

Electrosynthesis of 2,3,5-trisubstituted selenium-chalcogenophenes from (Z)-chalcogenenyne and diselenides

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ABSTRACT

The chemistry of heterocyclic compounds is constantly progressing with regard to the efficient development of methodologies for the construction of these important building blocks for academic and industrial applications. It is worth noting that the chemistry of Thio- and Seleno-heterocycles has the most diverse applications in synthesis, materials science and medicinal chemistry. Therefore, as part of the continuous effort of our research group to develop more efficient methods for the synthesis of chalcogeno-heterocyclic compounds, herein we reported a new methodology to access selenophene **3** and thiophene **4** derivatives using constant current, undivided cell using (Z)-chalcogenenyne **1a** and diorganoyl diselenides **2a** as starting material in this transformation (Figure 1). This electrochemical chalcogeno-cyclization of chalcogenoenynes involves a simple protocol, open-air, room temperature, short reaction times. The scope demonstrated good functional group tolerance and good to high yields. This approach represents an important contribution to the synthetic and medicinal chemistry and for the current C–Se/S chemistry.

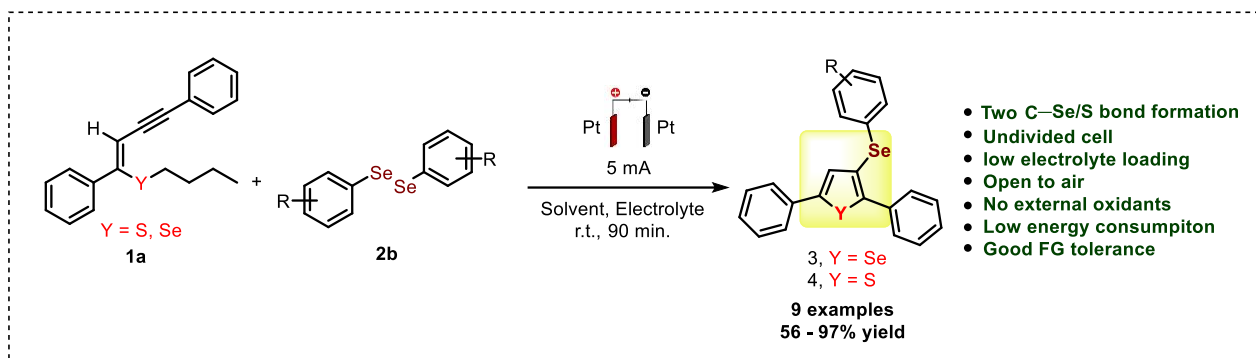


Figure 1. Electrosynthesis of trisubstituted chalcogenophenes from diselenides and Z-Chalcogenenyne

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REFERENCES

- (1) Mustafa, M.; Winum, J.-Y. The Importance of Sulfur-Containing Motifs in Drug Design and Discovery. *Expert Opin. Drug Discov.* **2022**, *17* (5), 501–512. <https://doi.org/10.1080/17460441.2022.2044783>.
- (2) Álvarez-Pérez, M.; Ali, W.; Anna Mar, M.; Handzlik, J.; Domínguez-Álvarez, E. Molecules Selenides and Diselenides: A Review of Their Anticancer and Chemopreventive Activity. **2018**. <https://doi.org/10.3390/molecules23030628>.
- (3) Chawla, S.; Sharma, S.; Kashid, S.; Verma, P. K.; Sapra, A. Therapeutic Potential of Thiophene Compounds: A Mini-Review. *Mini-Reviews Med. Chem.* **2023**, *23* (15), 1514–1534. <https://doi.org/10.2174/1389557523666230206104257>.
- (4) Scheide, M. R.; Nicoletti, C. R.; Martins, G. M.; Braga, A. L. Electrohalogenation of Organic Compounds. *Org. Biomol. Chem.* **2021**, *19* (12), 2578–2602. <https://doi.org/10.1039/D0OB02459G>.