**2.0 Methods and Materials**

**2.1. Synthesis of benzimidazole**

Benzimidazole derivatives **1**–**20** were synthesized by treating 3.12 mmol of 3,5-dichlorobenzene-1,2-diamine with 3.16 mmol of arylaldehyde. Then N, N-dimethylformamide (DMF) 10 ml and sodium metabisulphite (Na2S2O5) 3 mmol were mixed in the reaction. The reaction mixture was mixed and refluxed for 6 h. The reaction was observed by Thin layer chromatography (TLC) when reaction completed; the reaction mixture left for cooling 30 min then 30 ml of water was included which brought out precipitation. Finally, the precipitates were separated by filter and the crude product was recrystalized in ethyl acetate to afford pure crystal (Taha et al., 2015).

**2.2. Spectroscopic data**

**2.2.1. 4,6-dichloro-2-o-tolyl-1H-benzo[d]imidazole (1)**

1H NMR (500 MHz, DMSO):*δ* 9.45 (1H, NH) 8.37 (d, *J* = 2.1 Hz, 1H, Ar-H), 8.19 (s, 1H, Ar-H), 7.78 (dd, *J* = 2.1 Hz,7.45 Hz, 1H, Ar-H), 7.47–7.41 (m, 3H, Ar-H), 2.61 (s, 3H, CH3); 13C NMR (125 MHz, DMSO-*d6*): *δ* 151.8 (C-2), 141.4(C-4), 137.4 (C-10), 136.7 (C-11), 136.4 (C-5), 131.5 (C-8), 130.2 (C-15), 129.6 (C-14), 129.5 (C-12), 128.6 (C-13), 122.6 (C-7), 122.4 (C-6), 114.0 (C-9), 18.5 (CH3); Anal. Cal for C14H10Cl2N2: C = 60.67, H = 3.64, N = 10.11. Found: C = 60.65, H = 3.60, N = 10.07; EI MS *m/z* (% rel. abund.): 278 (M+ 2, 16), 276 (M+, 52.9), Yield: 78%.

**2.2.2. 4-(4,6-dichloro-1H-benzo[d]imidazol-2-yl) benzene-1,3-diol (2)**

1H NMR (500 MHz, DMSO):*δ* 10.2 (s, 1H, NH), 9.60 (s, 2H, 2xOH), 7.98 (d, *J* = 8.4 Hz, 1H, Ar-H), 7.62 (d, *J* = 1.4 Hz, 1H, Ar-H), 7.43 (d, *J* = 1.4 Hz, 1H, Ar-H), 6.47 (dd, *J* = 2.4, 8.4 Hz, 1H, Ar-H), 6.47 (d, *J* = 2.4 Hz, 1H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 160.0 (C-13), 156.4 (C-11), 152.9 (C-2), 141.9 (C-4), 136.4 (C-5), 130.6 (C-8), 130.5 (C-15), 123.7 (C-7), 122.1 (C-6), 113.7 (C-9), 110.9 (C-10), 109.2 (C-14), 105.8 (C-12); Anal. Cal for C13H8Cl2N2O2: C = 52.91, H = 2.73, N = 9.49. Found: C = 52.88, H = 2.71, N = 9.47; EI MS *m/z* (% rel. abund.): 297 (M+ 2, 9), 295 (M+, 31), Yield: 83%.

**2.2.3. 4,6-dichloro-2-(pyridin-3-yl)-1H-benzo[d]imidazole (3)**

1H NMR (500 MHz, DMSO): *δ* 13.61 (s, 1H, NH), 9.37 (s, 1H, Ar-H), 8.74 (dd, *J* = 1.5, 5.0 Hz, 1H, Ar-H), 8.55 (s, 1H, Ar-H), 7.64 (s, 1H, Ar-H), 7.63 (dd, *J* = 5.0, 8.2 Hz, 1H, Ar-H), 7.45 (s, 1H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 155.3 (C-11), 152.9 (C-2), 147.7 (C-13), 141.9 (C-4), 136.6 (C-5), 135.6 (C-15), 132.7 (C-10), 130.6 (C-8), 124.2 (C-14), 123.7 (C-7), 122.1 (C-6), 113.9 (C-9); Anal. Cal for C12H7Cl2N3: C = 54.57, H = 2.67, N = 15.91. Found: C = 54.55, H = 2.67, N = 15.88; EI MS *m/z* (% rel. abund.): 265 (M+ 2, 26), 263 (M+, 73), Yield: 74%.

**2.2.4. 4,6-dichloro-2-(4-fluorophenyl)-1H-benzo[d]imidazole (4)**

1H NMR (500 MHz, DMSO): *δ* 13.24 (s, 1H, NH), 8.25 (s, 1H, Ar-H), 7.47 (d, *J* = 2.4 Hz, 1H, Ar-H), 7.66 (s, 1H, Ar-H), 7.45 (s, 1H, Ar-H), 6.67 (dd, *J* = 2.4, 8.4 Hz, 1H, Ar-H) 6.61 (d, *J* = 2.4 Hz, 1H, Ar-H); 13C NMR (1254 MHz, DMSO): *δ* 163.2 (C-13), 152.6 (C-2), 141.6 (C-4), 136.4 (C-5), 130.8 (C-8), 130.3 (C-10), 129.1 (C-11), 129.3 (C-15), 123.9 (C-7), 122.3 (C-6), 116.2 (C-12), 116.0 (C-14), 113.9 (C-9); Anal. Cal for C13H7Cl2FN2: C = 55.54, H = 2.51, N = 9.97. Found: C = 55.52, H = 2.51, N = 9.96; EI MS *m/z* (% rel. abund.): 282 (M + 2, 24), 280 (M+, 80), Yield: 77%.

**2.2.5. 4,6-dichloro-2-(2-chlorophenyl)-1H-benzo[d]imidazole (5)**

1H NMR (500 MHz, DMSO): *δ* 8.22 (s, 1H, NH), 7.76 (d, *J* = 7.74 Hz, 1H, Ar-H), 7.58 (d, *J* = 7.43 Hz, 1H, Ar-H), 7.37 (t, 1H, Ar-H), 7.41 (t, 1H, Ar-H), 7.31 (s, 2H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 153.2 (C-7), 142.1 (C-1), 138.7 (C-8), 136.6 (C-2), 132.5 (C-13), 130.7 (C-5), 130.4 (C-11), 129.7 (C-12), 129.5 (C-9), 127.7 (C-10), 124.2 (C-4), 122.3 (C-3), 114.4 (C-6); Anal. Cal for C13H7Cl3N2: C = 52.49, H = 2.34, N = 9.43. Found: C = 52.47, H = 2.32, N = 9.41; EI MS *m/z* (% rel. abund.): 296 (M + 2, 12), 298 (M+, 34), Yield: 79%.

**2.2.6. 4-(4,6-dichloro-1H-benzo[d]imidazol-2-yl) benzene-1,2-diol (6)**

1H NMR (500 MHz, DMSO): *δ* 9.58 (s, 1H, NH), 9.32 (s,1H, OH), 9.10 (s, 1H, OH), 7.64 (d, *J* = 2.1 Hz, 1H, Ar-H), 7.52–7.48 (m, 2H, Ar-H), 7.34 (d, *J* = 2.1 Hz, 1H, Ar-H), 6.88 (d, *J* = 8.1 Hz, 1H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 152.7 (C-2), 147.1 (C-13), 145.7 (C-12), 141.7 (C-4), 136.6 (C-5), 130.6 (C-8), 124.4 (C-10), 123.5 (C-7), 123.3 (C-15), 122.3 (C-6), 116.2 (C-14), 114.5 (C-11), 114.1 (C-9); Anal. Cal for C13H8Cl2N2O2: C = 52.91, H = 2.73, N = 9.49. Found: C = 52.91, H = 2.72, N = 9.48; EI MS *m/z* (% rel. abund.): 297 (M + 2, 6), 295 (M+, 22), Yield: 81%.

**2.2.7. 5-(4,6-dichloro-1H-benzo[d]imidazol-2-yl)-2-methoxyphenol (7)**

1H NMR (500 MHz, DMSO): *δ* 11.50 (s, 1H, NH), 9.80 (s,1H, OH), 7.67 (d, *J* = 2.1 Hz, 1H, Ar-H), 7.66 (dd, *J* = 2.1, 8.2 Hz, 1H, Ar-H), 7.57 (d, *J* = 2.1 Hz, 1H, Ar-H), 7.37 (d, *J* = 2.2 Hz, 1H, Ar-H), 7.12 (d, *J* = 8.3 Hz, 1H, Ar-H), 3.81 (s, 3H, OCH3); 13C NMR (125 MHz, DMSO): *δ* 152.8 (C-2), 147.3 (C-13), 147.4 (C-12), 141.7 (C-4), 136.5 (C-5), 130.4 (C-8), 124.1 (C-10), 123.7 (C-7), 122.7 (C-15), 122.1 (C-6), 113.7 (C-9), 113.7 (C-11), 111.6 (C-14), 56.3 (OCH3); Anal. Cal forC14H10Cl2N2O2: C = 54.39, H = 3.26, N = 9.06. Found: C = 54.39, H = 3.24, N = 9.08; EI MS *m/z* (% rel. abund.): 310 (M + 2, 10), 308 (M+, 36), Yield: 76%.

**2.2.8. 4,6-dichloro-2-m-tolyl-1H-benzo[d]imidazole (8)**

1H NMR (500 MHz, DMSO): *δ* 13.38 (s, 1H, NH), 8.05 (s, 1H, Ar-H), 7.97 (d, *J* = 8.2 Hz, 1H, Ar-H), 7.55 (d, *J* = 1.4 Hz, 1H, Ar-H), 7.49 (t, *J* = 7.4 Hz, 1H, Ar-H), 7.39 (d, *J* = 1.9 Hz, 1H, Ar-H), 7.35(s, 1H, Ar-H); 2.51 (s, 3H, CH3); 13C NMR (125 MHz, DMSO): *δ* 152.7 (C-2), 141.5 (C-4), 137.7 (C-10), 137.3 (C-11), 136.4 (C-5), 131.1 (C-12), 130.6 (C-8), 129.1 (C-14), 129.2 (C-13), 128.7 (C-15), 123.7 (C-7), 122.1 (C-6), 113.9 (C-9), 21.6 (CH3); Anal. Cal for C14H10Cl2N2: C = 60.67, H = 3.64, N = 10.11. Found: C = 60.63, H = 3.63, N = 10.09; EI MS *m/z* (% rel. abund.): 278 (M + 2, 21), 276 (M+, 67), Yield: 80%.

**2.2.9. 4,6-dichloro-2-p-tolyl-1H-benzo[d]imidazole (9)**

1H NMR (500 MHz, DMSO): *δ* 13.33 (s, 1H, NH), 8.08 (d, *J* = 8.4 Hz, 2H, Ar-H), 7.54 (s, 1H, Ar-H), 7.41 (d, *J* = 8.4 Hz, 2H, Ar-H) 7.38 (s, 1H, Ar-H), 2.52 (s, 3H, CH3); 13C NMR (125 MHz, DMSO): *δ* 153.1 (C-2), 141.7 (C-4), 136.6 (C-5), 131.5 (C-10), 131.7 (C-13), 130.6 (C-8), 129.5 (C-12), 129.6 (C-14), 128.7 (C-11), 128.9 (C-15), 123.7 (C-7), 122.1 (C-6), 113.8 (C-9), 21.3 (CH3); Anal. Cal for C14H10Cl2N2: C = 60.67, H = 3.64, N = 10.11. Found: C = 60.65, H = 3.61, N = 10.07; EI MS *m/z* (% rel. abund.): 278 (M + 2, 11), 276 (M+, 39). Yield: 86%.

**2.2.10. 2-(4,6-dichloro-1H-benzo[d]imidazol-2-yl) benzene-1,4-diol (10)**

1H NMR (500 MHz, DMSO): *δ* 13.24 (1H, NH), 11.48 (1H, OH), 9.15 (1H, OH), 7.66 (s, 1H, Ar-H), 7.54 (s, 1H, Ar-H), 7.43 (d, *J* = 1.4 Hz, 1H, Ar-H), 6.92 (d, *J* = 9.1 Hz, 1H, Ar-H), 6.87 (dd, *J* = 6.4, 9.1 Hz, 1H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 153.1 (C-2), 150.1 (C-14), 146.8 (C-11), 141.7 (C-4), 136.4 (C-5), 130.6 (C-8), 123.7 (C-7), 122.1 (C-6), 119.7 (C-10), 117.8 (C-12), 117.1 (C-13), 114.3 (C-15), 113.7 (C-9); Anal. Cal for C13H8Cl2N2O2: C = 52.91, H = 2.73, N = 9.49. Found: C = 52.88, H = 2.71, N = 9.47; EI MS *m/z* (% rel. abund.): 297 (M + 2, 23), 295 (M+, 73), Yield: 84%.

**2.2.11. 2-(4,6-dichloro-1H-benzo[d]imidazol-2-yl)-5-methoxyphenol (11)**

1H NMR (500 MHz, DMSO): *δ* 12.56 (1H, NH), 10.40 (1H, OH), 8.06 (d, *J* = 9.1 Hz, 1H, Ar-H), 7.66 (s, 1H, Ar-H), 7.45 (d, *J* = 2.1 Hz, 1H, Ar-H), 6.65 (dd, *J* = 2.4, 8.6 Hz, 1H, Ar-H), 6.63 (d, *J* = 2.4 Hz, 1H, Ar-H), 3.84 (s, 3H, OCH3); 13C NMR (125 MHz, DMSO): *δ* 162.2 (C-13), 156.2 (C-15), 152.7 (C-2), 141.5 (C-4), 136.6 (C-5), 130.6 (C-8), 129.7 (C-11), 123.7 (C-7), 122.1 (C-6), 113.7 (C-9), 110.6 (C-10), 107.2 (C-12), 104.2 (C-14), 55.8 (OCH3); Anal. Cal for C14H10Cl2N2O2: C = 54.39, H = 3.26, N = 9.06. Found: C = 54.37, H = 3.26, N = 9.06; EI MS *m/z* (% rel. abund.): 310 (M + 2, 15), 308 (M+, 48), Yield: 91%.

**2.2.12. 4,6-dichloro-2-(3-chlorophenyl)-1H-benzo[d]imidazole (12)**

1H NMR (500 MHz, DMSO): *δ* 8.26 (s, 1H, NH), 8.17 (s, 1H, Ar-H), 7.67 (s,1H, Ar-H), 7.61–7.58 (m, 3H, Ar-H), 7.41 (d, *J* = 2.1 Hz, 1H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 152.7 (C-2), 141.5 (C-4), 139.4 (C-10), 136.2 (C-5), 134.6 (C-12), 130.4 (C-8), 130.3 (C-11), 130.2 (C-15), 129.5(C-14), 128.6 (C-13), 123.5 (C-7), 122.1 (C-6), 113.7 (C-9); Anal. Cal for C13H7Cl3N2: C = 52.47, H = 2.37, N = 9.41. Found: C = 52.46, H = 2.36, N = 9.42; EI MS m/z (% rel. abund.): 298 (M + 2, 17), 296 (M+, 52), Yield: 82%.

**2.2.13. 4-(4,6-dichloro-1H-benzo[d]imidazol-2-yl) phenol (13)**

1H NMR (500 MHz, DMSO): *δ* 10.18 (s, 1H, NH), 9.20 (1H, OH), 8.05 (d, *J* = 8.4, 1H, Ar-H), 7.56 (d, *J* = 1.1 Hz, 1H, Ar-H), 7.8 (d, *J* = 1.1 Hz, 1H, Ar-H), 6.95 (d, *J* = 8.4, 2H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 158.3 (C-13), 152.7 (C-2), 141.5 (C-4), 136.2 (C-5), 130.7 (C-11), 130.6 (C-15), 130.4 (C-8), 123.7 (C-7), 122.1 (C-6), 116.4 (C-12), 116.3 (C-14), 113.7 (C-9), 113.3 (C-10); Anal. Cal for C13H8Cl2N2: C = 55.94, H = 2.89, N = 10.04; O, 5.73 Found: C = 55.92, H = 2.87, N = 10.05; EI MS*m/z* (% rel. abund.): 280 (M + 2, 23), 278 (M+, 67), Yield: 85%.

**2.2.14. 4,6-Dichloro-2-(4-chlorophenyl)-1H-benzo[d]imidazole (14)**

1H NMR (500 MHz, DMSO): δ 10.26 (s, 1H, NH), 8.22 (s, 1H, Ar-H), 7.65 (d, J = 8.5 Hz, 2H, Ar-H), 7.58 (s, 1H, Ar-H), 7.42 (J = 8.5 Hz, 2H, Ar-H); 13C NMR (125 MHz, DMSO): δ 152.7 (C-2), 141.5 (C-4), 136.4 (C-5), 134.3 (C-13), 132.6 (C-10), 130.4 (C-8), 129.3 (C-12), 129.5 (C-14), 128.7 (C-11), 128.9(C-15), 123.7 (C-7), 122.3 (C-6), 113.7 (C-9); Anal. Cal for C13H7Cl3N2: C = 52.47, H = 2.37, N = 9.41 Found: C = 52.47, H = 2.37, N = 9.42; EI MS *m/z* (% rel. abund.): 298 (M + 2, 12), 296 (M+, 32), Yield: 85%.

**2.2.15. 2-(4,6-dichloro-1H-benzo[d]imidazol-2-yl) phenol (15)**

1H NMR (500 MHz, DMSO): *δ* 11.66 (s, 1H, NH), 9.89 (1H, OH), 8.11 (d, *J* = 9.1 Hz, 1H, Ar-H), 7.64 (s, 1H, Ar-H), 7.45 (d, *J* = 2.0 Hz, 1H, Ar-H), 7.41 (d, *J* = 2.0 Hz, 1H, Ar-H), 7.08 (d, *J* = 8.0 Hz, 1H, Ar-H), 7.02 (t, *J* = 7.1 Hz, 1H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 154.1 (C-11), 152.7 (C-2), 141.7 (C-4), 136.2 (C-5), 131.7 (C-15), 130.4 (C-8), 130.1 (C-13), 123.5 (C-7), 122.1 (C-6), 121.6 (C-14), 118.3 (C-10), 117.6 (C-12), 113.7 (C-9); Anal. Cal for C13H8Cl2N2O: C = 55.94, H = 2.89, N = 10.04. Found: C = 55.92, H = 2.88, N = 10.04; EI MS *m/z* (% rel. abund.): 280 (M + 2, 24), 278 (M+, 78), Yield: 81%.

**2.2.16. 4,6-dichloro-2-(2,6-dimethoxyphenyl)-1H-benzo[d]imidazole (16)**

1H NMR (500 MHz, DMSO): *δ* 10.60 (s, 1H, NH), 8.06 (d, *J* = 9.1 Hz, 1H, Ar-H), 7.63 (s, 1H, Ar-H), 7.43 (d, *J* = 2.1 Hz, 1H, Ar-H), 6.67 (dd, *J* = 2.4, 8.4 Hz, 1H, Ar-H), 6.62 (d, *J* = 2.4 Hz, 2H, Ar-H), 3.82 (s, 6H, 2xOCH3), 13C NMR (125 MHz, DMSO): *δ* 162.2 (C-13), 156.2 (C-15), 152.7 (C-2), 141.5(C-4), 136.4 (C-5), 130.6(C-8), 129.7 (C-11), 123.5 (C-7), 122.1 (C-6), 113.7 (C-9), 110.6 (C-10), 107.2 (C-12), 104.2 (C-14), 55.8 (OCH3), 55.5 (OCH3); Anal. Cal for C15H12Cl2N2O2: C = 55.75, H = 3.74, N = 8.67. Found: C = 55.60, H = 3.264, N = 8.59; EI MS *m/z* (% rel. abund.): 310 (M + 2, 15), 308 (M+, 48), Yield: 91%.

**2.2.17. 4,6-dichloro-2-(3-methoxyphenyl)-1H-benzo[d]imidazole (17)**

1H NMR (500 MHz, DMSO): *δ* 11.60 (s, 1H, NH), 7.82 (d, *J* = 7.6 Hz, 1H, Ar-H), 7.76 (d, *J* = 1.6 Hz, 1H, Ar-H), 7.62 (d, *J* = 1.6 Hz, 1H, Ar-H), 7.52 (t, *J* = 8.1 Hz, 1H, Ar-H), 7.42 (d, *J* = 1.6 Hz, 1H, Ar-H), 7.12 (dd, *J* = 8.2, 2.1 Hz, 1H, Ar-H), 3.87 (s, 3H, OCH3); 13C NMR (125 MHz, DMSO): *δ* 161.1 (C-12), 152.7 (C-2), 141.7 (C-4), 136.4 (C-5), 131.6 (C-10), 130.6 (C-8), 130.2 (C-14), 123.5 (C-7), 122.1 (C-6), 120.0 (C-15), 114.1 (C-13), 114.1 (C-9), 111.3 (C-11), 55.8 (OCH3); Anal. Cal for C14H10Cl2N2O: C = 57.36, H = 3.44, N = 9.56. Found: C = 57.35, H = 3.41, N = 9.56; EI MS *m/z* (% rel. abund.): 294 (M + 2, 15), 292 (M+, 34), Yield: 88%.

**2.2.18. 4,6-dichloro-2-(pyridin-2-yl)-1H-benzo[d]imidazole (18)**

1H NMR (500 MHz, DMSO): δ 13.55 (s, 1H, NH), 8.76 (d, *J* = 2.1 Hz, 1H, Ar-H), 8.35 (d, *J* = 7.6 Hz, 1H, Ar-H), 8.06 (t, *J* = 8.1 Hz, 1H, Ar-H), 7.61(t, *J* = 5.1 Hz, 1H, Ar-H), 7.55 (s, 1H, Ar-H), 7.43 (d, *J* = 2.1 Hz, 1H, Ar-H); 13C NMR (125 MHz, DMSO): δ 155.2 (C-10), 152.7 (C-2), 149.2 (C-12), 141.7 (C-4), 137.2 (C-14), 136.4 (C-5), 130.4 (C-8), 124.2 (C-15), 123.7 (C-7), 123.6 (C-13), 122.1 (C-6), 113.7 (C-9); Anal. Cal for C12H7Cl2N3: C = 54.57, H = 2.67, N = 15.91. Found: C = 54.54, H = 2.65, N = 15.92; EI MS *m/z* (% rel. abund.): 265 (M + 2, 12), 263 (M+, 38.4), Yield: 88%.

**2.2.19. 4-(4,6-dichloro-1H-benzo[d]imidazol-2-yl) phenol (19)**

1H NMR (500 MHz, DMSO): *δ* 10.21 (s, 1H, NH), 9.50 (s, IH, OH), 8.07 (d, *J* = 8.6, 2H, Ar-H), 7.58 (d, *J* = 1.1 Hz, 1H, Ar-H), 7.38 (d, *J* = 1.1 Hz, 1H, Ar-H), 6.95 (d, *J* = 8.6, 2H, Ar-H); 13C NMR (125 MHz, DMSO): *δ* 158.3 (C-13), 152.7 (C-2), 141.5 (C-4), 136.2 (C-5), 130.7 (C-11), 130.9 (C-15), 130.4 (C-8), 123.7 (C-7), 122.1 (C-6), 116.4 (C-12), 116.4 (C-14), 113.7 (C-9), 113.3 (C-10); Anal. Cal for C13H8Cl2N2: C = 55.94, H = 2.89, N = 10.04; O, 5.73 Found: C = 55.94, H = 2.87, N = 10.04; EI MS *m/z* (% rel. abund.): 280 (M + 2, 23), 278 (M+, 67), Yield: 85%.

**2.2.20. 2-(4,6-dichloro-1H-benzo[d]imidazol-2-yl)-5-methoxyphenol (20)**

1H NMR (500 MHz, DMSO): *δ* 10.60 (s, 1H, NH), 9.30 (s, IH, OH), 8.06 (d, *J* = 9.1 Hz, 1H, Ar-H), 7.65 (s, 1H, Ar-H), 7.45 (d, *J* = 2.1 Hz, 1H, Ar-H), 6.67 (dd, *J* = 2.4, 8.6 Hz, 1H, Ar-H), 6.62 (d, *J* = 2.4 Hz, 1H, Ar-H), 3.84 (s, 3H, OCH3); 13C NMR (125 MHz, DMSO): δ 162.2 (C-13), 156.2 (C-15), 152.7 (C-2), 141.5 (C-4), 136.6 (C-5), 130.6(C-8), 129.7 (C-11), 123.5 (C-7), 122.1 (C-6), 113.7 (C-9), 110.6 (C-10), 107.2 (C-12), 104.2 (C-14), 55.8 (OCH3); Anal. Cal for C14H10Cl2N2O2: C = 54.39, H = 3.26, N = 9.06. Found: C = 54.37, H = 3.24 N = 9.07; EI MS *m/z* (% rel. abund.): 310 (M + 2, 15), 308 (M+, 48), Yield: 91%.

**2.3. Biological evaluation**

**2.3.1. Antiglycation Assay**

Bovine Serum Albumin (BSA) was purchased from Merck Marker Pvt. Ltd. (Germany), rutin and methylglyoxal (MG) (40% aqueous solution) were from Sigma Aldrich (Japan), sodium dihydrogen phosphate (NaH2PO4), disodium hydrogen phosphate (Na2HPO4) and sodium azide (NaN3) were purchased from Scharlau Chemie, S. A. (Spain), while dimethyl sulphoxide (DMSO) was purchased from Fischer Scientific (UK). Bovine Serum Albumin (10 mg/mL), methyl glyoxal (14 mM), various concentrations of the compounds (prepared in DMSO, 10% final concentration), and 0.1 M phosphate buffer (pH 7.4) containing sodium azide (30 mM) was incubated under aseptic conditions at 37 °C for 9 days. After 9 days, each sample was examined for the development of specific fluorescence (excitation, 330 nm; emission, 440 nm) against sample blank (Khan et al., 2011; Khan et al., 2013a; Taha et al., 2014). Rutin was used as a positive control. The percent inhibition of AGE formation in the test sample versus control was calculated for each inhibitor compound by using the following formula: % inhibition= (1- fluorescence of test sample/ Fluorescence of the control group) × 100.

**2.3.2 DPPH (1, 1-Diphenyl-2-picryl hydrazyl) free radical scavenging activity:**

The free radical scavenging activity was measured by 1,1-diphenyl-2-picrylhydrazil (DPPH) using literature protocols. Reaction mixture contains 5 *μ*L of test sample (1 mM in DMSO) and 95 *μ*L of DPPH (Sigma, 300 *μ*M) in ethanol. The reaction mixture was taken into a 96-well microtiter plate and incubated at 37º C for 30 min. The absorbance was measured at 515 nm on microtiter plate reader (Molecular Devices, CA, USA). Percent radical scavenging activity was determined in comparison with a DMSO containing control. IC50 values represent the concentration of compounds to scavenge 50% of DPPH radicals. Propyl gallate was used as a positive control. All the chemicals used were of analytical grade (Sigma, USA) (Anouar et al., 2013; Khan et al., 2012).

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