Synthesis and Characterization of Hexasubstituted Cyclotriphosphazene Derivatives with Azo Linking Units

ABSTRACT

A series of new hexasubstituted cyclotriphosphazene derivatives with azo linking units, **4a-d** have been synthesized. The alkylation reaction of 4-acetamidophenol with alkylbromide (heptyl, nonyl, decyl, and dodecyl) formed **1a-d**, which were further reduced to form the corresponding intermediates, **2a-d**. The diazotization reaction of **2a-d** with phenol formed calamitic compounds, **3a-d** with the azo group later reacted with hexachlorocyclotriphosphazene (HCCP) to yield the final compounds, **4a-d**. The functional groups of all the compounds were determined using Fourier Transform Infrared (FTIR), while their molecular structures were characterized by Nuclear Magnetic Resonance (NMR) spectroscopy. The purity of these compounds was confirmed using CHN elemental analysis. Polarized Optical Microscopy (POM) was used to determine the liquid crystal properties of the synthesized compounds. The rod-like intermediates, **3a-d** and the disc-like hexasubstituted final products, **4a-d** were found to be non-mesogenic without any liquid crystal properties. The results showed that the introduction of non-mesogenic intermediate sidearms would eventually give non-mesogenic products. All the final compounds showed the clearing temperature in the range of 120-130°C.