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RESEARCH ARTICLE

# Synthesis of Polymerization of New Derivative of 2-Decanoic Acid Extracted from Coriander Seed

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## Abstract

This work, includes preparation of the derivative of decanoic acid was extracted from conriander seeds by fractional distillation for four hours, then reacted with one groups of amin of thio urea the2nd group amin in thioureia was reacted with maleic anhydride a different drugs was used to obtain novel derivatives. The compounds written off as by using some spectroscopic methods, H1NMR and FT-IR used to characterization the derivatives, control drug release was studying of some derivatives, biological activity against bacterial was studying and thermal stability of the derivatives.

**Keywords:** *Decanoic acid, Conriander seeds, FT-IR, H1NMR*

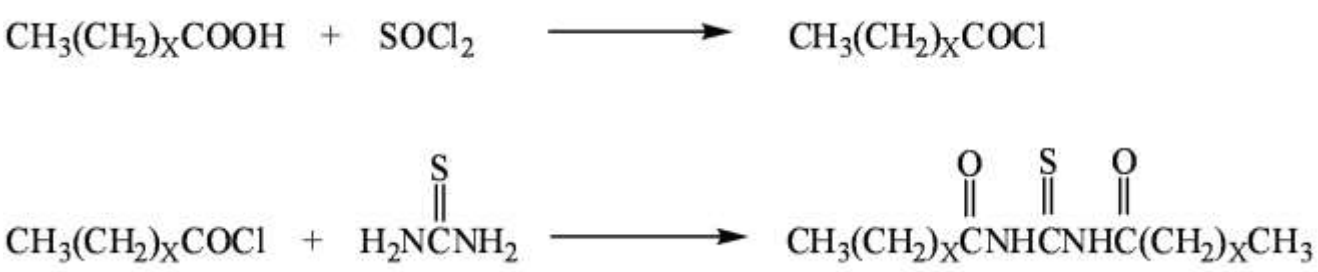
## Introduction

The important oils and excerpts of perfumed vegetation and spices have been used in nutrition conservation, pharmaceuticals products, stand by medicine and natural treatments.[1] Currently, Those plants need to be verified scientifically for the configuration of essential oil and its biological activities, to improve the quality of healthcare so which have used in classical medicine[2]. The oil insides in dissimilar types are varied inherently, affected greatly on culture conditions and environment, as well as yield and after harvesting, and hence assessments of the oils from many medicinal plants are being conducted.

One of the most useful EO bearing spices as well as medical plants is Coriandrum sativum [3]. Coriander an annual herb of the parsley family detection of α-pinene, limonene, ß-.The organic conformation of foils and grain fats of C. Sativum. This countryside approval it to be recognized for therapeutic practice and off the record amongst the further oils existing in the worldwide flea market [4].Examined of some chemicals and biological compounds which have bioactive caustic. Newly, several widespread assessments of coriander have issued, focusing only going on their biologically active modules, mainly phenolic compounds, In addition to many medical accomplishments. [5-6] Coriander roots have flavor the deeper leaves are usually consumed in many gastronomies in Asian regions, while the coriander is cut besides secondhand in soup and flour [7-8]. It has proved its taste and aromatic properties, coriander, it is essential pharmaceutical parsley as point out via a number of spice dealer. Coriander is present in curatives preparations beside gastrointestinal troubles in stock treatment.

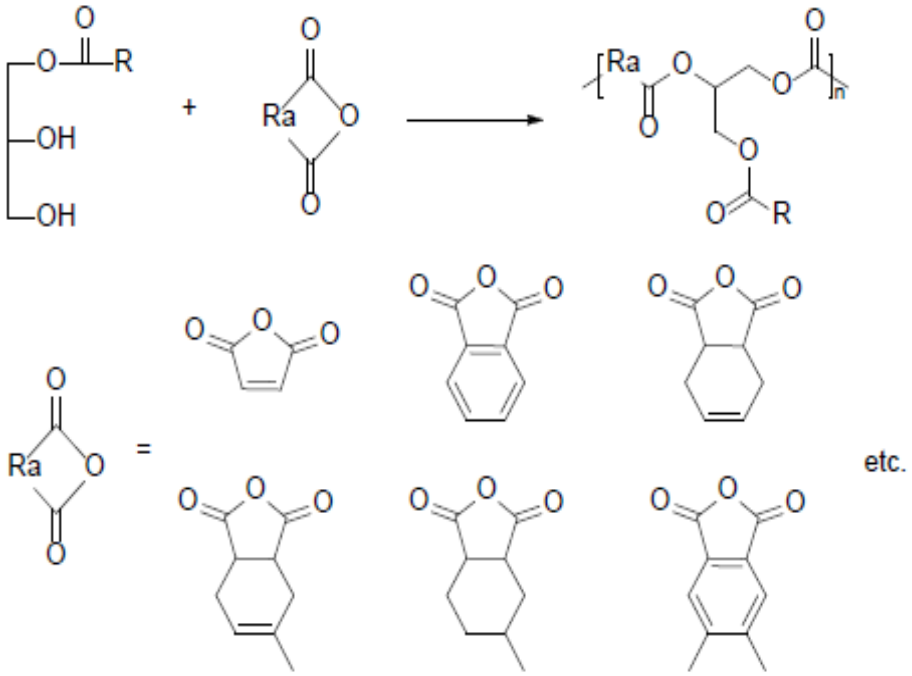
In the north of Pakistan, full coriander leaves are popularly used for abdominal swelling, diarrhoea, purge, coughing, grumbles of stomach, jaundice and puke [9-10].In olden India medicine, coriander was used to treat joint problems and demagogic illnesses. In fact, classical polyhedral formulation. Differences in the organic appearance of coriander in needed oils can be understood from corner to corner areas taking about description whole reasons effecting the organic structure of oils, ie, inborn, climatological, seasonal, geographic too other situations [11-12].

Decanoic acid, a 10 carbon containing carboxylic acid), is an important precursor in the production of nylon and polyamides the commercial process for the production of Decanoic acid depends on chemical methods, principally involving alkaline oxidation of vegetable oils, such as castor oil, in which 2-octanol is generated as a byproduct [13-14]. However, the production of medium-chain through chemical routes has several problems, particularly the use of harsh production conditions and generation of by-products. Biological processes for the production of DCAs can overcome these limitations microorganisms, such as E. coli, has been a focus of several studies [15-16] the toxicity of decanoic acid is considered to be a major limitation in the biological production Thiourea, having a considerably wide range of applications, is a functional organic compound similar to urea, except that the oxygen atom is replaced by a sulfur atom. The properties of urea and thiourea differ significantly because of the difference in electronegativity between sulfur and oxygen.

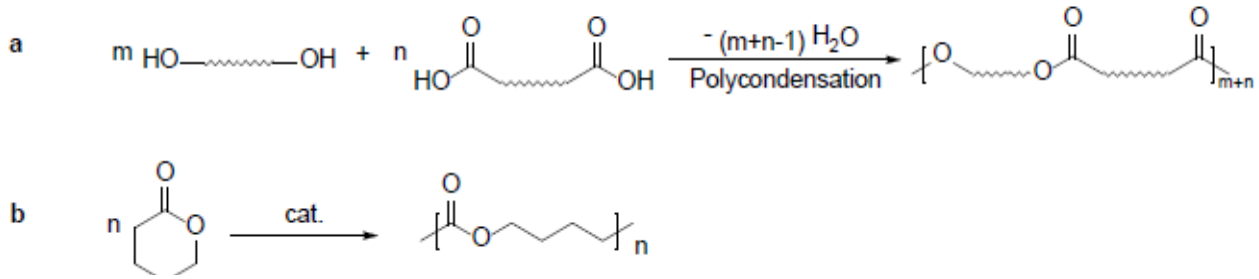


**Scheme 1: general reaction of acids with thiourea**

ω-Hydroxy fatty acids are a class of straight long-chain aliphatic organic compounds with carboxylic acid and hydroxyl functionalities located at both ends of the fatty acid chain. The ω-hydroxy fatty acids have been attracted much attention for preparation of mixed diesters, cosmetic formulations and phospholipids [17] Polyesters are the most widespread used biodegradable polymeric materials for drug carrier and tissue engineering. Polyesters can be synthesized either by ring opening polymerization (ROP) of cyclic ester monomers or polycondensation of two multifunctional monomers. Condensation polymerization is a polymerization process by which two molecules (monomer, oligomer or polymer molecules) are linked together by generating a new functional group with elimination of a small molecule resulting elongation of polymer chains Vegetable oil based polyester resins (alkyds) were mainly obtained by polycondensation from monoglyceride with dicarboxylic acid anhydride [18-19].

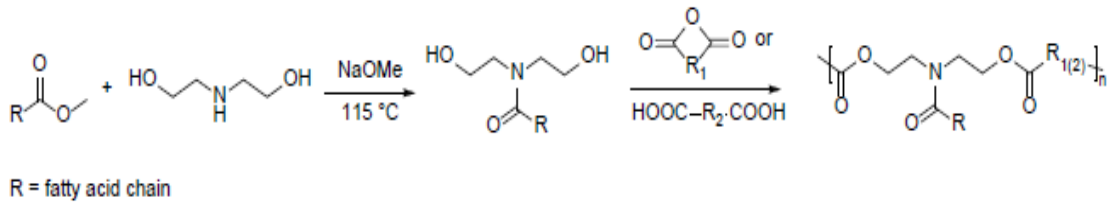


The properties of the polyesters can be adjusted by using different type of dicarboxylic anhydride and monoglyceride/anhydride feed ratios. When dicarboxylic acid anhydrides with rigid structures are used, polyesters with higher glass transition temperatures and cross-linking densities will be obtained Polyester can be synthesized by condensation polymerization with the elimination of water molecules in each condensing [20-21]). ROP of cyclic ester monomers is one of the most effective methods to obtain homo- or copolyesters with a high molar mass and low dispersity under milder reaction conditions in comparison to condensation polymerization [22-23]. Metallic compounds [61], Guanidine based catalysts [24-25], strong acids [26-27], phosphazene [28], N-heterocyclic carbine [29, 30]. Bifunctional thiourea-amine [31-32] and enzyme [33-34] have been applied as catalysts to the controlled ROP of cyclic esters.




**Scheme 2.a: Typical polycondensation of synthesis of polyester by ring-opening polymerization of a lactone**

The synthesis of vegetable oil based polyesteramide is generally accomplished by condensation polymerization of N, N-bis (2-hydroxy ethyl) fatty amides which were obtained by amidation of fatty acids with diethanolamine, with various dibasic acid or anhydrides [35-36].




**Scheme 3: Synthetic route of vegetable oil based polyesteramide**

The aim of this study was to synthesize and characterize fatty acid-grafted-maleic anhydrid (fatty acid-*g*-MA) polymer and loaded for use as carriers for drug delivery.

## Experimental

## Materials and Instruments

Decanoic acid was obtained from Coriandrum seed. Ethanol and aceton remained obtained as of Merck.1H-NMR spectra documented by spectrophotometer of a Shimadzu in Dimethylsulphoxide (DMSO). The FTIR spectra documented by (4000-400cm$^{-1}$) at a Shimadzu

### Synthetic Methods of Compounds

- 5 gm of coriander seed was dissolved (25 ml) in mixture of ethanol and acetone.
- Distillation solution about 3hr (70C$^{0}$).Until the disappearance of oily substance.
- He extracted substance (decanoic acid) is collected and divided to part the first part was added few drops of thionyl chloride and then reacted with 1 mol of thiourea.
- The mixture was refluxed about 2hr, the product was collected and washed with diethyl ether solvent.

Paracetamol dissolved in DMF and reacted with the mixture, and refluxed about for 1hr, the result was swashed in ethanol. Then we let it dry the room warmly .another drug was prepared in the same procedure.

The second part of extracted reacted with maleic anhydride and then refluxed about one hour, few drops of ammonium persulphat APS added to the mixture and heated 5mints

viscous yellow product was obtained ,different amino drugs was reacted with the mixture

## Result and Discussion

The main objectives of the present research were the synthesis of new derivatives of Decanoic [1] by reaction of decanoic acid with thiourea and maleic anhydride in presence of with acetone as a solvent The FTIR spectra of prepared compound(1,2,3) confirmed by the peaks at (3178,3180,,3190 cm-1) due to N-H stretching. totaling to the overhead point out peaks, the peaks seeming in the assortment (3000 to 2900) cm-1 appearances the attendance of (-CH2) group in completely three spectra. Apart as of the extra ordinarily detected peaks spectra are (1703 cm-1carbonyl group (C=O) 1H-NMR spectra of compound [9] δ ppm presented singlet signal of (δ = 5.5, 4) ppm owing to (, H1, N-H) proton, singlet signal δ = (4, 1- ) ppm owing to (3H, CH3), another data was tabulated in the tables 1and 2.

Thermogravimetric Analysis (TGA) measures the amount and rate of change in the weight of a material as a function of temperature or time in a controlled atmosphere. TGA is a useful technique to assess the thermal stability of polymer. It is an important technique in which the mass of the substance is measured as a function of temperature, while the substance is subjected to controlled temperature programme. In any polymer analysis, the TG trace follows a relatively simple pattern. Thus the sample weight decreases slowly as the reaction begins, then decreases rapidly over a corresponding narrow temperature range and finally comes to a minimum as the reactants are spent.

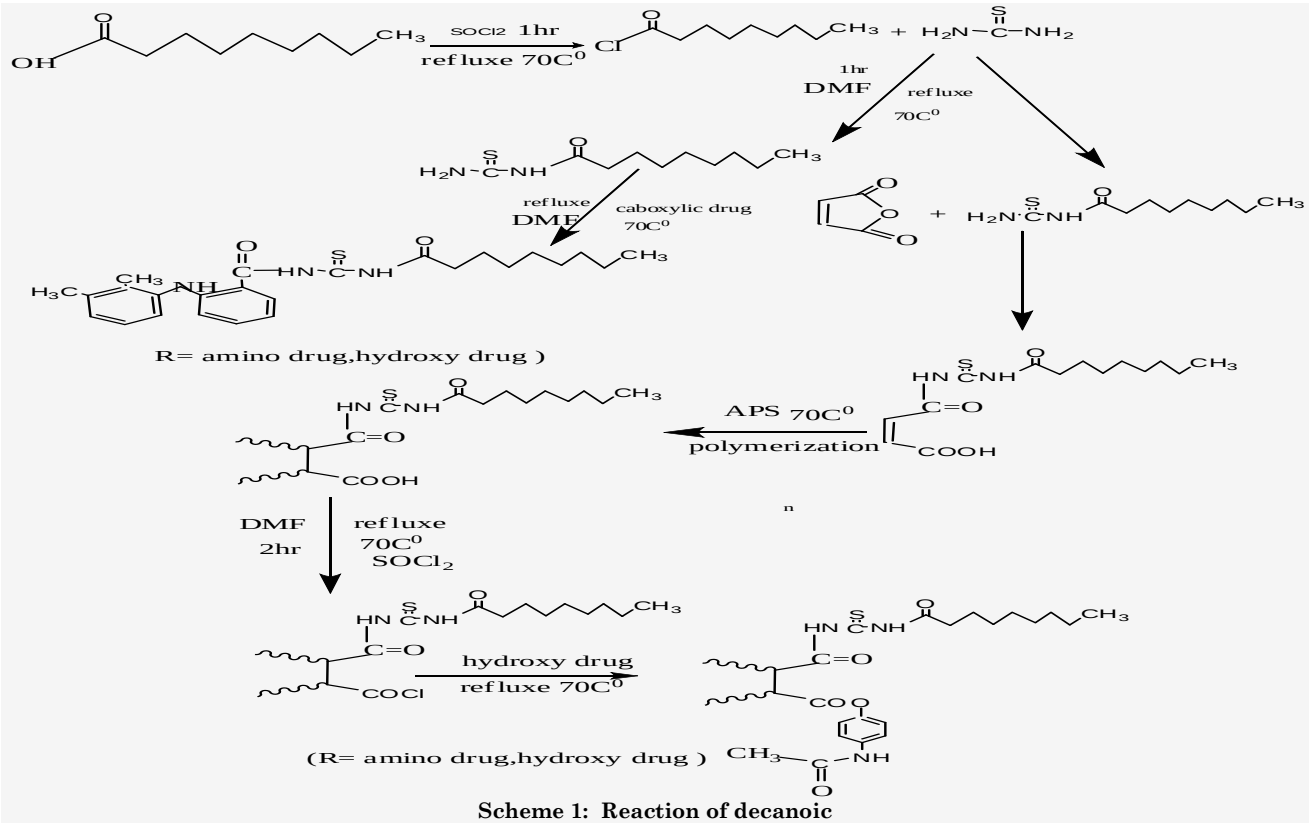
The conventional controlled release dosage form is the inability to increase its residence time for example in pH 1.1 of small intestine, resulting in an improved and bioavailability of the basic drug and to prolong the presences of dosage form in the stomach until all the drug is released in the desired period of time.

**Table1: FT-IR of compounds (1)**

| Com | N-H | C-Harm | C-H alp | C=O | C=C |
|---|---|---|---|---|---|
| **1** | **3178** | **3022** | **2989** | **1703** | **1654** |
| **2** | **3190** | **3008** | **2927** | **1745** | **1622** |
| **3** | **3180** | **3068** | **2929** | **1743** | **1653** |

**Table 2: Hnmr-Spectral of Compound**

| Com | N-H | $CH_3$ | $CH_2$ | CH=CH | PH | CH-N |
|---|---|---|---|---|---|---|
| 1 | 5.5 | 4 | 4-5 | 4 | 6-7 | 5 |
| 2 | 4 | 1 | 2.2,5.3 | 3.5 | 6-7 | 5 |




**Scheme 1: Reaction of decanoic**

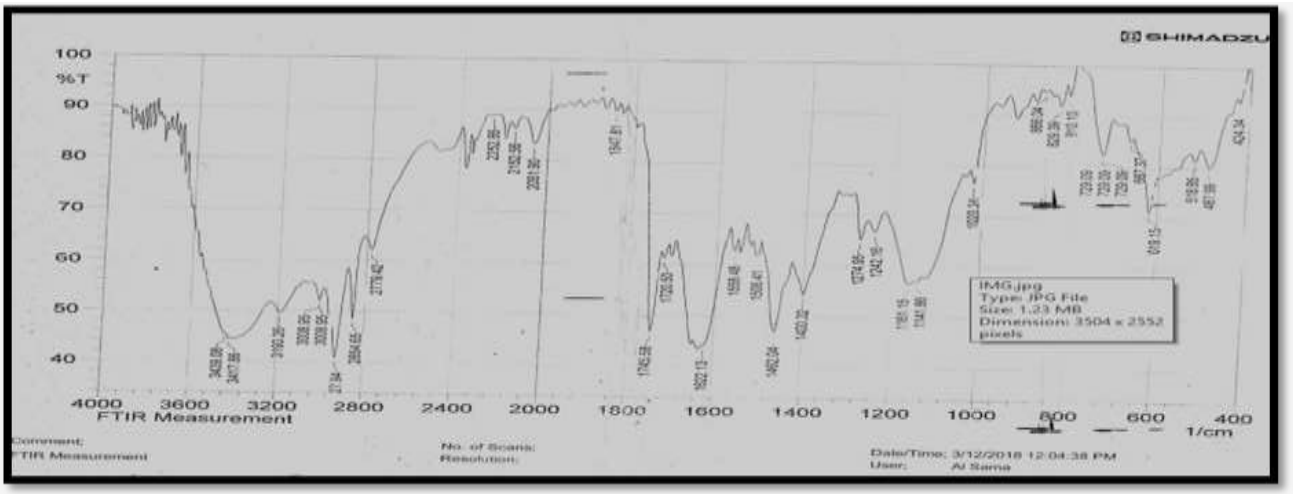



**Figure 1: FTIR of decanoic acid with thiourea**

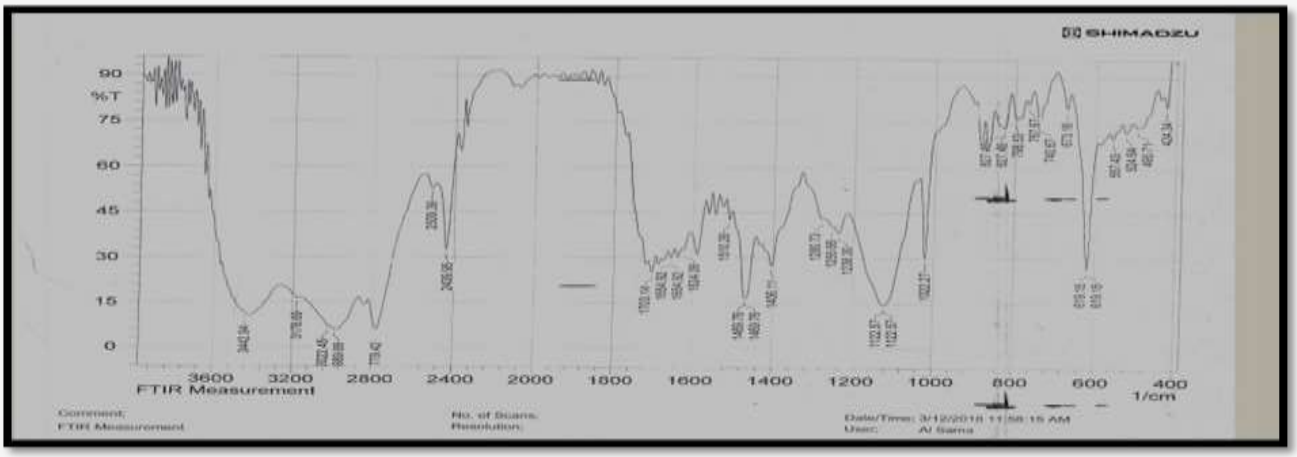



**Figure 2: FTIR of decanoic acid with thiourea with amoxcilline**

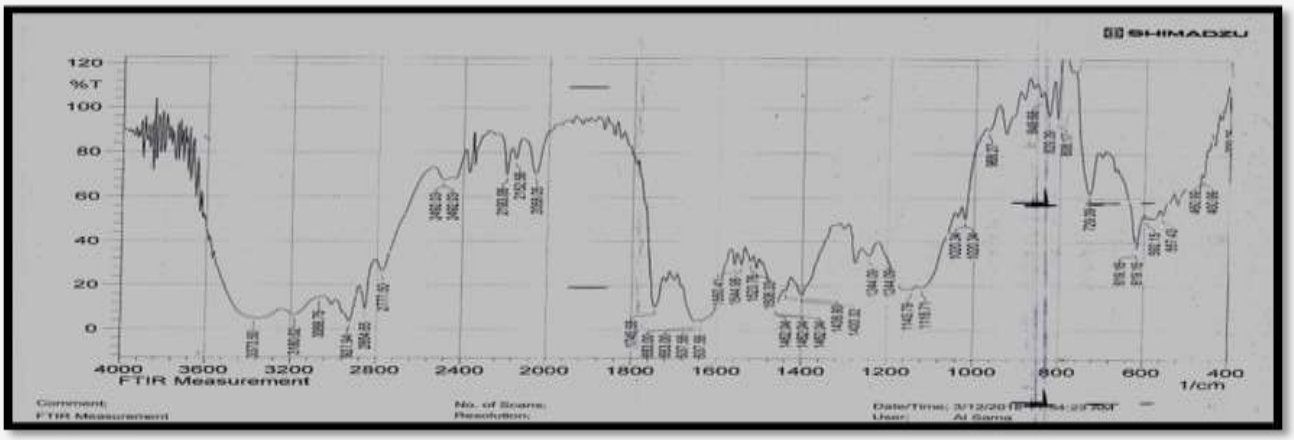



**Figure 3: FTIR of decanoic acid with thiourea with paracetamol**

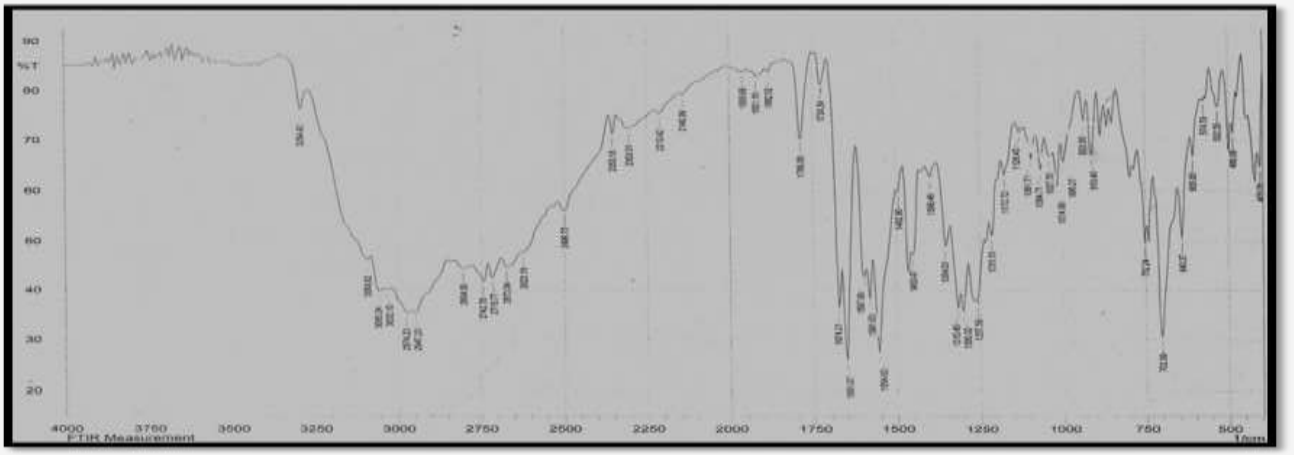



**Figure 4: FTIR of decanoic acid with maleic anhydride**

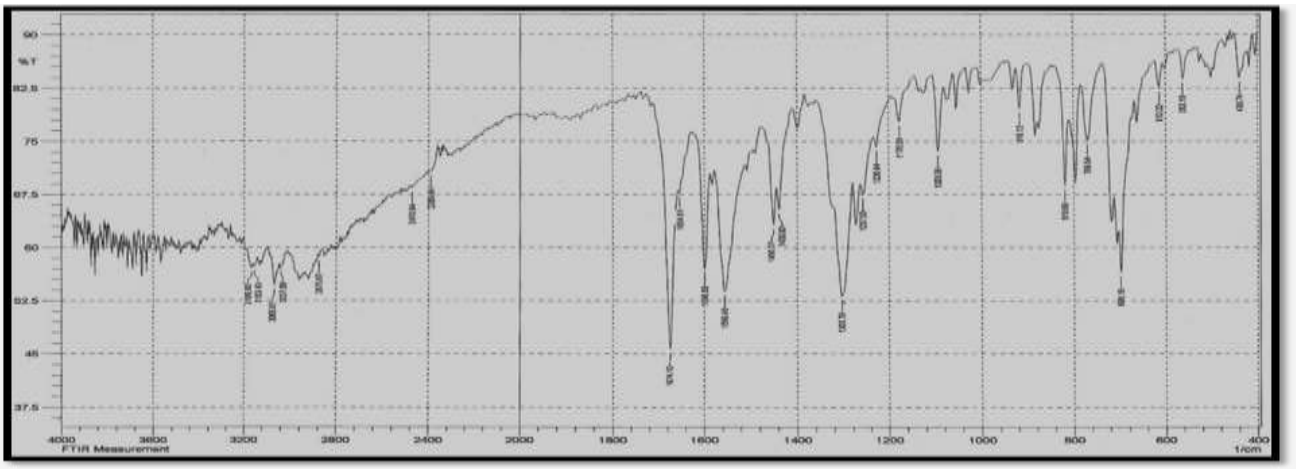



**Figure 5: FTIR of poly decanoic acid with maleic anhydride with paracetamol**

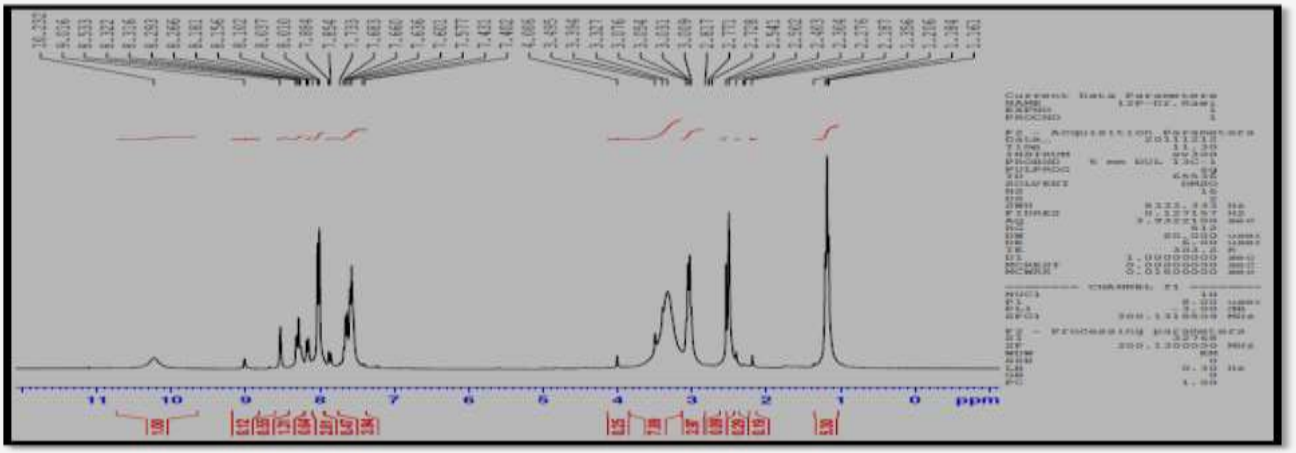



**Figure 6: NMR of decanoic acid with thiourea**

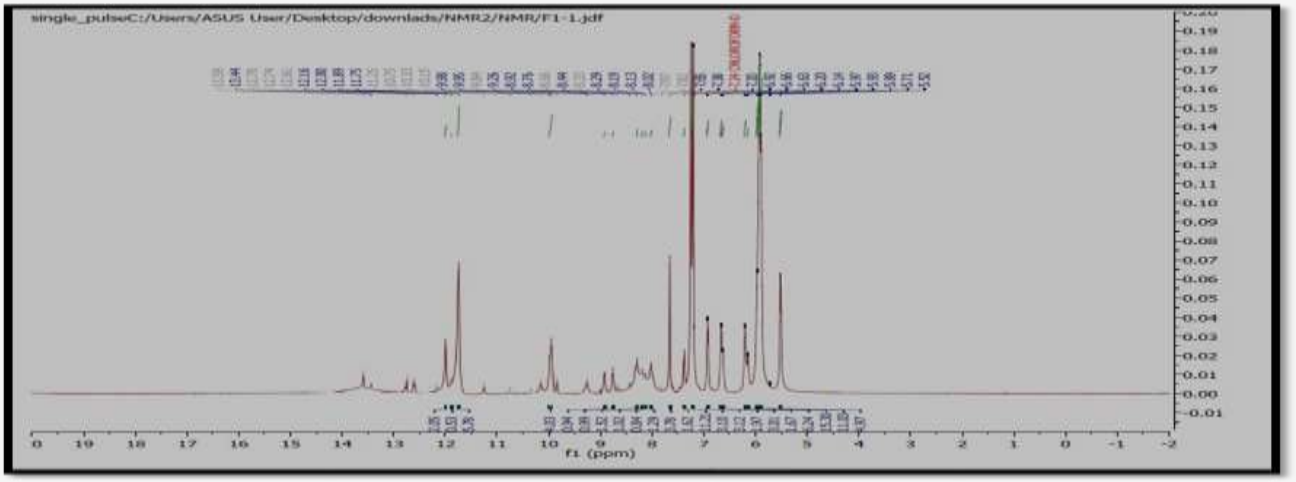



**Figure 7: NMR of decanoic acid with thiourea with paracetamol**

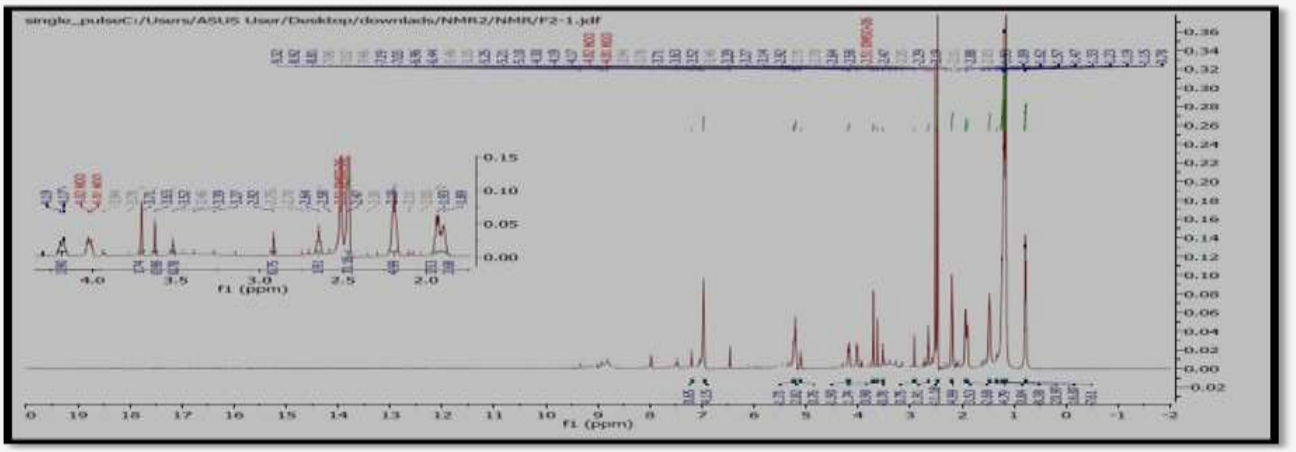



**Figure 8: NMR of poly decanoic acid with maleic anhydride with paracetamol**

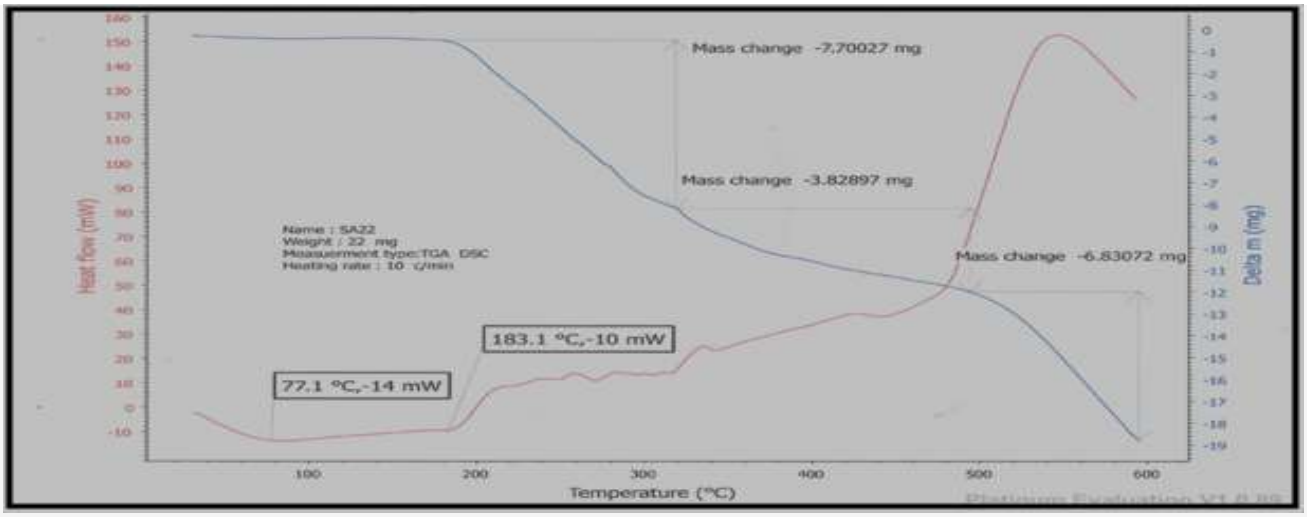



**Figure 9: TGA of poly decanoic acid with maleic anhydride**

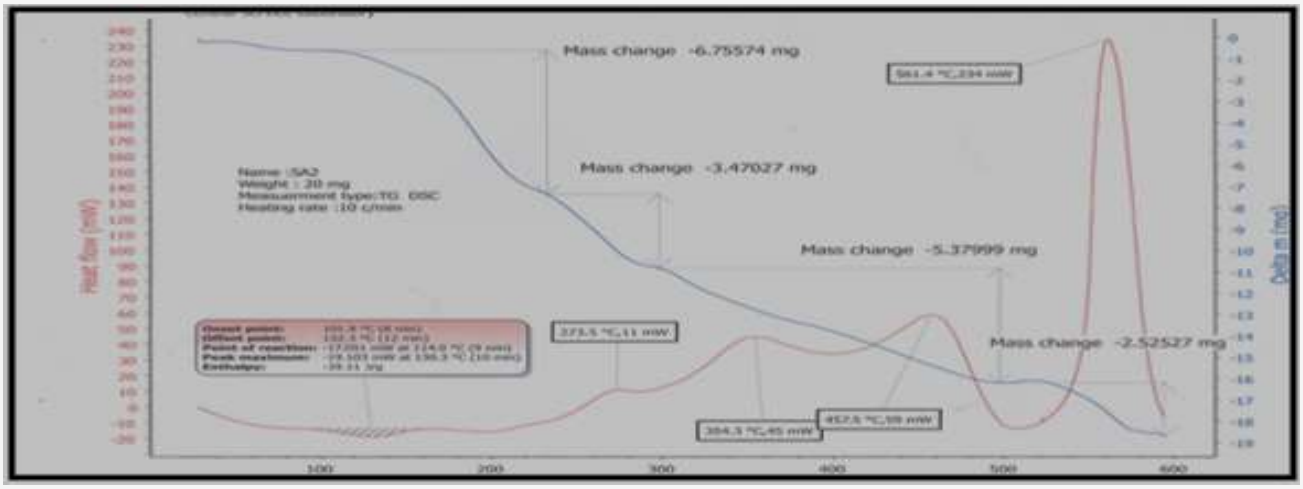



**Figure 10: TGA of poly decanoic acid with maleic anhydride with paracetamol**

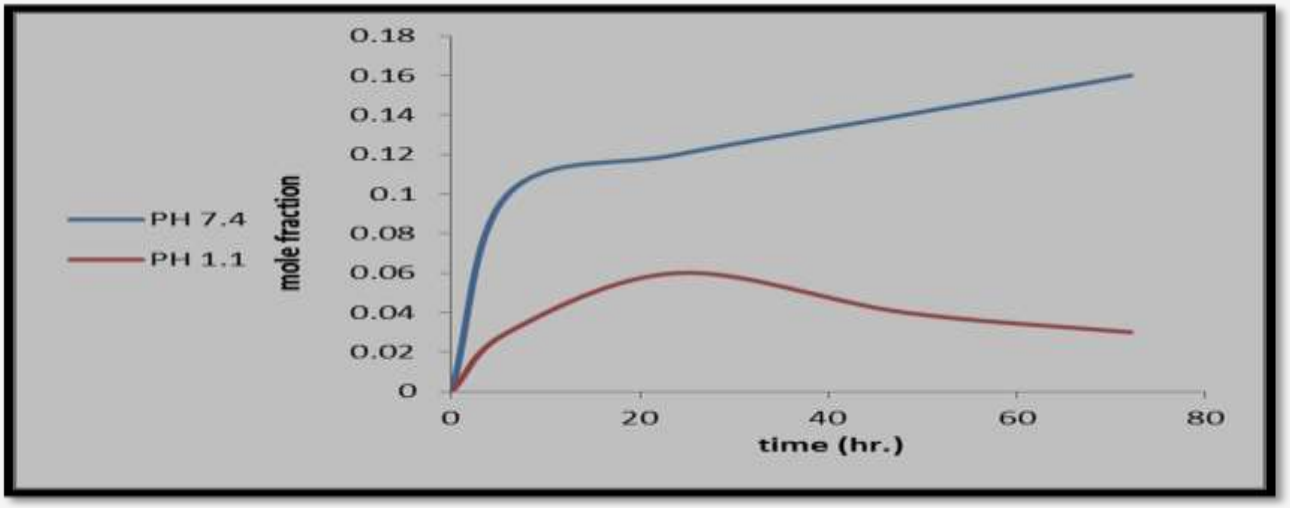



**Figure 11: Drug release of poly decanoic acid with maleic anhydride with paracetamol in pH 1.1 and 7.4 at 37°C**

## Conclusions

This research complete synthesis and identification (IR and $^{1}$H-NMR) of novel polymers by highly efficient methodology. This method depends on decanoic acid was extracted from coriander seed reacted with one groups of amin of thiourea; the2$^{nd}$ group amin in thioureia was reacted with maleic anhydride a different drugs was used to obtain novel derivatives. In addition to simplicity, this method is very fast and low coast for synthesis of these polymers.

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