COMPUTATIONAL STUDIES OF SUPRAMOLECULAR CHEMISTRY IN IBUPROFEN DRUG ANALYSIS.

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Abstract

A probe into the literature survey clearly reveals no work has been administered for the project work evaluation of Ibuprofen sodium tablet. therefore this study aimed to determination of physical properties such as appearance solubility, melting point specific optical rotation, loss on drying. The structure of the identification of ibuprofen sodium using Infra-red spectroscopy were carried various spectral studies. From these studies, i do know about the knowledge of chemistry and spectroscopy. The main objective of this study is to specified and unspecified impurities using high performance liquid chromatography, Assay method of Ibuprofen methods of characterization

INTRODUCTION

Ibuprofen the first member of this group to come into general use has been 2. 4-isobutyl phenyl propionic acid. It forms white or almost white powder or crystals. . It as characteristic odour. . It is insoluble in water. It is soluble in organic solvent like Ethanol and Acetone. Ibuprofen has been not recommended for use by pregnant women. • It should be kept in well closed containers at room temperature. Isobutyl phenyl propionic acid is associated with several suspected or probable interaction that can affect the action of other drugs.Chemical industry zone with common effluent-discharge facility, innovative plant layout and high degree of mechanization. It has a separate multi-utility plant capable of undertaking custom manufacturing of Nizatidine from pilot plant to commercial scale achieved in record time. Modern laboratory with comprehensive facilities including microbiological testing, modern fire hydrant and fire alarm system spread over 44,000 square meter and ultra modern packing section and state of the drying equipments are salient features of plant. Pharmaceutical chemistry is a study of compounds used in medicine, embracing the main branches of chemistry like analytical

chemistry, physical and organic chemistry. Medicinal chemistry is concerned with the isolation determination of structure and synthesis of compounds, which are used in medicines. It involves the study of the metabolism and mechanism of action of drugs and the relationship between structure and biological activity. In the past few decades there has been a hiatus in the momentum of research and discover of “novel” medical compounds. The word drug is derived from the French word "drogne". which mean "herb”.

The source of drugs is chemical analysis, Micro organisms, Minerals, Higher flowering plants and animals. The synthetic drugs are obtained by modification of the structure of naturally occurring drugs or by pure synthesis. It is possible to prepare to prepare many new analgesics, anesthetics, antipyretics, anti inflammatory etc., by chemical

Analgesics are group of drugs which relief pain they act on the central nerve system and causes in sensibility to pain they are generally classified as

1. Narcotics analgesics. 2. Non Narcotics analgesics.

Ibuprofen may increase the blood level of lithium by reducing the excretion of lithium by the kidneys. Increased level of lithium may lead to lithium toxicity. Ibuprofen may be used in combination with amino glycosides the blood levels of the aminoglycosides may increase; presumably the elimination of amino glycoside from the body is reduced. It is used as Non steroidal anti inflammatory, 2. It is used as analgesics. 3. It is used as antipyretics. Ibuprofen (from the now outdated nomenclature iso-butyl-propanoicphenolic acid) is a non-sterodial anti-inflammatory drug (NSAID) originally marketed as brufen and since then under various other trademarks most notably nurofen, Advil and mortin. It is uses for relief of symptoms of arthritis, primary dysmenorrheal, fever, and as an analgesic, especially where there is an inflammatory component. Ibuprofen is known to have an antiplatelet effect, though it is relatively mild and short-lived when compared with that of aspirin or other more well-known antiplatelet drugs. Ibuprofen is a core medicine in the the world health organization's "Essential drugs list", which is a list minimum medical needs for a basic health care system.

. Introduction

1.1 Cyclodextrins

Cyclodextrins (CDs) are cyclic oligosaccharides, which are able to form host-guest (inclusion) complexes with various molecules. The three most important CDs are the α-CD, β-CD and γ-CD, which consist of six, seven and eight gluco pyranose units respectively. The CDs are produced through the degradation of starch by the enzyme CD transglycosylase that is obtained from the bacterium Bacillus macerans [1].

Most of the current interest in CDs arises from their ability to partially or fully complex a wide range of guest species within their annuli to form host-guest complexes [2, 3]. Their ability to form host-guest complexes has led to the use of CDs in a number of fields [3, 4]. For example, CDs have been used in the pharmaceutical industry, as solubilizers, diluents and as tablet ingredients which improve the stability, bioavailability and pharmacokinetic properties of drugs [5-8]; in food, cosmetic, toiletry and tobacco industries, either for the stabilization of flavours and fragrances or for the elimination of undesired tastes [2,9]; in the chemical industry, as catalyst or catalyst additives, as separation media for some industrial-scale products and for stabilization of azo dyes [10-13]; and in the analytical sciences and especially for enantio separations in gas chromatography, high-performance liquid chromatography, supercritical fluid chromatography and capillary electrophoresis as a consequence of the ability of CDs to bind chiral organic molecules stereo selectively [14-16].

1.2 The discovery and Characterization of cyclodextrins

Cyclodextrins are produced through the degradation of starch by the enzyme CD glycosyl transferase, which is obtained from Bacillus macerans and related bacteria [17]. The first report in the literature of the isolation of a substance identifiable as a CD was that of Villiers [18] which appeared in 1891. In the period 1903-1911, during the course of work on food spoilage, Franz Schardinger had noted various strains of bacteria which survived the cooking process and which

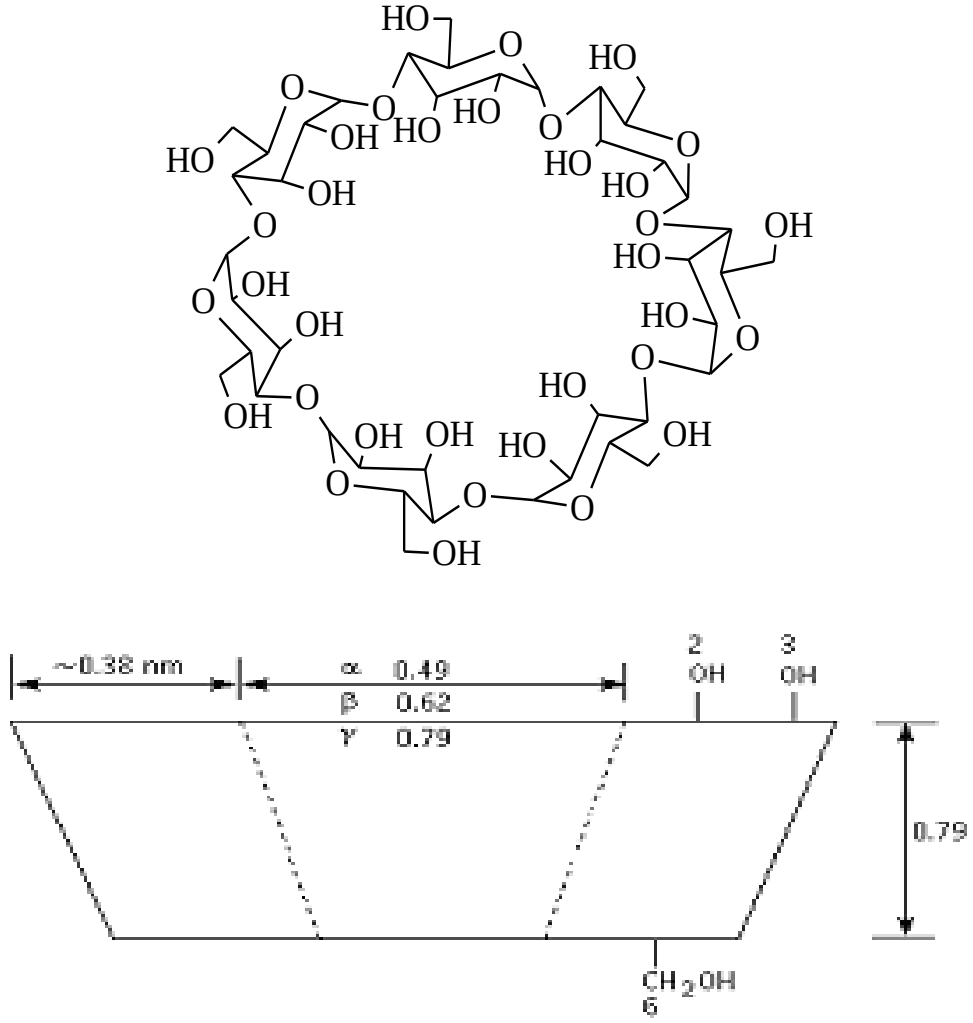
were thought to be responsible for some cases of food poisoning [19]. Schardinger found that one of these heat-resistant or "thermophilic" bacteria, which he called strain II, was able to dissolve starch and form crystalline polysaccharides (dextrins).

The next major contributor to CD chemistry was Karl Freundenberg, who developed a method of obtaining pure α-CD and β-CD [20], and in the process also isolated another crystalline dextrin, which he named γ-CD. Credit for the determination of the structure of Schardinger's dextrins must also go to Freudenberg who first tentatively proposed a ring structure in 1936 [21]. In the next few years, Freudenberg tested his hypothesis, and came to the conclusion that Schardinger's dextrins were cyclic oligosaccharides composed solely of glucose residues bonded by α-1,4-glycosidic linkages [22]. However, the molecular weights of the most common CDs were not determined until much later [23].

1.3 Physical and Chemical properties

Cyclodextrins are macro cyclic oligosacchrides consisting of α-1, 4-Linked glucopyranose subunits. They appear like toroidal macro rings with a cavity (Fig. 1) in the center [24]. Crystal structure analyses of cyclodextrins have revealed that all glucose residues in the ring possess the thermodynamically favored $^{4}C_{1}$ chair conformation with all substitutions in the equatorial position. The external surface of a cyclodextrin contains secondary hydroxyl groups situated on the upper rim of the ring, whereas primary hydroxyl groups are located on the bottom rim. The inner surface of the hydrophobic cavity is lined by hydrogen atoms and ether-like oxygens [26].

Figure 1. Structure of β-CD (top) and approximate dimensions of α-CD, β-CD, and γ-CDs (bottom), adopted from ref [25].



Then overall appearance of a cyclodextrin molecule resembles a truncated cone with the wide "open" and narrow "closed" apertures. The cavity diameters (maximum values based on the Van der-Waals radii) are 5.3 Å, 6.5 Å, and 8.3 Å for α-CD, β-CD, and γ–CD respectively. Table a summarizes the most important structural features of α-CD , β- CD, and γ- CD.

Table a. Structural and physical properties of α-CD, β-CD, and γ–CD [27, 28].

Property	**α-CD**	**β-CD**	**γ-CD**
Number of glucose units	6	7	8
Molecular weight (g/mol)	972	1135	1297
Solubility in water at 25°C	14.5	1.85	23.2
[α]D at 25°C	150 ± 0.5	162.5 ± 0.5	177.4 ± 0.5
Cavity diameter, Å	4.7 - 5.3	6.0 – 6.5	7.5 – 8.3
Height of torus, Å	7.9 ± 0.1	7.9 ± 0.1	7.9 ± 0.1
Approx. value of cavity. $Å^3$	174	262	427
Crystal water, wt %	10.2	13.2 – 14.5	8.13 – 17.7
Hydrolysis by A. oryzae α-amlase	negligible	slow	rapid

Due to the presence of hydroxyl groups, cyclodextrins are soluble in polar solvents [29]. Therefore, studies on cyclodextrins have been mostly conducted in aqueous media. Among the three native most common cyclodextrins, β-CD has the lowest solubility in water (Table a). This is ascribed to the intramolecular hydrogen bond formation between the C_2-OH groups of one glucopyranoside unit with the C_3-OH group of the adjacent glucopyranose. A complete secondary belt is formed by these hydrogen bonds thus enhancing the rigidity of the β-CD molecule. In α-CD, the hydrogen bond belt is incomplete, because one glucopyranose unit is in a distorted position. The largest γ -CD has a more flexible structure and is the most soluble of the three cyclodextrins.

1.4 Use and regulatory of cyclodextrins

The use of CDs has increased annually around 20–30%, of which 80–90% was in food products. The widespread utilization of CDs is reflected in pharmaceutical, food, chemical and other industrial areas [30]. In the pharmaceutical industry, CDs and their derivatives have been used in drugs either for complexation or as auxiliary additives such as solubilizers, diluents, or tablet ingredients to improve the physical and chemical properties, or to enhance the bioavailability of poorly soluble drugs [31]. In the chemical industry, CDs and their derivatives are used as catalysts to improve the selectivity of reactions, as well as for the separation and purification of industrial-scale products. In the food, cosmetics, toiletry, and tobacco industries, CDs have been widely used either for stabilization of flavours and fragrances or for the elimination of undesired tastes, microbiological contaminations, and other undesired compounds [32, 33]. However, the regulatory status of CDs in foods differs between countries. In the USA α-CD, β-CD, and γ-CDs have obtained the GRAS list (FDA list of food additives that are 'generally recognized as safe') status and can be commercialized as such. In Japan α-CD, β-CD, and γ-CDs are recognized as natural products and their commercialization in the food sector is restricted only by considerations of purity. In Australia and New Zealand α-CD, β-CD, and γ-CDs are classified as Novel Foods from 2004 and 2003, respectively [34]. The recommendation of Joint FAO/WHO Expert Committee on Food Additives for a maximum level of β-CDs in foods is 5 mg/kg per day. For α-CD, β-CD, and γ-CDs no Acceptable Daily Intake was defined because of their

favorable toxicological profiles. Moreover, in July 2005 the U.S. Environmental Protection Agency did away with the need to establish a maximum permissible level for residues of α-CD, β-CD, and γ-CDs in various food commodities [35].

STRUCTURE OF IBUPROFEN SODIUM

sodium2-[4-(2methyl-propyl) phenylpropanoate

Na -

Molecular Formula : 228.262650 [g/mol]

Molecular Weight : 50°c-54°c

Melting point: white crystalline powder

Appearance:freely soluble in acetone, ethanol and ether. Solubility

ASSAY:

Strength of O. IN HCI - 0.1025N Assay determination: Trail-1:

tial weight of ibuprofen sodium sample: 0.10006g

mal weight of ibuprofen sodium sample: 0.000069, 0.10000g

Weighed accurately 0.10000g of sample in a reaction vessel dissolved in 40ml of glacial acetic acid and titrated against 0.1N perchloric acid solution. =86.02%W/W

Assay on dried basis *86.08* x 100 =586.50 99.4%W/W

Assay on dried basis =

(Impurity B) 2-4-butylphenylpropanoic acid

(Impurity-E) 4-Isobutyl aceto phenone

(Impurity -D) 2-14- ethyl phenyl) propanoic acid

(Impurity -C) 2-[4-1-hydroxy-2-methyl propylphenylpropanoic acid

1. (Impurity M) 2-hydroxy-2-(4-2-methyl propyl)-phenylpropanoic acid

Experimental Methods

The 1H & 13C NMR spectra were recorded on a BRUKER 400 MHz NMR spectrometer using DMSO as solvent. the space temperature Fourier transform infrared spectra of 2M5NA were recorded within the range 400-4000 cm-1 at a resolution of ±5 cm-1 employing a BRUKER spectrophotometer equipped with a LiTaO3 detector, a KBr beam splitter, a He-Ne laser source and a boxcar atomization used for 250 averaged interferograms collected for both the sample and therefore the background. High performance liquid chromatography. an appropriate HPLC instrument equipped with UV detector. Column using Themoquest Hypersil ODS 150 X 4.6mm, 5µm (or) equivalent. The quantum chemical computations of this heterodimer were employed with density functional theory (DFT) method by using Gaussian 09 [11] program package with basis set of 6-311++G (d,p). The SCXRD crystallographic information file (CIF) file of ibuprofenwas used as an input. The optimized structure of this crystal was visualized using Chemcraft v1.8 software [13]. the very best occupied molecular orbital (HOMO), lowest unoccupied molecular orbital (LUMO), Molecular electrostatic potential (MEP) and hyperpolarizability of the isolated molecule were calculated from an equivalent basis set. the entire charge

spread is described by MEP. HOMO-LUMO energy gap affirms the chemical softness of the fabric . of these parameters were visualized using Gaussview software

CHEMICAL NAMES:

Acetone, Ethanol, Potassium bromide, Sodium hydroxide, Phosphoric acid, Acetonitrile, Propanol, Thioacetamide, perchloric acid, Potassium permanganate sulphuric acid

(Impurity J) [2-(4-Isobutyryl phenyl) propanoic acid

(Impurity -A) 2-[3-(2methyl propyl) phenyl] propanoic acid

Result and discussions

ANALYSIS OF IBUPROFEN SODIUM:

RESIDUAL SOLVENTS:

Preparation of internal standard working.

Solution (ISTD WS):

Weighed 50.6mg of n-propanol in a 500ml volumetric flask containing 100ml of water mixed and made upto 500ml with water.

Standard preparation:

Stock solution:

Weighed 100.4mg of Toluene in a 100ml volumetric flask containing 50ml

of ISTD WS and made upto 100 ml with ISTD WS from that 10ml of

solution pipetted out into a 100ml volumetric flask and made up to the

volume with ISTD WS.

Standard working solution:

Pipetted out 5ml from of stock solution in a head space sample vial and crimped properly using crimper and placed 6 numbers of vials.

SYSTEM SUITABILITY:

RUN NO

SOLVENT RATIO TOLUENE

AVERAGE 1.8186 % RSD

4.0

SYSTEM SUITABILITY: Passes

phenyl] propanoic acid LT 0.03% (Impurity D)

2-[4-hydroxy-2-methyl propyl]phenyl) propanic LT 0.03% acid (Impurity L)

2 RS-2-hydroxy-2-[4-(2

methyl propyl)-phenyl) LT 0.03% unspecified propanoic acid (Impurity M)

Any impurity, RRT 0.60, Total impurities 0.04%

OPTICAL ROTATION:

Preparation of 0.1N NaOH:

Sample solution:

Weighed 2.50050g of Ibuprofen sodium in 100ml of volumetric flask dissolved and diluted to the volume with 0. IN NaOH

NON-STEROIDAL ANTI-INFLAMMATORY:

The drugs which are used to diminish or reduce inflammation and the pain arising from it are termed as anti inflammatory agents.

ANTIPYRETICS:

Those drugs which are used t bring down the body temperature during high

fever.

Ibuprofen:

They are known to have much lower maximal effects than do the opioid analgesics which find use for the relief of more serve type of pain.

These drugs can be classified as

1. Salicylic acid derivatives. 2. Aryl acetic acid derivatives. 3. Pyrazole derivatives. 4. N-arylanthranilic derivatives.

Ibuprofen is classified under the aryl acetic and derivatives.

Ibuprofen has been the drug of the class where in addition to an aryl substituent on a carbon of acetic and there is a methyl group attached to it.

These many appropriately be termed as propionic acid derivatives

INFRARED SPECTROSCOPY:

Region in cm and intensity	Stretching
3350	N-H str
3000-3100	c≡c-H str
3080	C-H (aromatic)
1710	C=O str
1680-1650	N=O str
2960-2850	C-H str
1020-1070	C=C – O –C
1500-1570	Ar – NO2
1620-1535	-N=0
~3500	N-H str (1°amine, amide)
~3400	N-H str (1°amine, amides) H-bond

Compare the spectrum with the reference spectrum. The sample spectrum exhibits maxima only at the utmost wave length that of reference spectrum. After analysis remove the pellet holder from the compartment discard the pellet.

IR ABSORPTION SPECTRUM:

Sample Preparation:

Ibuprofenindentification of infrared spectroscopy. The IR range is identified peaks in 1702 are **thanks to** c=o stretching (Ketone). From the position of absorption bands shows a band at 3348.76 in N-H stretching, 290 in C-H stretching, 1275.41 is (N=O) nitro compounds, 3080 is C-H stretching is aromatic ring and 1055.17 is C=C-O-C stretching.

Absorption position of 602, 622.08, 670.11, and 696.84 is C-H def. There absorption at 2991.84 is C-H stretching.

Region in cm^{-1} and intensity	**Absorption**
1702	C=O str (Ketone)
3348.76	N-H str
2940	C-H str
1275.41	-N=0 str
3080	C-H str (Aromatic ring)
1055.17	C=C-O-C
670.11, 696.84	C-H def
2991.84	C-H str in CH_3

Melting Point:

Ensure that the sample is within the sort of fine powder, if not crush the sample to a fine powder. Fill sample during a meeting point capillary , to approximately 2mm height top it and insert it into the sample hole provides on the highest of the instrument. Observe through view glass the beginning of meeting. The lower display show the initial temperature press 'stop' at the top of the meeting. Now upper display shows the ultimate temperature write the initial and final temperatures. Stop the heater. Carefully remove the capillary from the part and permit the oil bath to chill right down to temperature.

LOSS ON DRYING:

Accurately weighted a clean previously dried(for half-hour) and cooled LOD bottle(W1) Mix and weigh accurately about 1gm of sample with the LOD bottle(W2).Place the loaded LOD bottle within the drying chamber. Dry the sample at the temperature 105degree c for 4 hours. Take the LOD bottle and keep it inside the desiccators. Allow it to achieve the space temperature and weigh(W3).Continue the drying until constant weight is

obtained. Until two consecutive weighing don't differ by quite 0.50mg per gram of substance taken, the second weighing following a further hour of drying.

Calculation:

Loss on drying (%W/W) = $\frac{Loss\ of\ weig\ ht\ (W2-W3)}{weig\ ht\ of\ sample\ (W2-W1)} \times 100$

Where,

W1- Empty weight of the LOD Bottle with lid.

W2- Weight of the LOD bottle with lid and sample before drying.

W3- Weight of the LOD bottle with lid and sample after drying.

RESIDUAL IGNITION (sulphated Ash)

Weigh accurately about 1gm of the sample into a previously cleaned, ignited, and cooled and weighed a platinum/silica crucible. Moisten the sample with vitriol , and keep the crucible within the electric bunsen and ignite gently until the sample get charged continue ignition till no fumes are evolved. Transfer the crucible into muffle furnace. Ignite it at 600+- 50 °c until the carbon is consumed. Allow the crucible to chill to temperature and weigh continue the ignition until constant weight is obtained. Until two consecutitive weighing don't differ by quite 0.50mg per gram of substance taken the second weighing following a further 15 to half-hour ignition period.

Calculations:

Residue on ignition (%W/W) = $\frac{weig\ ht\ of\ the\ residue\ (in\ g)}{weig\ ht\ of\ the\ sample\ (in\ g)} \times 100$

HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY OR HIGH PRESSURE LIQUID CHROATOGRAPHY HPLC

RELATED SUBSTANCES BY HPLC CONDITIONS:

CHROMATOGRAPHIC PURITY [BY HPLC]

CHROMATOGRAPHIC CONDITIONS:

Wave Length	:	230 nm
Flow Rate		: 1.0 mL/min
Injection volume	:	20µL
Date Acquistion Time	:	45 min
Total Run time		: 55min

MOBILE PHASE :

SOLUTION A :

Dissolve about 1.54g of ammonium acetate (AR grade) in 1000mL of HPLC grade/Milli-Q water and filter through 0.45µ membrane filter.

SOLUTION B:

Degassed mixture of methanol: Acetonitrile (65:35v/v)

GRADIENT PROFILE;

TIME MIN	% MOBILE PHASE A	%MOBILE PHASE B	FLOW(mL/MIN)
0.01	90	10	**1.0**
35	20	80	**1.0**
45	20	80	**1.0**
EQUILIBIRIUM TIME:			
46	**90**	**10**	**1.0**
55	**90**	**10**	**1.0**

Flow rate and other mobile phase parameters may be adjusted to achieve system suitability requirements

IBUPROFENIMPURITIES SOLUTION PREPARATION: [RESOLUTION SOLUTION]

SOLUTION A:

Weigh accurately about 20mg of IbuprofenUSP reference standared.Internal reference standard in a 10mL volumetric flask dissolve in 0.5mL of methanol and make up to volume with methanol.

SOLUTION B:

Weigh accurately about 10mg of Ibuprofenrelated compound-A into a 10mL of volumetric flask and dissolve in 0.5mL of methanol and dilute to volume with methanol.

System Suitability solution: (Solution-c)

Pipette out 4mL of solution A and 0.4mL of solution B into a 10mL volumetric flask and dilute to volume with methanol.

Run Sequence:

Inject methanol (blank) and record the chromatogram.

(i) Inject resolution solution'c' record the chromatogram.

(ii) Inject standard preparation (solution E) in five replicates

(iii) Inject 50ppm IS4 standard solution record the chromatogram.

(iv) Inject the preparation (solution E) record the chromatogram

(v) Reject any peak arising in the test preparation, due to methanol(blank)

System Suitability criteria: (Solution-C)

The resolution ‘R” between Ibuprofenand Ibuprofenrelated compound-A in solution – c is not less than 1.5

The relative standard deviation for the area of 5 injections of Ibuprofenstandard preparation (solution –E) is not more than 2.0

Test preparation:

Pipette out ml of the standard lead solution in to a suitable test tube, and add 10ml of 6N hydrochloric acid

Test Preparation:

Weigh 1gm of sample (from the formula 2.0/1000L,where ‘L’ is heavy metals limit in %) in suitable silica crucible, add sufficient quantity of sulphuric acid to web the substance. Ignite it carefully at a low temperature in electrical Bunsen burner until thoroughly charred. (The crucible may be loosely covered with suitable lid during the charring). Add to the carbonized mass 2ml of nitric acid and 5 drops of sulphuric acid and heat it cautiously until white fumes no longer are evolved. Ignite in the muffle furnace at 500º-600ºc until the carbon is completely burned off (No longer than 2 hours). If carbon remains, allow to residue to cool, add a few drops of sulphuric acid, evaporate and ignite again. Cool, add 5ml of 6N HCL acid cover and digest on a stream both for 10 minutes. Cool and quantitatively transfer the solution to a test tube. Rinse the crucible with a second 5ml portion of 6N HCl acid, and transfer the rinsing to the test tube.

Procedure:

Adjust the answer in each of the tubes containing the quality preparation, the test preparation and therefore the monitor preparation with ammonia water , added cautiously and drop risen to a pH of 9, cool, and adjust with glacial ethanoic acid , added drop wise, to a pH of 8, then add 0.5ml in excess. employing a pH meter or short-range pH indicator paper as external indicator, check the pH and adjust if necessary, with in ethanoic acid or 6N ammonia water to a pH between 3.0 and 4.0, filter if necessary, washing with a couple of ml of water in to a 50ml color comparison tube, then add 1.2 ml

of thio acetamide- Glycerin base Ts, dilute with water to 50ml, mix and permit to face for two minutes and consider down ward over a white surface. the color of the answer from the test preparation isn't darker than that of the answer from the quality preparation.

MELTING POINT:

Melting point of Irradipine = 168ºc

Sulphated Ash: (Residue on Ignition)

Temperature = 600ºc

Weight of Ash = 0.00056 g

Calculation:

Sulphated Ash = 0.06% (NMT 0.10% W/W)

LOSS ON DRYING:

Loss of Weight = 0.00193 g

LOD = 0.19% (NMT0.20% W/W)

Chromatography Purity by HPLC:

Standard Preparation:

Retention time		=	30.4
Run – 01	Area	=	1290.21
Run -02	Area	=	1281.68
Run – 03	Area	=	1285.10
Run – 04	Area	=	1268.96
Run – 05	Area	=	1291.01

Area of Isradipine = 1283.40

RELATED SUBTANCES BY HPLC:

Distance about 3.08001gm of ammonium acetate (AR grade) in 2000ml of HPLC grade/Milli-Q-water and filter through 0.45ml membranes filter.

Solution B:

Degassed mixture of methanol added to 1300ml and then added to 700ml of acetonitrile and diluted in.

HPLC grade Acetonitrile

Detector wave length : 230nm

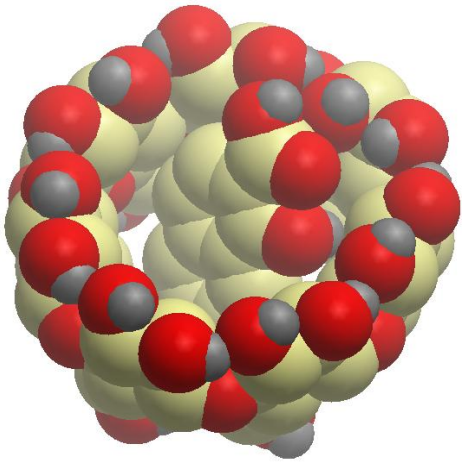
Injection Volume : 20 ml

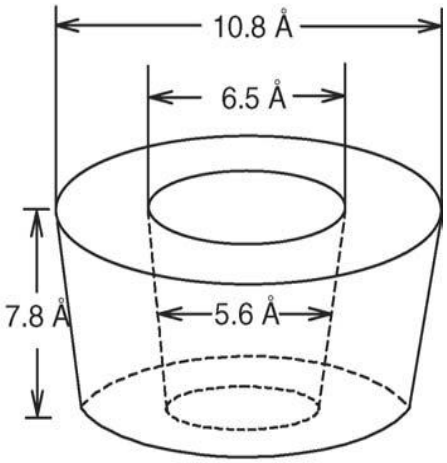
Flow rate : 1.0ml/min

Date Acquisition time: 45min

Total Run Time : 55 min

Diluent: - Methanol





Resolution Solution:

Weigh accurately about 19.95 mg in 10ml volumetric flask dissolved in 0.5ml methanol and make up to volume.

Inclusion complex formation of* ibuprofen *with β-CD

The absorption and fluorescence maxima of ibuprofen in several β-CD concentration are given in Table.1. The absorption maxima of ibuprofen appear at 342nm within the longer wavelength (Fig. 2). In β-CD medium the absorption maxima of ibuprofen is red shifted to 344.5nm and therefore the absorption intensity increases regularly upon increasing the concentration of β-CD. No clear isosbestic point is observed in spectrum . The absorption spectra show only very slight change in absorption maxima even within the presence of the very best concentration of β-CD used (12x10-3 M). This behavior has been attributed to the improved dissolution of ibuprofen molecule through the hydrophobic interaction between guest molecule (ibuprofen) and non-polar cavity of β-CD. Since, this means the formation of 1:1, host–guest inclusion complex of ibuprofen: β-CD. The binding constant for the formation of ibuprofen: β-CD complex has been determined by analyzing the changes within the intensity of absorption maxima with the β-CD concentration.

CONCLUSION:

Ibuprofen sodium is a derivative of Ibuprofen substance which used as analgesic. Some important analytical parameter such as *widely used as a* melting point, moisture content, assay, loss on drying were carried out in determine the purity of raw materials used for the production of *Ibuprofen sodium.* The purity of final product Ibuprofen sodium was determined by the determination of loss on drying assay, bulk density, SOR, HPLC. All the analytical parameters determined correlated with the theoretical and standard values. Ibuprofen sodium is identified by IR, HPLC, UV and GC The dominant peaks in the IR spectra of Ibuprofen are correlated with observed value and theoretical value. The results are suitably interperated. The purity of the 600mg Ibuprofen sodium tablet (99%) is confirmed by assay test UV spectra and HPLC methods. From these methods it is concluded that the purity of the tablet is 99.8%. If impurities present in the tablet it will produce some side effects. This behavior has been attributed to the improved dissolution of ibuprofen molecule through the hydrophobic interaction between guest molecule (ibuprofen) and non-polar cavity of β-CD. Since, this means the formation of 1:1, host–guest inclusion complex of ibuprofen: β-CD. The binding constant for the formation of ibuprofen: β-CD complex has been determined by analyzing the changes within the intensity of absorption maxima with the β-CD concentration.

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