



Reference: ZAA/331.1-OCInt
Spiez, 02.08.2011

Internship for organic chemistry skills development at SPIEZ LABORATORY

Synthesis of compounds related to precursors, degradation products and by-products of CW-agents

Programme of the 2011 Three-months Internship

Main subjects	Days (approx.)
1. Accommodation (public transport and services, city and shopping) Introduction to SPIEZ LABORATORY, Chemistry Department, Organic Chemistry branch and staff Introduction to laboratory (safety and working rules) Internship organization	2
2. GC/MS, lectures, demonstration, hands-on training	4
3. Synthesis work, preparation of organophosphorus compounds (NMR and GC/MS identification): propylphosphonic dichloride, methylthiophosphonic dichloride, methylthiophosphonic difluoride, diisopropyl propylphosphonate, isopropyl propylphosphonochloridate, isopropyl-2-methoxyethyl propylphosphonate, methyl ethylphosphonic acid, N,N-dipropylphosphoramidic dichloride, diisopropylchlorophosphate	20
4. NMR, lectures, demonstration, hands-on training	5
5. Visit to the Chemistry branches (Analytical chemistry, Detection and Decontamination, Arms control, and Intervention Team)	2
6. Introduction to the Toxic Substances Building, synthesis of highly toxic substances (glove box, computer assisted technology)	1
7. Synthesis work, preparation of non-phosphorus compounds (NMR and GC/MS identification): N-isopropylacetamide, N-ethyl-N-isopropylamine, N-ethyl-N-methylaminoethane-2-ol, N,N-dimethylaminoethane-2-chloride and the corresponding hydrochloride salt, N,N-dimethylaminoethane-2-thiol and the corresponding hydrochloride salt	10
8. Sample preparation, lectures, extraction (soil, sand, water and organic solutions), derivatization (methylation and silylation), analysis, hands-on training	5
9. Synthesis work, microscale preparation of Amiton and O-Amiton analoga, symmetrical and asymmetrical (R1 - R3 = Me, Et, Pr and iPr).	5
10. Stockpiled chemical databases and declarations of the Schedule 1 chemicals to the OPCW	1
11. Quality assurance	1
12. Visits to other departments of SPIEZ LABORATORY (Biology, Physics, NBC-Protection and Federal Commission for NBC-Protection)	2
13. Reports (technical and final OPCW)	5
14. Cleaning, packing, departure	2