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# NEW SYNTHESIS OF 1-ARYL-4-(4-HYDROXY-3,5-DIIODO-α-METHYL-BENZYLIDENE)-2-PHENYLIMIDAZOL-5-ONES

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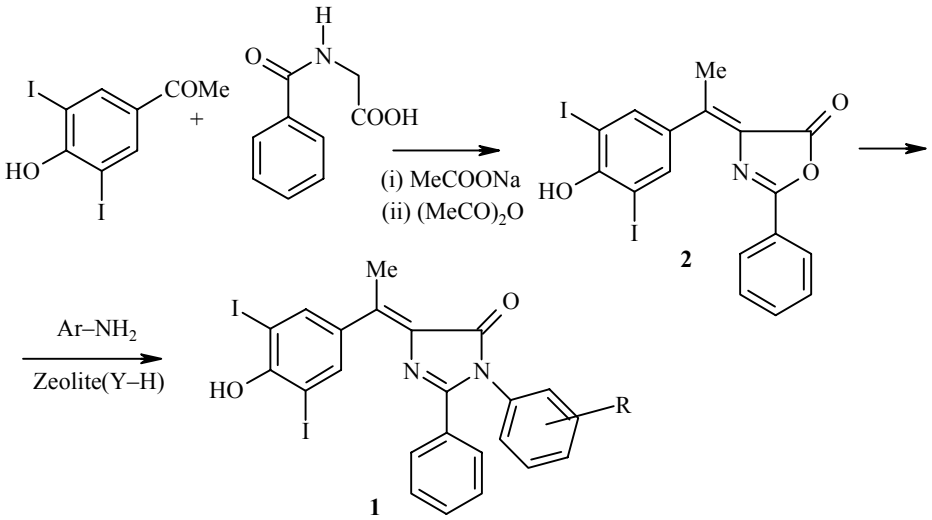
*Some new 1-aryl-4-(4-hydroxy-3,5-diiodo-α-methylbenzylidene)-2-phenylimidazol-5-ones were prepared by treating the mixture of an analogous 5-oxazolone derivative with aromatic and substituted aromatic amines in the presence of Zeolite (Y-H) catalyst.*

**Keywords:** amines, hippuric acid, imidazolones, oxazolones, zeolites.

Imidazolones are associated with several pharmacological activities [1-4]. Imidazolidinones have been reported to possess potent CNS depressant activity. Some imidazoles and substituted imidazolones possess monoamine oxidase (MAO) inhibitory and anticonvulsant activity [5-7]. Benzylidene derivatives are also reported to possess anticonvulsant and MAO inhibitory activity. These observations prompted us to synthesize some new 1-aryl-4-(4-hydroxy-3,5-diiodo-α-methylbenzylidene)-2-phenylimidazol-5-ones by a new method.




**1 a** R = H, **b** R = 4-Cl, **c** R = 4-Br, **d** R = 4-I, **e** R = 4-OH, **f** R = 3-$NO_2$, **g** R = 4-$NO_2$, **h** R = 3-COOH, **i** R = 4-COOH, **j** R = 2-Me, **k** R = 4-Me, **l** R = 2-OMe, **m** R = 3-OMe, **n** R = 4-OMe

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Usually imidazolones **1** are prepared by heating a mixture of 5-oxazolone derivatives **2** with aromatic and substituted aromatic amines in the presence of pyridine for 10-15 h, the yield of the imidazolones **1** being 50-65%. In the context of our studies we have synthesized some new 5-imida- zolones **1** by the condensation of aromatic and substituted aromatic amines with 5-oxazolone derivative **2** in the presence of (Y-H) Zeolite. The reaction proceeds 3-5 h with 85-96% yield. The 5-oxazolone derivatives (azlactones) are prepared by the condensation of hippuric acid with 4-hydroxy-3,5-diiodoacetophenone in the presence of sodium acetate and acetic anhydride. The compounds were crystallized from alcohol. The products were identified on the basis of elemental analysis and spectral data (IR and $^1$H NMR).

## EXPERIMENTAL

Melting points were determined in open capillary tubes and are uncorrected. The purity of the compounds used was checked by TLC silica gel G. IR spectra were recorded in nujol on a Perkin-Elmer-237 spectrophotometer. $^1$H NMR spectra were recorded in $CDCl_3$ on a Perkin-Elmer R-32 spectrometer (90 MHz) using TMS as internal standard.

**4-(4-Hydroxy-3,5-diiodo-α-methylbenzylidene)-2-phenyloxazol-5-one (2**). A mixture of 4-hydroxy-3,5-diiodoacetophenone (0.01 mol), hippuric acid (0.01 mol), acetic anhydride (0.03 mol), and sodium acetate (0.01 mol) is heated on an electric hot plate with constant shaking in a conical flask. As soon as the mixture was liquefied completely, the flask was heated on a water bath for 2 h. Ethanol (5 ml) was added slowly to the contents of the flask and the mixture was allowed to stand overnight. The separated crystalline solid was filtered off, washed with ice-cold alcohol, then with hot water to obtain 0.509 g (96%) of oxazolone **2**; mp 115°C. IR spectrum (neat), ν, cm$^{-1}$: 3650, 1630-1610, 1610-1580, 1660-1640. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.6 (s, 3H, $CH_3$); 7.0-8.2 (m, 7H, Ar–H); 9.8 (s, 1H, Ar–OH). Found, %: C 38.41; H 2.03; N 2.61. $C_{17}H_{11}I_2NO_3$. Calculated, %: C 38.45; H 2.09; N 2.64. M 531.09.

**1-Aryl-4-(4-hydroxy-3,5-diiodo-α-methylbenzylidene)-2-phenylimidazol-5-ones (1a-n)** (**General Procedure**). A solution of oxazol-5-one **2** (0.01 mol) and an aromatic amine (0.01 mol) in pyridine was heated with Zeolite (Y-H) catalyst on an oil bath at 150°C for 3-5 h. The excess of pyridine was distilled off. The mixture was cooled and poured into crushed ice and HCl. The product was filtered off and recrystallized from ethanol to give 5-imidazolones **1a-n**.

**Compound 1a**. Yield 89%; mp 125°C. IR spectrum (neat), ν, cm$^{-1}$: 3700, 1630-1615, 1610-1595, 1660-1640. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 7.2-8.2 (m, 12H, Ar–H); 9.9 (s, 1H, Ar–OH). Found, %: C 45.45; H 2.57; N 4.56. $C_{23}H_{16}I_2N_2O_2$. Calculated, %: C 45.57; H 2.66; N 4.62. M 606.20.

**Compound 1b**. Yield 95%; mp 93°C. IR spectrum (neat), ν, cm$^{-1}$: 3705, 1635-1615, 1610-1595, 1665-1640. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.7 (s, 3H, $CH_3$); 7.0-8.2 (m, 11H, Ar–H); 9.8 (s, 1H, Ar–OH). Found, %: C 43.10; H 2.30; N 4.55. $C_{23}H_{15}ClI_2N_2O_2$. Calculated, %: C 43.12; H 2.36; N 4.57. M 640.65.

**Compound 1c**. Yield 94%; mp 165°C. IR spectrum (neat), ν, cm$^{-1}$: 3710, 1630-1610, 1605-1590, 1650-1640. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 7.1-8.1 (m, 11H, Ar–H); 9.9 (s, 1H, Ar–OH). Found, %: C 40.28; H 2.14; N 4.06. $C_{23}H_{15}BrI_2N_2O_2$. Calculated, %: C 40.32; H 2.21; N 4.09. M 685.10.

**Compound 1d**. Yield 88%; mp 94°C. IR spectrum (neat), ν, cm$^{-1}$: 3715, 1630-1610, 1605-1590, 1660-1635. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.7 (s, 3H, $CH_3$); 7.2-8.0 (m, 11H, Ar–H); 9.7 (s, 1H, Ar–OH). Found, %: C 37.71; H 2.10; N 3.85. $C_{23}H_{15}I_3N_2O_2$. Calculated, %: C 37.73; H 2.07; N 3.83. M 732.10.

**Compound 1e**. Yield 90%; mp 152°C. IR spectrum (neat), ν, cm$^{-1}$: 3710, 1635-1615, 1610-1580, 1665-1640. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 7.1-8.2 (m, 11H, Ar–H); 9.9 (s, 1H, Ar–OH); 10.5 (s, 1H, Ar–OH). Found, %: C 44.34; H 2.53; N 4.45. $C_{23}H_{16}I_2N_2O_3$. Calculated, %: C 44.40; H 2.59; N 4.50. M 622.20.

**Compound 1f**. Yield 93%; mp 129°C. IR spectrum (neat), ν, cm$^{-1}$: 3700, 1625-1615, 1610-1590, 1660-1635. $^1$H NMR spectrum ($CDCl_3$), δ, ppm: 2.9 (s, 3H, $CH_3$); 7.0-8.4 (m, 11H, Ar–H); 10.0 (s, 1H, Ar–OH). Found, %: C 42.39; H 2.27; N 6.42. $C_{23}H_{15}I_2N_3O_4$. Calculated, %: C 42.42; H 2.32; N 6.45. M 651.20.

**Compound 1g**. Yield 91%; mp 130°C. IR spectrum (neat), ν, $cm^{-1}$: 3690, 1635-1610, 1605-1590, 1655-1640. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 7.0-8.2 (m, 11H, Ar–H); 9.9 (s, 1H, Ar–OH). Found, %: C 42.35; H 2.25; N 6.38. $C_{23}H_{15}I_2N_3O_4$. Calculated, %: C 42.42; H 2.32; N 6.45. M 651.20.

**Compound 1h**. Yield 87%; mp 136°C. IR spectrum (neat), ν, $cm^{-1}$: 3700, 1625-1615, 1610-1595, 1660-1640. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.7 (s, 3H, $CH_3$); 7.3-8.3 (m, 11H, Ar–H); 9.9 (s, 1H, Ar–OH); 10.9 (s, 1H, COOH). Found, %: C 44.37; H 2.44; N 4.28. $C_{24}H_{16}I_2N_2O_4$. Calculated, %: C 44.33; H 2.48; N 4.31. M 650.21.

**Compound 1i**. Yield 96%; mp 85°C. IR spectrum (neat), ν, $cm^{-1}$: 3710, 1630-1620, 1610-1595, 1650-1640. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 7.2-8.4 (m, 11H, Ar–H); 9.8 (s, 1H, Ar–OH); 10.8 (s, 1H, COOH). Found, %: C 44.24; H 2.43; N 4.26. $C_{24}H_{16}I_2N_2O_4$. Calculated, %: C 44.33; H 2.48; N 4.31. M 650.21.

**Compound 1j**. Yield 93%; mp 100°C. IR spectrum (neat), ν, $cm^{-1}$: 3690, 1635-1620, 1610-1590, 1656-1645. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 2.3 (s, 3H, Ar-$CH_3$); 7.3-8.2 (m, 11H, Ar–H); 10.0 (s, 1H, Ar–OH). Found, %: C 46.45; H 2.88; N 4.50. $C_{24}H_{18}I_2N_2O_2$. Calculated, %: C 46.48; H 2.93; N 4.52. M 620.23.

**Compound 1k**. Yield 90%; mp 78°C. IR spectrum (neat), ν, $cm^{-1}$: 3685, 1630-1615, 1610-1595, 1660-1640. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.9 (s, 3H, $CH_3$); 2.2 (s, 3H, Ar-$CH_3$); 7.1-8.1 (m, 11H, Ar–H); 9.9 (s, 1H, Ar–OH). Found, %: C 46.41; H 2.87; N 4.43. $C_{24}H_{18}I_2N_2O_2$. Calculated, %: C 46.48; H 2.93; N 4.52. M 620.23.

**Compound 1l**. Yield 92%; mp 135°C. IR spectrum (neat), ν, $cm^{-1}$: 3700, 1630-1615, 1610-1590, 1665-1640. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.9 (s, 3H, $CH_3$); 4.1 (s, 3H, $OCH_3$); 7.2-8.2 (m, 11H, Ar–H); 9.7 (s, 1H, Ar–OH). Found, %: C 45.27; H 2.79; N 4.31. $C_{24}H_{18}I_2N_2O_3$. Calculated, %: C 45.31; H 2.85; N 4.40. M 636.23.

**Compound 1m**. Yield 85%; mp 110°C. IR spectrum (neat), ν, $cm^{-1}$: 3705, 1635-1615, 1610-1585, 1660-1645. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.8 (s, 3H, $CH_3$); 4.2 (s, 3H, $OCH_3$); 7.2-8.2 (m, 11H, Ar–H); 9.6 (s, 1H, Ar–OH). Found, %: C 45.23; H 2.77; N 4.35. $C_{24}H_{18}I_2N_2O_3$. Calculated, %: C 45.31; H 2.85; N 4.40. M 636.23.

**Compound 1n**. Yield 90%; mp 140°C. IR spectrum (neat), ν, $cm^{-1}$: 3695, 1635-1615, 1610-1590, 1650-1645. $^1H$ NMR spectrum ($CDCl_3$), δ, ppm: 2.9 (s, 3H, $CH_3$); 3.9 (s, 3H, $OCH_3$); 7.2-8.2 (m, 12H, Ar–H); 9.9 (s, 1H, Ar–OH). Found, %: C 45.30; H 2.80; N 4.36. $C_{24}H_{18}I_2N_2O_3$. Calculated, %: C 45.31; H 2.85; N 4.40. M 636.23.

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