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Synthesis, characterization and spectral studies of new 4(Substituted phenyl hydrazono)-N^{I}-(R)-amino malonyl-3-methyl-2-Pyrazolin-5-one and 3-methyl-4(Substitutedphenyl hydrazono)-Isoxazolone

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ABSTRACT

Synthesis of some new substituted 2-pyrazolin-5-one were synthesized by the condensation of 3-chloro-4-methoxy ethyl aceto hydrazone (1a) and different substituted phenyl malonamic acid hydraz ides(2a-2l) by using glacial acetic acid as a medium, substituted isoxazolone were synthesized by 3-chloro-4-methoxy ethyl aceto hydrazone(1a) and hydroxylamine hydrochloride with sodium acetate. The structures of synthesized compounds have been characterized by their physical properties and spectral analysis like IR.

Key words: 2-Pyrazolin-5-ones, Isoxazolone, Glacial acetic acid, Condensation, Spectral studies.

INTRODUCTION

The literature survey reveals that pyrazolone and isoxazolone have been studied extensively because of their ready accessibility, diverse chemical reactivity and broad spectrum of biological activity[1-5], therapeutical importance of pyrazolone have been studied as bactericides and fungicides[6,7], derivatives of pyrazolone have been extensively used for their importance as antipyretics and analgesics[8] ,various pyrazolones have been claimed to be effective as germicides , it's derivatives have been found to possess antibacterial[9] , antidepressant[10] activities and cerebro protective effect[11] . Isoxazolone have been found to be associated with wide range of pharmacological activities like antipyretic, immunoregulator[12] ,anticonvulsant[13] . Severalsubstituted pyrazolones and isoxazolones have been synthesized in our laboratory[14-18] by various workers. It was thought to interest to synthesize some new substituted 2-pyrazolin-5-one and isoxazolone derivative bearing chloro and meth- oxy groups. The biological and analytical uses of synthesized compounds are under study.

EXPERIMENTAL

Material

All melting points were determined in open capillary tubes and were uncorrected. IR spectra (Cm^{-1}) were recorded in Kbr-disc on Perkin-Elmer spectrum RX-1 FT-IR spectrophotometer at Central Drug Research Institute (CDRI), Lucknow . All chemicals used in the synthesis were of analytical grade obtained from Sigma-Aldrich Company Germany. The purities of newly synthesized compounds were checked on silica-gel-coated Al plates (Merck), by using 10% (benzene / methanol) for 2-pyrazolin-5-one and isoxazolone. The physical

and analytical data of all the novel synthesized compounds are mentioned in the Table-1 and IR spectral data are recorded in Table-2.

Synthesis of ethyl 2,3-dioxobutyrate 2(3-chloro-4-methoxy)phenyl hydrazone (1a)

To the primary amine (0.025 mole) was diazotised by adding con.HCl (8ml)and distilled water(7ml) at 0°C in an ice-bath,the cold aqueous solution of Sodium Nitrite(0.025 ml) was added to it , then the prepared diazonium salt solution was added gently drop wise in to the (at 0°C temperature) cold solution of Sodium acetate (0.12 mole) and ethyl aceto acetate (0.025 mole) in ethyl alcohol (25 ml) dissolved with the minimum quantity of water. The solid product started separating,then filtered and washed with cold water, recrystallised with hot ethanol.

Synthesis of malon (R) anilic acid hydrazide (2a-2l)

To the substituted aniline (0.025 mole) , diethyl malonate (0.05 mole) was added with the catalyst (DMF) and then refluxed for 45-60 minutes,after some time ethanol (20 ml) was added to it, filtrate was concentrated over the water-bath,ethanol (20 ml) and hydrazine hydrate 99% was added, the solid was separated after some time recrystallised by absolute ethanol and was identified malon (R) anilic acid hydrazides (2a-2l).

General procedure for the synthesis of substituted 3-methyl-2-pyrazolin-5-one (3a-3l)

To (1a;0.001 mole) dissolved in absolute ethanol (10 ml) and (2a-2l ;0.001 mole) was added with the catalyst glacial acetic acid and then refluxed for 4-5 hours, the resulting solid was obtained during refluxing,filtered, recrystallised from hot absolute ethanol 99 %.

General procedure for the synthesis of substituted 3-methyl-isoxazolone (4a)

To (1a; 0.001 mole) dissolved in excess of ethanol (25ml),aqueous solution of hydroxylamine hydrochloride (0.01 mole) and Sodium acetate (0.01 mole) dissolved in minimum quantity of water was refluxed for 4-hours ,obtained crystals on cooling ,was recrystallised from absolute ethanol 99 %.

RESULTS AND DISCUSSION

The IR (Kbr) spectrum of newly synthesized novel substituted pyrazolones and isoxazolone have recorded in the frequency region

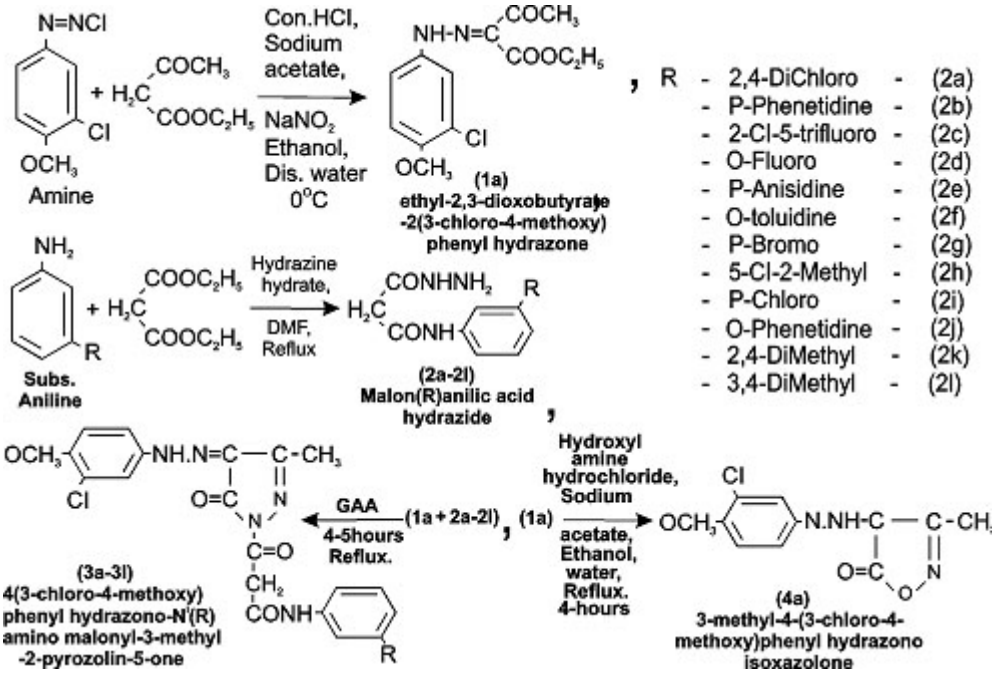

Table 1: Physical and Analytical data of the Synthesized Compounds (1a,2a-2l,3a-3l,4a)

Compounds codes	Molecular Formula	Molecular Weight	Melting Point $0^{o}C$	Yield %	Colour	% Analytical Data C cal.%	(Found)%	H cal.%	(Found)%	N cal.%	(Found)%
1a	$C_{13}H_{16}N_2O_4Cl_1$	299.74	82	83.19	Glorious sunset	52.09	52.12	5.38	5.40	09.34	09.38
2a	$C_9H_9N_3O_2Cl_2$	262.11	131	50.40	Crystalline white	41.24	41.26	3.46	3.47	16.03	16.05
2b	$C_{11}H_{15}N_3O_3$	237.26	123	40.31	Off white	55.68	55.71	6.37	6.39	17.71	17.75
2c	$C_{10}H_9N_3O_2Cl_1F_3$	295.66	135	44.82	Whitish cream caress	40.62	40.64	3.07	3.08	14.21	14.25
2d	$C_9H_{10}N_3O_2F_1$	211.20	89	35.06	White pebble	51.18	51.19	4.77	4.78	19.89	19.91
2e	$C_{10}H_{13}N_3O_3$	223.24	119	47.15	Light coffee	53.80	53.84	5.87	5.89	21.50	21.54
2f	$C_{10}H_{13}N_3O_3$	207.23	94	32.59	Magnalia	57.96	57.92	6.32	6.30	20.28	20.29
2g	$C_9H_{10}N_3O_2Br_1$	272.12	124	43.56	Morning white	47.59	47.62	3.70	3.71	15.44	15.47
2h	$C_{10}H_{12}N_3O_2Cl_1$	241.68	103	46.73	Brillient white	49.69	49.70	5.00	4.98	17.38	17.41
2i	$C_9H_{10}N_3O_2Cl_1$	227.66	166	48.94	Crystalline corel white	47.48	48.51	4.42	4.44	18.46	18.49
2j	$C_{11}H_{15}N_3O_3$	237.26	134	37.23	Crystalline white	55.68	55.70	6.37	6.38	17.71	17.74
2k	$C_{11}H_{15}N_3O_2$	221.26	136	31.84	Creamish white	59.71	59.73	6.83	6.85	18.99	19.02
2l	$C_{11}H_{15}N_3O_2$	221.26	151	36.62	Orange frost	59.71	59.73	6.83	6.86	18.99	19.03
3a	$C_{20}H_{18}N_5O_4Cl_3$	498.77	251	38.32	Sporty yellow	48.16	48.17	3.63	3.64	14.04	14.07
3b	$C_{22}H_{24}N_5O_5Cl_1$	473.92	252	42.08	Wild yellow	55.75	55.78	5.10	5.12	14.77	14.82
3c	$C_{21}H_{16}N_5O_4Cl_2F_3$	532.33	238	39.32	Corel cream	47.38	47.40	3.40	3.42	13.15	13.20
3d	$C_{20}H_{16}N_5O_4Cl_1F_1$	447.87	221	46.07	Wild yellow	53.63	53.61	4.27	4.25	15.63	15.66
3e	$C_{21}H_{22}N_5O_5Cl_1$	459.90	241	50.95	Pale cream	54.84	54.87	4.82	4.84	15.23	15.27
3f	$C_{21}H_{22}N_5O_4Cl_1$	443.90	259	36.75	Light pale cream	56.82	56.83	4.99	4.97	15.77	15.79
3g	$C_{20}H_{18}N_5O_4Cl_1Br_1$	508.78	250	48.16	Pale cream	47.21	47.23	3.76	3.78	13.76	13.79
3h	$C_{21}H_{21}N_5O_4Cl_2$	478.35	245	36.59	Magnalia	52.72	52.70	4.42	4.40	14.64	14.68
3i	$C_{20}H_{19}N_5O_4Cl_2$	464.32	252	53.70	Wild yellow	51.73	51.77	4.12	4.15	15.08	15.10
3j	$C_{22}H_{24}N_5O_5Cl_1$	473.92	232	35.94	Off white	55.75	55.77	5.10	5.11	14.77	14.80
3k	$C_{22}H_{24}N_5O_4Cl_1$	457.93	233	39.92	Magnolia	57.70	57.72	5.28	5.30	15.29	15.30
3l	$C_{22}H_{24}N_5O_4Cl_1$	457.93	262	35.50	Light pale cream	57.70	57.67	5.28	5.31	15.29	15.31
4a	$C_{11}H_{12}N_3O_3Cl_1$	269.69	167	34.51	Light camp fire	48.98	49.01	4.48	4.51	17.80	17.84

4000-450 cm^{-1} are furnished in Table-2. The IR Sectrum of 4(3-chloro-4-methoxy)phenyl hydrazono-N^{I} (R) amino malonyl-3-methyl-2-pyrazolin-5-one[3a-3h] showed absorption in the range of 3053.7-3051.0 cm^{-1} indicated the presence of aromatic -CH, absorption in the range 3298.0-3286.4 cm^{-1} reveals the -NH stretching , absorption in the range 2364.1-2362.9 cm^{-1} indicating -N=CH stretching vibrations, -C=N shows stretching vibrations in the range 1599.6-1589.5 cm^{-1} ,aromatic C=O shows stretching vibrations in the range 1654.3-1652.4 cm^{-1} , absorption in the range 1241.1-1233.4 cm^{-1} reveals -C-N stretching, absorption in the range 1498.5-1491.0 cm^{-1} reveals -N-N .-C-Cl linckage shows stretching vibrations in the range 690.3-667.3 cm^{-1} , absorption in the range 1430.6-1412.3 cm^{-1} reveals -CH_3 stretching. These observations are lent support to the assigned structures, colouring properties, melting points of the compounds 3a-3h and other compounds 3i-3l. The IR Spectrum of newly synthesized substituted isoxazolone[4a] shows stretching vibrations of -N=CH at the absorption 2362.0 cm^{-1} ,absorption at 1565.3 indicating the presence of C=N and absorption at 1711.7 cm^{-1}reveals the aromatic C=O , absorption at 1488.5 cm^{-1} indicates the N-N stretching vibrations, absorption at 1432.1 reveals the CH_3 group.

Table 2: IR Absorption Bands

Compounds codes	Ar CH cm^{-1} stretching	NH cm^{-1} stretching	N=CH cm^{-1} stretching	C=N cm^{-1} stretching	Ar C=O cm^{-1} stretching	C-N cm^{-1} stretching	N-N cm^{-1} stretching	C-Cl cm^{-1} stretching	CH_3 cm^{-1} stretching
3a	3050.3	3298.0	2363.9	1599.6	1653.0	1234.1	1491.0	667.5	1427.0
3b	3052.0	3296.9	2363.1	1591.1	1654.1	1236.2	1498.5	671.7	1420.0
3c	3052.4	3293.9	2363.3	1594.1	1652.4	1234.9	1495.6	667.3	1429.6
3d	3051.0	3295.0	2363.1	1592.2	1653.1	1233.4	1498.0	669.5	1429.5
3e	3053.7	3296.1	2364.1	1589.5	1654.0	1241.1	1497.0	675.5	1412.4
3f	3051.3	3294.3	2363.2	1594.3	1654.3	1234.2	1497.6	669.7	1429.3
3g	3052.3	3294.5	2363.4	1591.0	1652.5	1236.1	1495.9	671.0	1428.3
3h	3051.0	3286.4	2362.9	1592.8	1653.5	1238.4	1494.9	690.3	1430.6
4a	-	-	2362.9	1565.3	1711.7	-	1488.5	-	1432.1

All of these observations are agreed with the assigned structures and colouring properties, melting points of the newly synthesized compound 4a.

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