

IMPURITY-INDUCED PHOSPHORESCENCE IN CARBAZOLE DERIVATIVES

PIEMAISĪJUMU RADĪTA FOSFORESCENCE KARBAZOLA ATVASINĀJUMOS

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Phosphorescence is a type of luminescence in which the emission lifetime is longer than 1 μ s. Usually, phosphorescence is exhibited by metal containing compounds, but the high toxicity and manufacturing costs as well as low stability limits the use of such materials. To overcome these drawbacks purely organic phosphorescent materials recently have become popular because of their biocompatibility, low cost, and limitless design possibilities.¹

Carbazole **1** subunit is a widely used moiety in the field of purely organic phosphorescence, but in 2021 it was shown that commercially available carbazole has an isomeric impurity – benzo[*f*]indole **2**, which is responsible for the phosphorescence obtained from carbazole containing luminophores.² Herein, we report the synthesis of carbazoles **3b–7b** in which the carbazole ring was formed through *Clauson-Kaas* cyclization, thus avoiding commercial impurities. Initially, carbazoles **3b–7b** showed phosphorescence, however, after laborious purification, it disappeared. This led us to believe, that a byproduct in the *Clauson-Kaas* cyclization was responsible for the phosphorescence. Therefore, we created a series of two component systems, where carbazole derivatives **3b–7b** were used as hosts and byproducts **3c–7c** and **3d–7d** as dopants. The two component systems where the indole derivatives **3c–7c** were used as dopants, didn't exhibit phosphorescence. Meanwhile employing benzo[*b*]carbazole derivatives **3d–7d** as dopants resulted in an intense phosphorescence.

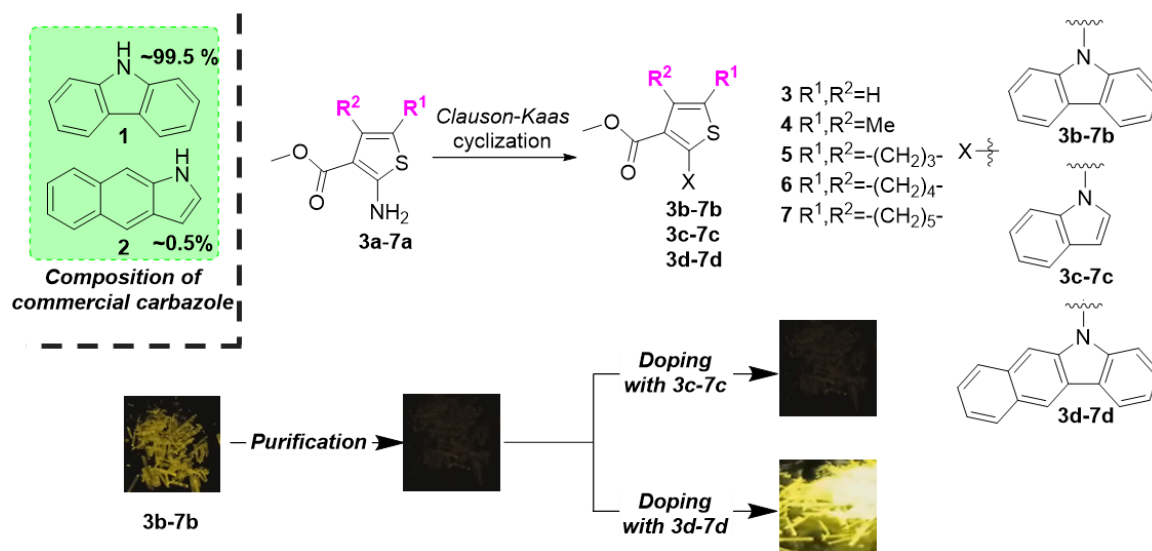


Fig. 1. Impurity-induced phosphorescence in carbazoles **3b–7b**

References

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