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Comparative analysis of Ibuprofen tablets by UV Visible Spectroscopy & FTIR

Dr. Dipti. B. Ruikar [1], Dr. Bhushan Bhoyar*[2], Mr. Shreyash Khawale[2], Mr.Tushar Moon[2], Mr.Tejas Barbuddhe[2], Mr.Ayush Thakare[2], Mr. Gajanan J Deshmukh[3]

[1] School of Pharmacy, G H Raisoni University, Amravati-444701, Maharashtra
[2] P R Pote Patil College of Pharmacy, Amravati-444604, Maharashtra
[3] Government polytechnic, Pharmacy Department, Amravati-444602, Maharashtra 444602
*** Corresponding author:**Dr. Dipti B. Ruikar
dipti21ruikar@gmail.com

ABSTRACT:

To assess the integrity and excellence of various makes of Ibuprofen tablets, ultraviolet (UV) spectrophotometry and Fourier-transform infrared (FTIR) spectroscopy are employed. Simultaneously, a straightforward, economical, and responsive spectrophotometric approach is established to ascertain the composition of Ibuprofen tablets accessible in the local market. Furthermore, both externally available and internally produced tablets undergo evaluation via UV spectrophotometry and FTIR spectroscopy. UV spectrophotometry centers on gauging the absorbance at the predominant wavelength of 223 nm using a phosphate buffer solution. The tablets' overall purity is gauged by matching them with the criteria established by the United States Pharmacopoeia (USP) and the British Pharmacopoeia (BP). In the case of FTIR spectroscopy, the spectra of commercial and in-house Ibuprofen tablets are scrutinized and juxtaposed. While both marketed and in-house tablets conform to the weight uniformity specification, FTIR spectroscopy emerges as a more precise and sensitive method, producing more favorable outcomes compared to UV spectrophotometry. The eminence and safety of pharmaceutical products are of utmost significance.

Keywords: Ibuprofen, UV spectrophotometry, phosphate buffer, Disintegration, Dissolution.

INTRODUCTION:

The studies for solid oral dosage forms have recently widened the scope to a variety of special dosage forms such as tablets. For class II drugs, like Ibuprofen, it is very important to have discriminative methods for different formulations in physiological conditions of the gastrointestinaltract, which will identify different problems that compromise the drug bioavailability. In the present work, we study the comparison of drug and the stability and efficacy of the dosage forms through some of instruments we used Ex. Uv Spectroscopy and FTIR. For quantitative analysis, the UV/V is spectrophotometry was used because this methodology had been adequately validated.

Fourier transform in frared spectroscopy:

Infrared spectroscopy examines the vibrations of molecules**.** Functional groups can be connected to distinctive in frared absorption and that are related to their fundamental vibrations. There are 3N-6 vibrational motions of the molecule's atoms, often known as 3N-6fundamental vibrations or normal modes, for an on linear moleculewithNatoms.Ifthereisachangeinthemolecule'sdipolemoment2duringthe vibration, the typical mode of vibration is infrared active (that is, it absorbs the incident in frared light). As a result, infrared typically cannot detect symmetric vibrations. All vibrations that are symmetrical about a molecule's centre of symmetry are specifically inactive in the in frared when the molecule has a centre of symmetry.[1]

Fourier transmitted infrared (FTIR) spectroscopy has been used to study the physical and chemical interactions between drugs and excipients. FT-IR spectra were recorded with FT-IR spectrometer (IRAffinity-1S, Shimadzu, Japan). Each sample was powdered and mixed with KBr (Uvasol, Merck, and Kga A, Germany). Pellets were prepared by using hydraulic press with a pressure of 100 Kg/cm2 for 15 min. The pellets were then scanned from 4000 to 400cm-1 with a mirror speed of 2 mm/sec. Drug-excipient compatibility study was carried out by the FT-IR analysis of pure drug ibuprofen, and the formulation containing ibuprofen andpolymers.[1]

Application:-

FTIR can be used in all applications where a dispersive spectrometer was used in the past (see external links). In addition, the improved sensitivity and speed have opened new areas of application. Spectra can be measured insituations where very little energy reaches the detector and scan rates can exceed 50 spectraa second. Fourier transform in frared spectroscopy isused in geology, chemistry, materials, and biology research fields.[1]

Macroscopy and Imaging:-

An infrared microscope allows samples to be observed and spectra measured from regions as small as 5 microns across. Images can be generated by combining a microscope with linear or2-D array detectors. The spatial resolution can approach 5

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microns with tens of thousands of pixels. The images contain a spectrum for each pixel and can be viewed as maps showing the intensity at any wave length or combination of wavelengths.[1]

Ultra violet Spectroscopy Analysis:

UV-VIS spectroscopy is considered as the oldest analytical technique that can be defined as the spectrophotometric technique which is used to measure the intensity of light in UV (10–400nm) and VIS (400–800 nm) regions as a function of wavelength. The wavelengths of UV and VIS radiations are usually expressed in nanometres (nm). The analyte absorbs the light of specific wavelength (UV and VIS only) and the amount of radiation absorbed by the analyte is measured.

The spectrum produced after the absorption of UV-VIS light results from the interaction of EMR in UV-VIS region with the analyte. It forms the basis to analyse a variety of substances like organic, inorganic, biochemical, and pharmaceutical compounds. In UV-VIS spectroscopy, absorption of radiation soccurs at electronic energy levels (one of the three basic energy levels, i.e., electronic, vibrational, and rotational energy levels) of molecules; therefore, this technique is also known a selectronic spectroscopy.[2]

Absorbance Laws:-

There are basically three laws for spectroscopy that describe the absorbance of light through a material. The details of these laws have been described below.

Beer's Law:-

It can be described as the be am intensity of them on ochromatic light is decreased exponentially when the concentration of analyte increases arithmetically (Fig.3.10). In quantitative analysis, primarily concerned with solutions, the effect of concentration of the coloured constituent in solution depends upon the light absorption or transmission. It can be expressed as:

$I=I^{-klc}$

Lambert's Law:-

The rate of decrease in the intensity of incident light with the thickness of the medium is directly proportional to the intensity of incident light. It can also be stated that the intensity of emitted light is decreased exponentially as the thickness of absorbing medium is increased. It is expressed as:

$I=Ie^{-k2l}$

Beer–Lambert Law:-

Beer–Lambert law (or Lambert–Beer law) describes a linear relationship between the absorbance of light and the concentration of absorbing species. The Beer– Lambert law is written as:

$I=I^{-kcl}$

This law is derived by combining the Beer's law and Lambert's law that associates the light absorption with the properties of sample across which the light travels.

Limitations from Beer–Lambert Law:-

Beer–Lambert law shows a direct correlation between the absorbance (A) of given analyte to the concentration (c) and path length (b) of the sample. This relationship is linear but, under certain conditions, this relationship breaks down and gives anon-linear relationship. The most important deviations from Beer–Lambert law may be categorized into the following two categories:

Real Deviations:-

Beer and Lambert laws describe the absorption characteristics of solutions that have relatively low concentrations (10mM), then the analyte begins to behave differently owing to the interactions with surrounding solvent molecules or other solute molecules present in solution and hydrogen bonding also plays a significant role in this regard.

Chemical Deviations:-

This type of deviation is observed owing to the presence of chemical species in sample which is being analysed. Various factors are involved in chemical deviation notably association, dissociation, polymerization, complex formation, and interaction of analyte with solvent to make a product having different absorption properties.[2]

Ibuprofen:

Ibuprofen is a medication in the non steroidal anti-inflammatory drug (NSAID) class which isused for treating pain, fever, etc. It isused for the treatment of mild – to – moderate pain, inflammation, and fever caused by many and diverse diseases. It isused for treating menstrual cramps (dysmenorrhea), osteoarthritis, rheumatoid arthritis, and juvenile idiopathic arthritis. Besides its upsides, there are some downsides of ibuprofen. It increases the risk of heart, kidney, and liver failure. At low dosage, it does not appear to increase the risk of heart attack; however, at higher dosage, the risk may get an increase. This chemical drug is listed on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system. According to the IUPAC, it is (RS)-2-(4-(2-methylpropyl) (phenyl) propanoic acid. The original synthesis of ibuprofen by the Boots Group started with the compound 2-methylpropylbenzene.[1] Ibuprofen blocks the enzyme that make spros tag land ins

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(cyclooxygenase), resulting in lower levels of prostaglandins that help in reducing inflammation, pain, and fever.

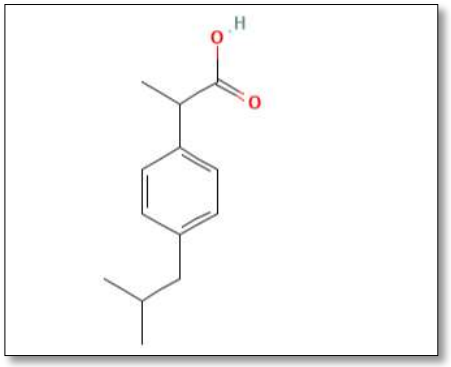

Fig no.1: Structure of Ibuprofen.

This review is focused on various chemical and functional properties and experimental studies of ibuprofen including various detection methods such as potentiometric, ultraviolet spectrophotometric, FTIR which can also be used for the extraction, quantification, and quality analysis. Ibuprofen has the analgesic and antipyretic properties. Pharmacologically, it has similar action to those of other prototypical NSAIDs. Ibuprofen is apropionic acid derived and NSAID with anti-inflammatory, analgesic, and antipyretic effects and has the cardio protective effect of aspirin. Ibuprofen having propionic acid derivatives inhibits the activity of cyclooxygenase I and II that decrease the formation of precursors of prostaglandins and thromboxane's. This leads to decreased pros tag land in synthesis, by prostaglandin synthase, the main physiologic effect of the drug. Ibuprofen also causes a decrease in the formation ofthromboxaneA2synthesis.[3]

The absorption of the drug is rapid and complete when given orally. Ibuprofen is eliminated following biotransformation to glucuronide conjugate metabolites that are excreted in urine, with little of the drug being eliminated unchanged Beauchamp. found oil from the olive plant showing similar ibuprofen activity due to the presence of oleocanthal. Studies showed that inflammation and plaque pathology is suppressed by ibuprofen in mouse for Alzheimer disease. In 1993, Has son et al. Were able to study the ibuprofen effect on the muscles or eness, damage.[3]

Like other non-steroidal anti-inflammatory drugs (NSAIDs), ibuprofen is a potentinhibit or of pros tag land in synthesis, and many oral lits the rapeutic and toxic effects are linked to this characteristic. The general impression is that it is less potent and thus less toxic than in dome thac in in usual doses, but it has often been used in the past in relatively low doses. In a comparative, double-blind, crossover study of ibuprofen, naproxen, fetoprotein, and tolmetinin patients with rheumatoid arthritis, ibuprofen in Equip-effective doses was the best tolerated; however, the patients and physicians preferred naproxen.

All NSAID scan cause or aggravate hypertension and inhibit the effects of anti hypertensive drugs. Data from arandomized trial have suggested that ibuprofen significantly increases blood pressure inpatients taking ACE inhibitors.[3]

Table no.1: Properties of Ibuprofen.

Sr. no	Contents	Properties
1	IUPAC	2-[4-(2-methylpropyl) phenyl] propanoic acid
2	Description	White off – white colour cap let shape tablets Plane on both sides.
3	WaterSolubility	Less than 1mg of ibuprofen dissolving in 1ml water.
4	Ph	Neutral format pH4
5	Molecularweight	206.8g/ml
6	Pka	5.20
7	logp	3.50

Pharmacokinetic Properties:

Absorption and Permeability:

Following oral administration of ibuprofen, maximum plasma concentrations are reached within 1–2h in humans with an absolute bio availability (BA) of about 100%. Antacids like magnesium hydroxide accelerate the rate of absorption duet opH changes in the gastrointestinal (GI) system induced by the ant acid. However, the extent of absorption, expressed as AUC was not affected. Also, ibuprofen absorption was much slower when concomitantly administered with aluminium hydroxide capsules than with sodium bicarbonate capsules. A rank order correlation was observed between dissolution parameters and the in vivo results that reflect rate of absorption, but no differences were noted in the AUC values. Food intake also affects the absorption rate of ibuprofen, which is likely due to food induced pH elevation in the stomach resulting in earlier in vivo dissolution of ibuprofen.[4]

Rapid and complete absorption suggests a high permeability through the GI membrane. Scintigraphy studies with sustained release products in humans indicate that ibuprofen absorption occurs throughout the GI tract following oral administration, which again supports a high permeability.[4]

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Therapeutic Applications:

A low dose ibuprofen is as effective as aspirin and paracetamol for the indications normally treated with over-the-counter medications.16 It is widely used as an analgesic, an anti-inflammatory and an antipyretic agent. Racemic ibuprofen and S (+) enantiomer are mainly used in the treatment of mild to moderate pain related. to dysmenorrhea, headache, migraine, postoperative dental pain, management of spondylitis, osteoarthritis, rheumatoid arthritis and soft tissue disorder. 20A number of other actions of NSAIDs can also be attributed to the inhibition of prostaglandins (PGs) or thromboxane synthesis, including alteration in platelet function (PGI2 and Thromboxane), prolongation of gestation and labour (PGE2,PGF2A), gastrointestinal mucosal damage (PGI2 and PGE2), fluid and electrolyte imbalance (renal PGs), premature closure of ductusarteriosus (PGE2) and bronchial asthma.[4]

Advers Reactions:

NSAIDs are widely used, frequently taken in appropriately and potentially dangerously. Nevertheless, ibuprofen exhibits few adverse effects. The major adverse reactions include the affects on the gastro intestine altract (GIT), the kidney and the coagulation system. Base don clinical trial data, serious GIT reactions prompting withdrawal of treatment because of hematemesis, peptic ulcer, and severe gastric pain or vomiting showed an incidence of 1.5%with ibuprofen compared to 1% with placebo and 12.5 % with aspirin. Ibuprofen was a potential cause of GI bleeding, increasing the risk of gastric ulcers and damage, renal failure, epist axis, apoptosis, heart failure, hyper kalaemia, confusion, and broncho spasm. It has been estimated that 1 in 5 chronicusers (lasting over along period of time) of NSAIDs will develop gastric damage which can be silent. Other adverse effects of ibuprofen have been reported less frequently. They include thrombocytopenia, rashes, headache, dizziness, blurred vision and in few cases toxic amblyopia, fluid retention and enema. Patients who develop ocular disturbances should discontinue the use of ibuprofen.[4]

Clinical Pharmacology of Ibuprofen:

Ibuprofen is supplied as tablets with apotency of 200to800mg. The usual dose is 400to 800 mg three times a day. It is almost insoluble in water having pKa of 5.3.8 It is well absorbed orally; peakse rum concentrations are attained in 1to2 hours after oral administration. It is rapidly bio-transformed with a serum half-life of 1.8 to 2 hours. The drug is eliminated in24 hours after the last dose and eliminated through metabolism. The drug is more than 99%protein bound, extensively metabolized in the liver and little is excreted unchanged. Although highly bound to plasma proteins (90-99%), displacement interactions are not clinically significant, hence the dose of oral anti-coagulants and oral hypoglyc aemic needs not be altered. More than 90% of an ingested dose is excreted in the urine as metabolites or their conjugates, the major metabolites are hydroxylated and carboxylate compounds.[5]

Old age has no significant effects on the elimination of ibuprofen. Renal impairment also has no effect on the kinetics of the drugs, rapid elimination still occurs as a consequence of metabolism. The administration of ibuprofen tablets either under fasting conditions or immediately before meals yield quiet similar serum concentrations-time profile. When it is administered immediately after a meal, there is a reduction in the rate of absorption but no appreciable decrease in the extent of absorption. Ibuprofen absorption was much slower when concomitantly administered with aluminium hydroxide capsules than with sodiumbic arbonate capsules. Arankor dercorrelation was observed between dissolution parameters and the in vivo results that reflect rate of absorption, but no differences were noted in the AUC values. The general impression is that it is less potent and thus less, but it has often been used in the past in relatively low doses. In a comparative, double-blind, cross over study of ibuprofen.[5]

Material & Methods:

API:- Ibuprofen

Excipient:- Hydroxy propylmethyl cellulose, Lactose Monohydrate, Starch (Intra-granular), Starch (Extra-granular), Magnesium Stearate.

Chemicals:- Potassium Dihydrogen Phosphate, Sodium Hydrogen Phosphate, Ammonium Chloride

Instrument and Equipment:-

Sr. No.	struments and Equipment's	Make	Model no.
1.	compressionmachine	RIMEK Mini Press II	-
2.	Fourier Transform Infrared spectroscopy	Bruker India Scientific Ltd.	Alph aII
3.	UV-VIS Spectrophotometer	LABINDIA Analytical	UV3092
4.	Hardness Tester	Vin Syst Technologies	-
5.	Thickness Tester	Digital Caliper	-
6.	Dissolution Apparatus	LABINDIA	DS8000
7.	sintegration Apparatus	LABINDIA	DT1000

Table no.2: Instrument and Equipment's

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Manufacturing of In-House tablet:-Formulation Composition

Batchsize 30 Tablets		
Sr. no.	**Ingredients**	**gm/Batch**
1	Ibuprofen(powder)	12.00
2	Hydroxypropyl methyl cellulose	1.20
3	Lactose Monohydrate	11.70
4	Starch (Intragranular)	6.86
5	Starch (Extragranular)	3.00
6	Magnesium stearate	1.20
7	Water	10.00

Table no.3: Ingredients required for In-house tablets Manufacturing Procedure:-

1. All the ingredients were weighed accurately by using calibrated balance.
2. Ibuprofen and half quantity of lactose were shifted using mesh no.44 along with HydroxyPropyl Methyl Cellulose.
3. Material of stage 2 was manually blended for 5 minutes and transfer in granulation bowl.
4. Material of above stage wash and granulated using purified water.
5. Weight granules of above stage was dried in hot air oven for45minat50^0C.
6. Dried granules of above stage were shifted using meshno.30.
7. Accurately weighed starch was shifted through 40 mesh and blended manually with dried granules of stage 6for5min.
8. Blended granules of stage 7 were lubricated with magnesium stearate manually for 2 minutes.
9. Lubricated granules of above stage were compressed using caplet shape
10. Compressed tablet is De-Dusted and packed in poly bag for further evaluation.

Tablet Compression

Machine: RIMEK Mini Press II Punches:

1. Lower punch – 6mm embossed with 5.
2. Upper punch-6mm embossed with DP102.

Fig No.2: Compression of Tablet

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Micro meritics of lubricates blends:

- **Bulk density:**

The term bulk density refers to a measure used to describe a packing of particles. It is(gm/ml) and was determine using a balance and measuring cylinder. Initially the weight of the measuring cylinder was tarred. Then, 4 gm preserved (40#) bulk drug were poured into the measuring cylinder using a funnel. Then volume of the powder was taken. Bulk density of the granules was calculated using following formula.[5]

Bulk density=Weight of powder/ Volume of powder.

- **Tapped density:**

Tapped density is determined by placing a graduated cylinder containing same mass of powder used for B.D. on a mechanical tapper apparatus which is operated for a fixed number of taps (approx 500) until powder bed volume has reached aminimum.[6]

Tapped density = Weight of powder /min. volume of powder

- **Carr's Index (CI):**

Tapped and bulk density measurements can be used to estimate the carr's index of a material. Carr's index was determined by,[7]
Carr's index (%) = [(Tapped density–bulk density)/ tapped density]*100

Hausner's ratio (HR):
It is stated by Hausner. It was calculated as follow:[8]Hausnerratio=Tappeddensity/Bulkdensity

- **Angle of repose (Tanθ):**

Angle of repose is the tan inverse of angle between height (h) of pile of powder and the radius (r) of the base of conical pile. It can be obtained between the free standing surface of the powder heap and the horizontal plane. The fixed funnel that is secured with its tip at a given height h, above graph paper, placed on the flat horizontal surface. Powder is carefully poured through funnel until the apex of conical pile just touches the tip off unnel.[9]

Angle of repose $=\frac{h}{r}$

Evaluation of In-house tablets:
Description:
White off-white colour caplet shape tablets plane on both sides.

Hardness test:
The hardness of tablets for fast dissolving tablets is usually kept low for easy disintegration in the mouth. The hardness was measured using Sullinger hardness tester.

Fig no. 3: Hardness Tester

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Appearance:
Tablet from each formulation were randomly selected and organoleptic properties such as colour, taste, and shape were evaluated. Ibuprofen 400 mg tablets: White to off-white, caplet shaped, plain on the both side.

Fig no.4: Ibuprofen In-house tablets

Thickness:
The thickness of tablets was determined using a Digimatic vernier calliper (Mitutoya, Japan). Three tablets from each batch were used, and average values were calculated. Small variation in tablet thickness and diameter significantly affects hardness and dissolution profile of tablet. The tablet diameter and thickness is measured by using vernier calliper. Least count of measuring instrument is the ratio of smallest division on mains cale and total number of divisions on vernier scale or thimble scale. Mostly tablet have uniform diameter unless they have prepared by using different dies. Small variation in tablet thickness and diameter.

Figno.5 :Digimatic vernier calliper

Weight Variation Test:
Fifteen tablets were selected randomly from each batch and weighed individually on electronic balance. The individual weighed is then compared with average weight for the weight variations. The following percentage deviation in weight variation is allowed.

Fig no.6: Weighing scale

Fourier transform infrared spectroscopy

- **FTIR ofI buprofen (API) tablets:**

Procedure for analyzing of Ibuprofen (API):

11. The powder has been placed on platform, and slowly rotated the knob so that it is right above your powder (Ibuprofen).
12. The powder just placed on the top which is started for the analysis and get the spectrum.

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- **FTIR of In-house Ibuprofen tablets:**
  Procedure for analyzing of In-house Ibuprofen tablets:

1. The prepared In-house tablets are weighed properly about 400mg pertablets.
2. The5 tablets of batch (30Tablets) were crushed into powdered form through mortar and pestle.
3. The powder has been placed on platform, and slowly rotated the knob so that it is right above your powder(Ibuprofen).
4. The powder just placed on the top which is started for the analysis and get the spectrum.
5. After the analysis spectrum graph is recorded and analysed.

- **FTIR of Marketed Ibuprofen tablets:**
  Procedure for analysing of Marketed Ibuprofen tablets

1. The prepared Marketed tablets are weighed properly about 400mg per tablets.
2. The 5 tablets of batch were crushed into powdered form through mortar and pestle.
3. The powder has been placed on platform, and slowly rotated the knob so that it is right above your powder (Ibuprofen).
4. The powder just placed on the top which is started for the analysis and get the spectrum.

Disintegration time Testing:

A single tablet was added to a cylinder containing water and complete dispersion of the tablet in water was recorded as the disintegration time (LABINDIA, DT1000)[27].

It was determine using USP tablet disintegration test apparatus, using 900 ml of distilled water without disk at room temperature. Test was performed on 6 tablets. The results are shown in Table no.[10]

Fig no.7: Disintegration Apparatus.

Comparative analysis of drug release profile of Marketed and In-house tablets:

Dissolution profile of oral solid dosage form of ibuprofen:

The dissolution test for immediate or controlled release in solid oral dosage forms has recently widened to a variety of novel or special dosage forms. Because of the different characteristics of early dosage form, the site absorption and dosing routes and applications, it is essential to consider the following factors in the development of the test method: Apparatus selection, dissolution medium, agitation and temperature.[11]

For in vitro dissolution of poorly soluble drugs, it is difficult to find adequate hydrodynamic conditions as agitation rate, medium composition, and suitable volume, as well as a good discriminating power. In these conditions adequate dissolution cannot be achieved with aqueous solutions within physiologicp Hranges(1.2-6.8).[12]

Evaluation of Dissolution Profile of Ibuprofen in Tablet Formulation:

The drug dissolution study was performed in a USPIII paddle apparatus LABINDIADS8000). The dissolution medium was phosphate buffer (900 mL, pH 7.2, 37^0c). A vacuum was used to deaerate the medium. The rate of agitation of the paddle was 50 rpm. Ibuprofen was analysedat223 nm by UV spectrophotometry (UV-LAB INDIA) after suitable dilution with the phosphate buffer.[13]

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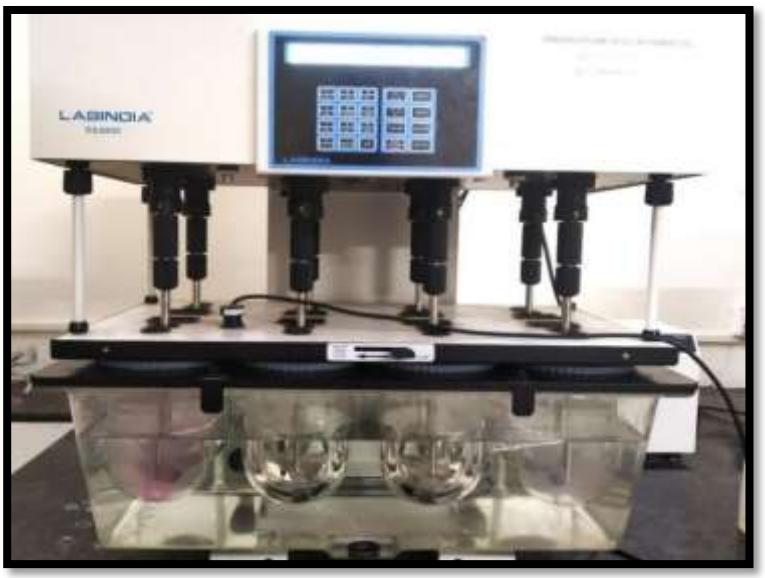

Fig no.8: Dissolution apparatus Preparation of Phosphate buffer:

- Dissolve Potassium 8.50 gm of Potassium di-hydrogen phosphate and 21.75 gm of sodium hydrogen phosphate and 1.70gm of Ammonium chloride in1litre of Volume tricflask.
- Makeup the final volume upto 1 litre Phosphate buffer solution.
- After Make up the Volume the next step is to checked pH of the solution by using pH meter.

Result and Discussion:
Result and evaluation of In-house tablets before compression

Tests	Results of Analysis
Colour	White powder
Odour	No characteristic odour
Bulk density	0.49g/ml
Tapped density	0.59g/ml
Angle of repose	24.22
Carr's Index	16.94%
Hausner's ratio	1.20

Table no.4: Value of evaluation parameter of blends before compression

As per the above data tapped density and bulk density does not show any considerable difference.
However, formulation with 1.2 and above percentage of Magnesium stearate shows good and excellent property.

Result and evaluation of Marketed tablets

1. **Name:** Ibuprofen Tablet I.P
2. **Manufacture name:** Brufen 400
3. **Manufactured by:** Abbott India Limited
4. **Address:** L18, Verma Industrial Area, Saicetta, Goa 403722

- **Description:**
  Pink colour round shape tablet plain on both side
- **Size and Shape:**
  Thickness of tablet ranging from 5.73mm – 5.99mm. All the tablets are circular bi-convex in shape.
- **Hardness:**
  The average hardness of Marketed Ibuprofen tablets is 8.5kp.

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Sr.no	Contents	Properties
1	Description	Pink colour round shape tablet plain on both side
2	Average weight	557.7mg
3	Thickness	5.76mm
4	Hardness	8.5kp
5	Friability	0.10%
6	Disintegration time	105sec

Table no.5: Evaluation of Marketed tablets

Fourier Transform Infrared Spectroscopy:

FTIR of Ibuprofen (API)

The FTIR Spectra of ibuprofen (API) in purest form was observed. The FTIR of ibuprofen (API) is shown as follows:

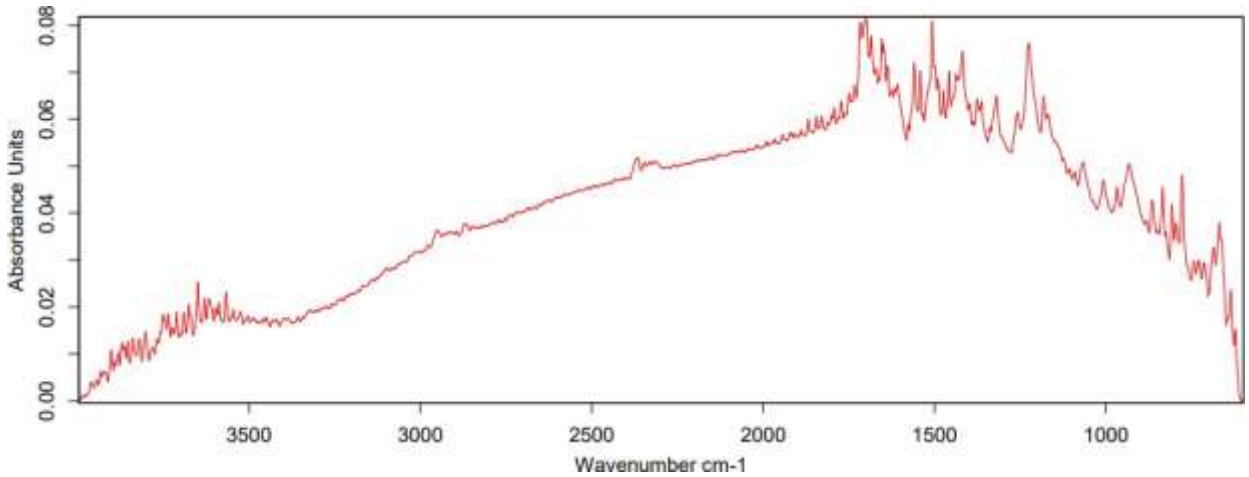

Fig no.9: FTIR of Ibuprofen (API)

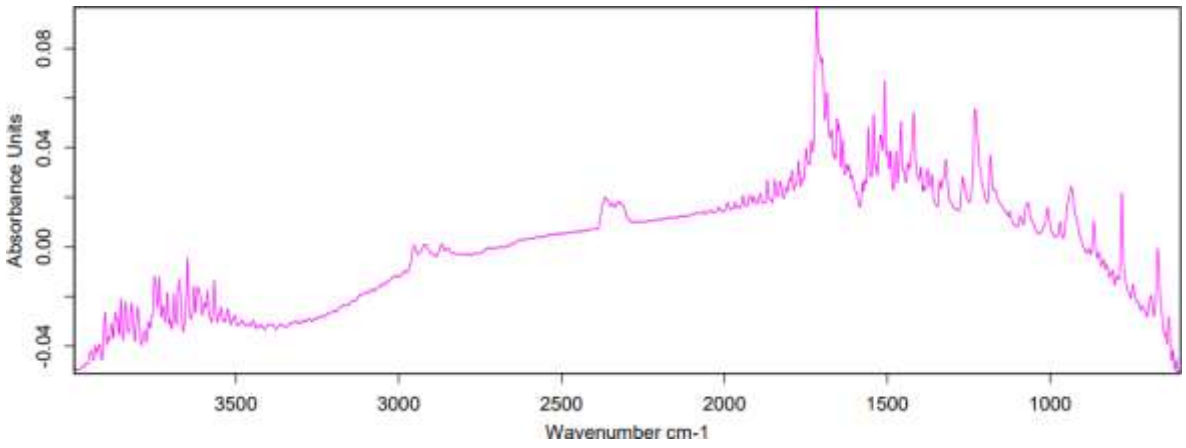

Fig no.10: FTIR of Marketed Tablets

Result and evaluation of In-house tablet:

1. Name: Ibuprofen 400mg Immediate Release Tablet
2. Batchsize: 30 Tablets

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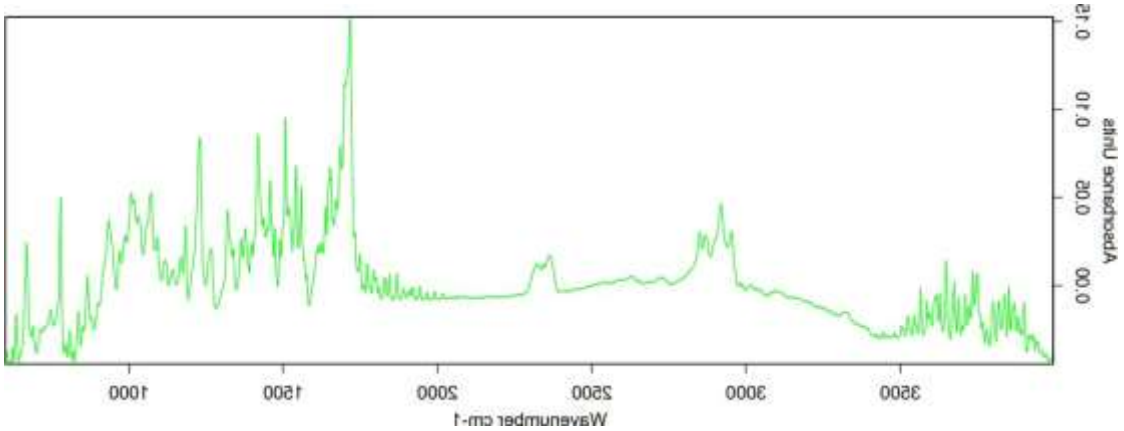
3. Batchno.30-F1

Sr.no	Contents	Properties
1	Description	White off-white colour caplet shape tablets plane on both side
2	Average tablet weight	1080mg
3	Thickness	6.76mm
4	Hardness	6.00kp
5	Disintegration time	90 sec

Table no.6: Evaluation of In-house tablets

FTIR of In-house tablets:
The FTIR Spectra of ibuprofen In-house tablet in purest form was observed. The FTIR of ibuprofen In-house tablet is shown as follows:



Figno.11: FTIR of In-house Tablets

Calibration curve of Ibuprofen:
UV spectrophotometric study of Ibuprofen was carried out to determine absorption maxima (λmax) in Phosphate buffer 7.2ph. The prepared stock solution was scanned in the range of 200 to 400 nm using UV spectrophotometer (LAB INDIA Analytical, UV 3092) and the spectrum was recorded. The absorption maxima (λmax) was obtained at 223 nm.
The calibration curve of Ibuprofen was drawn by measuring the absorbance of different concentration in distilled Phosphate buffer at 223nm. The calibration curve obtained is given table no.

- **The Uv Analysis of Ibuprofen (API) samples:**

Sr. no	Concentration (µg/ml)	Absorption
1	12.5	0.495
2	25	0.892
3	50	2.158
4	100	4.835

Table no.7: Calibration curve of Ibuprofen (API)

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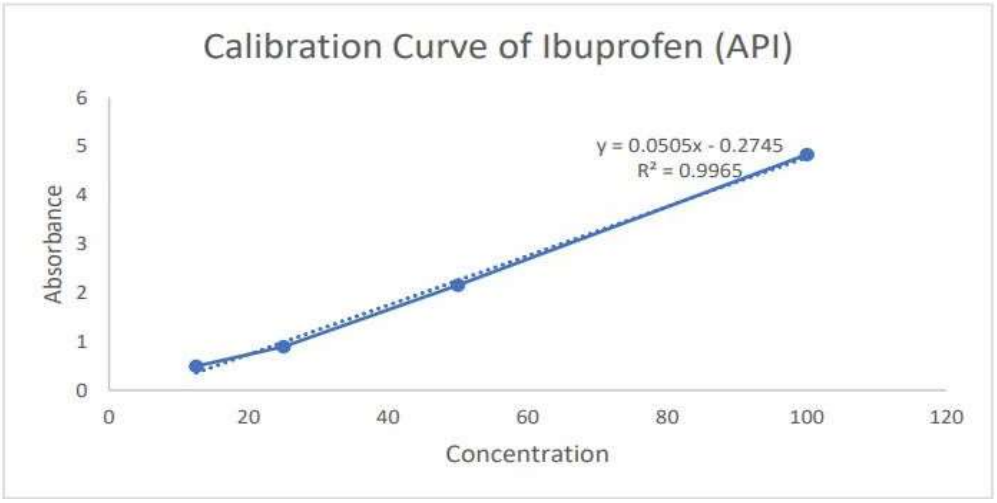

Fig no12.: Standard graph of Ibuprofen (API)

The value of slope and intercept in Phosphate buffer was 0.0505 and 0.2745 respectively. The calibration curves (Fig12.) were linear and obeyed Beer-Lambert's Law. The correlation coefficient value was 0.9965 indicating excellent linearity of the data.

Dissolution Profile:

Instrument used to calculate dissolution was dissolution apparatus, having model no. DS 8000 and having make LABINDIA. Dissolution studies were conducted by talking 900ml of water as dissolution media for 12 hours and USP Dissolution Apparatus II (paddle) (LAB INDIA DS8000) was used at 37 +0.5°C and 50 rpm. Samples for dissolution study were withdrawn. At every time interval the samples (5ml) of the solution were withdrawn from the dissolution apparatus and the samples were replaced with fresh dissolution medium to maintain the sink condition.

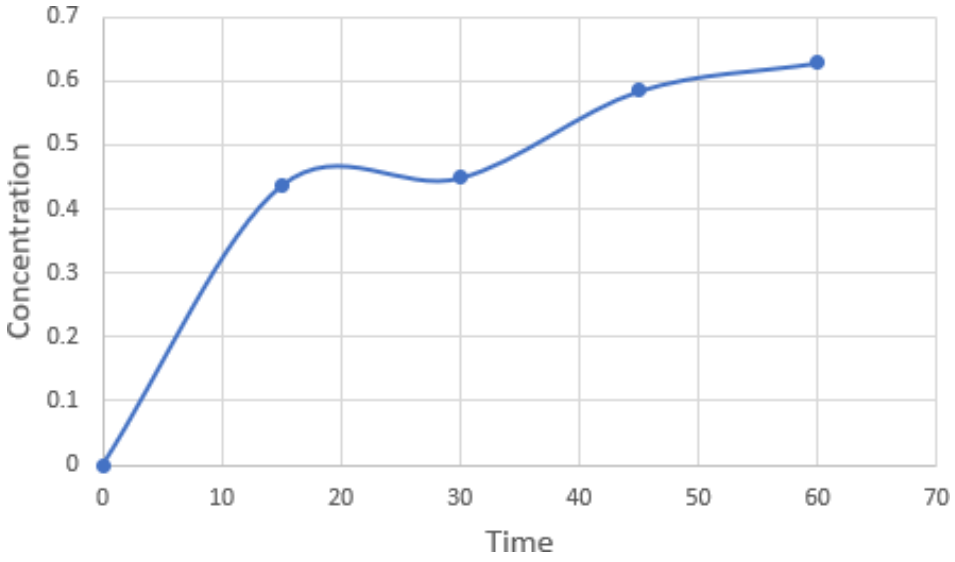

Fig no.13: Dissolution study of In-house Tablets

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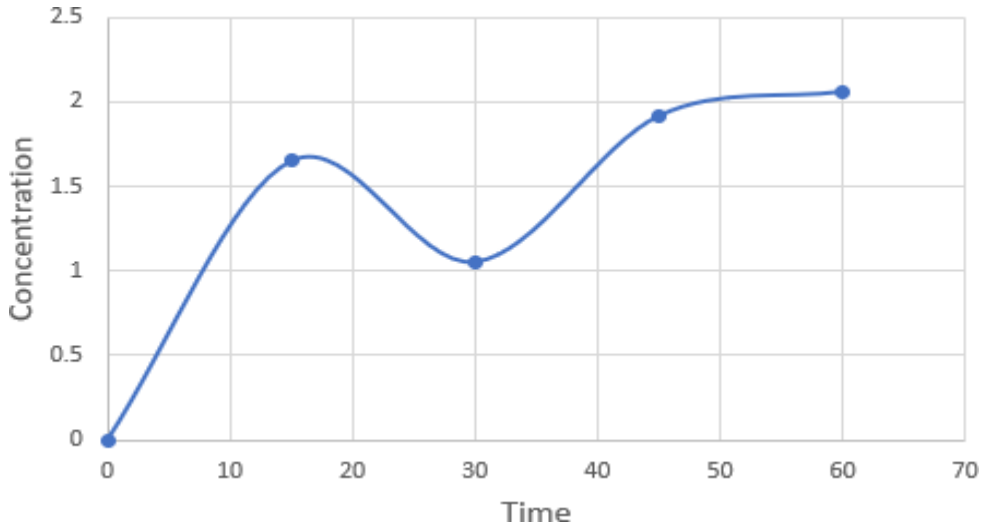

Fig no.14: Dissolution study of Marketed Tablets

Conclusion:

The Immediate release of tablet of ibuprofen having dose of 400 mg was manufactured successfully with satisfactory evaluation parameter. The in-house formulation shows similar Disintegration and Dissolution profile of marketed formulation (Brufen 400mg). The physical parameter of In-house parameter was compared with marketed formulation with respective drug release profile, It is observed that drug release rate of marketed formulation is similar to the in-house for 20min which is acceptable criteria for immediate release tablet.

This concludes successful formulation and comparison of In-house formulation with marketed formulation of ibuprofen immediate release tablet 400mg.

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