

# 1,3,4-Thiadiazoles in the design and synthesis of new star-shaped mesogens displaying columnar liquid crystal properties.

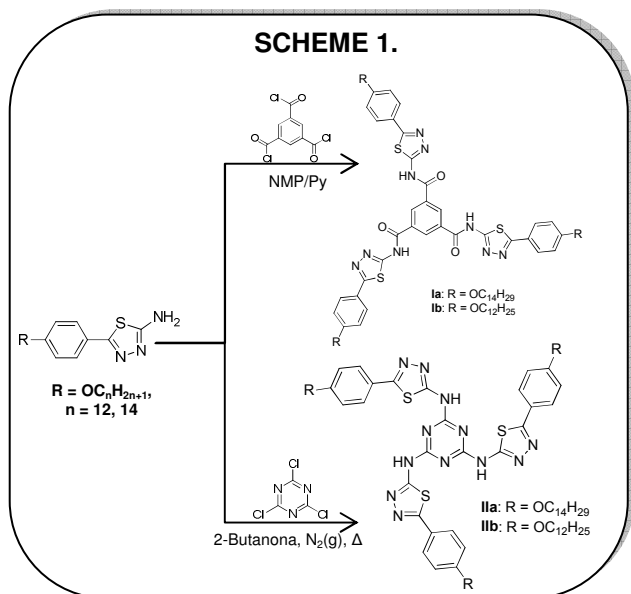
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## INTRODUCTION

Recently, columnar materials have acquired great attention due to their potential technological applications.<sup>1</sup> The introduction of a thiadiazole ring within the main structure opens the possibility of generating new mesogenic units. It causes changes in the polarity, polarizability and geometry, due to the associated dipole moment.<sup>2</sup> In this work we report the synthesis and mesomorphic properties of new columnar liquid crystals with benzene and/or triazine cores and three pendant *n*-alkoxyphenyl-1,3,4-thiadiazole arms (**la-b** and **IIa-b** respectively). The synthetic route is shown in scheme 1.

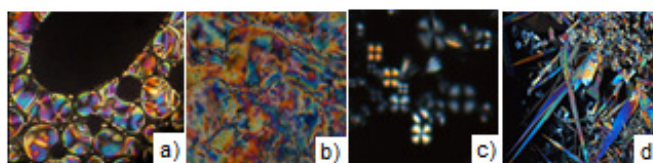


## RESULTS AND DISCUSSION

Compounds **la-b** and **IIa-b** are thermotropic liquid crystals. In all the cases a columnar mesophase was observed. The mesophase exhibited by these compounds were identified according to their optical textures which were observed by optical polarizing microscopy (Figure 1).

The amide and amine function favors the stabilization of the columnar mesophase due to the formation of intermolecular hydrogen bonding. The compounds exhibited moderate and wide

mesomorphic temperature ranges (Table 1). The triamides **la** and **lb** have a mesomorphic range of 25°C and 42°C, respectively, which are influenced by the length of the terminal alkoxy chains so we can conclude that as increases the length of peripheral chain in two carbon atoms the mesomorphic range is lower. In the case of the triamines **IIa-b**, the thermal stability of mesophase is higher than the triamides **la-b** until the partial decomposition of the compound which occur in 245°C for **IIa** and 250°C for **IIb**.



**Figure 1.** Optical micrographs (magnification: x10) of (a) **la**, at 90°C; (b) **lb**, at 102°C; (c) **IIa** at 153°C; (d) **IIb** at 130.1°C.

**Table 1.** Transition temperatures (°C) for compounds of series **la-b** and **IIa-b**. d= decomposition temperature.

Compound	Transition Temperature (°C)
<b>la</b>	Cr 70 Col <sub>x</sub> 95 I
<b>lb</b>	Cr 95 Col <sub>x</sub> 137 I
<b>IIa</b>	Cr 134 Col <sub>x</sub> 245 d
<b>IIb</b>	Cr 121 Col <sub>x</sub> 250 d

## CONCLUSION

In conclusion, we have described the synthesis and mesomorphic properties of new columnar liquid crystals, based on triamides and triamines incorporating 1,3,4-thiadiazole heterocycle..

## ACKNOWLEDGEMENTS

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