

## Formulation Development of Taste Masked Aceclofenac Orodispersible Tablets

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**Abstract:** The aim of this study was to establish a formulation of taste masked Orodispersible Tablet of Aceclofenac for intended benefits. Orodispersible tablets of Aceclofenac were prepared using superdisintegrants croscarmellose sodium alone or combination of Kollidon CL-SF and Ludiflash with other necessary excipients by direct compression method. The tablets prepared were evaluated for thickness, uniformity of weight, hardness, friability, wetting time, *in vitro* disintegration and dissolution time. All the tablets disintegrated within 18 to 49 s. Almost 90% of drug was released from both formulations within 15 min. However, the formulation containing combination of Kollidon CL-SF and Ludiflash showed better disintegration and dissolution profile than the other containing croscarmellose. Our results suggest that taste masked ODTs of Aceclofenac can be prepared by direct compression technique using a combination of superdisintegrants.

**Key words:** Aceclofenac • Orodispersible Tablets • Kollidon CL-SF • Croscarmellose Sodium • Ludiflash.

### INTRODUCTION

Aceclofenac (2-{2-[(2,6-Dichlorophenyl) amino] phenyl} acetoxy) acetic acid) is an orally effective non-steroidal anti-inflammatory drug [NSAID] of the phenyl acetic acid group, which possesses remarkable anti-inflammatory, analgesic and antipyretic properties [1]. Aceclofenac is superior from other NSAIDs as it has selectivity for cox-2, a beneficial cox inhibitor, better GI tolerability and improved cardiovascular safety than other selective cox-2 inhibitors and has a faster and more potent effect than the other NSAIDs [2]. The analgesic efficacy of Aceclofenac 100 mg is more prolonged than that of acetaminophen 650 mg and Aceclofenac appears to be particularly well-tolerated among the NSAIDs, with a lower incidence of gastrointestinal adverse effects [3, 4].

Aceclofenac is sparingly soluble in water and bitter in taste. For poorly soluble orally administered drugs, the rate of absorption is often controlled by the rate of dissolution [5]. The rate of dissolution can be increased by increasing the surface area of available drug by various methods. The dissolution of a drug can also be influenced by disintegration time of the tablets. Faster disintegration of tablet delivers a fine suspension of drug particles resulting in a higher surface area and faster dissolution, which in turn enhances bioavailability of the drug [6, 7].

Solid dosage forms are popular because of ease of administration, accurate dose, self medication, pain avoidance and most importantly the patient compliance. Although most popular solid dosage forms include tablets and capsules, one important drawback of these dosage forms for some patients is the difficulty to swallow [8]. For this reason, tablets that rapidly dissolve or disintegrate in the oral cavity have attracted a great deal of attention [9, 10]. ODTs are not only indicated for people who have swallowing difficulties [11], but also are ideal for active people [12, 13]. The advantages of ODTs are increasingly being recognized in both industry and academics [14]. Their growing importance has been underlined in European Pharmacopoeia that defines the term "Orodispersible Tablet [ODT]" as a tablet that to be placed in the mouth where it disperses rapidly before swallowing. ODTs are also known as fast melts, quick melts, fast disintegrating tablet, that have the unique property of disintegrating in the mouth in seconds without chewing or water and are thus assumed to improve patient compliance [15]. An ODT usually dissolves in the oral cavity within 15 s to 3 min [6, 16].

The basic approach in development of ODT is the use of superdisintegrants such as cross-linked carboxymethylcellulose [croscarmellose], sodium starch glycolate, povidone [crospovidone] etc, which provide instantaneous disintegration of tablet after placing in

mouth, thereby releasing the drug in saliva [17]. Various technologies used in the manufacture of ODT include freeze-drying or lyophilization, sublimation, spray drying, moulding, mass extrusion and direct compression [18]. The present study deals with the development of a taste masked ODT of Aceclofenac by direct compression having adequate hardness, reduced disintegration time and acceptable taste without bitterness.

## MATERIALS AND METHODS

**Materials:** Aceclofenac was received as a gift from Beximco Pharmaceuticals Limited. Kollidon CL-SF and Ludiflash were generously provided by BASF Bangladesh. Croscarmellose sodium, mannitol, aspartame, magnesium stearate used were of analytical grade and procured from commercial sources.

**Preparation of Aceclofenac ODTs:** Aceclofenac ODTs were prepared by direct compression method according to formula given in the Table 1. Two different formulations were prepared. All the ingredients were sieved separately through sieve no. 40 except magnesium stearate which was sieved through sieve no. 80. The weighed amount of drug and other ingredients were mixed first and magnesium stearate was finally added and mixed thoroughly. The tablets were compressed in Clit Compression Machine [Pilot Press, Germany] using 8 mm standard concave punches.

**Micromeritics of Powder Blend:** Before final compression of tablets, powdered mixture was subjected to pre-compression parameters such as bulk density, tapped density, angle of repose, powder compressibility and Hausner ratio. All the experiments were done in triplicates and expressed as mean± SD.

Table 1: Formulation design of Aceclofenac 5 mg ODTs

FormulationIngredients	F1 (mg)	F2 (mg)
Aceclofenac	100	100
Croscarmellose sodium	-	12
Ludiflash	78.5	-
Kollidon CL-SF	5	-
Microcrystalline cellulose 102	-	37
Mannitol	-	34.5
Magnesiumstearate	2	2
Aspartame	10	10
Aerosil	1.5	1.5
Sodium lauryl sulfate	3	3
Total	200	200

**Bulk Density:** Bulk density was determined by measuring the volume of the predetermined or pre-weighed mass of the powder blend according to the protocol described [19].

$$\text{Bulk Density } [D_b] = [M] / [V_o]$$

where,

M = Mass or weight of the powder blend

V<sub>o</sub> = Apparent volume of the powder blend into the cylinder

**Tapped Density:** Tapped density was achieved by mechanically tapping a measuring cylinder containing a powder sample. After observing the initial volume, the cylinder was mechanically tapped and volume readings were taken until little further volume change was observed. The mechanical tapping was achieved by raising the cylinder and allowing it to drop under its own weight from a specified distance. Tapped density was determined using the following equation [19].

$$\text{Tapped density } [D_t] = [M] / [V_t]$$

where,

M = Mass or weight of the powder blend

V<sub>t</sub> = Final volume of the powder blend into the cylinder.

**Powder Compressibility:** Powder compressibility was determined by calculating the compressibility index [Carr's Index] and the Hausner Ratio [19].

**Carr's Index or Compressibility Index [I]:** This was calculated by the formula and expressed as percentage [%].

$$I = D_t - D_b \times 100\%$$

where,

D<sub>b</sub> = Bulk density,

D<sub>t</sub> = Tapped density.

**Hausner Ratio:** Hausner ratio is an indirect index of ease of powder flow. It is calculated by the following formula-

$$\text{Hausner Ratio} = D_t / D_b$$

where,

D<sub>b</sub> = Bulk density,

D<sub>t</sub> = Tapped density

**Angle of Repose:** The determination of angle of repose of Aceclofenac powder blend was carried out by employing fixed funnel method [20].

Angle of repose  $\theta = \tan^{-1} [H/R]$ , H=height of the pile, R = radius of the pile.

**Evaluation of Formulated Tablets:** The prepared tablets were evaluated for various official and nonofficial specifications.

**Weight variation:** Twenty tablets were selected at random and average weight was calculated. Then individual tablet was weighed and this weight was compared with an average weight [21].

**Tablet Hardness and Friability:** Tablets were evaluated for hardness and friability using Pharma Test Hardness Tester and Pharma Test Friabilator respectively [22].

**In Vivo Taste Evaluation of Aceclofenac ODT:** The prepared tablets were subjected to taste evaluation test in 6 healthy volunteers after obtaining informed consent. All the volunteers were given details about the purpose, any risk involved and the procedure for taste evaluation [23]. Taste evaluation of Aceclofenac ODT was conducted and the degree of bitterness was judged as per the six point scale as follows:

Taste Characteristics	Score
Pleasant	0
Tasteless	1
Slightly sweet	2
Slightly bitter	3
Moderately bitter	4
Intensely bitter	5

**Content Uniformity:** Twenty tablets were taken and amount of drug present in each tablet was determined. The tablets were crushed in a mortar and the powder equivalent to 100 mg of drug was transferred to 100 ml volumetric flask. The powder was dissolved in 5 ml of 70% methanol and the volume was adjusted with phosphate buffer [pH 6.8]. The sample was mixed thoroughly and filtered through a whatman filter paper. The filtered solution was diluted suitably and analyzed for drug content by UV spectrophotometer [Shimadzu 1700, Shimadzu Corporation, Kyoto, Japan] at 276 nm. The same phosphate buffer without drug served as blank [24].

**Wetting Time:** Ten petridishes [10 cm] containing tissue paper at the bottom were taken and ten milliliters of water containing eosin dye was added to each petridish.

A tablet was then carefully placed on the surface of the tissue paper. The time required for the water to reach the upper surface of the tablet was noted as the wetting time in seconds [25].

**Modified Disintegration Time:** The modified disintegration time was observed by placing the tablet into a petridish prefilled with water and allowed to stand without shaking. The time required for complete disintegration was measured in seconds [7].

**In Vitro Disintegration Time:** The *in vitro* disintegration time was determined using disintegration test apparatus [Eureka Alpha/Numeric Disintegration tester]. A tablet was placed in each of the six tubes of the apparatus and a disc was added to each tube. The time in seconds taken for complete disintegration of the tablet with no discernible mass remaining in the apparatus was measured [7, 26].

**Disintegration in Oral Cavity:** The time required for complete disintegration of tablet in oral cavity was determined in six healthy volunteers who were given tablets from both formulations after obtaining informed consent [27, 28].

**Water Absorption Ratio:** A piece of tissue paper folded twice was placed in a small petridish containing 6 ml of water. A tablet was put on the paper and the time required for complete wetting was recorded. The wetted tablet was then weighed. Water absorption ratio, R, was determined using following equation [19].

$$R=10[W_a/W_b]$$

where,

$W_b$  = Weight of tablet before water absorption

$W_a$  = Weight of tablet after water absorption

**In Vitro Drug Release Study:** In vitro drug release study was carried out using tablet dissolution test apparatus, USP Apparatus 2 [Paddle type] at 50 rpm [Eureka DT 700 Germany]. 900 ml of phosphate buffer [pH 6.8] was placed in dissolution vessels and a temperature of  $37 \pm 0.50^\circ\text{C}$  was maintained. 10 ml sample was withdrawn at predetermined time intervals and an equivalent amount of fresh dissolution fluid equilibrated to the above temperature was added. The absorbance values of diluted sample were determined spectrophotometrically at 276 nm using UV spectrophotometer [Shimadzu 1700, Shimadzu Corporation, Kyoto, Japan] [29].

## RESULTS AND DISCUSSION

**Study of Flow Properties:** In the present study, Aceclofenac ODTs were prepared by using Kollidon CL-SF, Ludiflash and croscarmellose sodium as superdisintegrants (Table 1). Two formulations were developed and tablets were made by direct compression technique.

As the flow property of the powder mixture is important for the uniformity of the mass of the tablets, both angle of repose and compressibility of the powder were analyzed before compression of the tablets. The angle of repose and compressibility index [%] ranged from  $23.6 \pm 2.07^\circ$  to  $28.05 \pm 0.98^\circ$  and  $10.8 \pm 5.69$  to  $9.99 \pm 3.95\%$ , respectively. The results of bulk density and tapped density also ranged from  $53.6 \pm 1.52$  g/ml to  $51.33 \pm 3.7$  g/ml and  $60.3 \pm 2.51$  gm/ml to  $57.00 \pm 2.6$  g/ml, respectively. All these data indicate that the flow property of powder blend was satisfactory (Table 2).

**Tablet Characteristics:** The data obtained from post-compression parameters such as hardness, friability, weight variation, thickness are shown in Table 3. The hardness was found to be in the range of  $2.38 \pm 0.06$  to  $4.86 \pm 0.04$  kg/cm<sup>2</sup> for all the tablets from both formulations indicating that these formulations confer adequate mechanical strength with an ability to withstand physical and mechanical stress while handling the tablets. In all the formulations, the friability values were less than 1% which met the pharmacopoeial limits. All the tablets passed weight variation test as the percentage weight variation

was within the pharmacopoeial limits. The weight of all the tablets was found to be uniform with low standard deviation values ( $201.77 \pm 0.30$  to  $207.73 \pm 0.47$ ) indicating that mixing of drug, disintegrants and excipients was efficient and homogenous.

**In vivo Taste Evaluation of Aceclofenac ODT:** The taste of ODT is an important characteristic that must be evaluated. Therefore, the prepared Aceclofenac ODTs were subjected to taste evaluation test in six healthy volunteers according to set protocol. The results of taste evaluation studies shown in Table 3 suggest that aspartame as sweetener used in F1 is sufficient to mask the bitter taste of Aceclofenac. Addition of mannitol in F2 has further imparted sweetness to the tablets, which can be omitted in the commercial formulation to reduce the cost.

**In vitro Wetting and Disintegration Studies:** The *in vitro* disintegration time, modified disintegration time, wetting time, amount of drug content, disintegration in oral cavity and water absorption ratio were also determined and results are shown in Table 4. The percent drug content of Aceclofenac in all the tablets was found to be between  $97.53 \pm 0.05\%$  to  $99.95 \pm 0.03\%$ , which was within the acceptable limit. The results of *in vitro* wetting time and *in vitro* disintegration time of all the tablets were found to be within the acceptable limits and satisfied the criteria for ODTs. The *in vitro* wetting time (Fig. 1) was in the range of  $12.3 \pm 2.51$  to  $17.00 \pm 2.00$  s while the *in vitro* disintegration time was  $24.50 \pm 1.43$  to  $24.90 \pm 1.68$  s.

Table 2: Micromeritics of powder blend

Formulation Batch No.	Bulk Density (g/ml)	Tapped Density (g/ml)	% of Compressibility	Hausner Ratio	Angle of Repose
F1	$53.6 \pm 1.52$	$60.3 \pm 2.51$	$10.8 \pm 5.69$	$1.12 \pm 0.07$	$23.6^\circ \pm 2.07$
F2	$51.33 \pm 3.7$	$57.0 \pm 2.6$	$9.99 \pm 3.95$	$1.11 \pm 0.05$	$23.05^\circ \pm 0.98$

Table 3: Different physical/evaluation parameters observed with two formulations (F1 & F2)

Formulation No.	Appearance	Weight variation (mg)	Friability (%)	Hardness (kg/cm <sup>2</sup> )	Thickness (mm)	Taste masking score
F1	Passes	$207.73 \pm 0.47$	$0.569 \pm 0.01$	$4.86 \pm 0.04$	$3.34 \pm 0.03$	0
F2	Passes	$201.77 \pm 0.30$	$0.613 \pm 0.01$	$2.38 \pm 0.06$	$3.41 \pm 0.01$	2

Table 4: Analytical Parameters

Formulation No.	In vitro disintegration	Modified disintegration	Disintegration in oral	Water absorption	Ratio	Assay
	Time (s)	time (s)	Wetting time (s)	cavity (s)		
F1	$24.50 \pm 1.43$	$32.33 \pm 2.51$	$17.0 \pm 2.00$	$27.7 \pm 1.37$	$18 \pm 2.64$	$97.53 \pm 0.05$
F2	$24.90 \pm 1.68$	$34.33 \pm 3.98$	$12.3 \pm 2.51$	$22.2 \pm 0.91$	$19.3 \pm 2.51$	$99.95 \pm 0.03$

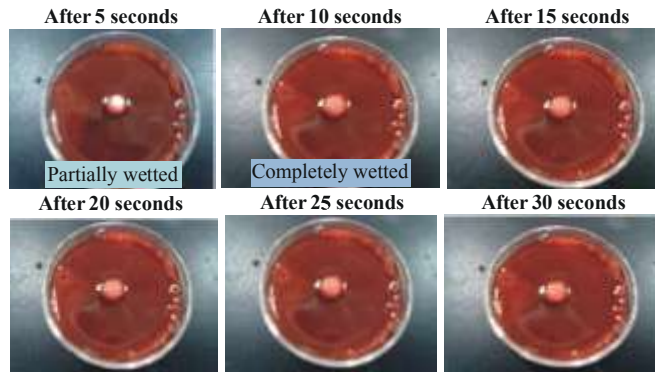


Fig. 1: Observation of the wetting of the tablet at different time intervals

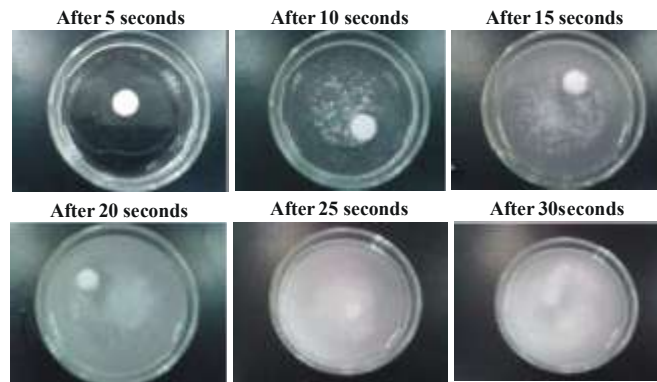


Fig. 2: Observation of the modified disintegration time of the tablet at different time intervals

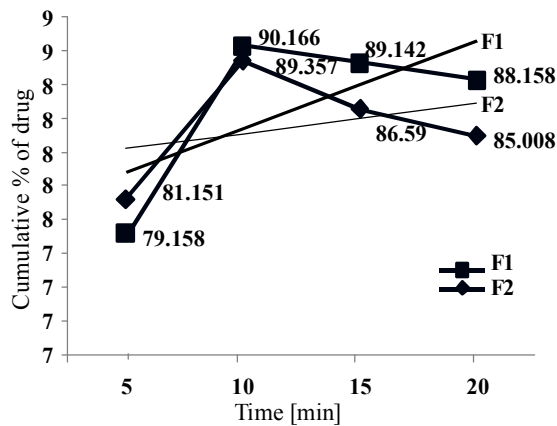


Fig. 3: Comparative study of cumulative % of drug release at different time intervals from F1 and F2

It was observed that Kollidon CL-SF and Ludiflash used in F1 and croscarmellose sodium used in F2 as superdisintegrants, showed rapid disintegration. Tablets of both formulations (F1 and F2) were found to possess the least wetting time ( $12.3 \pm 2.51$  s and  $17.00 \pm 2.0$ s) and disintegration time ( $24.50 \pm 1.43$  s and  $24.90 \pm 1.68$  s), which are required characteristics of an ideal ODT. The modified

disintegration time (F1:  $32.33 \pm 2.51$  s, F2:  $34.33 \pm 3.98$  s), time to disintegrate in oral cavity (F1:  $27.7 \pm 1.37$  s, F2:  $22.2 \pm 0.91$  s) and water absorption ratio ( $18 \pm 2.64$  to  $19.3 \pm 2.51$ ) values were also found to be acceptable for ODT.

**Drug Release Studies:** The cumulative percent of the drug released (dissolution test) from formulations F1 and F2 are shown in Fig. 3. F1 was found to release 90.16% drug while F2 released 89.35% drug at the end of 10 min of dissolution. These results suggest that a good bioavailability of drug is possible from both the formulations. Our results are consistent with previous studies demonstrating the effect of superdisintegrants in fast dissolving tablets [10, 14, 17]. Best fit straight line graph showing drug release clearly depicts the superiority of F1 over F2.

## CONCLUSION

From the above discussion, it can be concluded that both formulations have satisfactory organoleptic properties and at the same time, they show an increased dissolution profile. However formulation containing

combination of Kollidon CL-SF and Ludiflash showed better disintegration and dissolution profile than the other containing croscarmellose. Moreover, the concentration of aspartame used in F1 has sufficiently masked the bitterness of Aceclofenac. This study demonstrates that taste masked ODTs of Aceclofenac can be prepared by direct compression technique using a combination of superdisintegrants as it satisfies all the criteria of an ODT and would be a better alternative to the currently available conventional tablets. ODT of Aceclofenac is advantageous over conventional tablet as the dispersed bulk of the tablet will be rapidly distributed and diluted in stomach resulting in no localized decrease in pH, thus, eliminates the possibility of gastric irritation and ulceration. As the ODT enhances better patient convenience and compliance, Aceclofenac with this formulation may be commercially important as this will attract a larger group of patients, in particular, who are active and busy and having swallowing difficulties. Nevertheless, our current study did not include many formulations for better justification. Further investigations will be needed to confirm the in vivo efficiency.

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#### REFERENCES

1. Dooley, M., C.M. Spencer and C.J. Dunn, 2001. Aceclofenac: a reappraisal of its use in the management of pain and rheumatic disease. *Drugs*, 61(9): 1351-78.
2. Solanki, S.S. and R. Dahima, 2011. Formulation and evaluation of aceclofenac mouth-dissolving tablet. *J. Adv. Pharm. Technol. Res.*, 2(2): 128-131.
3. Radke, R.S., J.K. Jadhav and M.R. Chajeed, 2009. Formulation and evaluation of orodispersible tablet of baclofen. *International Journal of Chem. Tech. Research*, 1(3): 517-521.
4. Malakar, S., S.B. Rao, A.P. Kumar and S.V. Kulkarni, 2010. Formulation and evaluation of fast dissolving dispersible aceclofenac tablets. *International Journal of Pharmacy and life Sciences*, 2(5): 90-96.
5. Swamy, P.V., S.N. Gada, S.B. Shirsand, M.B. Kinagi and H. Shilpa, 2010. Design and evaluation of cost effective orodispersible tablets of diethylcarbamazine citrate by effervescent method. *International Journal of Pharma Sciences and Research*, 1(6): 258-264.
6. Bhowmik, D., B. Chiranjib, R. Krishnakanth, Pankaj and M. Chandira, 2009. Fast Dissolving Tablet: An Overview. *Journal of Chemical and Pharmaceutical Research*, 1(1): 163-177.
7. Ravikumar, S., R. Patil, M.B. Patil, M.S. Paschapur and R. Mahalaxmi, 2010. Design and Characterization of aceclofenac mouth dissolving tablets by effervescent formulation approach. *International Journal of Pharmaceutical Sciences*, 2(1): 220-236.
8. Reddy, L.H., B. Ghosh and Rajneesh, 2002. Fast dissolving drug delivery system; a review of the literature. *Indian J Pharm Sci.*, 64: 331-6.
9. Siddiqui, M.D.N., G. Garg and P.K. Sharma, 2011. A short review on "A Novel Approach in Oral Fast Dissolving Drug Delivery System and Their Patents". *Advances in Biological Research*, 5(6): 291-303.
10. Bhardwaj, V., M. Bansal and P.K. Sharma, 2010. Formulation and Evaluation of Fast Dissolving Tablets of Amlodipine Besylate Using Different Super Disintegrants and Camphor as Sublimating Agent, *American-Eurasian Journal of Scientific Research*, 5: 264-269.
11. Andersen, O., O.K. Zweidorff, T. Hjelde and E.A. Rødland, 1995. Problems when swallowing tablets, A questionnaire study from general practice. *Tidsskr Nor Laegeforen.*, 115(8): 947-949.
12. Dali, S.A., C. Subhashis, S. Singh and M. Brahmeshwar, 2009. Mouth Dissolving Tablets: An Overview of Formulation Technology. *Sci Pharm.*, 77: 309-326.
13. Banker, G.S. and N.R. Anderson, 1987. Tablet, In: L. Lachman, H.A. Lieberman and J.L. Kanig, (Eds.), *The Theory and Practice of Industrial Pharmacy*. Varghese Publishing House, Mumbai, pp: 293-399.
14. Kumar, S., S.K. Gupta and P.K. Sharma, 2012. A Review on Recent Trends in Oral Drug Delivery-Fast Dissolving Formulation Technology. *Advances in Biological Research*, 6(1): 06-13.
15. Badgular, B.P. and A.S. Mundada, 2011. The technologies used for developing orally disintegrating tablets: a Review. *Acta Pharm.*, 61(2): 117-39.

16. Kaur, T., B. Gill, S. Kumar and G.D. Gupta, 2011. Mouth dissolving tablets: A novel approach to drug delivery. *International Journal of Current Pharmaceutical Research*, 3(1): 1-7.
17. Wagh, M.P., C.P. Yewale, S.U. Zate, P.I. Kothawade and G.H. Mahale, 2010. Formulation and evaluation of fast dispersible tablets of aceclofenac using different superdisintegrants. *International Journal of Pharmacy and Pharmaceutical Sciences*, 2: 154-157.
18. Parakh, S.R. and A.V. Gothoskar, 2003. A review of mouth dissolving tablet technologies. *Pharm Tech.*, 27(11): 92-98.
19. Allen, T., 1997. Particle size measurement, 5<sup>th</sup> Ed. London.
20. Reddy, L.H., B. Ghosh and Rajneesh, 2002. Fast dissolving drug delivery system; a review of the literature. *Indian J Pharm Sci.*, 64: 331-6.
21. U.S.P., The United State Pharmacopeia, 2004. 27<sup>th</sup> Revision, United States Pharmacopeial Convection Inc., The Broad of Trustees, Washington, U.S.A., pp: 170, 219, 2302, 2396.
22. Kuchekar, B.S., A.C. Badhan and H.S. Mahajan, 2003. Mouth dissolving tablets: a novel drug delivery system. *Pharma Times*, 35: 7-9.
23. Malik, s K., G. Arora and I. Singh, 2011. Taste Masked Microspheres of Ofloxacin: Formulation and Evaluation of Orodispersible Tablets. *Sci. Pharm.*, 79: 653-672.
24. Sharma, A., A. Jain, A. Purohit, R. Jatav and R.V. Sheorey, 2011. Formulation and evaluation of aceclofenac fast dissolving tablets. *International Journal of Pharmacy and life Sciences*, 2(4): 681-686.
25. Shah, D.P., V.C. Jain, N.G. Sonani, H.P. Dalvadi and N.J. Patel, 2010. Influence of various excipients on quality control parameter of aceclofenac tablets containing SSG. *International Journal of Pharmaceutical Sciences*, 1: 113-121.
26. Mangal, M., S. Thakral, M. Goswami and N. Thakur, 2012. Comparison Study between Various Reported Disintegrating Methods for Fast Dissolving Tablets. *African J. Basic and Applied Sciences*, 4(4): 106-109.
27. Kulkarni, A.P., A.B. Khedkar, S.R. Lahotib and M.H.D. Dehghanb, 2012. Development of Oral Disintegrating Tablet of Rizatriptan Benzoate with Inhibited Bitter Taste. *American- Eurasian Journal of Scientific Research*, 7(2): 47-57.
28. Kraemer, J., J. Gajendran, A. Guillot, J. Schichtel and A. Tuereli, 2012. Dissolution testing of orally disintegrating tablets. *J. Pharm. Pharmacol.*, 64(7): 911-8.
29. Srinivas, M., A. Parambil, M. Krishnan and N.U. Achutha, 2008. Enhancement of dissolution rate and bioavailability of aceclofenac. *International Journal of Pharmaceutics*, 350: 279-290.