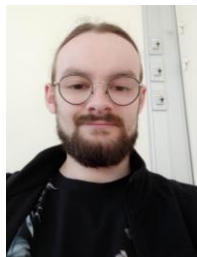


CONTINUOUS FLOW NEUTRALIZATION OF SULFUR MUSTARD SIMULANTS WITH OZONE



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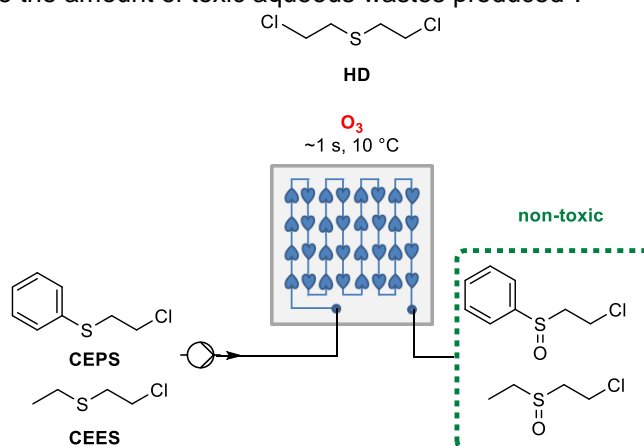
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Chemical warfare agents (CWAs) are extremely toxic synthetic molecules for mammals. Among them, mustard gas, or yperite (**HD**), has one the most significance in military terms. **HD** is labeled as blister agent and used for incapacitation, causing severe eye injuries, respiratory irritation and skin burn as well as painful blistering¹.

Standard methods of decontamination mostly rely on chemical oxidation with strong reagents, such as aqueous bleach. Despite some effectiveness, these methods generate huge amounts of aqueous wastes that needs to be retreated at dedicated facilities². Herein is presented a study aiming at chemical neutralization of **HD** in organic medium using gaseous reagent ozone. All the work was conducted with HD simulants, namely 2-chloroethyl ethyl sulfide (**CEES**) and 2-chloroethyl phenyl sulfide (**CEPS**), to develop a method of mustard neutralization using continuous flow technology that would drastically reduce the amount of toxic aqueous wastes produced³.



The optimization of the reaction conditions led to a full conversion both **CEES** and **CEPS** with a high selectivity toward their non-toxic sulfoxide counterparts after 1 s of reaction time at 10 °C.

¹ S. Chauhan, R. D'Cruz, S. Faruqi, K.K. Singh, S. Varma, M. Singh, V. Karthik, *Environmental Toxicology and Pharmacology*, **2008**, 26, 113–122

² B. Picard, I. Chataigner, J. Maddaluno and J. Legros, *Org. Biomol. Chem.*, **2019**, 17, 6528–6537.

³ M. Boddaert, P. Bianchi, D. V. Silva-Brenes, A. Musina, M. Winter, P. M. C. Roth, P. Y. Renard, J. Legros, J. C. Monbaliu, *Green Chem.*, **2024**, 26, 128