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RAPID SPECTROPHOTOMETRIC ESTIMATION OF TRACE AMOUNTS OF MEFENAMIC ACID BASED DISPERSIVE LIQUID–LIQUID MICROEXTRACTION OF IN PHARMACEUTICAL PREPARATIONS

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ABSTRACT : A dispersive liquid-liquid microextraction combines with UV-V is spectrophotometry for the preconcentration and determination of Mefenamic acid in pharmaceutical preparation was developed and introduced. The proposed method is based on the formation of charge transfer complexation between mefenamic acid and chloranil as an n-electron donor and a π-acceptor, respectively to form a violet chromogen complex measured at 542 nm. The important parameters affecting the efficiency of DLLME were evaluated and optimized. Under the optimum conditions, the calibration graphs of standard and drug, were ranged 0.03 - 10 µg mL^{-1}. The limits of detection, quantification and Sandell's sensitivity were calculated. Good recoveries of MAF Std. and drug at 0.05, 2.5, 7.5 and 10 µg mL^{-1} ranged 94.00 – 100.2%. The method was applied successfully to determine MFA in pharmaceutical preparation from different sources.

Key words : Mefenamic acid, chloranil, DLLME, microextraction, pharmaceutical preparation.

INTRODUCTION

Mefenamic acid (MFA) known as 2- [(2,3-dimethyl phenyl) amino] benzoic acid) (Fig. 1) is a non-steroidal anti-inflammatory drug with anti-analgesic and antipyretic properties. MFA is a diphenylamine derivative pollutant and the third compound on the European Union list of priority pollutants (Drzyzga, 2003; Abdolmohammad-Zadeh *et al*, 2014).

It is extensively used to treatment many diseases like rheumatoid arthritis, osteoarthritis, non-articular rheumatism and sports injuries (Muraoka and Miura, 2003). Overdoses of MFA produce toxic metabolite accumulation that causes acute hepatic necrosis, inducing morbidity, nausea, vomiting, mortality in humans and occasionally bloody diarrhea (Drzyzga, 2003).

Many studies have revealed that MFA cannot be effectively removed by conventional sewage treatment plants and that it has been detected at trace level in the effluent of wastewater treatment plants (Roberts and Thomas, 2006; Soulet *et al*, 2002). Therefore, due to the vital importance of MFA in pharmaceutical formulations and biological fluids, several analytical methods have been developed for the quantitative determination of MFA samples such as spectrophotometry (Dinç *et al*, 2002; Zheltvay *et al*, 2011), fluorimetry (Sabry, 1998), potentiometry (Kormosh and Matviychuk, 2013), chromatography (Rouini *et al*, 2004), chemiluminescence (Zisimopoulos *et al*, 2009), capillary electromigration (Polášek *et al*, 2000), potentiometric titration (Çakýrer *et al*, 1999), polarography (Yin-Hua and HU, 1993) and voltammetry (Liu and Song, 2006).

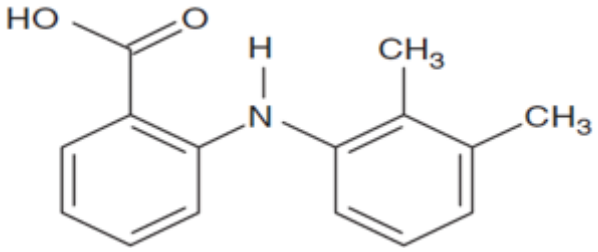

Fig. 1 : Chemical structure of mefenamic acid (Rouini *et al*, 2004).

Most of the reported methods involve complicated procedures, which require several manipulation steps, no single visible spectrophotometric method has been reported for the individual determination of mefenamic acid in pharmaceutical formulations (Raza, 2008). Therefore, the need for a fast, low cost, and selective method is obvious, especially for the routine quality control analysis of pharmaceutical products containing mefenamic acid. The recent trend is toward minimizing the amounts of hazardous solvent consumed, and waste generated, Microextraction techniques, such as solid-phase microextraction (Penalver *et al*, 2002) single drop microextraction (Ahmadi *et al*, 2006), liquid-phase