



RESEARCH ARTICLE

# APPLICATION OF MIXED HYDROTROPY IN SPECTROPHOTOMETRIC ANALYSIS OF FRUSEMIDE IN DIFFERENT FORMULATIONS

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Received: August 08, 2011 / Revised: August 11, 2011 / Accepted: August 12, 2011

The present study describes the use of an aqueous solution containing a blend of hydrotropic solubilizing agents (mixed hydrotropic substance's solution) as a successful solvent system utilizing the concept of mixed hydrotrophy for spectrophotometric analytical estimation of various conventional formulations as well as novel drug delivery systems. Frusemide, a poorly water-soluble drug, was estimated by application of mixed hydrotropic solubilization method. There was more than 15-fold enhancement in aqueous solubility of frusemide in a solution of blend of hydrotropic agents which consisted of 30% urea, 13.6% sodium acetate and 11.8% sodium citrate. This solvent mixture was employed to solubilize the drug from the fine powder of tablet formulations as well as the niosomes of frusemide. The selected  $\lambda_{\max}$  for spectrophotometric estimation was 333 nm. The hydrotropic agents used in the analysis and additives used in the manufacture of tablets and preparation of niosomes did not interfere in the analysis. Statistical data proved the accuracy, reproducibility and precision of the proposed method. The results suggested that proposed method is new, rapid, simple, accurate, and reproducible as well as employed aqueous solvent instead of organic solvents in estimation of drug from the dosage forms.

**Key words:** Mixed hydrotrophy, Frusemide, Urea, Hydrotropic agents, Niosomes, Sodium acetate.

## INTRODUCTION

The term hydrotrophy originally put forward to describe the increase in the solubility of a solute by the addition of fairly high concentration of alkali metal salts of organic acids (Neuberg, 1916). Later on, the definition of the hydrotropic agent was extended to include cationic and non-ionic organic compounds bearing the essential structural features of Neuberg's hydrotropes (Saleh and El-Khordagui, 1985). The efficacy of hydrotropes in enhancing the water solubility of pharmaceutical compound depends on suitably matching the structural features of the hydrotropic agents with those of the drug. Each hydrotropic agent is effective in increasing the water solubility of selected hydrophobic drugs.

The effective hydrotropic agents are those that destabilize water structure and at the same time interact with poorly soluble drug.

Maheshwari utilized application of hydrotropes in pharmaceutical analysis (Maheshwari *et al* 2005a; 2006a). Analysis of various poorly water-soluble drugs like ketoprofen, salicylic acid, aceclofenac and frusemide by titrimetric analysis by use of sodium benzoate solution as solubilizing agent is reported (Maheshwari, 2005; 2006a; 2006b). Also use of sodium benzoate as hydrotropic solubilizing agent to estimate various poorly water-soluble drugs such as ofloxacin, norfloxacin, nalidixic acid, metronidazole,