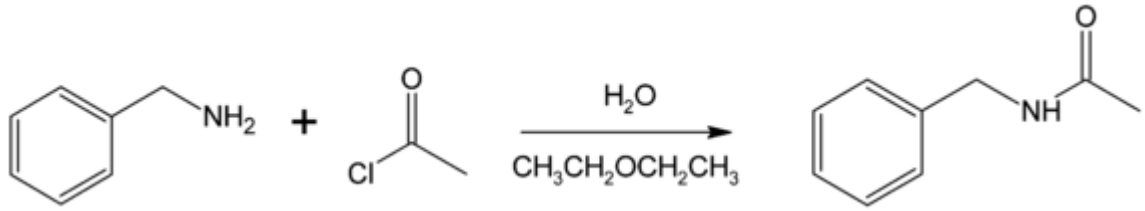
Schotten–Baumann reaction

The **Schotten–Baumann reaction** is a method to synthesize amides from amines and acid chlorides:

Schotten-Baumann reaction	
Named after	Carl Schotten Eugen Baumann
Reaction type	Condensation reaction
Identifiers	
Organic Chemistry Portal	schotten-baumann-reaction
RSC ontology ID	RXNO:0000165



An example of a Schotten-Baumann reaction. Benzylamine reacts with acetyl chloride under Schotten-Baumann conditions to form *N*-benzylacetamide.

Schotten–Baumann reaction also refers to the conversion of acid chloride to esters. The reaction was first described in 1883 by German chemists Carl Schotten and Eugen Baumann.[1][2]

The name "Schotten–Baumann reaction conditions" often indicate the use of a two-phase solvent system, consisting of water and an organic solvent. The base within the water phase neutralizes the acid, generated in the reaction, while the starting materials and product remain in the organic phase, often dichloromethane or diethyl ether.

Contents

Applications

The Schotten–Baumann reaction or reaction conditions are widely used in organic chemistry.[3][4][5]

Examples:

- synthesis of N-vanillyl nonanamide, also known as synthetic capsaicin
- synthesis of benzamide from benzoyl chloride and a phenethylamine
- acylation of a benzylamine with acetyl chloride (acetic anhydride is an alternative)

in the **Fischer peptide synthesis** (Emil Fischer, 1903)[6] an α-chloro acid chloride is condensed with the ester of an amino acid. The ester is then hydrolyzed and the acid converted to the acid chloride enabling the extension of the peptide chain by another unit. In a final step the chloride atom is replaced by an amino group completing the peptide synthesis.

Further reading

- Schotten, C. (1884). "Ueber die Oxydation des Piperidins" (https://zenodo.org/record/1425345). *Berichte der deutschen chemischen Gesellschaft*. **17** (2): 2544–2547. doi:10.1002/cber.188401702178 (https://doi.org/10.1002%2Fcber.188401702178).
- Baumann, E. (1886). "Ueber eine einfache Methode der Darstellung von Benzoësäureäthern" (https://zenodo.org/record/1425451). *Berichte der deutschen chemischen Gesellschaft*. **19** (2): 3218–3222. doi:10.1002/cber.188601902348 (https://doi.org/10.1002%2Fcber.188601902348).

See also

- Lumière–Barbier method

References

1. W Pötsch. *Lexikon bedeutender Chemiker* (VEB Bibliographisches Institut Leipzig, 1989) (ISBN 3-323-00185-0)
2. M B Smith, J March. *March's Advanced Organic Chemistry* (Wiley, 2001) (ISBN 0-471-58589-0)
3. Kent, R. E.; McElvain, S. M. (1945). "Isobutyramide". *Organic Syntheses*. **25**: 58. doi:10.15227/orgsyn.025.0058 (https://doi.org/10.15227%2Forgsyn.025.0058).
4. Cope, Arthur C.; Ciganek, Engelbert (1959). "N,N-Dimethylcyclohexylmethylamine". *Organic Syntheses*. **39**: 19. doi:10.15227/orgsyn.039.0019 (https://doi.org/10.15227%2Forgsyn.039.0019).
5. X. Wang, S. O. de Silva, J. N. Reed, R. Billadeau, E. J. Griffen, A. Chan, and V. Snieckus (1995). "7-Methoxyphthalide". *Organic Syntheses*. **72**: 163. doi:10.15227/orgsyn.072.0163 (https://doi.org/10.15227%2Forgsyn.072.0163).
6. Emil Fischer (1903). "Synthese von Polypeptiden" (https://zenodo.org/record/1426082). *Berichte der deutschen chemischen Gesellschaft*. **36** (3): 2982–2992. doi:10.1002/cber.19030360356 (https://doi.org/10.1002%2Fcber.19030360356).