Asian Journal of Chemistry Vol. 20, No. 6 (2008), 4922-4924

NOTE

Quantitative Determination of Ketoprofen Bulk Drug Using Sodium Salt of Aspirin as Hydrotropic Solubilizing Agent

R.K. MAHESHWARI* and MAHAVEER SINGH
Department of Pharmacy,Sri G.S. Institute of Technology and Science
23, Park Road, Indore-452003, India
E-mail: rkrkmaheshwari@yahoo.co.in

In the present investigation, ketoprofen (a widely used non-steroidal antiinflammatory drug) has been selected as a poorly water-soluble model drug. There was more than 50 folds enhancement in aqueous solubility of ketoprofen by 1.0 M aspirin sodium compared to its aqueous solubility. This hydrotropic agent was employed to solubilize the ketoprofen in bulk drug form. The proposed method is new, simple, accurate, environmentally friendly and reproducible. Statistical data proved the accuracy reproducibility and the precision of the proposed method.

Key Words: Hydrotropy, Ketoprofen, Aspirin sodium.

The term hydrotropy has been used to designate the increase in solubility of various poorly water-soluble compounds due to presence of a large amount of additive. Concentrated aqueous hydrotropic solutions of urea, nicotinamide, sodium benzoate, sodium salicylate, sodium acetate and sodium citrate have been observed to enhance the aqueous solubility of many poorly water-soluble drugs[1-15].

Maheshwari has analyzed several poorly water-soluble drugs, *viz.*, frusemide[1], ketoprofen[2,4] and tinidazole[3] by use of hydrotropic solubilization technique. Maheshwari[4] have developed new analytical methods based on hydrotropic solubilization phenomenon for poorly water-soluble drugs like aceclofenec[5], metronidazole[6], norfloxacin[6], tinidazole[6], nalidixic acid[6] and hydrochlorthiazide[7].

There was tremendous increase in aqueous solubility of ketoprofen in 1.0 M aspirin sodium solution. Thus, it was thought worthwhile to solubilize the poorly water-soluble ketoprofen bulk drug with the help of this solution to carryout its titrimetric analysis. Chemically, ketoprofen is [2(3-benzoyl-phenyl)]propionic acid].

All chemicals and solvents were of analytical grade. Ketoprofen drug sample was supplied by Alkem Laboratories Limited, Mumbai as gift sample.

Preliminary solubility studies of ketoprofen: Solubility of ketoprofen was determined in distilled water and 1.0 M aspirin sodium solution at 28 ± 1 ºC. There was more than 50 fold enhancement in the solubility of ketoprofen bulk drug in 1.0 M aspirin sodium solution as compared to solubility in distilled water.

Preparation of 1.0 M aspirin sodium solution: 10 g of sodium hydroxide was dissolved in 100 mL of distilled water. Then 45 g powered aspirin was added to 100 mL sodium hydroxide solution, adding little at a time with constant shaking. When aspirin powder got dissolved in sodium hydroxide solution, the pH of the solution was adjusted to 7.0 with additional NaOH solution using Cyber Scan-510 pH meter. Then volume was made up to 250 mL with distilled water

Analysis of ketoprofen bulk drug sample by Indian Pharmacopoeial method[15]: Ketoprofen bulk drug sample was analyzed by dissolving accurately weighed drug (0.5 g) in 25 mL ethanol (95 %) previously neutralized to phenolphthalein solution and titrating it with NaOH solution (0.1 M) and the drug content was calculated (Table-1).

Analysis of ketoprofen bulk drug sample by proposed method: Accurately weighed (0.5 g) ketoprofen bulk drug sample was solubilized in 50 mL of 1.0 M aspirin sodium solution by shaking for about 5 min and titrated with 0.1 M sodium hydroxide solution using phenolphthalein as indicator. Blank determination was carried out for necessary correction and the amount of ketoprofen was computed (Table-1).

TABLE-1
ANALYSIS DATA OF KETOPROFEN BULK DRUG SAMPLE

Amount of drug taken (mg)	Amount found (mg)		Percentage estimated	
	IP method	Proposed method	IP method	Proposed method
500	497.5	498.2	99.50	99.64
500	501.3	497.4	100.26	99.48
500	496.7	500.7	99.34	100.14

As evident from Table-2 the mean percentage estimation of ketoprofen estimated in bulk drug sample by Indian Pharmacopoeial method[16] and the proposed method are 99.70 and 99.75, respectively.The results of analysis by the proposed method are close to the result of analysis by standard method (IP method). This confirms the accuracy of the proposed method. Validation of proposed method is further confirmed statistically by low values of standard deviation, per cent coefficient of variation and standard error (Table-2).

TABLE-2
STATISTICAL EVALUATION OF ANALYSIS

Method	Mean percent estimation	Standard deviation	%Coefficient of variation	Standard error
IP	99.70	0.490	0.491	0.346
Proposed	99.75	0.338	0.339	0.195

Conclusion

The proposed method is cost-effective, environmentally friendly, safe, accurate and reproducible. Major advantage of proposed method is that the organic solvent is precluded but not at the expense of accuracy. Definitely, there is further scope of 1.0 M aspirin sodium as solubilizing agent for the titrimetric analysis of other poorly-water soluble drugs. The proposed method can be successfully employed in the routine analysis of ketoprofen in the bulk drug sample.

ACKNOWLEDGEMENT

The authors are thankful to M/s. Alkem Laboratory Limited, Mumbai for providing the gift sample of ketoprofen.

REFERENCES

1. R.K. Maheshwari, *Indian Pharmacist*, **4**, 55 (2005).
2. R.K. Maheshwari, *Asian J. Chem.*, **18**, 393 (2006).
3. R.K. Maheshwari, *Asian J. Chem.*, **18**, 640 (2006).
4. R.K. Maheshwari, *Pharma Rev.*, **3**, 123 (2005).
5. R.K. Maheshwari, S.C. Chaturvedi and N.K. Jain, *Indian Drugs*, **43**, 516 (2006).
6. R.K. Maheshwari, S.C. Chaturvedi and N.K. Jain, *Indian J. Pharm. Sci.*, **68**, 195 (2006).
7. R.K. Maheshwari, S.C. Chaturvedi and N.K. Jain, *Indian Drugs*, **43**, 541 (2005).
8. N.K. Jain, R.K. Agrawal and A.K. Singhai, *Pharmazie*, **45**, 221 (1990).
9. G.D. Poochikian and J.C. Cradock, *J. Pharm. Sci.*, **68**, 728 (1979).
10. S. Ueda, *Chem. Pharm. Bull.*, **14**, 2 (1996).
11. P. Simamora, J.M. Alvarez and S.H. Yalkowsky, *Int. J. Pharm.*, **213**, 25 (2001).
12. I.A. Darwish, A.T. Florence and A.M. Saleh, *J. Pharm. Sci.*, **78**, 577 (1989).
13. E. Coffman and D.O. Kildsig, *J. Pharm. Sci.*, **85**, 951 (1996).
14. A.A. Rasool, A.A. Hussain and L.W. Dittert, *J. Pharm. Sci.*, **80**, 387 (1991).
15. Indian Pharmacopoeia, Controller of Publications, New Delhi, India, Vol. 1, p. 332 (1996).

(*Received*: 22 March 2007; *Accepted*: 15 March 2008) AJC-6473