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SYNTHESIS AND CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF LACTOSYL OCTABENZOATE NANOPARTICALS

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Abstract: *In recent years nanoparticles have been the subject of focused researchers due to their unique properties that are significantly different from their bulk materials. Chemistry of lactosyl octabenzoate and with special reference to their utility as starting material in the synthesis of nitrogen and sulphure containing open chain and cyclic compound has been investigated by earlier workers. It appeared quite interesting to prepared Nanoparticles of the lactosyl octabenzoate to investigate the chemistry of these new compound with reference to their synthetic application.*

Keywords: *Lactosyl Octabenzoate, Nanoparticles and Antimicrobial activity.*

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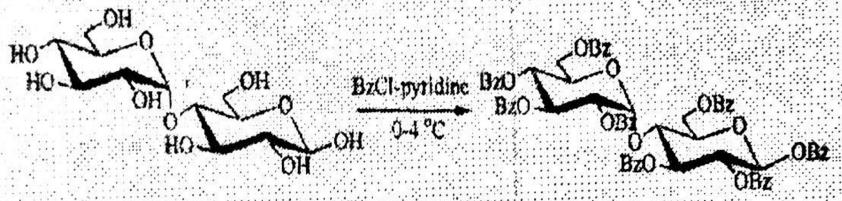
INTRODUCTION

In recent years, nanoparticles are gaining importance due to their unique properties and their antimicrobial activities that are significantly different from those of bulk materials [1]. These special and unique properties could be attributed to their small sizes and large specific surface area 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]. Recent studies have demonstrated that especially formulated nanoparticles have good antibacterial activity [3,4].

In view of applications of lactosyl octabenzoate and the nanoparticles in medicinal chemistry and in many other ways[5], we herein report the synthesis of lactosyl octabenzoate nanoparticles by the use of ultrasonicator.



Experimental:

Specific rotations were measured on Equip-Tronics Digital Polarimeter at 28 ^{0} C in $CHCl_3$. 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. The mass spectra were recorded on Jeol-SX-102(FAB) instrument.

a) Preparation of lactose octabenzoate:

In a 1 litre bottle having a tight cork, 55 ml dry pyridine and 55 ml of dry chloroform was taken. The bottle was cooled in an ice-salt bath. Now to this solution previously prepared cooled solution of 55 ml of benzoyl chloride in 55 ml dry chloroform was added with constant stirring. To this solution 20 gm of dry powder of lactose was added in several installments with constant stirring and maintaining the temperature of the reaction mixture below 5^0 C. This solution was allowed to stand for 24 hr, it was then transferred to a 500 ml conical flask. The solution was washed several times with dilute aqueous sulphuric acid, water. The solution layer was separated by separating funnel. Afterwards the chloroform was removed , a white precipitate was isolated with petroleum ether and purified with chloroform ether with m.p.114^0 C.

b) Nanopartical preparation of lactosyl octabenzoate:

Take about 1 gm of lactosyl bromide and dissolve complete lactosyl bromide 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 are done by the X-ray diffraction studies.

IR SPECTRUM OF LACTOSYL OCTABENZOATE[6]

Absorption observed (Cm^{-1})	Assignment	Absorption Expected (Cm^{-1})
3066	C-H Ar Stretching	3040-3010
1729	C=O stretching	1750-1735
1176	C-O Stretching	1210-1153
1068,909	Charecterstic of Lactose	1100-1000 and 910-900

NMR SPECTRAL STUDIES: The NMR Spectrum [7,8] of compound distinctly displayed signals due, Aromatic Protons at δ 7.47-7.15 ppm, lactosyl protons at δ 5.77-3.76 ppm.

Characterisation of Nanoparticles:

1. **Charterisation using UV – Visible Spectrophotometer:** Characteirisation of nanoparticles was done using visible Spectrophotomter by using model Single Beam UV-Visible Spectrophotometer with software(BI/CI/SP/SB-S-03)of Bio Era make. The UV-Visible Spectrocopy reveals the formation of nanoparticles by showing different absorption those from bulk material.
2. **Size determination of Lactose Octabenzoate Nanoparticle by X-Ray Diffraction Studies:** From the X-Ray diffraction it comes to know that size of nano octabenzoate is 28nm.

ANTIMICROBIAL ACTIVITY COMPARISON :

The bulk Lactose Octabenzoate and the Nanopartices of Lactose octabenzoate have been screened for antibacterial activity using cup plate agar diffusion method by measuring the inhibition zone in mm. The compounds were taken at a concentration of 1 mg/ml using dimethyl sulphoxide as solvent. Amikacin (100µg/ml) was used as a standard for antibacterial activity. The compounds were screened for antibacterial activity against *Escherichia coli, Staphylococcus aureus,* in nutrient agar medium.

Antimicrobials	Bulk	Nanoparticals
E. coli	10mm	15mm
S. aureus	10mm	15mm
S. typhi	12mm	18mm
P. vulgaries	11mm	15mm

Amikacin	13mm	22mm
Clandamycine	10mm	14mm
DMSO	38mm	30mm

*including the well diameter of 8mm. ** zone of inhibition in mm (15or less) resistance, (16-20mm) moderate and (more than 20mm) sensitive

Conclusion: Lactose octabenzoate Nanoparticles show good antimicrobial activity as compare to the bulk solution of lactose octabenzoate due to their large surface area to volume ratio, which is coming up current interest in the researchers.

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