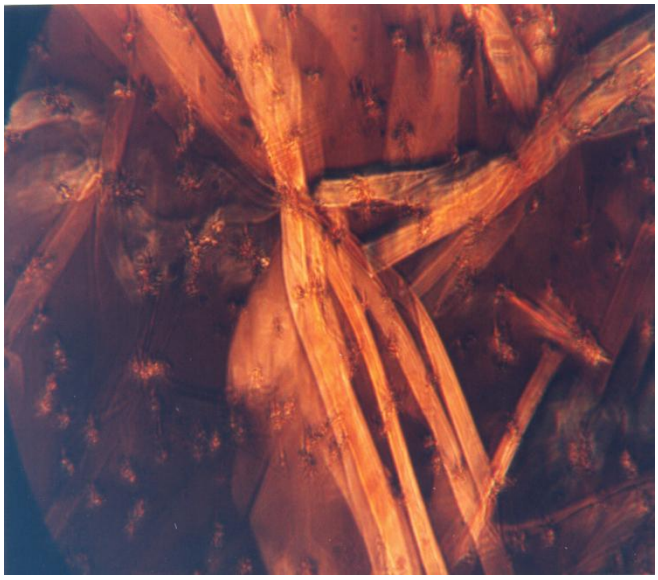

Figure 1: Texture photographed on cooling the mesophase of compound XI.

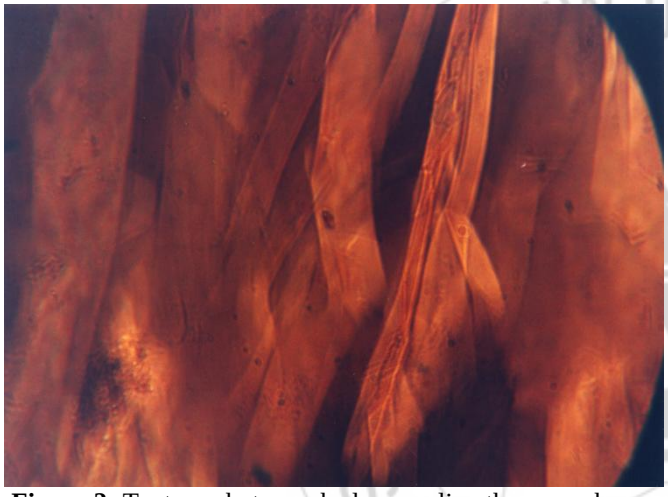

Figure 2: Texture photographed on cooling the mesophase of compound XII

Biological activity studies of the synthesized 3,9 – Bis -(4-hydroxy -3-methoxy phenyl) – 2,4,8,10, - tetraoxa spiro [5,5]- undecane (VIII): Literature survey revealed that cyclic ethers, 1,3 - dioxanes posses a wide variety of biological activities. In continuation of our studies, we have investigated the antibacterial activity studies.

The compound **VIII** was tested for antibacterial activity against Gram – positive bacteria, Bacillus subtilis, Bacillus pumilis, Enterococcus faecalis, Streptococcus faecalis and Micrococcus luteus and Gram – negative bacteria Pseudomonas marginalis, Escherichia coli, Proteus vulgaris and Klebsiella pneumoniae at concentrations of 20, 50, 100 and 200 µg/ml. The cultures of organisms grown over night at 37^{O}C, were used for testing the antibacterial activity which was checked by employing cup plate method. Nutrient agar medium (Himedia, India) was dissolved in water and pH was adjusted to 7.0. This was then distributed in 20ml quantity in boiling tubes; they were then plugged tightly with non-absorbent cotton and sterilized in an autoclave. The bacterial culture (50µl) was then added aseptically to the agar medium maintained at 45^{O}C, mixed well and poured immediately in sterilized petriplates. Test solutions of different concentrations of compound **(VIII)** were prepared in DMSO. After hardening, cups of 8mm diameter each were cut into agar and 50µl test solutions of varying concentrations (20, 50, 100 & 200 µg/ml) were placed in these cups. The plates were incubated at 37^{o}C for 24 hours and the diameter of inhibition zone was measured in mms. Solvent DMSO alone was kept as control, which did not have any inhibition zone. The activity was compared with standard antibiotic Benzyl Penicillin, (manufactured by Alembic Ltd., Vadodara, India), crystallized from MeOH and the antibacterial activity inhibition zones of the compound VIII were presented in the **Table – III**.

Table 3: Antibacterial Activity Inhibition Zones (mm)

Bacteria Name	Benzyl Penicillin	Compound VIII Concentration (µg/ml)			
		20	50	100	200
Gram Positive Bacteria					
Bacillus subtilis	25	-	14	16	20
Bacillus Pumilus	24	13	16	20	21
Enterococcus faecalis	22	-	14	19	20
Streptococcus faecalis	20	-	-	15	19
Micrococcus luteus	19	-	11	13	17
Gram Negative Bacteria					
Pseudomonas marginalis	21	-	12	16	18
Escherichia Coli	23	-	-	11	16
Proteus vulgaris	24	14	20	21	24

2. Results & Discussion

The results show that compound VIII showed antibacterial activity against all the Nine organisms. The minimum inhibition concentration (MIC) was 20µg/ml against Bacillus Pumilus, where as it was 50 µg/ml for remaining organisms, except E. Coli and S. faecalis. Compound (VIII) almost equally active as Benzyl Pencillin at 200µg/ml level against Proteus vulgaris. Our studies once again proved that, spiro 1,3 dioxanes are biologically active compounds. This is the first report in recent years, on the compound VIII structural analogues exhibiting anibacerial acivity. This is the first report of Spiro 1,3-dioxanes, exhibiting antibacterial properties.

3. Conclusion

A series of spiro 1,3-dioxanes were prepared and the parent molecule(VIII) exhibiting antibacterial properties . The dibenzal esters X– XIV were showing liquid crystalline properties . The above results indicate that the spiro dibenzal esters showed above room temperature liquid crystal properties with no effect on the increasing of the chain.

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Author Profile

Dr. P.V.N. Acharyulu , received his M.Sc. from Andhra University in 1998. He completed his Ph.D. in 2007, from Jawaharlal Nehru Technological University, Hyderabad. He has industrial and academic research experience, as well as teaching experience at U.G. and P.G. levels. Present he is working as a Professor, in Department of Chemistry, Sri Aditya Engineering College, Surampalem, Kakinada.