

1. Introduction	1
2. High Explosives	4
2.1. Production High Explosives	4
2.1.1. RDX and HMX	4
2.2. Current Demilitarization Situation	8
2.3. Available Treatment Technologies	9
2.4. Third Generation Technologies	11
2.4.1. Molten Salt Oxidation	11
2.4.2. Bioremediation/Composting	11
2.4.3. Alkaline Hydrolysis	12
3. High Explosives Contaminated Water	17
3.1. Contaminated Water Sources	17
3.2. Possible Future Technologies	18
3.3. Adsorption	22
3.3.1. Activated Carbon	22
3.3.2. Resins	24
3.4. Adsorbent Regeneration	24
3.4.1. Thermal Adsorbent Regeneration	25
3.4.2. Biological Adsorbent Regeneration	25
3.4.3. Chemical Adsorbent Regeneration	25
3.4.4. Alkaline Hydrolysis Regeneration	27
4. Objectives of this Study	29
5. Materials and Methods	32
5.1. Materials	32
5.1.1. High Explosives	32
5.1.2. Activated Carbon	32
5.2. Analytical Methods	33
5.2.1. High Performance Liquid Chromatography (HPLC)	33
5.2.2. Ion Chromatography (IC)	35
5.2.3. Gas Chromatography/Mass Spectrometry (GC/MS)	36
5.2.4. BET-Surface Area Measurements	36
5.2.5. Gas Analysis	37
5.2.6. Miscellaneous Analytical Methods	37
5.3. Batch Experiments	37
5.3.1. Chemical Kinetics: Batch Studies	37
5.3.2. Ammonia-experiments	38
5.3.3. Activated Carbon Isotherms	39
5.4. Fixed Bed Adsorber Experiments	39

6. Results and Discussion	41
6.1. Aqueous Homogeneous Alkaline Hydrolysis	41
6.1.1. Objectives	41
6.1.2. Chemical Kinetics.....	41
6.1.3. Temperature Dependency of Rate Constants.....	50
6.1.4. Intermediates and Endproducts.....	54
6.1.5. Conclusions	68
6.2. Adsorption	71
6.2.1. Objectives	71
6.2.2. Isotherms of Virgin Activated Carbon	71
6.2.3. Adsorption Kinetics.....	75
6.2.4. Conclusions	85
6.3. Batch Regeneration of Activated Carbon.....	86
6.3.1. Objectives	86
6.3.2. Regeneration Kinetics.....	86
6.3.3. Readsorption of Products.....	89
6.3.4. Regeneration Cycles	90
6.3.5. Acid Post Treatment	95
6.3.6. BET Surface Area Measurements.....	95
6.3.7. Residual Adsorbates after Regeneration.....	97
6.3.8. Conclusions	98
6.4. Fixed Bed Studies.....	100
6.4.1. Objectives	100
6.4.2. Column Adsorption	100
6.4.3. Column Regeneration	104
6.4.4. Repeated Adsorption and Regeneration	107
6.4.5. Conclusions	108
7. Summary	109
8. Zusammenfassung	112
Appendix	115
Notation.....	116
Derivation of the Equations Describing the Homogeneous Surface Diffusion Model (HSMD).....	117
References.....	123