Stirbar Sorptive Extraction and High Performance Liquid Chromatographic Determination of Carvedilol in Plasma by using a Ionic Liquid as Desorption Solvent

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Stir bar sorptive extraction (SBSE) is a high concentration capability solventless extraction technique, developed for enrichment of solutes from aqueous matrices. In SBSE, a sorptive stir bar is added to a vial containing the sample; this is stirred until analytes partition equilibrium time reached with the sorbent. After the extraction, the analytes can be introduced quantitatively into the analytical system by thermal desorption or liquid desorption [1].

In this paper, we carried out a comparison of SBSE coated with film of poly (methyl methacrylate - ethyleneglycol dimethacrylate - acrylic acid) prepared by solution polymerization method in laboratory based on reference 2 (PMMEDA) and SBSE (PDMS) followed by HPLC with ultraviolet detection (UV) for the determination of carvedilol in human plasma, where the former polymeric phases presented a better affinity to extract these target analyte from human plasma at the trace level.

In this paper, imidazolium-based ionic liquid [C8mim][BF4] also were tested as desorption solvent. Room-temperature ionic liquids (ILs), salts that are liquid at ambient temperature, are normally made up of relatively large organic cations and inorganic or organic anions. ILs are environmentally benign, nonvolatile, and nonflammable solvents. Because of these properties, ILs are used as environmentally friendly solvents in sample preparation [3]. The concentration of IL for the desorption step were optimized.

The present contribution aims the employing SBSE (PMMEDA) for extraction of the carvedilol, followed by desorption of the extract with solution of OMIm-BF4. The separation was performed on the C18 reverse-phase column with an isocratic mobile phase consisting of 0.1M acetate buffer–acetonitrile (55:45, v/v) adjusted to pH 4. The influences of factors such as solvent polarity, volume of desorption solvent, extraction and desorption time, pH and volume of sample and temperature on extraction efficiency were optimized.

The assay enables the measurement of carvedilol for therapeutic drug monitoring with a minimum quantification limit (LOQ) of 1 ng ml⁻¹. The calibration curve was linear over the concentration range 1–120 ng ml¹. The coefficients of variation for inter-day and intra-day assay were found to be less than 4.0%. This simple and highly sensitive method showed to be adequate for the measurement of carvedilol in typical and trace concentration levels.

REFERENCES