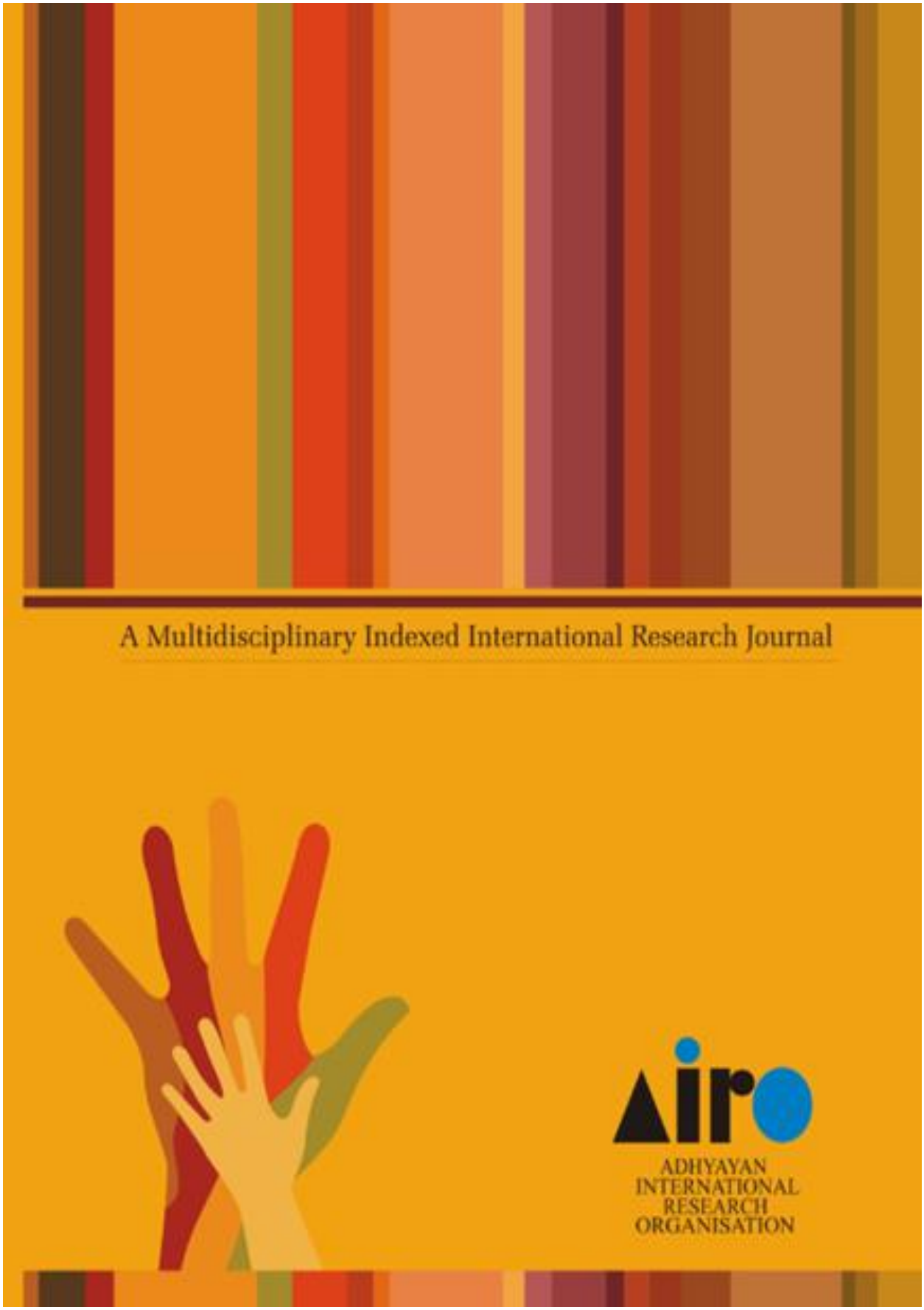
Airo International Research Journal
Volume XV, ISSN: 2320-3714
April, 2018
Impact Factor 0.75 to 3.19
UGC Approval Number 63012



Airo International Research Journal
Volume XV, ISSN: 2320-3714
April, 2018
Impact Factor 0.75 to 3.19
UGC Approval Number 63012

FORMULATION AND VALIDATION OF A METHOD FOR ESTIMATION OF THIOBARBITONE IN SOLID DOSAGE FORM AND FAST DISSOLVING TABLET BY USING UVAND FTIR

Nivedita Singh

Research Scholar, Department of Chemsitry, Sunrise University, Alwar, Rajasthan

Dr. Niraj Saxena

Supervisor, Department of Chemsitry, Sunrise University, Alwar, Rajasthan

Declaration of Author: *I hereby declare that the content of this research paper has been truly made by me including the title of the research paper/research article, and no serial sequence of any sentence has been copied through internet or any other source except references or some unavoidable essential or technical terms. In case of finding any patent or copy right content of any source or other author in my paper/article, I shall always be responsible for further clarification or any legal issues. For sole right content of different author or different source, which was unintentionally or intentionally used in this research paper shall immediately be removed from this journal and I shall be accountable for any further legal issues, and there will be no responsibility of Journal in any matter. If anyone has some issue related to the content of this research paper's copied or plagiarism content he/she may contact on my above mentioned email ID.*

ABSTRACT

The most important rate limiting step in bioavailability of any active pharmaceutical ingredient is solubility. It is estimated that among the newly discovered API's, 70% of them are having poor solubility. To overcome this, formulation scientists proposed several methods among which solid dispersions have emerged out as most effective method. A solid dispersion is basically a drug–polymer two-component system in which the mechanism of drug dispersion is the key to understanding its behavior. In Research and Development sector, there is an increased proportion API's which are poorly water – soluble. So, the essentiality of solubilization technologies in bringing those API's successfully to market has been playing a key role. The solid dispersion is one such technology which in recent years has led to the approval of a large number of products, suggesting it is now the preferred technology for drug solubilization. In this review, we summarize current trends in solid dispersions methods, emphasizing the development aspects of this important technology.

Key Words: *Solid Dispersions; API; Solubility; Bio availability*

INTRODUCTION

Thiobarbital is a drug which is a barbiturate derivative. It is the thiobarbiturate analogue of barbitalSodium thiopental is a member of the barbiturate class of drugs, which are relatively non-selective compounds that bind to an entire superfamily of ligand-gated ion channels, of which the $GABA_A$ receptor channel is one of several representatives.Thiopental is in a group of drugs called barbiturates. Thiopentalslows the activity of your brain and nervous system.

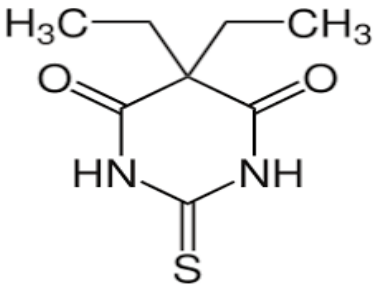
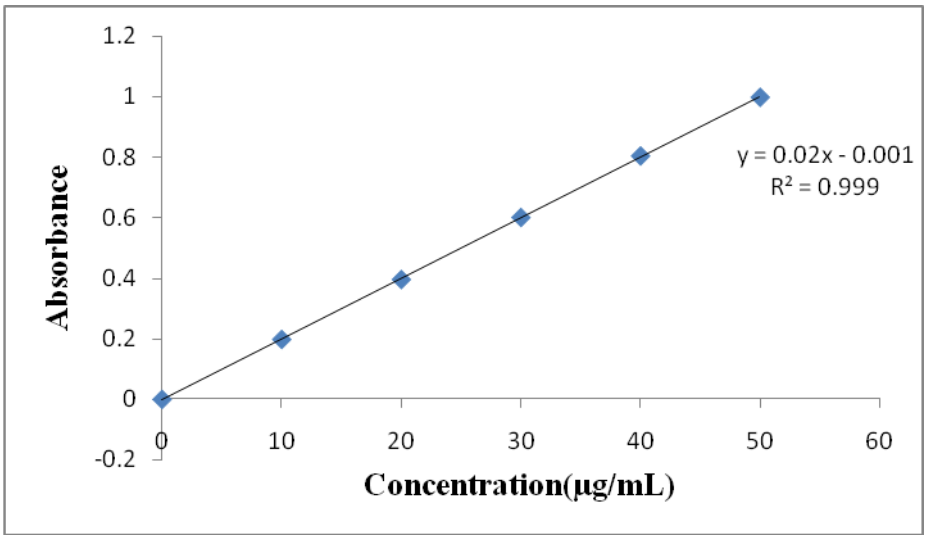


Fig no:1 Structure of Thiobarbital

Analytical method development for Thiobarbital:

a) Determination of absorption maxima

A spectrum of the working standards was obtained by scanning from 200-400nm against the reagent blank to fix absorption maxima. The λmaxwas found to be 239nm. Hence all further investigations were carried out at the same wavelength.



b) Preparation of standard graph in 0.1 HCl medium

100 mg of Thiobarbital was dissolved in methanol 5 ml, volumetric flask make up to 100 ml of 0.1 HCL , from this primary stock 10 ml was transferred to another volumetric flask made up to 100ml with 0.1 HCL, from this secondary stock was taken separately and made up to 10 ml with 0.1 HCl, to produce 10,20,30,40 and 50 µg/ml respectively. The absorbance was measured at 239 nm by using a UV spectrophotometer.

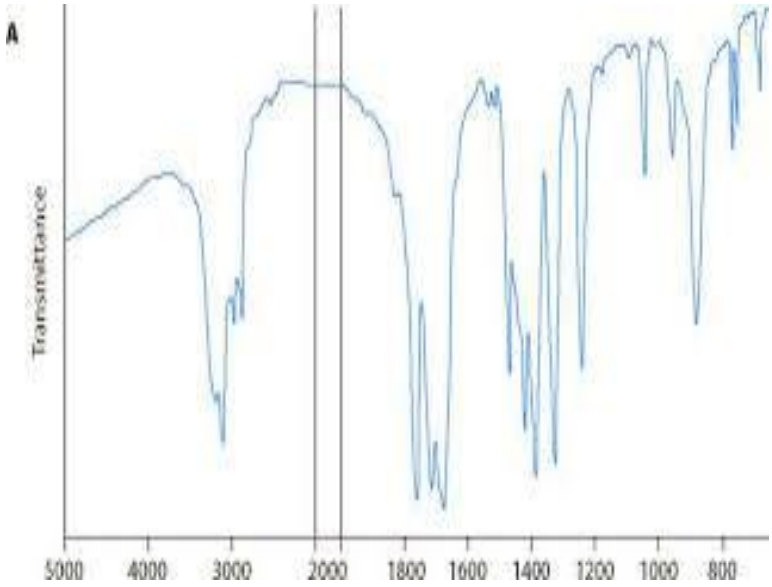


Fig no 2 FTIR Chromatogram showing Thiobarbitone

Formulation Development:

Solid dispersions were prepared by solvent evaporation method. Methanol was used as solvent. Thiobarbital dose was taken as 50mg.Water soluble polymers such as PEG 4000 were selected as carriers. Drug and polymer were taken in different ratios 1:1,1:2,1:3,1:4,1:5 stated in the formulation chart (Table 2 Aand 2.1). The prepared solid dispersions were passed through the sieve no 20 to get uniform sized particles. The solid dispersions were mixed with required quantities of diluent, lubricant and glidant. The blend was evaluated for precompression parameters.

	F1	F2	F3	F4	F5
Drug	50	50	50	50	50
PEG 4000	50	100	150	200	250

Table no: 1 Formulation of solid dispersion showing various compositions

	F1	F2	F3	F4	F5
Thiobarbital	10	15	20	25	30
PolyplasdoneXL	24	24	24	24	24
Mg. Stearate	1	1	1	1	1

Talc	1	1	1	1	1
MCC	QS	QS	QS	QS	QS
Total wt	80	80	80	80	80

Table no: 2 Formulation of fast dissolving tablet by using solid dispersion powder

Evaluation of tablets:

Angle of repose

The angle of repose of API powder is determined by the funnel method. The accurately weight powder blend are taken in the funnel. The height of the funnel is adjusted in a way that, the tip of the funnel just touched the apex of the powder blend. The powder blend is allowed to flow through the funnel freely on to the surface.

Bulk density

The powder sample under test is screened through sieve No.18 and the sample equivalent to 25 gm is weighed and filled in a 100 ml graduated cylinder and the power is leveled and the unsettled volume, V_0 is noted. The bulk density is calculated in g/cm^3 by the formula. [56]

Bulk density = M/V_0 …….. (2)

M = Powder mass

V_0 = apparent unstirred volume

Tapped densities

The powder sample under test is screened through sieve No.18 and the weight of the sample equivalent to 25 gm filled in 100 ml graduated cylinder. The mechanical tapping of cylinder is carried out using tapped density tester at a nominal rate for 500 times initially and the tapped volume V_0 is noted. Tappings are proceeded further for an additional tapping 750 times and tapped volume, V_b is noted. The difference between two tapping volume is less the 2%, V_b is considered as a tapped volume V_f. The tapped density is calculated in g/cm^3 by the formula. [57]

Tapped density=M/V_f …… (3)

M =weight of sample power taken

V_f=tapped volume

Compressibility Index

The Compressibility Index of the powder blend is determined by Carr's compressibility index to know the flow character of a powder. The formula for Carr's Index is as below:

Carr's Index (%) = [(TD-BD) /TD] x100 …….. (4)

Hausner's ratio

The Hausner's ratio is a number that is correlated to the flowability of a powder or granular material. The ratio of tapped

density to bulk density of the powders is called the Hasner's ratio. It is calculated by the following equation.

Post compression parameters

Thickness

The thickness of tablets was determined by using Digital micrometer. Ten individual tablets from each batch were used and the results averaged.

Weight variation

Twenty tablets were randomly selected from each batch and individually weighed . The average weight and standard deviation three batches were calculated. It passes the test for weight variation test if not more than two of the individual tablet weights deviate from the average weight by more than the allowed percentage deviation and none deviate by more than twice the percentage shown. It was calculated on an electronic weighing balance.

Friability

The friability values of the tablets were determined using a Roche-type friabilator. Accurately weighed six tablets were placed in Roche friabilator and rotated at 25 rpm for 4 min.

Percentage friability was calculated using the following equation.

$$\text{Friability} = ([w_O - w] / w_O) \times 100$$

Where; w_O = weight of the tablet at time zero before revolution.

w = weight of the tablet after 100 revolutions.

Assay The content of drug in five randomly selected tablets of each formulation. The five tablets were grinded in mortar to get powder; this powder was dissolved in 0.1 N HCl by sonication for 30 min and filtered through filter paper. The drug content was analyzed spectrophotometrically at 239 nm using UV spectrophotometer. Each measurement was carried out in triplicate and the average drug content was calculated.

Disintegration test

Six tablets were taken randomly from each batch and placed in USP disintegration apparatus baskets. Apparatus was run for 10 minutes and the basket was lift from the fluid, observe whether all of the tablets have disintegrated.

SUMMARY & CONCLUSION

Thiobarbital belongs to class II drugs, that is, characterized by low solubility and high permeability therefore, the enhancement of its solubility and dissolution profile is expected to significantly improve its bioavailability and reduce its side effects.

Thiobarbital was mixed with various proportions of excipients showed no colour change at the end of two months, proving no drug-excipient interactions.

The precompression blend of Thiobarbital solid dispersions were characterized with respect to angle of repose, bulk density, tapped density, Carr’s index and Hausner’s

ratio**.** The precompression blend of all the batches indicating good to fair flowability and compressibility. Solid dispersions were prepared with various concentrations of carriers, the prepared solid dispersions were compressed into tablets by using rotary tablet punching machine, and 6 mm punch, with the hardness of 4.5kg /cm^2.The formulated tablets were evaluated for various quality control parameters. The tablets were passed all the tests. Among all the formulations F4 formulation containing, Drug and Peg 4000 in the ratio of 1:4 showed good result that is 99.32 % in 6 minutes. As the concentration of polymer increases the drug release was decreased. While the formulations containing PEG 4000 showed less release. Hence from the dissolution data it was evident that F4 formulation is the better formulation. By conducting further studies like In vivostudies, preclinical and clinical studies we can commercialize the product.

REFERENCES:

1. SarodeAshish,WangPeng,CoteCatherine, Worthen David R. Low-Viscosity hydroxypropylcellulose(HPC) grades SL and SSL:versatile pharmaceutical polymers for dissolution enhancement, controlled release, and pharmaceutical processing.AAPS Pharm Sci Tech.2013;14(1):151-159

2. Dr.K.L.Senthilkumar and Y.sirisha. Enhancement of dissolution rate studies on solid dispersion of Aceclofenac.International Journal of Pharma and Bio Sciences. 2011; 2 (2):70-76

3. Ashis Kumar Mehatha, VidyadharaSuryadevara, Sasidhar R Lankapalli, Abhijit M Deshmukh, Laxmana P Sambath. Formulation and optimization of pioglitazone solid Dispersions prepared by hot melt extrusion Technique. Indonesian J. Pharm.,2013;24(3): 206 – 214

4. P.Kumar, S.Kumar, A.kumar, M.Chander.Physicochemical Characterization of Solid Dispersion of Cefdinir with PVP K-30 and PEG 4000.International journal of pharmaceutical sciences and nanotechnology.2010; 3(2):948-956

5. Tantishaiyaku V, Kaewnopparat N, Ingkatawornwong S. Properties of solid dispersions of piroxicam in polyvinylpyrrolidone Int J Pharm.,1999;30(2):143-51.