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Fluorescence Studies of 4-Furanone and 4-Oxazolone Substituted Synthesized Coumarins.

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Abstract : 3-(coumarin-4-yl)-5-(substituted benzoyl)-2-(3H)-furanones have been prepared from 3-(substituted benzoyl propionic acid and coumarin-4-aldehyde and characterized on the basis of IR, ¹H NMR and mass spectrometric data. Some of the compounds have been tested for antibacterial activity.

I. INTRODUCTION

The chemistry of butenolides has attracted more attention in the last few decades due to their novel biological actions which was used as an important anthelmintic and ascaricidal agents.^{1,2} The butenolide ring present in cardenolides shows a strong oral cardiotoxic activity.³ The 3,3-diethylbutyrolactone has been reported to have anticonvulsant activity.⁴ While the butenolides have exhibited antibiotic activity.⁵ anti-inflammatory, analgesic, antitumor, antiviral and anticancer properties also.^{6,7} and potential pharmaceutical interest.^{8,9}

In the present investigations, we report the synthesis and reaction of 3-(coumarin-4-yl)-5-(substituted benzoyl)-2-(3H)-furanones following the literature procedure.¹⁰ with appropriate modification, and a study of biological activity of the resulting products. These compounds were synthesized according to Scheme I. Similarly, 3-(coumarin-4-yl)-5-(substituted benzoyl)-2-(3H)-Oxazolones,^{11,12} In our earlier work, we have assigned E-configuration based on NOE experiments.¹³ These compounds were synthesized according to Scheme II.

II. RESULTS AND DISCUSSION:

In our earlier work, we have assigned E-configuration based on NOE experiments.¹³ Similarly, 3-(coumarin-4-yl)-5-(substituted benzoyl)-2-(3H)-Oxazolones, were synthesized from (un)substituted benzoyl glycine by reacting with coumarin-4-aldehyde in the presence of Sodium acetate in acetic anhydride (Scheme II). The structures assigned to the compounds were supported by the results of I.R, ¹H NMR and Mass. Physiological studies: The synthesized molecules of Furanones (20-32) showed λ_{max} between 330nm to 420nm, while the synthesized molecules of Oxazolones (41-59) showed λ_{max} between 330nm to 420nm.

III. EXPERIMENTAL (General Procedure)

4-[(7-propanoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2-phenyl-(4H)furanone] 20: 7-propanoyloxycoumarin-4-carboxaldehyde, **9** (1.23g, 0.005 moles), fused sodium acetate (2.0gm) and benzoyl propionic acid, **17** (0.98g, 0.0055 moles) were intimately mixed by grinding in mortar. The mixture was mixed with acetic anhydride (3ml), heated on a boiling water bath for 20min., with shaking and stirring, diluted from ethanol solvent afforded **20**; yield 0.95g (49%); mp 260-262°C. IR(KBr): 3152, 839, 1767, 1620, 1506, 1251, 1221, 1135, 1006, 757 cm⁻¹; ¹H-NMR(CDCl₃): δ = 1.30(3H, t, J = 7.61Hz), 2.64-2.71(m, 2H), 6.62(s, 1H), 6.73(s, 1H), 7.09(1H, d, J = 2.3Hz), 7.13(1H, d, J = 2.3Hz), 7.19(1H, d, J = 2.3Hz), 7.28(2H, d, J = 8.2 Hz), 7.42(s, 1H), 7.67(2H, d, J = 8.2Hz), 7.73(1H, d, J = 8.6Hz); MS: m/z (M⁺, 389).

4-[(7-propanoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2-(4-methoxyphenyl)-5(4H)furanone] 21; yield 1.19g (57%); mp 256-258°C. IR(KBr): 3163, 3035, 2868, 1783, 1561, 1349, 1281, 755 cm⁻¹; ¹H-NMR(CDCl₃): δ = 1.29(3H, t, J = 7.52Hz), 2.61-2.69(m, 2H), 3.89(s, 3H), 6.68(s, 1H), 7.00(1H, d, J = 9.2Hz), 7.12(1H, d, J = 2.2Hz), 7.14(1H, d, J = 2.2Hz), 7.23(2H, d, J = 2.2Hz), 7.39(s, 1H), 7.73-7.77(s, 3H); MS: m/z (M⁺, 419). 4-[(7-butanoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2-phenyl-5(4H)furanone] 22; yield 0.95g (61%); mp 260-262°C. IR(KBr): m.p.=270-272°C char. IR(KBr): 3155, 927, 2878, 1750, 619, 1574, 1506, 1214, 1133, 990, 856, 753 cm⁻¹; ¹H-NMR(CDCl₃): δ = 0.98(3H, t, J = 7.4Hz), 1.49-1.75(m, 2H), 2.52(2H, t, J = 6.9Hz), 6.54(s, 1H), 6.66(s, 1H), 7.01-7.23(m, 5H), 7.34(s, 1H), 7.59(2H, d, J = 8.6Hz), 7.63(s, 1H).

4-[(7-butanoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2-(4-methylphenyl)-5(4H)furanone] **23**; The compound was obtained as orange yellow needle from ethanol, 1.19g (yield=57%, m.p.=265-268°C char). IR(KBr): 3163, 3035, 1783, 1699, 1561, 134

1281, 988, 750 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta=1.07(3\text{H}, \text{t}, \text{J} = 7.4\text{Hz})$, 1.76-1.87(m, 2H), 2.43 (s, 3H), 2.60(2H, t, J = 7.4Hz), 6.61(s, 1H), 6.68(s, 1H), 6.73(s, 1H), 7.08(1H, d, J = 2.3Hz), 7.12 (1H, d, J= 2.0 Hz), 7.27 (1H, t, J = 6.2Hz), 7.42(s, 1H), 7.65-7.75(m, 3H). 4-[(7-butanoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2-(4-methoxyphenyl)-5(4H) furanone24; yield 1.27g (59%); mp 260-262°C. IR(KBr): 3159, 2997, 2841, 1778, 1705, 1607, 1504, 1233, 989, 828 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta=1.07(3\text{H}, \text{t}, \text{J} = 7.5\text{Hz})$, 1.78-1.84(m, 2H), 2.60(2H, t, J = 7.8Hz), 3.90(s, 3H), 6.67(2H, d, J = 2.3Hz), 7.12(2H, d, J = 2.3Hz), 7.13(2H, t, J = 2.3 Hz), 7.20(1H, d, J = 2.3Hz), 7.39(s, 1H), 7.74-7.77(m, 2H).

4-[(7-benzoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2(4-methyl)phenyl-5(4H) furanone25, yield 1.52g (61%); mp284-286°C. IR(KBr):3161, 3030, 2917, 1785, 1474, 1413, 1347, 1260, 1134, 1025, 990 & 752 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta=2.57(\text{s}, 3\text{H})$, 6.65 (s, 1H), 6.77(s, 1H), 7.20-7.47(m, 4H), 7.49(s, 1H), 7.55(2H, t, J = 7.5Hz), 7.69(2H, t, J = 7.3Hz), 7.81 (2H, d, J = 8.8Hz), 8.22(2H, d, J = 7.0Hz). 4-[(7-benzoyloxy-2H-1-benzopyran-2-one-4-yl)methylene-2(4-methoxy)phenyl-5(4H)

furanone26; yield 1.23g (53%); mp284-286°C. IR(KBr): 3161, 3030, 2917, 1785, 1474, 1413, 1347, 1260, 1134, 1025, 990 & 752 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$ δ : 3.90(s, 3H), 6.70 (s, 1H), 6.91-7.20 (m, 3H), 7.29(s, 1H), 7.32 (1H, t, J = 6.6Hz), 7.35(1H, t, J = 7.3Hz), 7.53-7.81 (m, 6H), 8.22 (2H, d, J = 7.3Hz); MS: $mz(\text{M}^+, 467)$.

4-[(7-(2-chlorobenzoyloxy -2H-1- benzopyran -2-one -4-yl)methylene-2(4-methyl) phenyl-5(4H)furanone27, yield 1.52g (59%); mp258-260°C. IR(KBr): 3161, 3030, 2917, 1785, 1474, 1413, 1347, 1260, 1134, 1025, 990, 752 cm^{-1} ; $^1\text{H-NMR}(\text{D}_2\text{SO}_4)$ δ 2.59(s, 3H), 6.93(s, 1H), 7.24(s, 2H), 7.44-7.71(m, 6H), 7.87(1H, d, J = 8.8Hz), 8.07(2H, d, J = 7.0Hz), 8.24(s, 1H), 8.42(1H, d, J = 7.0Hz). 4-[(7-Benzyl-2H-1-benzopyran-2-one-4-yl)methylene-2(4-methyl)phenyl-5-(4H)

Furanone28; yield 1.42g (53%); mp245-247°C. IR(KBr):3160, 2997, 2841, 1778, 1705, 1607, 1504, 1351, 1251, 1142, 829 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: δ 2.44(s, 3H), 5.17(s, 2H), 6.62(s, 1H), 6.96(2H, d, J = 2.45Hz), 7.00(1H, d, J = 2.5Hz), 7.30(1H, d, J = 8.3Hz), 7.37(s, 1H), 7.38-7.64(m, 6H), 7.67(3H, d, J = 6.4Hz).

4 -[(7- Benzyl -2H-1- benzopyran -2-one -4-yl) methylene -2(4-methoxy)phenyl-5-(4H) furanone29; yield 1.40g (62%); mp284-286°C. IR(KBr):3160, 2841, 1778, 1705, 1607, 1504, 1351, 1251, 989, 829 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: δ 3.89(s, 3H), 5.16(s, 2H), 6.50(s, 1H), 6.68(s, 1H), 6.95-7.12(m, 4H), 7.26-7.44(m, 6H), 7.64(s, 1H), 7.67(s, 1H), 7.75(s, 1H). 4-[(7-(2'-Chlorobenzyl-2H-1-benzopyran-2-one-4-yl)methylene-2-phenyl)-5-(4H)

furanone30; yield 1.20g (53%); mp215-218°C. IR(KBr): 3146, 1784, 1716, 1610, 1538, 1507, 1352, 1281, 1185, 1160, 1035, 993 and 743 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta= 5.27(\text{s}, 2\text{H})$, 6.51(s, 1H), 6.79(s, 1H), 6.91-7.03(m, 3H), 7.29-7.34(m, 3H), 7.43-7.54(m, 5H), 7.64-7.77(m, 1H), 7.78 (1H, d, J = 3.6Hz), 7.82(1H, d, J = 9.9Hz).

4-[(7-(4-NitroBenzyl)-2H-1-benzopyran-2-one -4 -yl)methylene -2(4-methyl)phenyl-5-(4H)furanone31; yield 1.49g (62%); mp 290-293°C. IR(KBr):3032, 2856, 1778, 1701, 1611, 1518, 1346, 1281, 1185, 1148, 987 & 827; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta=2.66(\text{s}, 3\text{H})$, 5.36(s, 2H), 6.47(s, 1H), 6.78(s, 1H), 6.91-6.96(3H, t, J = 3.6Hz), 7.60(1H, d, J = 2.6Hz), 7.62(3H, d, J = 3.6Hz), 7.75(3H, t, J = 3.6 Hz), 8.25(2H, t, J = 3.6Hz).

4-[(7-(4-Cyano Benzyl -2H-1-benzopyran-2-one -4-yl)methylene -2(4-methyl)phenyl- 5 - (4H)furanone32; yield 1.25g (58%); mp284-286°C. (yield=58%, m.p.=250-255°Cchar). IR(KBr): 3436, 3072, 2854, 1728, 1612, 1509, 1352, 1214, 1183, 1019 and 966 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta= 2.43(\text{s}, 3\text{H})$, 5.22 (s, 2H), 6.52(s, 1H), 6.74(s, 1H), 6.92(3H, d, J = 2.6Hz), 7.00(1H, d, J = 2.6Hz), 7.28(s, 1H), 7.43(s, 1H), 7.57(2H, d, J = 8.4Hz), 7.66-7.57(m, 5H).

By successfully study of furanone, we prepared analogues Oxazolones which tremendous application in antitumour and anticancer activity. 4-(7-propanoyloxy-2H-benzopyran-2-one-4-yl)methylene -2-phenyl-5(4H) oxazolone41: 7-propanoyloxy benzopyran-2-one-4-carboxaldehyde (1.23g, 0.005 moles), fused sodium acetate (2.0gm) and benzoyl propionic acid, 17 (0.98g, 0.0055 moles) benzoyl Glycine 38 (0.98g, 0.0055 moles) mixed with Ac_2O (3ml), heated on a boiling water bath for 20 min. Cooled and filtered, dried, yield 1.03 g (53%); mp 235-237°C. IR(KBr): 3135, 3064, 2941, 1766, 1619, 1558, 1452, 1355, 1297, 1137, 978, 769 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta=1.30(3\text{H}, \text{t}, \text{J} = 7.50\text{Hz})$, 2.10-2.69(2H), 2.43(s, 3H), 2.60(2H, t, J = 7.4Hz), 7.17(1H, d, J = 2.2Hz), 7.21(1H, d, J = 2.2 Hz), 7.58 (2H, t, J = 7.2 Hz), 7.69-7.84(m, 3H), 8.23(1H, d, J = 7.0 Hz), 8.84(2H, d, J = 6.7Hz). MS: $mz(\text{M}^+, 389)$.

4-((7-propanoyloxy-2-one-4-yl)methylene)-2-(2-chlorophenyl)5(4H) oxazolone42: The compound was obtained as yellow needle from ethylacetate, 1.08g (yield=51%, m.p.=210-220°C). IR(KBr):3135, 2943, 1801, 1760, 1617, 1559, 1474, 1350, 1262, 1132, 977, 866 & 733 cm^{-1} ; $^1\text{H-NMR}(\text{CDCl}_3)$: $\delta=1.30(3\text{H}, \text{t}, \text{J} = 7.6\text{Hz})$, 2.60-2.71(m, 2H), 7.58

(2H, d, J = 7.6Hz), 7.21(1H, d, J = 2.2Hz), 7.58(2H, t, J = 2.73Hz), 7.75(s, 1H), 7.82(1H, d, J = 8.6 Hz), 8.16(1H, d, J = 7.0Hz). MS: m/z (M⁺, 423).

4-(7-Butonoyloxy-2H-bezopyran-2-one-4-yl)methylene)-2-phenyl-5(4H)oxazolone **43**; yield 1.02g (53%); IR(KBr): 3097, 2944, 1780,1760, 1617, 1558, 1328, 1262, 1137, 902 & 697 cm⁻¹; ¹H-NMR (CDCl₃): δ=1.07(3H, t, J = 7.4Hz), 1.56-1.88 (m, 2H),2.61(2H, t, J = 7.22Hz), 7.11-7.20(m, 2H), 7.41(s, 1H),7.57(2H, t, J = 7.0Hz), 7.68(1H, d, J = 7.0Hz), 7.80(2H, d, J = 8.6 Hz), 8.22(2H, d, J = 7.02Hz).

4-(7- Butonoyloxy -2H -bezopyran -2- one-4 -yl) methylene)-2-(2-chlorophenyl-5(4H) oxazolones**44**;yield 1.18g (53%); 190-200°C. IR(KBr): 3083, 2935, 1803, 1761, 1608, 1559, 1473,1264, 1179,974, 740 cm⁻¹; ¹H-NMR (CDCl₃): δ= 1.30(3H, t, J = 4.5Hz), 1.56-1.88 (m, 2H), 2.60(2H, d, J = 7.6Hz), 7.15(2H, d, J = 7.8Hz), 7.48(s, 2H), 7.84(2H, d, J = 5.5Hz), 7.79(2H, t, J = 7.6Hz), 8.16(1H, d, J = 6.63Hz).

4-((7-benzoyl-2H-bezopyran-2-one-4-yl) methylene)-2-phenyl-5(4H) oxazolone.45; (52%); 1.13g(yield = 52%, m.p.= 24-243 °C char). IR(KBr): 3078,1870, 1449, 1326, 1248, 1133, 1052, 975, 864 & 769cm⁻¹. ¹H-NMR(CDCl₃):δ=7.36(s,1H), 7.95-8.16(m,7H), 8.21-8.48(m,3H), 8.43-8.48(m, 2H), 8.74(, d, J = 7.68Hz).

4-((2-chlorobenzoyl)-2H-bezopyran-2-one-4-yl)methylene)-2-(2-chlorophenyl-5(4H) oxazolone**46**; yield 1.01g (39%); 190-200°C. IR(KBr): 3078, 1800, 1736,1558, 1449, 326, 1248, 1132,1051, 978, 864 & 699 cm⁻¹; ¹H(CDCl₃):δ=7.00(s, 1H), 7.39(s, 2H), 7.427.59(m, 4H),7.70(1H, t, J = 7.7Hz.), 7.80(2H, t, J = 7.7Hz), 7.99-8.13(m, 3H). 4-[7-(2-(Chlorobenzyl)-2H-bezopyran-2-one-4-yl)methylene)]-2-phenyl-5(4H) oxazolone**47**; yield 1.12g (49%); mp190-200°C. IR(KBr):3077, 1800, 1710, 1609, 1554, 1450,1374, 1350, 1280, 1175, 1064, 1064, 1008, 884,697 cm⁻¹; ¹H-NMR (CDCl₃): δ= 5.27(s, 2H), 6.95-7.03(m, 2H), 7.23-7.30 (m, 6H), 7.32(2H, d, J = 3.9Hz), 7.50 (s, 1H), 7.57(s, 1H), 7.61(1H, d, J = 3.5Hz), 7.74(1H, d, J = 8.6Hz).

4-[7-(2-Chlorobenzyl)-2H- bezopyran -2-one-4-yl)methylene)]2-(2-chlorophenyl-5-(4H) oxazolone**48**; yield 1.23g (50%); mp256-258°C. IR(KBr):3080, 1802, 1719, 1617, 1536, 1471, 1430, 1396, 1346, 1209, 1144, 1117, 1033, 1004, 961 & 736 cm⁻¹; ¹H-NMR (CDCl₃): δ= 5.27 (s, 2H), 6.95-7.03(m, 2H),7.23-7.30(m, 6H), 7.32(2H, d, J = 3.9Hz), 7.50 (s, 1H), 7.57(s, 1H), 7.61 (1H, d, J = 3.5 Hz), 7.74(1H, d, J = 8.6Hz).

4-[7-(4-(nitrobenzyl)-2H-bezopyran-2-one-4-yl)methylene)]-2-(2-chlorophenyl)-5(4H) oxazolone**49**; yield 0.98g (38%); 245-248°C. IR(KBr):2923, 2226, 1801, 1714, 1600, 1554, 1452,1327, 1282, 1145, 1067, 981, 821, 699 & 549 cm⁻¹; ¹HNMR(CDCl₃): δ= 5.22(s, 2H), 6.92(1H, d, J = 2.34Hz), 6.98 (1H, d, J = 2.7Hz), 7.02(1H, d, J = 2.7Hz),7.44-7.63(m, 6H), 7.69-7.77(m, 3H), 8.16(1H, d, J = 7.0Hz).

4-[7-(4-cyanobenzyl-2H-bezopyran-2-one-4-yl)methylene)]-2-phenyl-5(4H)oxazolone **50**; yield 1.14g (51%); 250-255°C. IR(KBr):2923, 2226, 1801, 1714, 1512, 1452, 1353, 1327,1282, 1145, 1067, 821549cm⁻¹; ¹H-NMR(CDCl₃):5.22(s, 2H), 6.92(s, 1H),6.99(1H, d, J = 9.0Hz), 7.24(s, 2H), 7.40 (s, 1H), 7.55-7.77(m, 8H), 8.22(2H, d, J = 7.8Hz).

4-[6-methyl-2H-1-bezopyran-2-one-4-yl) methylene)]-2-phenyl-5(4H) oxazolone**51**; yield 0.75g (51%); 253-255°C.IR(KBr):3066, 1801, 1716, 1654, 620, 1546, 1452, 1346, 1298, 1178, 1066, 759cm⁻¹; ¹H-NMR(CDCl₃):δ= 2.48(s, 3H),7.30(1H, d, J = 8.6Hz), 7.40(1H, d, J = 8.6Hz), 7.48(s, 1H), 7.54-7.62(m, 3H), 7.70(1H, t, J = 7.5 Hz), 7.76(s, 1H), 8.23(2H, d,J=7.4 Hz).

4-[6-methyl-2H-1-bezopyran-2-one-4-yl)methylene)]-2-(2-Chloro)phenyl-5(4H) oxazolone**52**; yield 0.73g (51%); 268-270°C.IR(KBr):3066, 1801, 1716, 1654, 1620, 1546, 1452, 1346, 1298, 1178, 1066, 883 & 759cm⁻¹. ¹H-NMR(CDCl₃):δ=2.48(s,3H),7.30 (1H, d, J = 8.2Hz), 7.40(1H, d, J = 8.2Hz), 7.47(1H, d, J = 8.0Hz), 7.54-7.62(m, 4H), 7.76(s, 1H), 8.18(1H, d, J = 8.2Hz).

4-[6-methyl-2H-1-bezopyran-2-one-4-yl)methylene)]2-(2-methyl)phenyl-5(4H) oxazolone**53**; yield 0.80g (49%); 231-232°C. 0.80g(yield=49%, m.p.=231-232°C). IR(KBr):3066,2922,1803,1712, 1652,1537, 1353,1261, 1182, 1089,871cm⁻¹; ¹H-NMR(CDCl₃):δ=2.45(s, 3H),2.82(s, 3H), 7.29(1H, d, J = 8.3Hz), 7.35-7.42 (m,3H), 7.48(s, 1H), 7.54(1H, t, J = 7.3 Hz), 7.61(s, 1H), 7.70(s,1H), 8.15(1H, d, J = 8.3Hz).

4-[7-methyl-2H-1-bezopyran-2-one-4-yl) methylene)]-2-phenyl-5(4H) oxazolone**54**: yield 0.73g (51%); 268-270°C.

The compound was obtained as orange yellow needles from ethanol,0.56g (yield=34%, m.p.=281-283°C). IR(KBr):3064, 1805, 1714, 1649, 1560, 1537, 1450, 1348, 1174, 952 and 887cm⁻¹. ¹H-NMR(CDCl₃):δ= 2.48(s, 3H), 7.19(1H, d, J = 7.1Hz), 7.21(s, 1H) 7.45(s, 1H), 7.57(2H, t, J = 7.0 Hz), 7.68-7.77(m, 3H), 8.23(2H, d, J = 7.4 Hz).

4-[7-methyl-2H-1-bezopyran-2-one-4-yl)methylene)]-2-(2-Chloro)phenyl-5(4H) oxazolone**55**: yield 0.64g (35%); 275-277°C. IR(KBr): 3085, 1805, 1712, , 1618, 1546, 1471, 1344, 1274, 1182, 1043,777 cm⁻¹; ¹H- NMR(CDCl₃): δ2.48(s, 3H),7.18(d, J = 7.8Hz, 1H), 7.21(s, 1H), 7.45(1H, t, J = 7.1Hz), 7.51-7.63(m, 3H), 7.70(m, 2H), 8.20 (1H, d, J = 8.3Hz).

4-[7-acetoxy-2H-1-benzopyran-2-one-4-yl)methylene]-2-(2-Chloro)phenyl-5(4H) oxazolone 56: yield 0.86g (42%); 226-240°C. IR(KBr):3097, 1797, 1701, 1620, 1554, 1537,1350, 1269, 1186, 894 &727 cm⁻¹; ¹H-NMR (CDCl₃): δ=2.32(s, 3H),7.22(1H, d, J = 8.6 Hz), 7.34(s, 1H), 7.56(s, 1H), 7.61(1H, t, J = 8.2 Hz), 7.67(s, 1H), 7.70-7.787(m, 2H),8.13(1H, d, J = 8.6 Hz), 8.22(1H, d, J = 8.6 Hz).

4-[7-acetoxy-2H-1-benzopyran-2-one-4-yl)methylene]-2-(2-methyl)phenyl-5(4H) oxazolone 57: yield 0.73g (51%); 268-270°C. 1.07g (yield=55%, m.p.=245-247°C).IR(KBr): 3097, 1805, 1760, 1718, 1604, 1556, 1535, 1348, 1265, 1178, 1027, 1178, 1020, 896 & 736cm⁻¹; ¹H-NMR(DMSO): δ=2.30(s, 3H), 2.66(s, 3H), 7.22(d,J=8.2Hz,1H),7.34(s, 1H), 7.47-7.51(m, 3H), 7.59(s, 1H), 7.63(1H, t, J = 7.7Hz), 8.03(1H, d, J = 8.2Hz), 8.21(1H, d, J = 8.2 Hz).

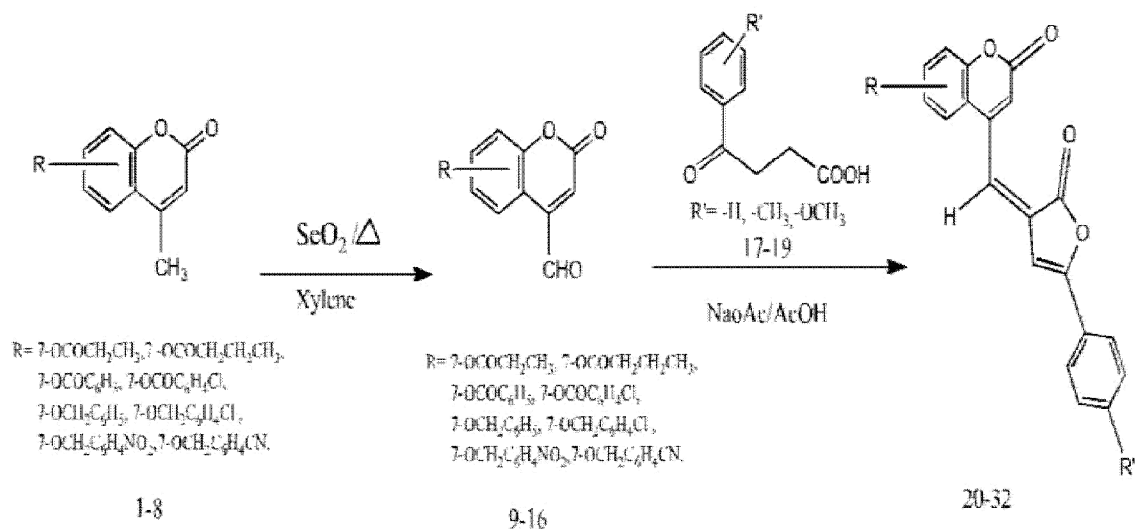
4-[2H-1-naph[1,2-b]pyran-2-one-4-yl)methylene]-2-(2-methyl)phenyl-5(4H) oxazolone

58 yield 0.28g (51%); mp263-265°C. IR(KBr):3062, 17971, 1712, 1600, 1552, 1533, 1357,1271, 1184, 1087, 883 and727cm⁻¹; ¹H-NMR(CDCl₃): δ=2.8(s, 3H), 7.44(2H, d, J = 8.8Hz), 7.58(1H t, J = 7.9Hz), 7.63(s, 1H), 6.68-7.72(m, 2H), 7.84 (1H, d, J = 8.8Hz), 7.76(s, 1H),7.92-7.98(m, 2H), 8.14 (1H, d, J = 8.8Hz), 8.56(1H, t, J = 8.2Hz).

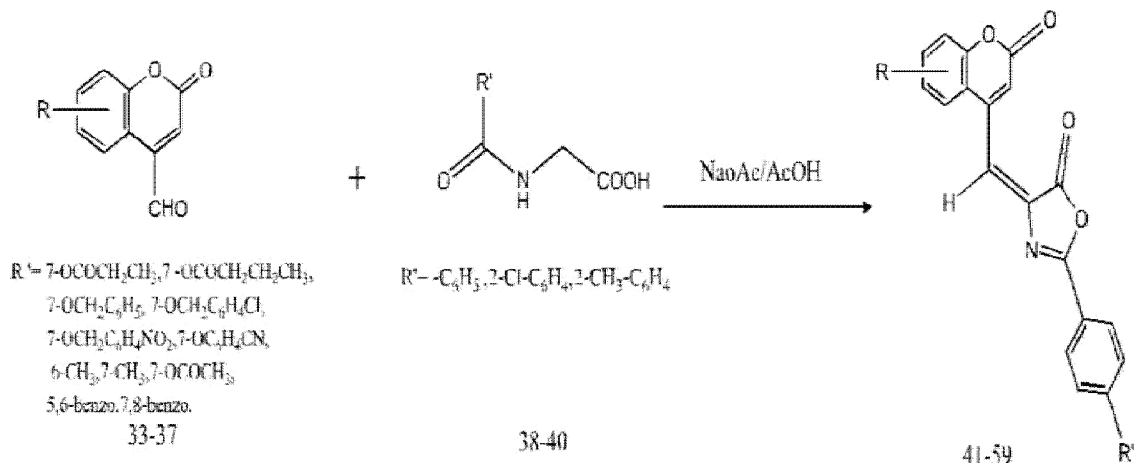
4-[2H-1-naph[2,3-b]pyran-2-one-4-yl)methylene]-2-(2-methyl)phenyl-5(4H) oxazolone 59; yield 0.70g (38%); 268-270°C.

IR(KBr):3066, 1797, 17311552, 1514, 1131, 1271, 1176,1271, 1033, 877,723cm⁻¹; ¹H-NMR(CDCl₃):δ=2.78(s, 3H), 7.34-7.42(m, 2H), 7.50-7.54(m, 2H),7.58(2H, t, J = 7.8Hz),7.70(s, 1H),7.92(1H, d, J = 8.3Hz), 7.97(1H, d, J = 8.3Hz), 8.04(1H, d, J = 8.3Hz), 8.14(1H, t, J = 8.3Hz), 8.31(1H, t, J = 8.3Hz).

Scheme I:-Synthesis of 4-Furanone substituted Coumarins:



Scheme II:-Synthesis of 4-Oxazolone substituted Coumarins:



Physiological Studies: Absorption Spectra of Furanones and Oxazolone :

No.	R and R'	λ_{max}	No.	R and R'	λ_{max}
1	R= COCH ₂ CH ₃ , R'=H	390	17	R=COCH ₂ CH ₂ CH ₃ ,R'=Cl	390
2	R=COCH ₂ CH ₃ , R'= OCH ₃	380	18	R= COC ₆ H ₅ , R'= H	360
3	R=COCH ₂ CH ₂ CH ₃ ,R'= H	420	19	R= COC ₆ H ₄ Cl, R'= Cl	370
4	R=COCH ₂ CH ₂ CH ₃ ,R'=CH ₃	395	20	R= CH ₂ C ₆ H ₄ Cl, R'= H	370
5	R=COCH ₂ CH ₂ CH ₃ ,R'=OCH ₃	380	21	R= CH ₂ C ₆ H ₄ Cl, R'= Cl	380
6	R= COC ₆ H ₅ , R'= CH ₃	360	22	R= CH ₂ C ₆ H ₄ NO ₂ , R'= Cl	370
7	R= COC ₆ H ₅ , R'= OCH ₃	330	23	R= CH ₂ C ₆ H ₄ CN, R'= H	380
8	R= COC ₆ H ₄ Cl, R'= CH ₃	360	24	R=6-CH ₃ , R'= H	380
9	R= CH ₂ C ₆ H ₅ , R'= CH ₃	410	25	R=6-CH ₃ , R'= Cl	380
10	R= CH ₂ C ₆ H ₅ , R'= OCH ₃	400	26	R=6-CH ₃ , R'= CH ₃	380
11	R= CH ₂ C ₆ H ₄ Cl, R'= CH ₃	350	27	R=7-CH ₃ , R'= H	380
12	R= CH ₂ C ₆ H ₄ NO ₂ , R'= CH ₃	360	28	R=7-CH ₃ , R'= Cl	360
13	R= CH ₂ C ₆ H ₄ CN, R'= CH ₃	380	29	R= 7-OCOCH ₃ , R'= Cl	360
14	R= COCH ₂ CH ₃ , R'= H	370	30	R= 7-OCOCH ₃ , R'= CH ₃	370
15	R= COCH ₂ CH ₃ , R'= Cl	390	31	R= 5,6-C ₄ H ₄ , R'= CH ₃	370
16	R=COCH ₂ CH ₂ CH ₃ ,R'= H	380	32	R= 7,8-C ₄ H ₄ , R'= CH ₃	370

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