present work, 9-fluorenone-2-carboxylic acid methyl ester (**1**) was prepared from 9-fluorenone-2-carboxylic acid and then converted into the acid hydrazide (**2**). Compound (**2**), is the key intermediate for the synthesis of several series of new compounds such as substituted 1,3,4-oxadiazole derivatives (**3-6**) were synthesized from the condensation of different substituted benzoic acids with compound (**2**) using $POCl_3$ as condensing agent. Treatment of compound (**2**) with formic acid gave the N-formylhydrazide (**7**), which upon refluxing with phosphorous pentoxide in benzene yielded the corresponding 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole (**8**). Reaction of hydrazide (**2**) with phenyl isocyanate to give N-phenyl semicarbazide derivative (**9**), then this compound (**9**) convert to 5-(9-fluorenone-2-yl)-N-phenyl-1,3,4-oxadiazole-2-amine (**10**) via intramolecular cyclization by syrup H_3PO_4. Also the hydrazide (**2**) was treated with CS_2/KOHafforded 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-thiol (**11**). Compound (**11**) was used toreactwith various alkyl halides and secondary amines to give 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-alkyl thiol (**12-15**) and 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-N-alkyl(**16-19**)derivatives respectively.

Keywords:9-Fluorenone,Acid hydrazide derivatives, 1,3,4-Oxadiazole.

Introduction:9-fluorenone (IUPAC name 9H-fluoren-9-one) is member of polycyclic aromatic hydrocarbon (PAH), which was widely used in the applications of thermo and light sensitizer, liquid crystal chemistry, luminescence chemistry, spectrophotoetric analysis, molecular chemistry and biochemorphology industry [1,2]. Heterocyclic compounds containing the five-membered nucleus possess a diversity of useful biological effects. For example, 1,3,4-oxadiazole (two nitrogen and one oxygen heteroatom) have been found to possess a widespectrum of biological activities suchas antibacterial [3,4], antifungal [5,6], anthelmintic [7], anti-tubercular [8], anti-infective [9], anticancer [10], anti-HIV [11], antioxidant [12], analgesic [13,14], anti histaminic [15], insecticidal [16], anti-inflammatory [17], anticonvulsant [18,19] and also reported as enzyme tyrosinase inhibitors [20]. 1,3,4-oxadiazole have ptylayed a crucial part in the development of theory in heterocyclic chemistry and also used extensively in organic synthesis [21]. Among the methods employed insynthesis of

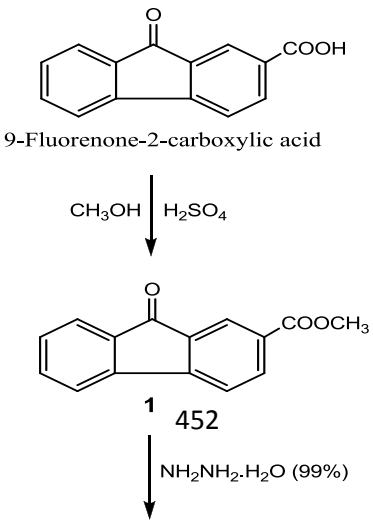
1,3,4-oxadiazole, condensation of hydrazideand its derivatives as thestarting materials with variety of

*Department of Chemistry, College of Science, University of Baghdad

substituted acids and bases are commonly used [22]. In continuation of interest in the chemistry of 9-fluorenone, 1,3,4-oxadiazole derivatives of this compound have been prepared by conventional synthetic techniques.**Materialsand Methods:*General***All reactions were monitored bythin-layer chromatography (TLC) using 0.25 mm pre-coated silica-gel F254 plates,spots were detected with iodine vapour.The IR spectra were recordedin (Department of Chemistry, College of Science, Baghdad of University)on (SHIMDZU) FT-IR 8400 spectrophotometer; solid samples were run in KBr discs,Liquid samples wererunas smears.UV spectrawererecorded withUV-Visible spectrophotometer(CARY)UV-100 Conc.Melting point were determined on a Gallenkamp meting point apparatus with sample contained in open capillaryglass tube in an electricallyheated metal block apparatusand were un corrected.^{1}H-NMR spectrawererecorded in (Al-Albytuniversity, Jordan) on ultra shield300 MHz NMR spectrophotometer in acetone-d_6 solutions and with tetra methylsilane (TMS) as an internal standard. **Preparation of 9-fluorenone-2-carboxylic acid methyl ester (1)**A mixture of 9-fluorenone-2-carboxylic acid(0.1mol)and an excess of methanol (10 ml) with sulfuric acid(1 ml) wererefluxed on water-bathfor(24hrs), then reaction mixture was cooled and theresulting solid(**1**)was washed with methanol and recrystallized from benzene to give compound (**1**). **Preparation of 9-fluorenone-2-carboxylic acid hydrazide (2) [8]**To a solutionof compound(**1**)(0.01 mol) in ethanol (30 ml), hydrazine hydrate (99%) (0.02 mol) was added thentheresultingmixture wasrefluxed on water-bathfor(3 hrs).Theformedprecipitate was filtered and recrystallizedfrom chloroformtogivethe hydrazide derivative(**2**).**Preparation of 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-aryl(3-6) [17]**A solution of compound (**2**) (0.01mole) in phosphorus oxychloride (5 ml)was added inportionswith stirring to a solution of appropriatesubstituted benzoic acid (0.01mole) and ethanol (20ml) were taken in a round-bottom flask. The mixture was refluxed for (8 hrs). The solution was cooled to room temperature and poured into crushed ice and then neutralized with (10%) $NaHCO_3$ solution,then the solid product was filtered, washed with water and recrystallized from a suitable solvent gave the compounds(**3-6**).**Preparation of N-formyl-9-fluorenone-2-carboxylic acid hydrazide (7)[23]**A solution of (**2**)(0.01 mol) in formic acid (20 ml) was refluxed for (30 min). The solvent wasevaporated and the residue was crystallized from benzeneafford (**7**).**Preparation of 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole (8) [23]**To a solution of (**7**)(0.01 mol) in ethanol (15 ml), phosphorous pentoxide (0.01 mol) was added. The mixture was refluxed for (3 hrs). The solvent wasevaporated, water (10 ml) was added and the mixture was extracted with chloroform. The solvent wasevaporated and the residue was recrystallized from benzene to give

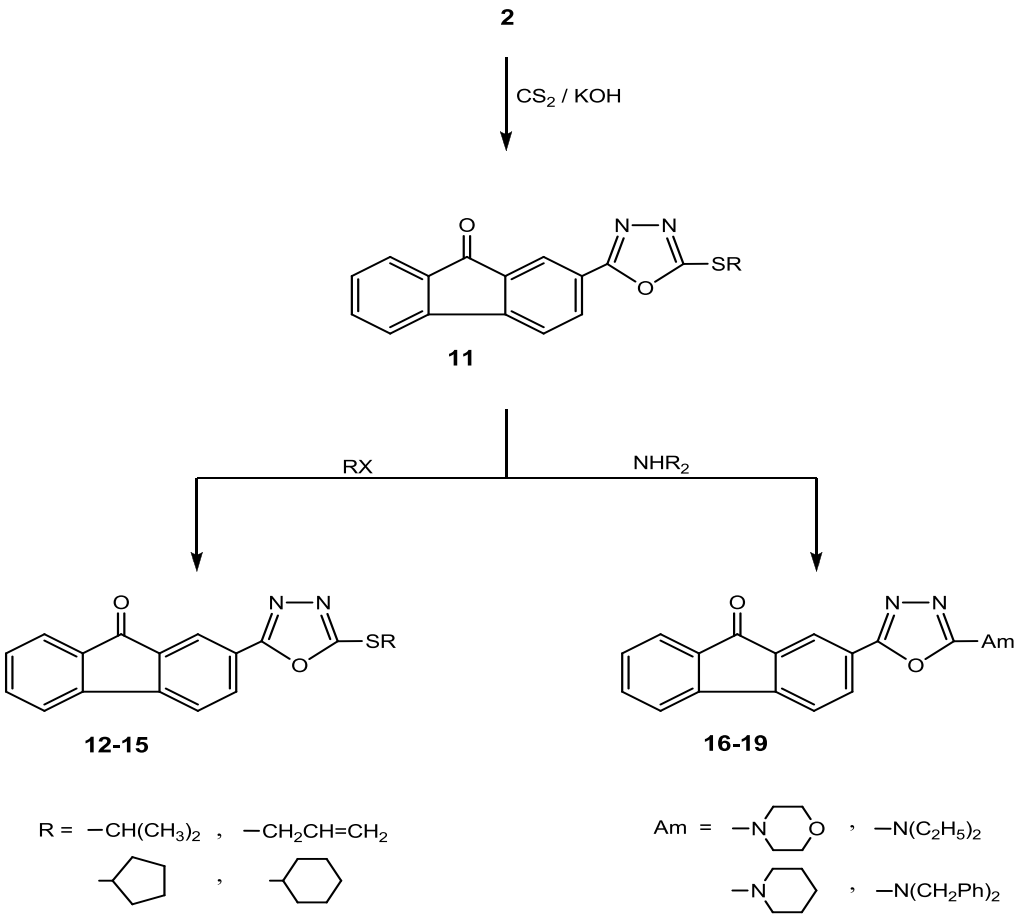
compound (**8**).**Preparation of N-phenyl-(9-fluorenone-2-carboxylic acid)semicarbazide (9)**To a solution of compound (**2**) (0.02 mol) in absolute ethanol (15 ml) phenyl isocyanate (0.04 mol) was added with continuous stirring and the mixture was refluxed for (4-5 hrs), then reaction mixture was cooled and theresulting solid(**9**)was recrystallized from chloroform.**Preparation of 5-(9-fluorenone-2-yl)-N-phenyl-1,3,4-oxadiazole-2-amine (10)**Compound (**9**) (0.01 mol) was dissolved in syrup of phosphoric acid (10 ml), heatedat120°Cfor (1hr), kept overnight and then poured intoanice-cold water.The resultingsolid (**10**)was filteredand recrystallized from methanol.**Preparation of 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-thiol (11)[24]**Compound (**2**)(0.02 mol) was added to a solution of KOH (0.02 mol) in absolute ethanol (20 ml) and the resulting mixture was cooled to 0ºC. Distilled carbon disulfide (0.04 mol) was added dropwise to the stirred mixture, which was refluxed for (6 hrs).The solvent was removed under reducedpressure, the residue was dissolved in water (50 ml) and then filtered.The filtrate was cooled, neutralized to pH (5-6) using glacial acetic acid and the separated product was filtered, washedwith water, dried and recrystallised from benzene to give (**11**).**Preparation of 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-alkyl thiol (12-15)[8]**To a stirred solution of (**11**)(0.01mol) and NaOH (0.01mol) in water (15 ml), a mixture of a suitable alkyl halide (0.01mol) and methanol (10 ml) was addeddropwise.The resulting mixture was stirred at room temperature for (7hrs). The precipitate formed was filteredoff and recrystallized from an appropriate solventto give (**12-15**)in good yields.**Preparation of 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-N-alkyl (16-19)[25]**To a stirred solution of compound (**11**)(0.02mol) in dry dioxane (15 ml) was added to a solution ofthe appropriate secondary amine (0.01mol) in dry dioxane (10 ml). The mixture was refluxed for (5 hrs). After cooling, the precipitate was filtered and crystallized from a suitable solventafford compounds (**16-19**).**Results and Discussion:**To achieve the desired heterocyles, the sequence of reactions shown in Scheme (1,2)wasfollowed. The esterification reaction of 9-fluorenone-2-carboxylic acid with methanol in the presence of sulfuric acid gave 9-fluorenone-2-carboxylic acid methyl ester (**1**),which was indicated by the disappearance of the broad band for OH stretching absorption for COOH group in9-fluorenone-2-carboxylic acid and appearance bands at 2944$cm^{-1}$and 2861cm^{-1} due to (C-H)stretching for (CH_3) group. The key intermediate for the synthesis of substituted1,3,4-oxadiazolederivativesis 9-fluorenone-2-carboxylic acid hydrazide (**2**) which was prepared by the reaction of compound (**1**) with hydrazine hydrate (99%).The FT-IR spectrum of acid hydrazide (**2**) showed absorption band in the region of 3272cm^{-1} characteristic of (NH_2) group and at 3141 cm^{-1} of (NH) group. The C=O stretching was observed at 1685 cm^{-1} for amide group. Condensation of acid hydrazide (**2**)with various substituted benzoic acids in presence of $POCl_3$yielded5-(9-

fluorenone-2-yl)-1,3,4-oxadiazole-2-aryl (**3**-**6**)in moderate to good yield, was confirmed by its FT-IR spectra that showed bands between (1222-1249) and (1098-1109)due to (C-O-C) asymmetric and symmetric stretching respectively, in addition to the band at (1657-1671) cm^{-1} for the (C=N) stretching,combined with the disappearance of the NH_2, NH and C=Oamidestretching bands.The ^{1}H-NMR spectrum of compound (**6**) showed a strong singlet signal at3.5 ppm attributed to the three protons of the methoxy group (OCH_3)and a multiplet signals at (7.1-8.3) ppmassigned to the aromatic protons. Further,N-formyl-9-fluorenone-2-carboxylic acid hydrazide (**7**) was obtained from reaction of (**2**)with formic acid [23,24]. The structure of compound (**7**)was confirmed by the presence of two amidic carbonyl stretching bands at1710 cm^{-1} and 1668 cm^{-1}(CO-NH-NH-CHO), in addition to the band at 2796cm^{-1} assigned to (C-H) stretching.Treatment of compound (**7**) with phosphorous pentoxide in benzene afforded 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole (**8**), which displayed two bands at 1231 cm^{-1} and 1113 cm^{-1} for the (C-O-C)asym. and sym. stretching, in addition to the band at 1669 cm^{-1} for the (C=N) stretching.In another 1,3,4-oxadiazole preparation, condensation of acid hydrazide (**2**) with phenyl isocyanate to give N-phenyl-(9-fluorenone-2-carboxylic acid) semicarbazide (**9**). The IR spectra of this compound showed abroad band at 1693 cm^{-1} which was assigned to amide (I) and amide (II)bands. When compound (**9**) was treated with H_3PO_4 at (120)°C, it was affected by intramolecular cyclization through the loss of H_2O and giving the expected 5-(9-fluorenone-2-yl)-N-phenyl-1,3,4-oxadiazole-2-amine (**10**), was indicated by the presence in their IR spectra of the ether (C-O-C) stretching bands at 1236 $cm^{-1}$and 1089 cm^{-1}, in additionto the band at 1668 cm^{-1} attributed to the (C=N) stretching,its^{1}H-NMR spectra for this compound showed a signal at 6.5ppm attributed to the (N-H) protonand a multiplet signals at (7.2-8.2) ppmbelong to the aromatic protons(Scheme 1).



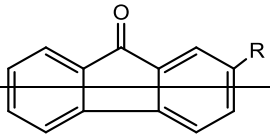
Compound 5-(9-fluorenone-2-yl)-1,3,4-oxadiazole-2-thiol (**11**) was synthesized by the ring closure reaction of acid hydrazide (**2**) with CS_2 in presence of KOH [24] which exists in atautomericthiol-thione equilibrium, as indicated by the (C=S) stretching band at 1165 cm^{-1}, S-H stretching at 2615 cm^{-1} and (N-H) stretching at 3191cm^{-1}[26]. Moreover, the compound (**11**) was conveniently alkylated by condensing it with different alkyl halides to give (**12**-**15**) derivatives. The FT-IR spectra showed bandsbetween (2941-2954) and (2848-2855) cm^{-1} assigned to (C-H)asym. and sym. stretching respectively,combined with the disappearance of the (S-H) stretching band.The ^{1}H-NMR spectrum of compound (**15**) showeda multiplet signals (1.2-2.1) ppm and (2.7-3.0) ppm attributed to the ten protons and one proton of the cyclohexyland a multiplet signals at (7.1-7.8) ppmbelong to the aromatic protons.While treatment of (**11**) with secondary amines resulted in compounds (**16**-**19**) by nucleophilic displacement of the (SH) group [25], which was indicated by the disappearance of the (S-H) vibration band,its ^{1}H-NMR spectra for compound (**19**) showed a signal at 5.1ppm attributed to the (CH_2) protons and a multiplet signals at (7.1-8.1) ppmbelong to the aromatic protons (Scheme 2).Table (1) represent the physical data of compounds (**1**-

19).Characteristic absorption bands of FT-IR and U.V spectra of compounds (**1-19**) are listed in Table (2).Table (3)represent the ^{1}H-NMR spectra for compounds (**6**,**10**,**15** and **19**).



Scheme 2

Table (1):Physical properties of the prepared compounds (1-19)

Compound structure	Comp. No.	R / Ar / Am	Color of crystal	m.p. °C	Yield %	Solvent of Rec.
	**1**	-$COOCH_3$	Yellow	182-183	81	Benzene

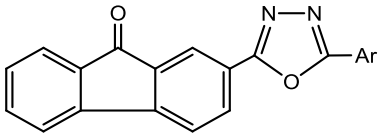
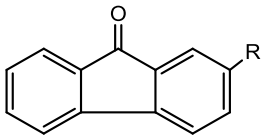
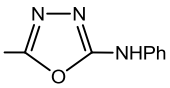
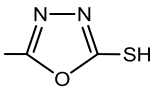
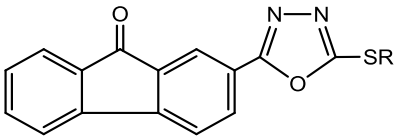
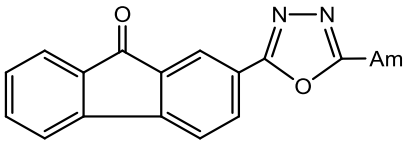
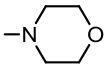
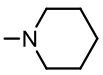
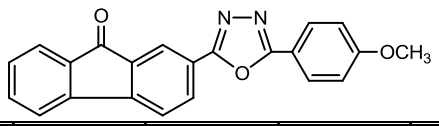
	2	-$CONHNH_2$	Yellow	90-92	80	Chloroform
	**3**	p-Cl-C_6H_4	Pale-yellow	118-120	70	Benzene
	4	p-NO_2-C_6H_4	Yellow	163-165	68	Toluene
	5	p-CH_3-C_6H_4	Yellow-brown	144-146	72	Toluene
	6	p-OCH_3-C_6H_4	Yellow-brown	182-184	70	Benzene
	**7**	-CONHNHCHO	Yellow	67-69 Dec.	75	Benzene
	8		Yellow-reddish	203-205	60	Benzene
	9	-CONHNHCONHPh	Pale-yellow	123-125	74	Chloroform
	10		Yellow-brown	191-193 Dec.	67	Methanol
	11		Yellow	114-116	74	Benzene
	**12**	-$CH(CH_3)_2$	Pale-yellow	88-90	73	Chloroform
	13	-$CH_2CH=CH_2$	Brown	160-162	71	Chloroform
	14		Dark-yellow	127-129	70	Chloroform
	15		Light yellow	155-157	70	Methanol
	**16**		Dark-yellow	224-226 Dec.	69	Toluene
	17	-$N(C_2H_5)_2$	Deep yellow	169-171 Dec.	70	benzene
	18		Pale-yellow	77-79	68	Chloroform
	19	-$N(CH_2Ph)_2$	Deep yellow	184-186	69	Chloroform

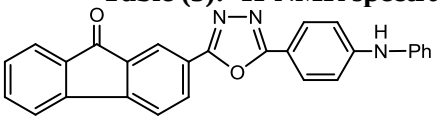
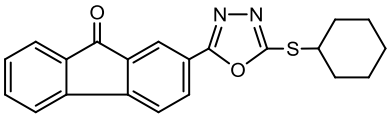
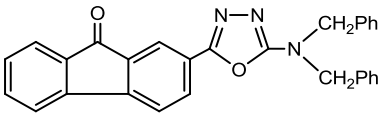
Table (2):Characteristic absorption bands of FT-IR and U.V spectra of compounds (1-19)

Comp. No.	FTIR spectral data cm^{-1}							U.V. (λ_{max}) nm
	υ(C=O) Ketone	υ(C-H) Aromatic	υ(C-H) Aliphatic	υ(C=C) Aromatic	υ(C=N) Imine	υ(C-O-C) Ether	Others (υ)	

Comp. No.	Compound structure	δH aromatic ppm	δH other bands ppm
6		7.1-8.3(m,11H,Ar-H)	3.5(s,3H, OCH_3)

1		3061	2944					351
2	172					-	3272, 3141 (N-H)hydrazide 1685(C=O) amide	353
3	171				1	1107	1091(C-Cl)	357
4	1716	3062 3051	-	1589	1668	1222 1109	1554, 1338 (C-NO_2)	359
5	1723	3060 3038	2949 2834	1569	1669	1237 1098	-	353
6	1720	3059 3040	2946 2841	1573	1657	1249 1105	-	352
7	1721	3063 3034	-	1582	-	-	1710, 1668 (C=O) amidic 2796 (C-H) aldehyde	366
8	1719	3062 3041	-	1592	1669	1231 1113	2959 (C-H) olefinic	359
9	1720	3065 3033	-	1589	-	-	3331, 3224 (N-H) amide I and II 1693 (C=O) amide I and II	369
10	1720	3066 3034	-	1588	1668	1236 1089	3328 (N-H) amine	364
11	1716	3096 3070	-	1593	1658	1238 1111	2615 (S-H) Thioenol form 1165 (C=S) Thioketo form 3191 (N-H) amine	360
12	1719	3065 3031	2941 2853	1576	1668	1239 1112	-	364
13	1716	3097 3032	2954 2855	1570	1663	1249 1118	1627 (C=C) olefinic	367
14	1721	3059 3030	2952 2849	1588	1662	1241 1110	-	364
15	1719	3060 3037	2942 2848	1593	1663	1240 1112	-	358
16	1720	3066 3042	2953 2851	1574	1664	1236 1098	1261 (C-N) imine	360
17	1721	3064 3041	2946 2848	1581	1663	1243 1110	1264 (C-N) imine	366
18	1719	3061 3042	2945 2844	1586	1669	1238 1094	1282 (C-N) imine	361
19	1720	3062 3022	2941 2852	1591	1665	1241 1097	1268 (C-N) imine	360

Table (3): ^{1}H-NMR spectra for compounds (6, 10, 15 and 19)

10		7.2-8.2(m,16H,Ar-H)	6.5(s,1H,NH)
15		7.1-7.8(m,7H,Ar-H)	1.2-2.1 (m,10H, cyclohexyl) 2.7-3.0 (m,1H, cyclohexyl)
19		7.1-8.1(m,17H,Ar-H)	5.1 (s,4H,CH_2)

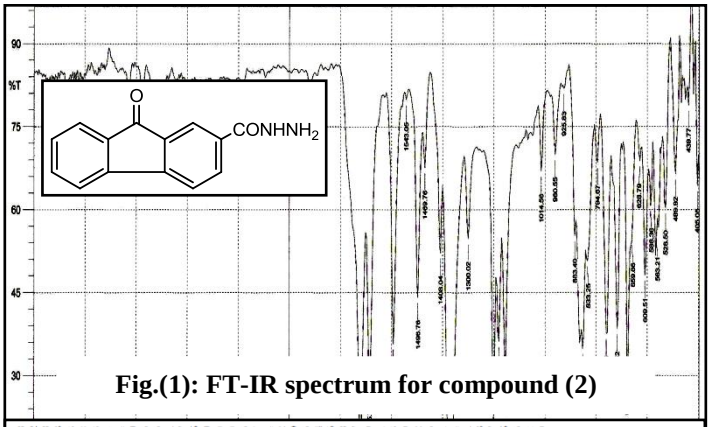


Fig.(1): FT-IR spectrum for compound (2)

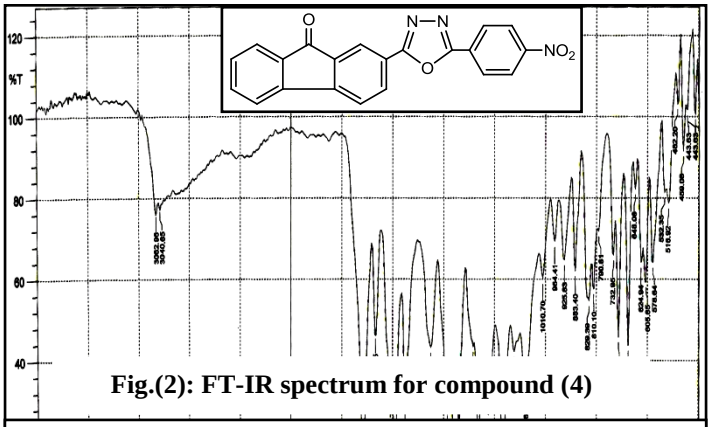
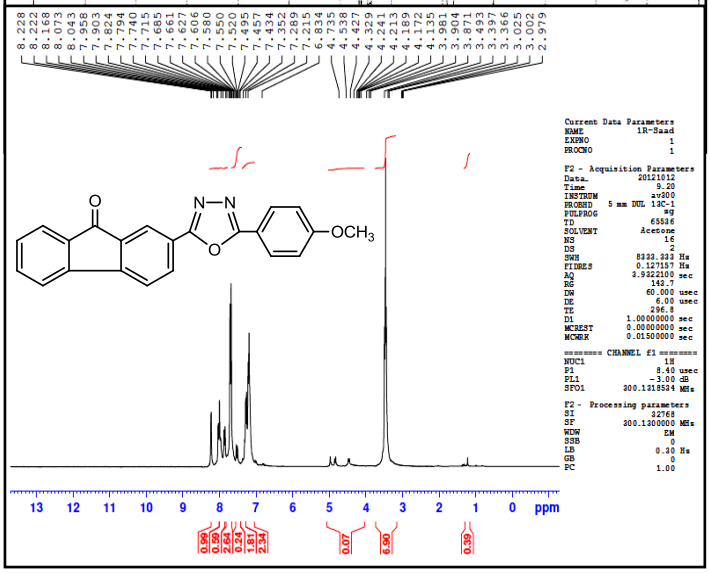
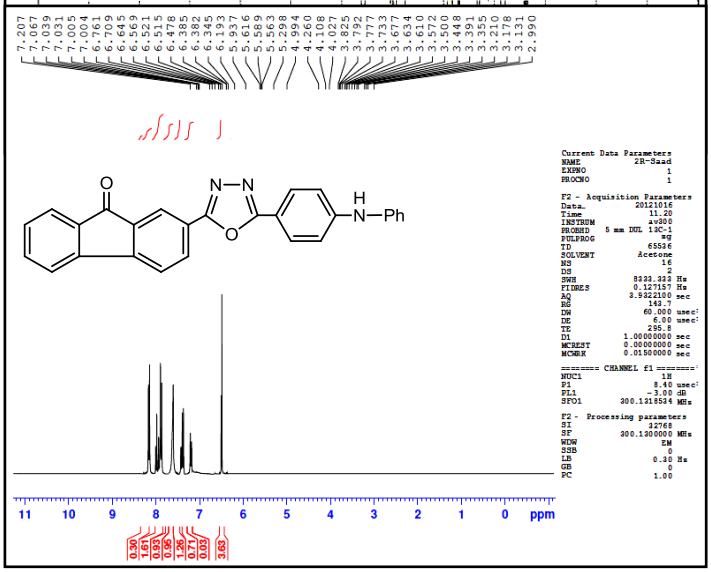
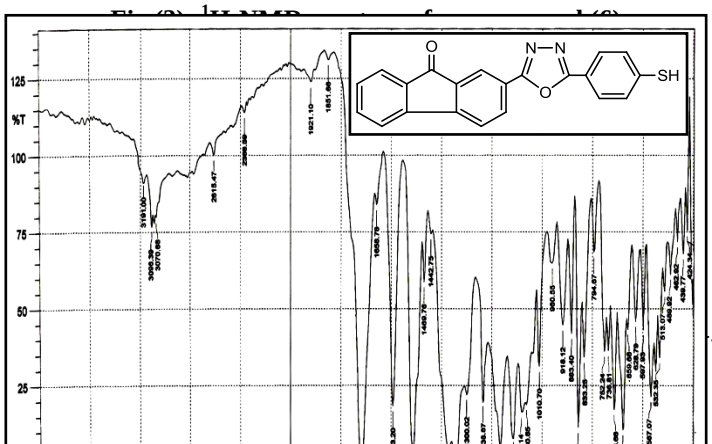


Fig.(2): FT-IR spectrum for compound (4)







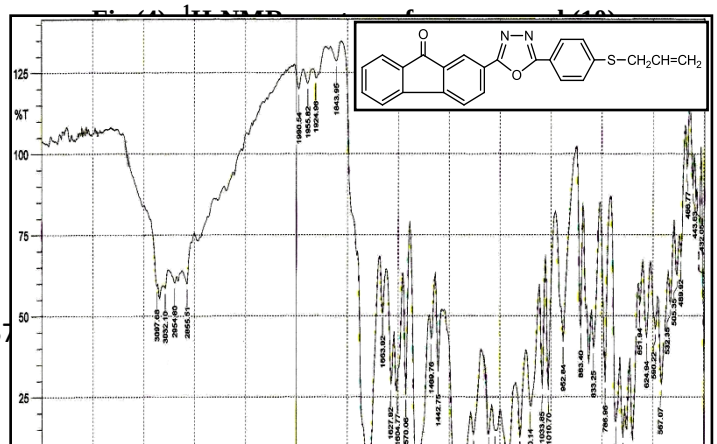


Fig.(5): FT-IR spectrum for compound (11)

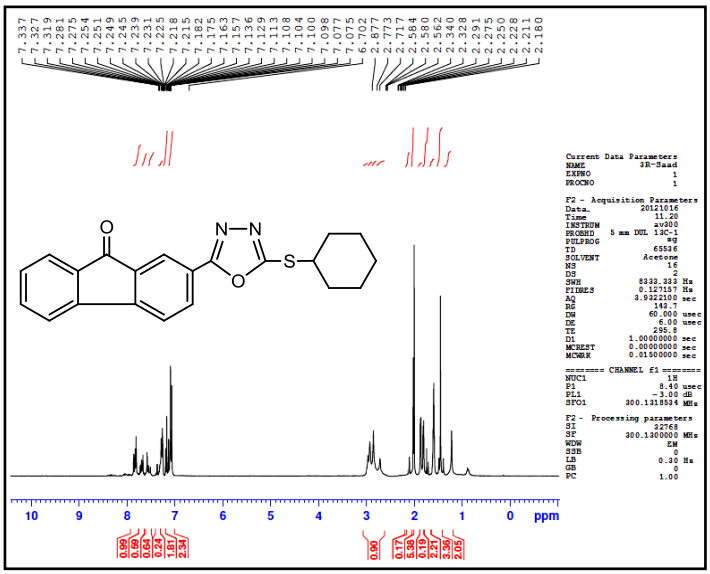


Fig.(6): FT-IR spectrum for compound (13)

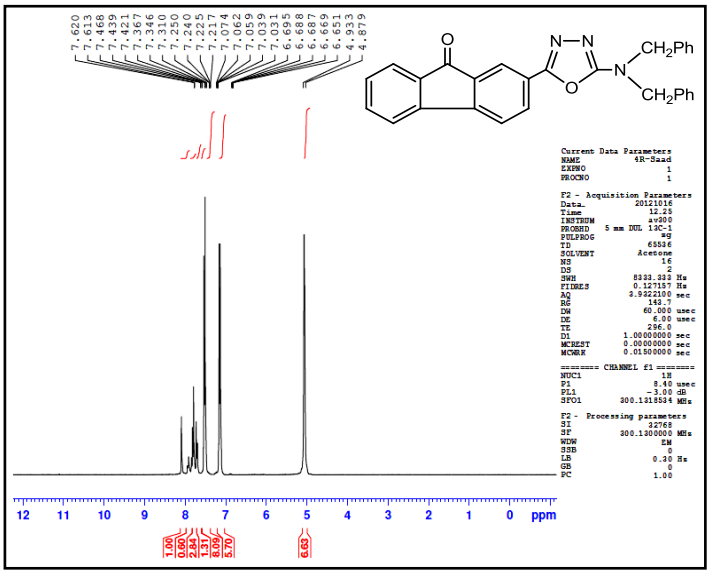


Fig.(7): ^{1}H-NMR spectrum for compound (15)

Fig.(8): ^{1}H-NMR spectrum for compound (19)

References:

1. Wei. Y, Dang. L, Zhang. X, Cui. W. and Wei. H. 2012."Solid-liquid phase equilibrium of 9-fluorenone and several polynuclear aromatic hydrocarbons". Flu.Pha.Equ., 318: 13-18.
2. Demadrille. R, Firon. M, Leroy. J, Rannou. P. andPron. A.2005. "Plastic Solar Cells Based on Fluorenone-Containing Oligomers and Regioregular Alternate Copolymers". Adv. Funct. Mater. 15(9): 1547-1552.
3. Jumat. S, Nadia. S, Ayad. H. andHiba. I. E. Y. 2010."Synthesis and antibacterial activity of some new 1,3,4-oxadiazole and 1,3,4-thiadiazole derivatives". J. Appl. Sci. Res.,6(7): 866-870.
4. Sowjanya. C,RamaBharathi. V,Devi. G. and Rajitha. G. 2011."Synthesis and evaluation of some novel 3-[5-phenyl-1,3,4-oxadiazole-2-yl]-2-(substituted styryl)-quinazoline-4(3H)-ones for antibacterial activity". J. Chem. Pharm. Res., 3(6): 212-216.
5. Maslat. A. O,Abussaud. M, Tashtoush. H. andAl-Talib. M. 2002."Synthesis, antibacterial, antifungal and genotoxicactivity of

Bis-1,3,4-oxadiazole derivatives". Pol. J. Pharmacol., 54(1): 55-59.

6. Bhatia. S. and Gupta. M. 2011. "1,3,4-Oxadiazole as antimicrobial agents: An overview". J. Chem. Pharm. Res., 3(3): 137-140.
7. Patel. K, Chandran. J. E, Shah.R,Vijaya.J. and Sreenivasa. G. M. 2010."Synthesis, characterization and anthelmintic activity (Peritumaposthuma) of new oxadiazole incorporated with imidazole and pyrazole". Int. J. Pharm. Bio. Sci., 1(3): 1-13.
8. Pattan. S. R, Rabara. P. A, Pattan. J. S, Bukitagar. A. A. andWakale. V. S. 2009."Synthesis and Evaluation of Some Novel Substituted 1,3,4-Oxadiazole and Pyrazole Derivatives For Anti tubercular Activity". Indian J. Chem., 48B: 1453-1456.
9. Kucukguzel. S. G,Kucukguzel. I, Tatar. E,Rollas. S, Sahin. F, Gulluce. M,De Clercq. E. andKabasakal. L. 2007."Synthesis of some novel heterocyclic compounds derived from diflunisalhydrazide as potential anti-infective and anti-inflammatory agents". Eur. J. Med. Chem., 42(7): 893-901.
10. Holla. B. S, Poojary. K. N,Bhat. K. S, Ashok. M. andPoojary. B.2005."Synthesis and anticancer activity studies on some 2-choloro-1,4-bis-(5-substituted-1,3,4-oxadiazole-2-yl-methyleneoxy)phenylene derivatives". Indian J. Chem., 44B: 1669-1673.
11. El-Sayeda. W. A, El-Essawyb. F. A, Alib. O. M, Nasr. B. S, Abdalla. M. M. and Abdel-Rahman. A. A. 2009."Anti-HIV activity of new substituted 1,3,4-oxadiazole derivatives and their acyclic nucleoside analogues". Z. Naturforsch., 64C: 773-778.
12. Cena. C, Bertinaria. M, Boschi. D, Giorgis. M. andGasco. A. 2006. "Use of the furoxan (1,2,5-oxadiazole 2-oxide) system in the design of new NO-donor antioxidant hybrids". ARKIVOC., 7: 301-309.
13. Husain. A. andAjmal. M. 2009. "Synthesis of novel 1,3,4-oxadiazole derivatives and their biological properties". Acta Pharm., 59(2): 223-233.
14. Amir. M.andShikha. K. 2004."Synthesis and anti-inflammatory, analgesic, ulcerogenic and lipid peroxidation activities of some new 2-[(2,6-dichloroanilino) phenyl]acetic acid derivatives". Eur. J. Med. Chem., 39(6):535-545.
15. Zou. X. J, Lai. L. H, Jin. G. Y. and Zhang. Z. X.2002."Synthesis, Fungicidal Activity, and 3D-QSAR of Pyridazinone-Substituted 1,3,4-Oxadiazoles and 1,3,4-Thiadiazoles". J. Agric Food Chem., 50(13): 3757-3760.
16. Mohan. T. P, Vishalakshi. B, Bhat. K. S, Rao. K. S. and Kendappa. G. N. 2004. "Synthesis and insecticidal activity of some 1,3,4-oxadiazolederivatives containing phenoxyfluorophenyl group". Indian J. Chem.,43B: 1798-1801.
17. Dewangan. D, Pandey. A, Sivakumar. T, Rajavel. R. and Dubey. R. D.2010."Synthesis of some novel 2,5-disubstituted1,3,4-oxadiazole and its analgesic, anti-

inflammatory, anti-bacterial and anti-tubercular activity". Int. J. Chem. Tech. Res., 2(3): 1397-1412.

18. Zarghi. A, Hamedi. S, Tootooni. F, Amini. B, Sharifi. B, Faizi. M, Tabatabai. S. A. andShafiee. A. 2008. "Synthesis and pharmacological evaluation of new 2-substituted-5-{2-[(2-halobenzyl)thio)phenyl}-1,3,4-oxadiazoles as anticonvulsant agents". Sci. Pharm., 76(2): 185-201.
19. Zarghi. A, Tabatabai. S. A, Faizi. M, Ahadian. A, Navabi. P, Zanganeh. V. andShafiee. A. 2005."Synthesis and anticonvulsant activity of new 2-substituted-5-(2-benzyloxyphenyl)-1,3,4-oxadiazoles".Bioorg.Med. Chem. Lett., 15(7): 1863-1865.
20. Sawant. R, Lanke. P, Jadhav. G. andBhangale. L. 2010."QSAR analysis of structurally similar 1,3,4-oxadiazoles as enzyme tyrosinase inhibitors". Drug Invention Today., 2(2): 169-172.
21. Mogilaiah. K.andReddy. N.V. 2003."Microwave assisted heterocyclization: A rapid and efficient synthesis of 1,8-naphthy-ridinyl-1,3,4-oxadiazoles". Indian J. Chemistry"., 42B:2124-2125.
22. Bhat. K.S, Karthikeyan. M.S, Holla. B.S.andShetty. N. S.2004."Synthesis of some new fluorine containing 1,3,4-oxadiazole derivatives as potential antibacterial and anticancer agents".Indian J. Chem.,42B: 1765-1769.
23. Shafiee. A, Yazdikarimy. B. andSadri. S.1989."Nitroimidazoles. VI. Syntheses of 1-methyl-2-(1,3,4-thiadiazol-2-yl)-5-nitroimidazole and 1-methyl-2-(1,3,4-oxadiazol-2-yl)-5-nitroimidazole". J. Heterocyclic Chem., 26(5): 1341-1343.
24. Henichart. J, Houssin. R. andLablanche. B. 1977."Syntheses and structure for triazoline-1,2,4-thiones-5 in position 3 and 4 unsubstituentdialkyl amino ethylene".J. Heterocyclic Chem., 14(4): 615-619.
25. Sharba. A. H. K, Al-Bayati. R. H, Aouad. M. and Rezki.N. 2005."Synthesis of Oxadiazoles, Thiadiazoles and Triazoles Derived from Benzo[b]thiophene". Molecules., 10(9): 1161-1168.
26. Andotra. C. S, Langer. T. C. andSharma. S. K. 1989."Synthesis of some nitro-substituted 1,3,4-oxadiazoles, 1,3,4-thiadiazoles and 1,2,4-triazoles as anti-amebic agents". J. Indian Chem. Soc., 66: 122-123.

تخليق وتشخيص1،3،4-اوكسادايازولات مشتقة من 9-فلورينون

رافد سعد داود*

*قسم الكيمياء - كلية العلوم - جامعة بغداد

الخلاصة:في العمل الحالي، 9-فلورينون-2-كربوكسيليك اسيد مثيل استر (**1**) حضرمن 9-فلورينون-2-كربوكسيليك اسيدوبعدذلكحولإلى اسيد هايدرازيد (**2**)، مركب (**2**) هو المفتاح الوسطيلتخليقعدةسلاسللمركبات جديدة مثلتعويض 1،3،4-اوكسادايازول (**3-6**)منتكاثف مركباتالبنزويك اسيدالمختلفةمع المركب (**2**) باستعمال $POCl_3$كعامل مكثف.معاملةالمركب (**2**) معحامضِالفورميك اعطى N-فورميل هايدرازيد (**7**)، الذي صعد مع معخامسأكسيدالفوسفوريالبنزينتجعنالمقابلة5-(9-فلورينون-2-ايل)- 1،3،4- اوكسادايازول (**8**). مفاعلة الهايدرازيد (**2**) مع فينيلإيزوسياناتلإعطاء مشتقN-فينيل سيميكاربازايد (**9**)، ثم هذا المركب (**9**) حول الى 5-(9-فلورينون-2-ايل)-N- فينيل-1،3،4-اوكسادايازول-2-امين (**10**) عن طريق التداخل الضمني بواسطة حامض الفوسفوريك. ايضا الهايدرازيد (**2**) تم مفاعلته مع كبريتد الكاربون وهيدروكسيد البوتاسيوم لاعطاء 5-(9-فلورينون-2-ايل)- 1،3،4-اوكسادايازول-2-ثايول (**11**). المركب (**11**) استعمل للتفاعل مع هاليدات الكيل و امينات ثانوية مختلفة لاعطاء 5-(9-فلورينون-2-ايل)-1،3،4-اوكسادايازول-2-الكيل ثايول (**12-15**) و 5-(9-فلورينون-2-ايل)-1،3،4-اوكسادايازول-2-N-الكيل (**16-19**)على التوالي.