AN EXAMINATION OF THE ODD/EVEN EFFECT FOR A SYSTEM IN WHICH THE METAL FRAGMENT IS PART OF THE VARIABLE CHAIN

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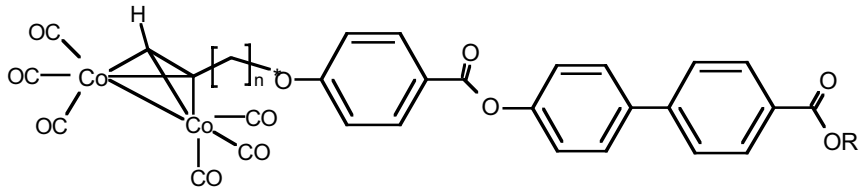
Many metallomesogen systems have been studied in recent years due to the possibility for novel properties (optical, magnetic, etc.) that can be introduced by the incorporation of a metal center.[1] In almost all of the systems studied, the metal center is located in the central region of the molecule. Little work has been done on compounds in which the metal center is separated from the aromatic core.[2]

Recently, we have examined a number of alkyne containing liquid crystals and their corresponding dicobalt hexacarbonyl complexes. In order to maintain mesomorphism upon incorporation of the metal fragment, it was necessary to separate the alkyne from the aromatic core (**1**).[3]



1a: n=4; **1b:** n=3; **1c:** n=2; **1d:** n=1

Organic liquid crystals are known to show a marked odd/even effect on phase transition temperatures as alkyl chain lengths are altered.[4] However, we are unaware of any such studies that have been done on metal-containing systems. This is likely due to the fact that most metallomesogens have the metal bound in the core of the molecule. Since compound 1 has a bulky metal moiety as part of the alkyl chain, we felt that a more dramatic odd/even behavior might be present than in a typical organic liquid crystal and we set out to investigate this question.

Alkynes consisting of four and six carbon tethers and their corresponding cobalt complexes were synthesized first (**1a**, **1c**). The hexynyl derivatives showed enantiotropic liquid crystalline behavior while the butynyl derivatives showed monotropic behavior. However, both systems maintained liquid crystallinity down to room temperature on cooling and this phase was stable for several hours.

Currently, we are studying similar derivatives containing an odd carbon tether. A series of pentynyl derivatives (**1b**) has been synthesized and these compounds also show monotropic behavior. The pentynyl derivatives do not maintain liquid crystallinity to room temperature; instead, they recrystallize between 45-60°C. This demonstrates a noticeable odd/even chain length effect in our alkyne metal-containing systems. Synthesis of the propynyl complexes, **1d,** is now underway. Details of the synthesis and structure/property analysis will be presented.

References:

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