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SYNTHESIS AND CHARACTERIZATION OF HEPTA-O-BENZOYL-β-D-MALTOSYL ISOTHIOCYANATE NANOPARTICALS

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ABSTRACT

The properties of many conventional materials change when formed from nanoparticles. *This is typically because* nanoparticles *have a greater surface area per weight than larger particles which causes them to be more reactive to some other molecules.* Nanoparticles *are used, or being evaluated for use, in many fields. In view of application of Nanoparticles and maltosyl compounds in this research work we have synthesized the series of maltosyl thiocarbamates Nanoparticles and compare the microbial activity of this nanoparticle with the bulk solution of the same compounds.*

Keywords: *Maltosyl thiocarbamates, Nanoparticles and Antimicrobial activity.*

INTRODUCTION

Carbohydrate especially lactosyl compounds have been uses as starting material in the synthesis of nitrogen and sulphure containing open chain and cyclic compound which was already investigated by earlier workers. Nanoparticles exhibit new physical-chemical properties which are not observed either in individual molecules, or in bulk nanoparticles show unique properties that are significantly different from their bulk materials. In view of this application[1] of lactosyl compounds and Nanoparticles in this we have synthesis to investigate the chemistry of this new compound with reference to their application.

Nanostructure materials are attracting a great deal of attention because of their potential for achieving specific processes and selectivity, especially in biological and pharmaceutical applications [2,3]. Recent studies have demonstrated that especially formulated nanoparticles have good antibacterial activity [4,5].

EXPERIMENTAL

UV-visible Spectra is measured using UV Spectrophotometer by using model Single Beam UV-Visible Spectrophotometer with software (BI/CI/SP/SB-S-03)of Bio Era make.. IR spectra were recorded on Perkin-Elmer spectrum RXI FTIR spectrophotometer (4000-450 cm^{-1}). ^1H NMR was recorded in $CDCl_3$ on Bruker DRX-300 spectrometer operating at 300 MHz.

a) Synthesis of hepta-O-benzoyl-α-D-maltosyl bromide:

The finally powdered Maltose octabenzoate (0.03M, 21.0g) was added gradually to the brominating agent. After the addition the flask was kept for 2hr at room temperature. Then the reaction mixture with chloroform (130ml) then the mixture was shaken vigorously for about 15 min. The resultant mixture was poured into ice cold water. The chloroform layer was then separated. It was washed several with aqueous sodium bicarbonate to remove excess of acetic acid followed by aqueous sodium metabisulphite to remove excess of bromine and finally 2-3 times with water. To the chloroform addition of petroleum ether afforded a solid (16.5 gm). This solid was expected hepta-O-benzoyl-α-D-maltosyl bromide (yield 77%). It was purified by dissolving it in minimum quantity of chloroform and reprecipitating it with petroleum ether,m.p.168°C.

b) Preparation of lead thiocyanate :

Lead thiocyanate was prepared by mixing aqueous solution of lead nitrate and ammonium thiocyanate. The white granular lead thiocyanate was filtered washed with distilled water and dried at 50° C.

c) Preparation of hepta-O-benzoyl-β-D-maltosyl isothiocyanate[6] :

To a suspension of hepta-O-benzoyl-α-D-maltosyl bromide (21 gm,0.03M) in sodium dried xylene (80ml) was added lead thiocyanate (6gm,0.03M). The reaction mixture was then treated for microwave synthesis for about 3 min. This solution was then cooled and liberated lead bromide was removed by filtration. The xylene filtrates was then treated with petroleum ether (60-80°C)

with stirring, a white solid mass obtained (13gm). This solid was expected hepta-O-benzoyl-β-D-maltosyl isothiocyanate.

It was purified by dissolving it in minimum quantity of chloroform and reprecipitating it with petroleum ether, m.p. 118-120°C. [Found; C;67.07, H;4.46, N;1.22, S;2.9; $C_{62}H_{49}O_{17}NS$ requires; C;66.96, H;4.41, N;1.26, S;2.88%].

d) Nanoparticals preparations of hepta-O-benzoyl-β-D-lactosyl isothiocyanate :

Take about 1 gm of maltosyl isothiocyanate and dissolve complete maltosyl isothiocyanate in the 50ml of solvent in 250 ml beaker. Now put this beaker in sonicator. The highly penetrating acoustic waves are passed through mixture which creat high pressure bubbles in the beaker due to which breakdown of the bulk material is takes place and desired sized nanoparticals are formed. The size determination of nanoparticals is done by the X-ray diffraction studies.

IR SPECTRUM OF LACTOSYL OCTABENZOATE

Absorption observed (cm^{-1})	Assignment	Absorption expected (cm^{-1})
3377.66	N-H stretching	3400-3100
3018.34	C-H stretching	3040-3010
1729.15	C-O Stretching	1750-1735
1325.45	C-N stretching	1350 – 1280
1173.72	C=S stretching	1200 – 1110

NMR SPECTRAL STUDIES[8,9]

The NMR Spectrum of compound distinctly displayed signals due to N-H Proton at δ 9.05 and d 6.57 ppm, Aromatic Protons at δ7.47-7.15 ppm, maltosyl protons at d 5.77-3.76 ppm.

CHARACTERIZATION OF NANOPARTICLES

1. **Cauterization using UV – Visible Spectrophotometer:** Characterization of nanoparticles was done using visible Spectrophotometer by using model Single Beam UV-Visible Spectrophotometer with software (BI/CI/SP/SB-S-03)of Bio Era make. The UV-Visible Spectroscopy reveals the formation of nanoparticles by showing different absorption those from bulk material.

2. **Size determination of Maltosyl isothiocyante Nanoparticle by X-Ray Diffraction Studies:** From the X-Ray diffraction it comes to know that size of nano octabenzoate is 30 nm.

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