1H NMR spectra were recorded on Bruker AC-200 MHz, JEOL-400 MHz, MSL-300 MHz, and DRX-500 MHz spectrometer using tetramethylsilane (TMS) as an internal standard. Chemical shifts have been expressed in ppm units downfield from TMS.

13C NMR spectra were recorded on AC-50 MHz, JEOL-100 MHz, MSL-75 MHz, and DRX-125 MHz spectrometer.

ESI-Mass spectra were recorded on API-Q-STAR spectrometer (Applied Biosystems).

MALDI analysis were done on MDS-SCIEX 4800 MALDI TOF/TOF instrument (Applied Biosystems).

High Resolution Mass Spectrometry (HRMS) was recorded on Waters SYNAPT G2 MS system.

Infrared spectra were scanned on Shimadzu IR-470 or Perkin-Elmer Spectra One FT-IR spectrometers with NaCl optics and are measured in cm⁻¹.

Optical rotations were measured with a JASCO DIP 370 digital polarimeter.

Melting points were recorded on Büchi M-560 melting point apparatus in an open capillaries and are uncorrected.

All reactions were monitored by Thin Layer Chromatography (TLC) carried out on 0.2 mm Merck silica gel plates (60 F254) with UV light, I₂ and anisaldehyde or ninhydrin in ethanol as development reagents.

All solvents and reagents were purified and dried according to procedures given in Vogel’s Text book of “Practical Organic Chemistry”. All reactions were carried out under nitrogen or argon atmosphere with dry, freshly distilled solvents under anhydrous conditions unless otherwise specified. Yields refer to chromatographically and spectroscopically homogeneous materials unless otherwise stated.

All evaporations were carried out under reduced pressure on Buchi rotary evaporator below 40 °C.

Silica gel (60–120) or (100-200) used for column chromatography was purchased from Merck (India).
HPLC purification was done on Dionex ICS-3000 series attached with PDA detector and equipped with SP (single pump).

UV-Vis spectrophotometric titrations were done on Perkin Elmer 950 spectrophotometer.