

Advances in Chemical Technologies for Water and Wastewater Treatment

WANG Xiaochang, CHEN Rong(editors)



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***Proceedings of the
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***Organised by
Xi'an University of Architecture and Technology***

International Conference on Advances in Chemical Technologies for Water and Wastewater Treatment, Xi'an, 2008

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Preface

The "International Conference on Advances in Chemical Technologies for Water and Wastewater Treatment" was organized by Chinese Chemical Society (CCS) under the co-organization of National Natural Science Foundation of China (NSFC), Japan Science and Technology Agency (JST) and Xi'an University of Architecture and Technology (XAUAT). The event was held in Xi'an, the historical city of China, from 15th to 18th May, 2008.

CCS, founded in 1932, is among the most influential academic organizations in China. Chemists of various disciplines all over the country are associated under the umbrella of CCS in a variety of branches and groups, of which the Group of Chemists for Water and Wastewater Treatment (GCWWT) has been active for long both domestically and internationally. The biennial conference on chemical technologies for water and wastewater treatment started in 1992 is the most important event of GCWWT to bring scientists, engineers together for exchanging the latest information on the progress in research and engineering practice covering a broad range of technologies related to chemistry, physicochemistry, biochemistry, analytical chemistry as well as process modeling and simulation and so on. In order to create an opportunity for international academic exchange in these fields, GCWWT proposed to make its 9th biennial conference as an international conference on chemical technologies for water and wastewater treatment. The proposal gained support from NSFC and JST which are leading foundations in China and Japan for science and technical researches and are mutually supporting China-Japan joint projects on water environment. Many world-famous professors and scholars were invited to join the scientific committee and to give keynote lecturers at the conference.

The conference focused on the latest progress in the theoretical and practical studies of chemical technologies which can be applied to drinking water purification, domestic and industrial wastewater treatment, improvement of sanitary condition and protection of water environment. It brought together scientists, engineers and professionals from all sectors related to water and wastewater, including government agencies, research institutes, engineering consultants, educational and training institutions, and industries from different countries and regions for a full discussion of the related topics.

The proceedings included all the full papers for oral and poster presentations at the conference in the plenary session and 4 special sessions which are 1) Coagulation and Separation Technologies, 2) Chemical Oxidation Technologies, 3) Biochemical and Biological Treatment Technologies, and 4) Technology Improvement and Process modeling. We believe that these papers will provide useful information on advances in chemical technologies for water and wastewater treatment.

The editors are grateful to Mr. ZHANG Qionghua, Misses WANG Chun and CAO Bing for their assistance in compiling the proceedings, and to Shaanxi Science & Technology Press for publishing the proceedings within a very limited time.

WANG Xiaochang
Chief Editor
May 2008, Xi'an, China

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Plenary Session
Keynotes lectures

The sand and microfiltration of algae in water supplies

Charles R. O'MELIA

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Abstract The following was observed in early work on the sand filtration of algal suspensions (1961):

- Three genera of algae (*Scenedesmus*, *Ankistrodesmus*, *Anabaena*) easily penetrated sand filters even at low filtration rates (0.2 to 2gpm/ft²) and using filters containing small media when no chemical pretreatment was used.
- Coagulant addition prior to filtration substantially improved the removal of all algal genera. Chemical pretreatment with a coagulant was found to be essential for effective algal filtration

Recent research (2008) on the microfiltration of three genera of algae (*Scenedesmus*, *Microcystis*, *Asterionella*) and of natural organic matter from the Great Dismal Swamp in Virginia, U.S.A led to the following conclusions:

- Microfiltration could easily remove the algal cells without chemical pretreatment. However, under certain conditions, fouling was extensive. Fouling by the algal cells was relatively small and easily reversible hydraulically. Fouling by exocellular algal organic matter could be extensive and was hydraulically irreversible
- Pretreatment of the algal suspensions with a coagulant removed much the algal organic matter and significantly reduced membrane fouling.

In summary, pretreatment of algal-laden waters with a chemical coagulant was necessary to accomplish algal removal by sand filtration and to control fouling by algal organic matter in microfiltration. Coagulant dose was critical to achieve these results.