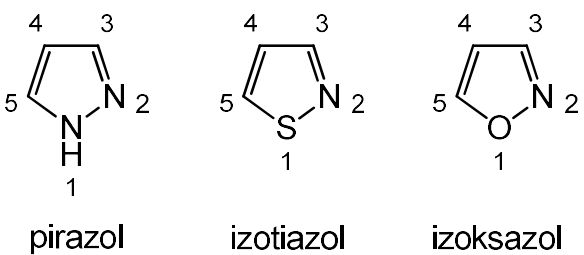
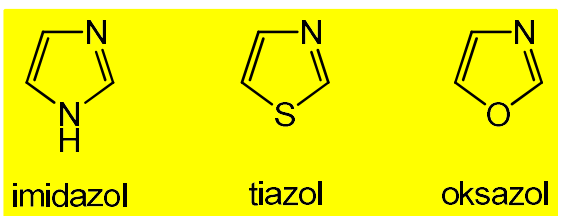
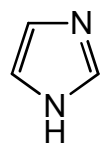


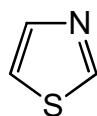
4. Pierścienie pięcioczłonowe z dwoma heteroatomami, imidazole, tiazole, oksazole



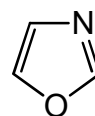
4.1. Imidazole, tiazole i oksazole - budowa i przykłady związków pochodzenia naturalnego



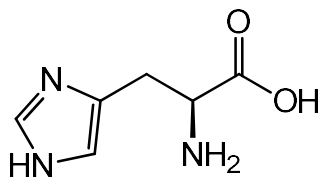
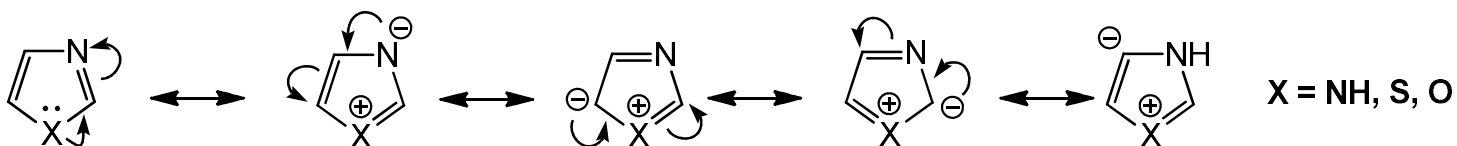
imidazol



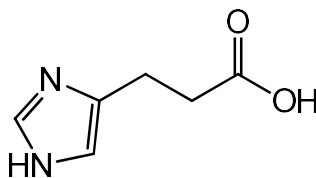
tiazol



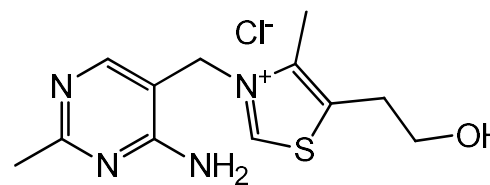
okszazol



histrydina

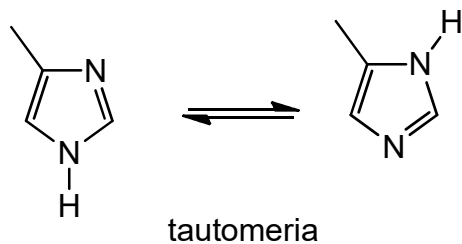
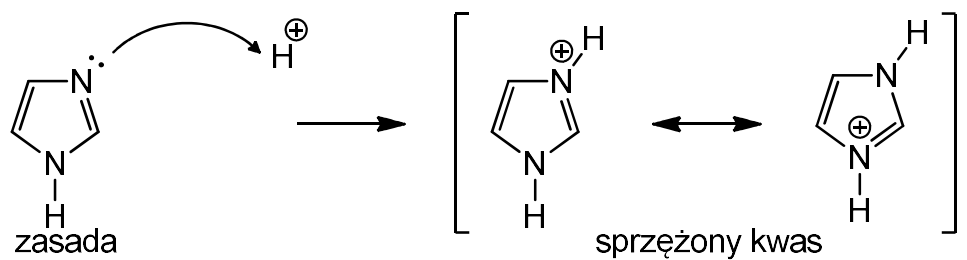
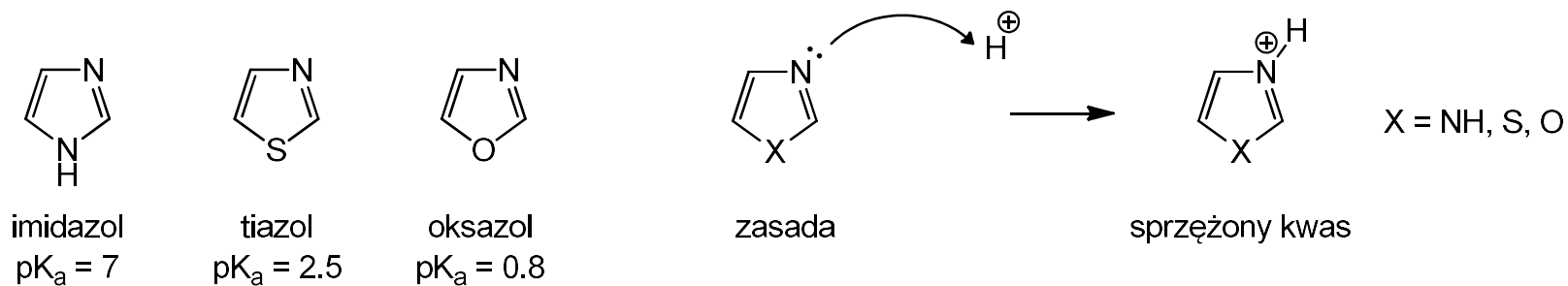


histamina

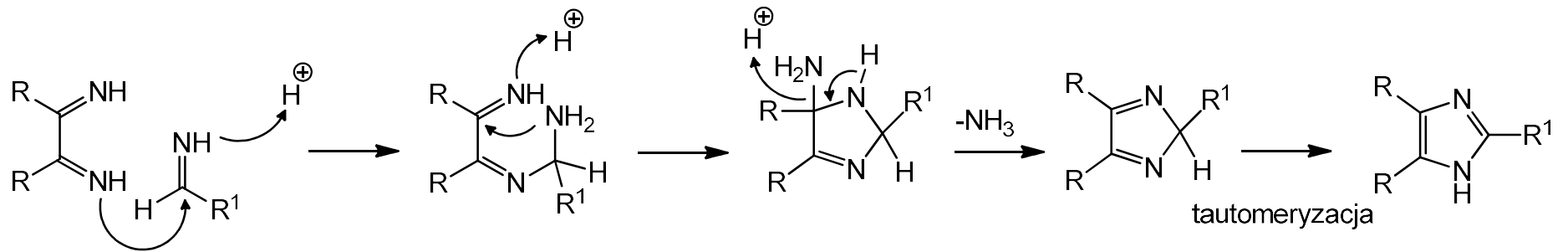
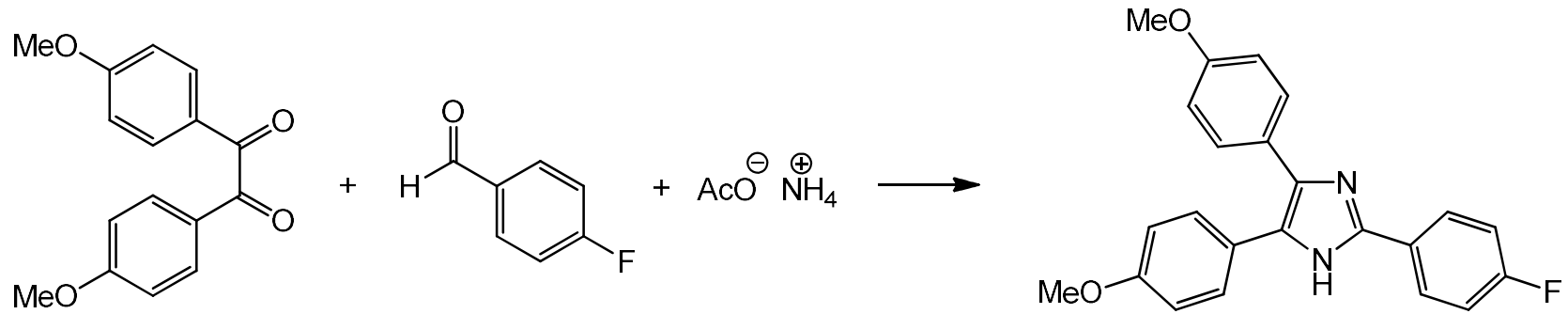


tiamina (wit. B1)

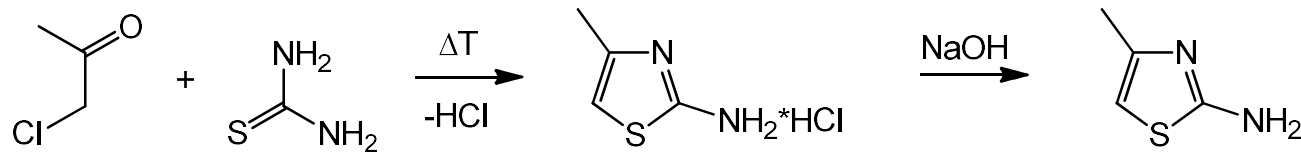
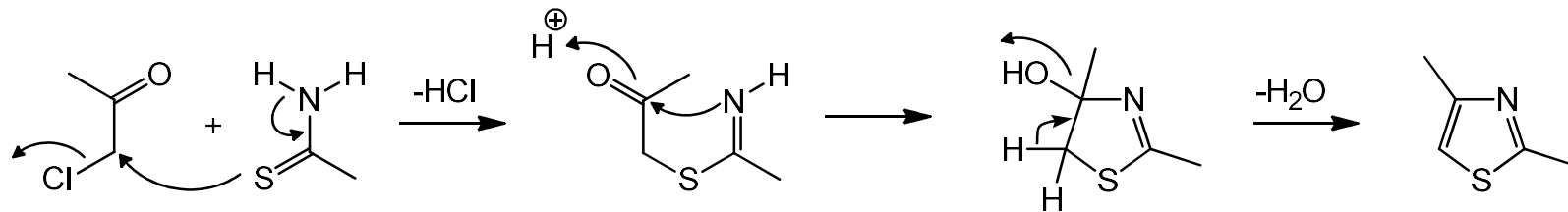
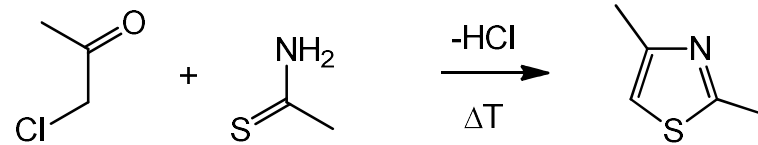
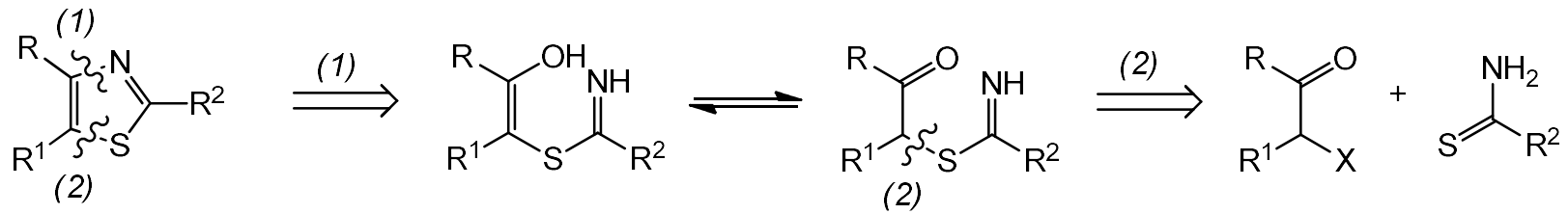
4.2. Imidazole, tiazole i oksazole - właściwości zasadowe, tautomeria imidazoli



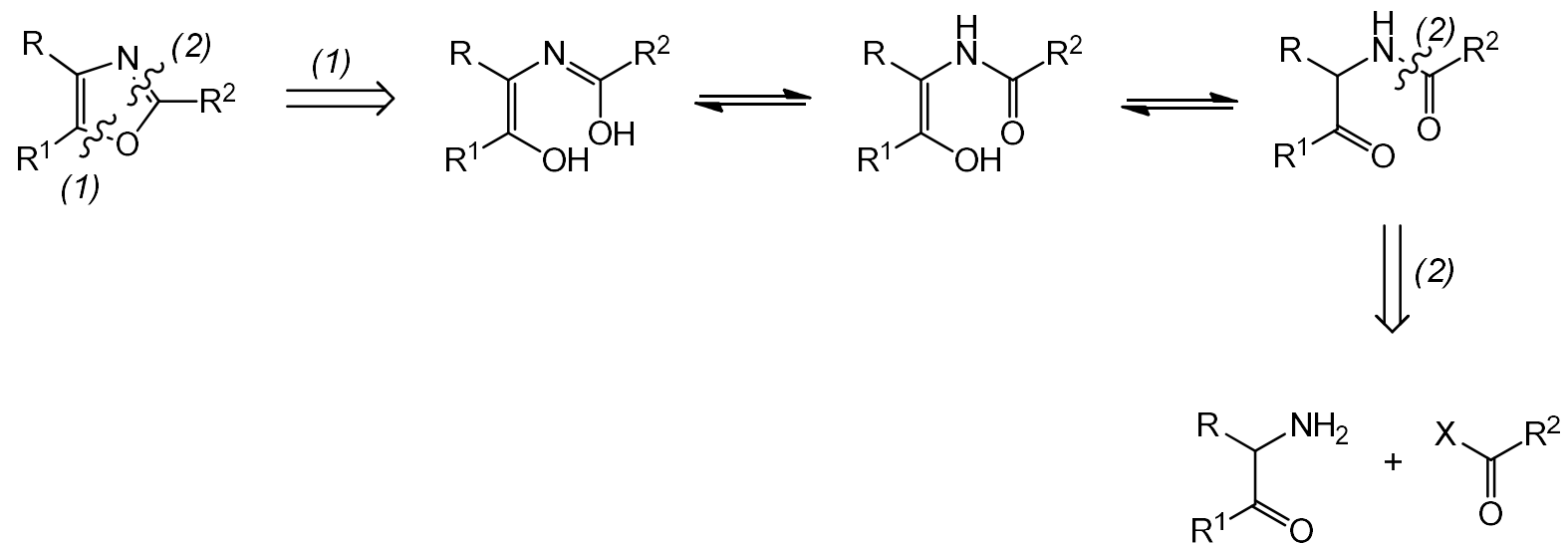
4.3. Imidazole, tiazole i oksazole - synteza imidazoli, metoda najczęściej stosowana



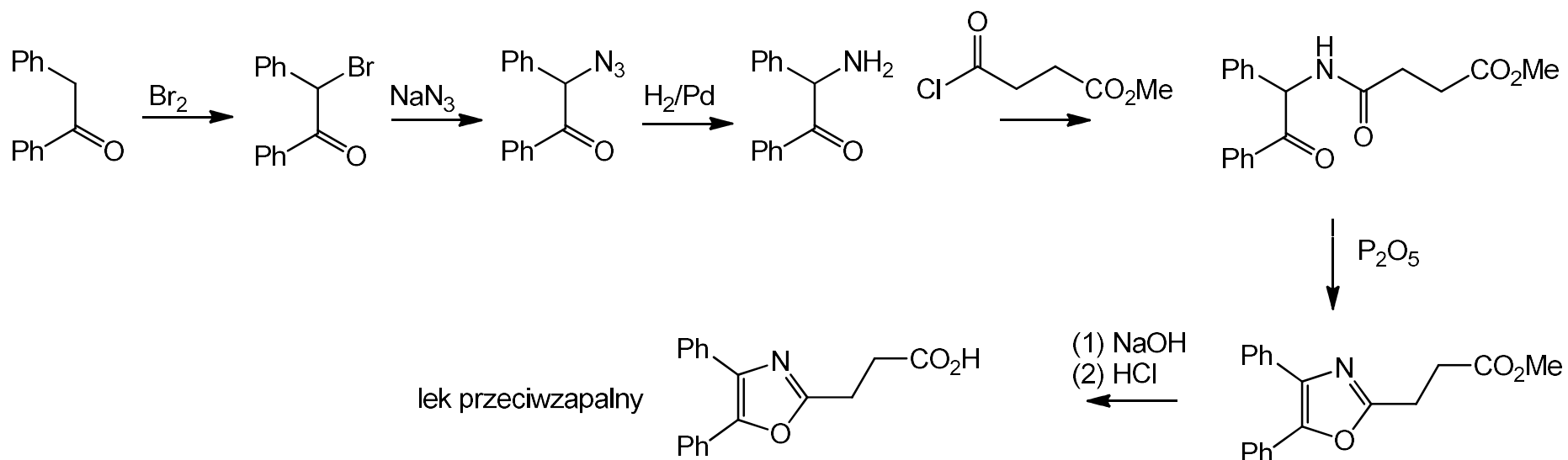
4.4. Imidazole, tiazole i oksazole - synteza tiazoli, metoda Hantzsch



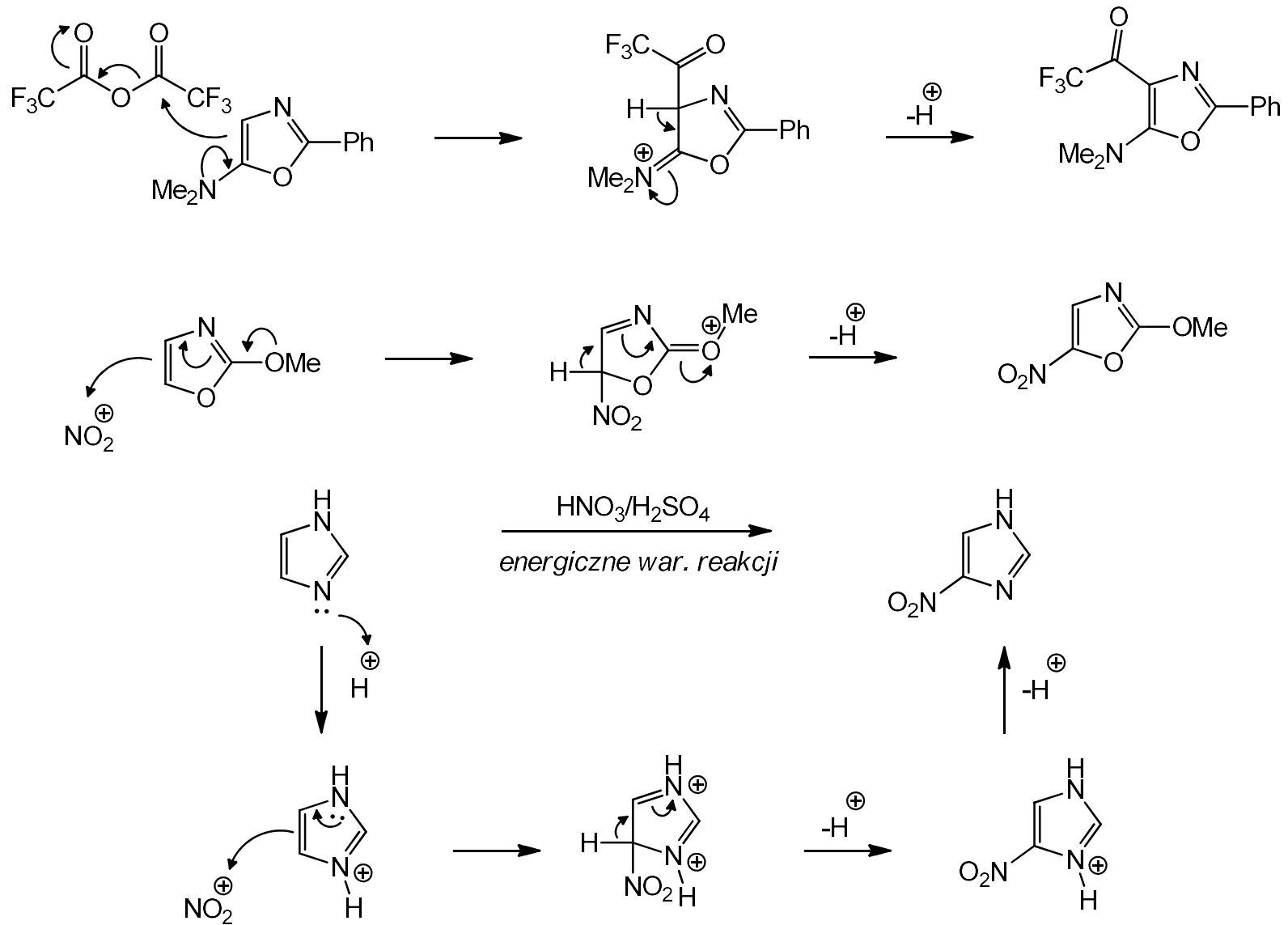
4.5. Imidazole, tiazole i oksazole - synteza oksazoli, synteza Robinsona-Gabriela, dyskonekcja



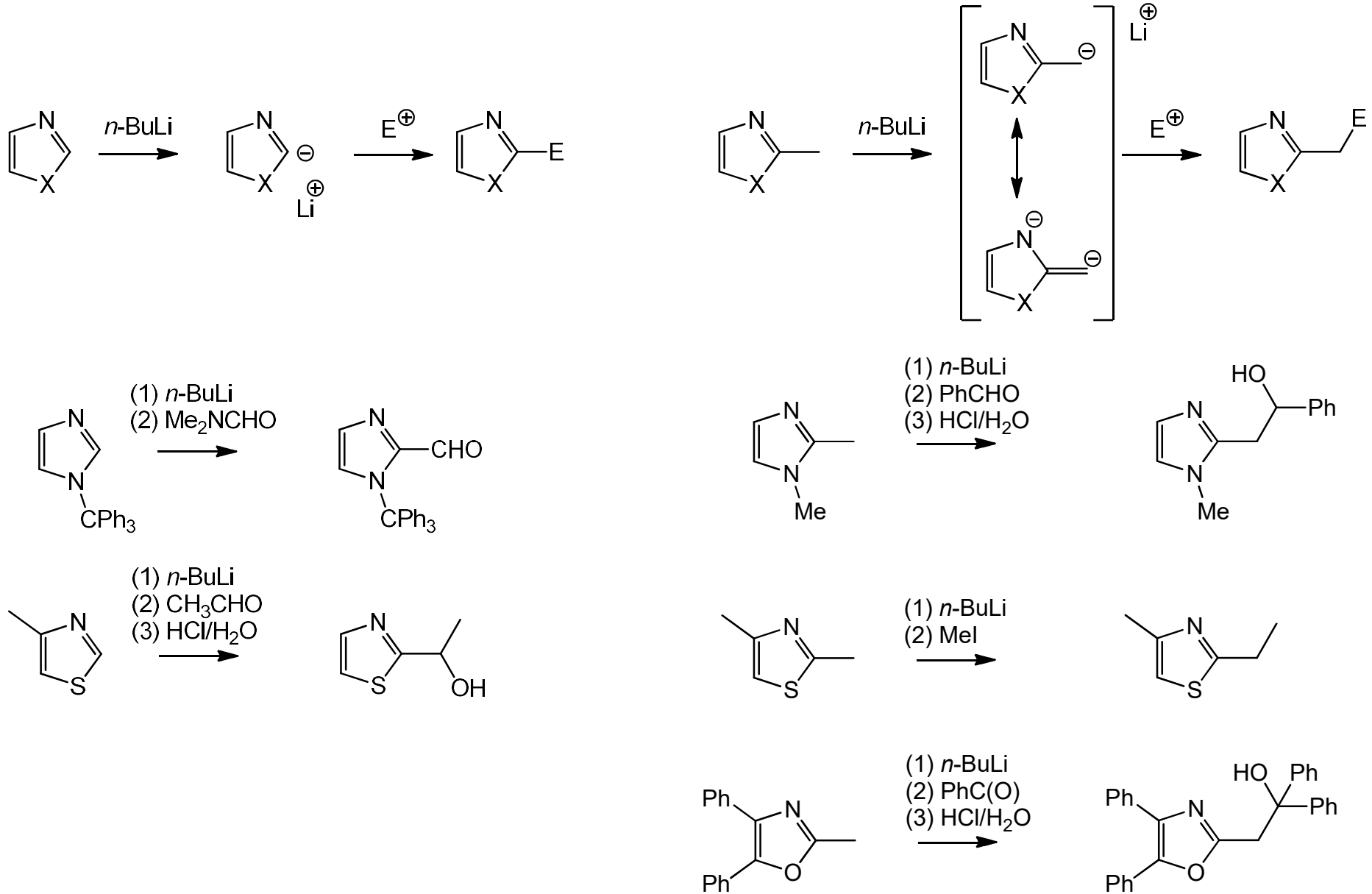
4.5.2. Imidazole, tiazole i oksazole - synteza oksazoli, synteza Robinsona-Gabriela, przykład



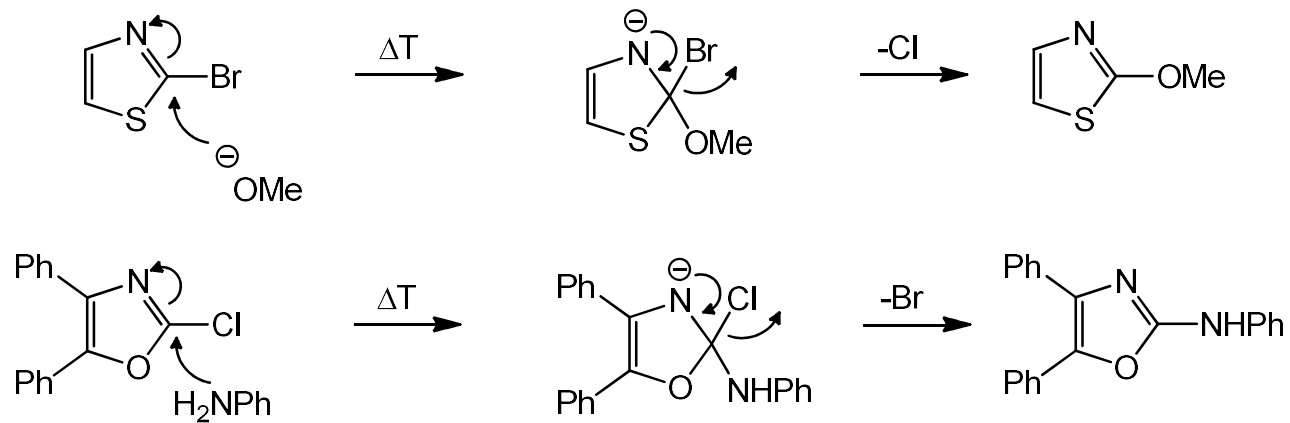
4.6. Imidazole, tiazole i oksazole - substytucja elektrofilowa



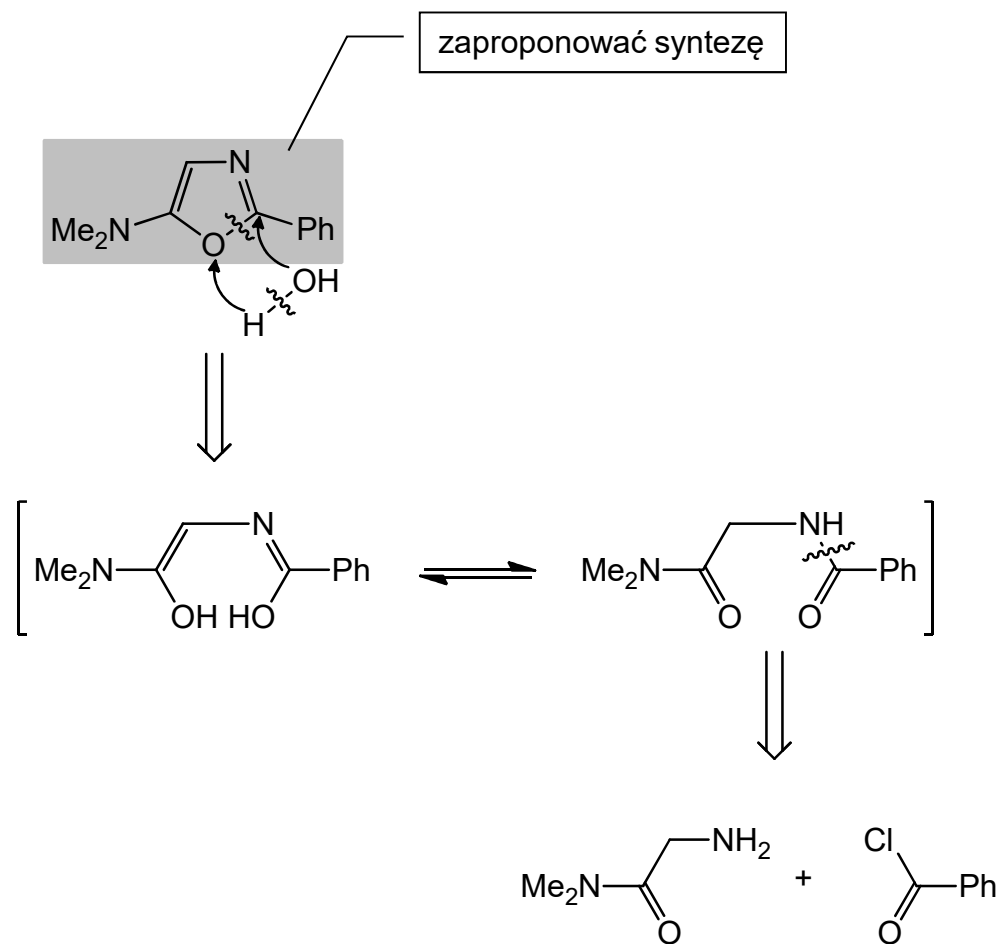
4.7. Imidazole, tiazole i oksazole – deprotonowanie i chemia anionów



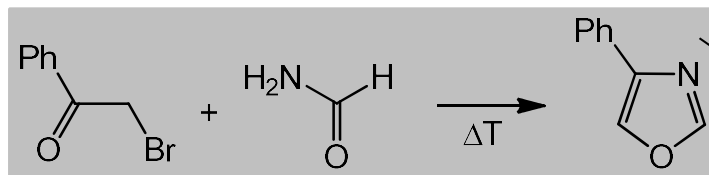
4.8. Imidazole, tiazole i oksazole - aromatyczna substytucja nukleofilowa



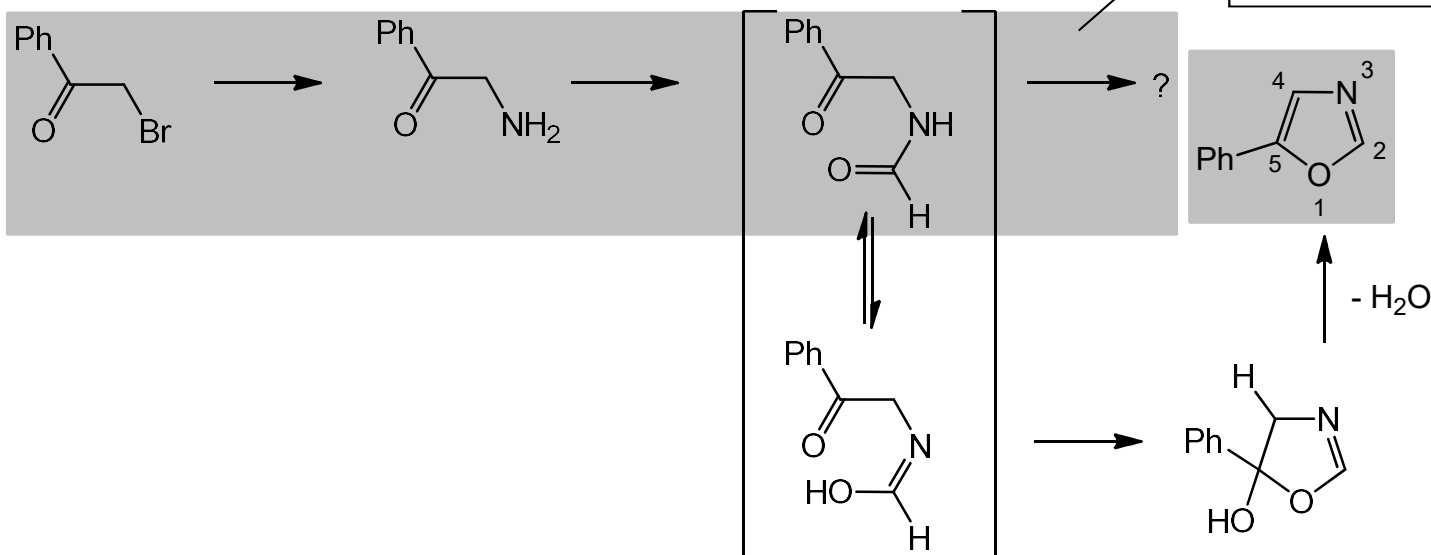
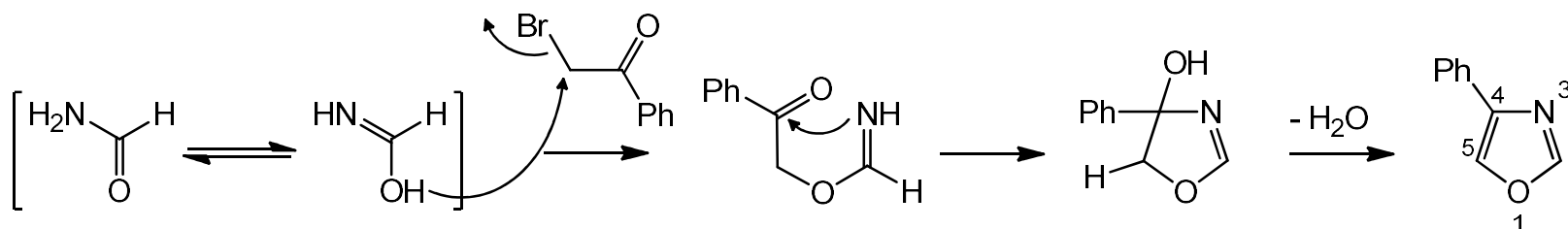
4.9. Imidazole, tiazole i oksazole - przykłady



4.9. Imidazole, tiazole i oksazole - przykłady

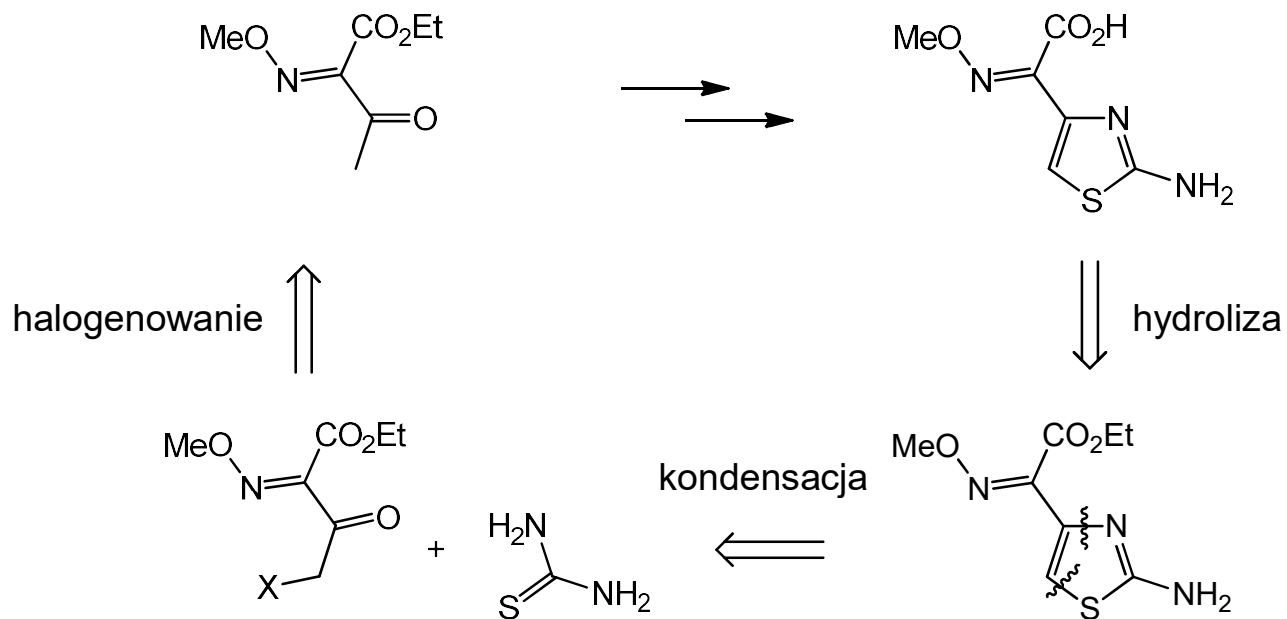


wyjaśnić przebieg reakcji
(synteza Blümleina-Lewy'ego)



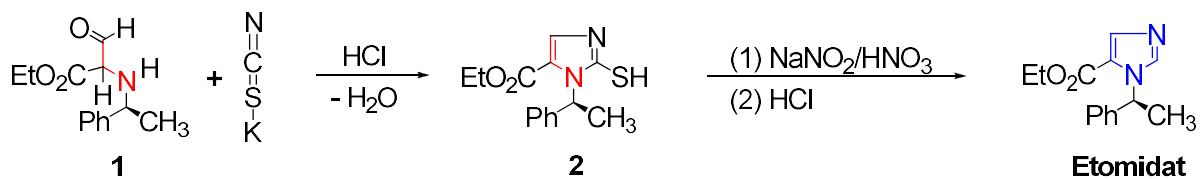
Jaki będzie produkt przekształceń?

4.9. Imidazole, tiazole i oksazole – przykłady



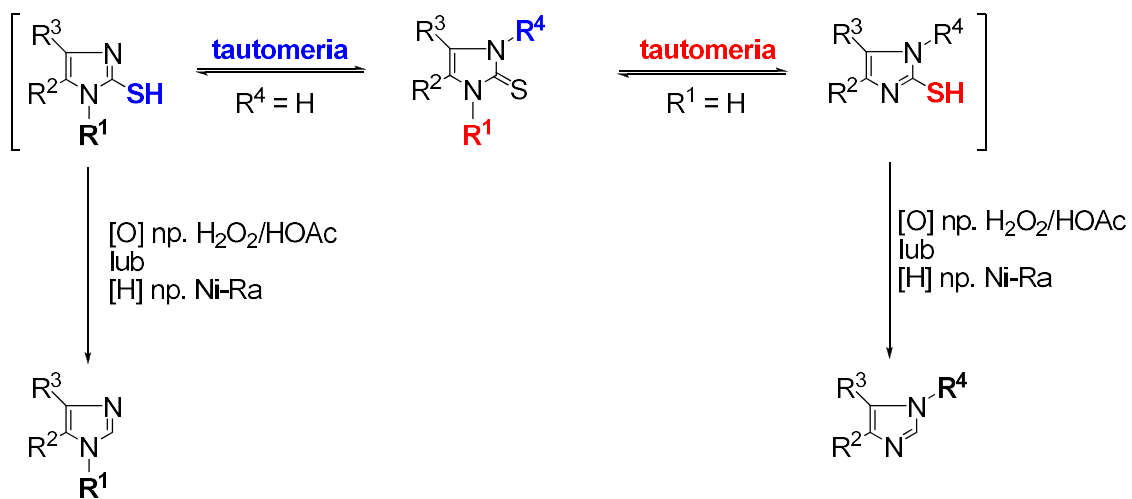
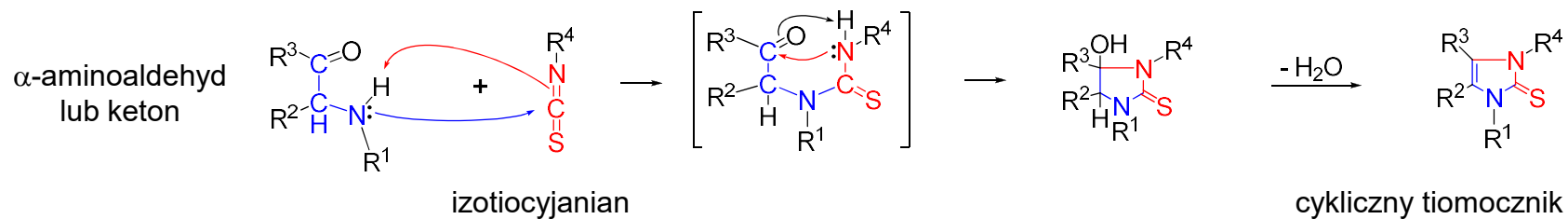
4.10. Synteza etomidatu, reakcja Marckwalda

Lek do narkozy niewziewnej



US Pat. 3.354.173 (1967)
Arzmein. Forsch. 1971, 21, 1234.
Pharm. Chem. J. 1978, 12, 195.

4.10.1. Synteza etomidatu, przebieg reakcji Marckwalda



Tetrahedron Lett. 2005, 46, 7315.