

# **DIRECTIONS IN SWEDISH RESEARCH ON WASTEWATER HANDLING WITH RESPECT TO ENERGY AND RESOURCE UTILIZATION**

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## **Abstract**

A change in research priorities has gradually occurred in many European countries in order to comply with sustainability principles. At present new technologies should meet requirements of sustainable development and multi-disciplinary approach is applied. Research activities in Sweden related to wastewater handling have been focused on optimizing the existing systems and the development of new methods with respect to energy and resources utilization.

The article presents recent results from research on biological nitrogen removal with Anammox process application. This new nitrogen conversion pathway can be applied for treatment of ammonium rich wastewater, including leachates from landfills and supernatants from dewatering of digested sludge with the purpose to decrease nitrogen discharges into waters. The introduction of deammonification process based on nitrification/Anammox can reduce the costs of plant operation due to less aeration and no external source of carbon demand in comparison to the traditional nitrification/denitrification.

Pharmaceuticals found in wastewater are passing through the wastewater treatment plant untreated and cause environmental problems. The application of membrane bioreactor system followed by granular activated carbon filtration has been studied as the efficient technology for removal of pharmaceutical compounds.

The growing quantities of sludge from wastewater treatment plants and stringent restrictions on landfilling and on agricultural use of sludge have gained research on sludge fractionation, product recovery and separation of toxic substances. Phosphate release and recovery from treated sewage sludge has been investigated and experiments were performed on sludge residue from supercritical water oxidation, ash from incineration and dried sludge at different temperatures. In the article future main research areas in wastewater handling planned to be investigated in Sweden are also specified.

# **ДОСЛІДЖЕННЯ ПРОЦЕСУ ЗВОТНО-ОСМОТИЧНОГО ПОМ'ЯКШЕННЯ ВОДИ**

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Вода, яка використовується для пиття і для виробництва продуктів харчування, повинна мати твердість 7 мг-екв/л. Природна вода часто має більшу твердість, що приводить до погіршення якості харчових продуктів, у виробництві яких вона використовується, і надалі до негативного впливу на здоров'я людини, яка ці продукти споживає. Крім великого вмісту карбонатів, вода також має великий природний вміст хлоридів та сполук заліза, а в паводковий період і значне біологічне забруднення. Таку воду без підготовки використовувати у виробництві харчових продуктів не можна.