Granular Activated Carbon For Water Wastewater Treatment

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HART GAIGE

Considerations Related to Granular Activated Carbon Adsorption Use and Design as a Unit Operation for Water Treatment Springer Science & Business Media

Activated carbon has been used for decades to remove organics from water at large scale in municipal water treatment as well as at small scale in Point of Use (POU) and Point of Entry (POE) water treatment. This study focused on Granular Activated Carbon (GAC) and activated Carbon Block (CB). This thesis has three related elements for organics control in drinking water. First, coagulation chemistry for Alum and Aluminum Chlorohydrate (ACH) was optimized for significant organics removal to address membrane fouling issue at a local municipal water treatment plant in Arizona. Second, Rapid Small Scale Column Tests were conducted for removal of Perfluorinated compounds (PFC). PFC were present in groundwater at a local site in Arizona at trace levels with combined concentration of Perfluorooctaneoic Acid (PFOA) and Perfloorooctanesulfonic Acid (PFOS) up to 245 ng/L. Groundwater from the concerned site is used as drinking water source by a private utility. PFC Removal was

evaluated for different GAC, influent concentrations and particle sizes. Third, a new testing protocol (Mini Carbon Block (MCB)) for bench scale study of POU water treatment device - specifically carbon block filter - was developed and evaluated. The new bench scale decreased the hydraulic requirements by 60 times approximately, which increases the feasibility to test POU at a lab scale. It was evaluated for a common POU organic contaminant: chloroform, and other model contaminants. 10 mg/L of ACH and 30 mg/L of Alum with pH adjustment were determined as optimal coagulant doses. Bituminous coal based GAC was almost three times better than coconut shell based GAC for removing PFC. Multiple tests with MCB suggested no short circuiting and consistent performance for methylene blue though chloroform removal tests underestimated full scale carbon block performance, but all these tests create a good theoretical and practical fundamental for this new approach and provides directions for future researchers.

Simulation of Granular Activated Carbon Columns for Waste Water Treatment John Wiley & Sons

"Many books have been written about granular activated carbon. Some focus on the theory of performance and removal mechanisms

while others focus on design features. This book focuses on solutions. It describes the challenges facing water providers to provide safe water that is acceptable to their customers, utility experiences using activated carbon, activated carbon applications, and design and procurement approaches. The appendices include detailed case studies and a life-cycle assessment demonstrating favorable sustainability considerations for activated carbon when compared to other treatment technologies. Never before has all of this information been together in one location. The what, why, and how of activated carbon are connected in this book and demonstrate why this treatment technology has maintained its status as an integral treatment technology in the quest for pure water over millennia"-- *Granular Activated Carbon Treatment of Lake Washington Water* Springer Science & Business Media Activated CarbonSolutions for Improving Water QualityAmerican Water Works Association **Acid Washing of Granular Activated Carbon and Its Impact on Drinking Water Quality** Routledge Tiivistelmä: Kaksivaiheinen aktiivihiilisuodatus talousveden valmistuksessa. A Background

Activated CarbonSolutions for Improving Water Quality
This monograph provides comprehensive coverage of technologies which integrate adsorption and biological processes in water and wastewater treatment. The authors provide both an introduction to the topic as well as a detailed discussion of theoretical and practical considerations. After a review of the basics involved in the chemistry, biology and technology of integrated adsorption and biological removal, they discuss the setup of pilot- and full-scale treatment facilities, covering powdered as well as granular activated carbon. They elucidate the factors that influence the successful operation of integrated systems. Their discussion on integrated systems expands from the effects of environmental to the removal of various pollutants, to regeneration of activated carbon, and to the analysis of such systems in mathematical terms. The authors conclude with a look at future needs for research and develoment. A truly valuable resource for environmental engineers, environmental and water chemists, as well as professionals working in water and wastewater treatment.
Activated Carbon for Water and Wastewater Treatment CRC Press
The past 30 years have

seen the emergence of a growing desire worldwide to take positive actions to restore and protect the environment from the degrading effects of all forms of pollution: air, noise, solid waste, and water. Because pollution is a direct or indirect consequence of waste, the seemingly idealistic demand for “zero discharge” can be construed as an unrealistic demand for zero waste. However, as long as waste exists, we can only attempt to abate the subsequent pollution by converting it to a less noxious form. Three major questions usually arise when a particular type of pollution has been identified: (1) How serious is the pollution? (2) Is the technology to abate it available? and (3) Do the costs of abatement justify the degree of abatement achieved? The principal intention of the Handbook of Environmental Engineering series is to help readers formulate answers to the last two questions. The traditional approach of applying tried-and-true solutions to specific pollution pr- lems has been a major contributing factor to the success of environmental engineering, and has accounted in large measure for the establishment of a “methodology of pollution c- trol. ” However, realization of the ever-increasing complexity and interrelated nature of current environmental problems makes it

imperative that intelligent planning of pollution abatement systems be undertaken.

Granular Activated Carbon for Removing Nontrihalomethane Organics from Drinking Water American Water Works Association

This multidisciplinary book presents a critical assessment of our knowledge of chemical threats to environmental security, with special reference to prevention of chemical releases, rapid detection, risk assessment and effective management of emergency situations and long-term consequences of chemical releases. The technologies evaluated concern mainly prevention and management of both intentional and accident releases of chemicals into the environment. The book features contributors from a range of relevant scientific fields.

Granular Activated Carbon Management at a Water Treatment Plant Amer Chemical Society

This standard describes the procurement of granular activated carbon (GAC) reactivation services and the use of reactivated GAC for potable water, wastewater, and reclaimed water treatment. This standard does not cover the design of activated carbon handling facilities, reactivation facilities, or adsorption processes. This standard can be

referenced in purchase documents for the reactivation of GAC. The stipulations of this standard apply when this document has been referenced and then only to the reactivation of GAC.

Drinking Water Treatment by Granular Activated Carbon

This research aimed to identify and understand mechanisms thar underlie the beneficial effect of ozonation on removal of pesticides and other micropollutants by Granular Activated Carbon (GAC) filtration. This allows optimization of the combination of these two processes, termed Biological Activated Carbon filtration. The study concluded that ozonation significantly improves removal of atrazine by GAC filtration not only due to the wellknown effect of oxidation of atrazine, but also due to the effect of partical oxidation of Background Organic Matter (BOM) present in water. Ozone-induced oxidation of BOM was found to improve adsorption of atrazine in GAC filters. Biodegradation of atrazine in these filters wasnot demonstrated. Higher GAC's adsorption capacity for atrazine and faster atrazine's mass transfer in filters with ozonated rather than non-ozonated influent were explained as due to ozonated BOM. Both can be attributed to enhanced biodegradability and reduced adsorbsbility of partially ozidated BOM compounds,

resulting in their increased biodegradation and decreased adsorption in GAC filters.

Use of Granular Activated Carbon and Carbon Block Filters at Municipal and Point of Use Drinking Water Treatment for Removal of Organics

This new book presents design, cost, and performance information on the application of GAC in drinking water, including the use of GAC both in the U.S. and overseas. Various design concepts for the unit operations that make up the GAC process are presented in 11 comprehensive, complete chapters, including a special chapter that provides cost equations and comparative cost studies for full scale application of GAC.

Application of Granular Activated Carbon for Water and Wastewater Purification

Bacteria Attached to Granular Activated Carbon Filters in Drinking Water

Activated Carbon

Evaluating Remaining Service Life of Granular Activated Carbon in Drinking Water Applications

Treatment of Water by Granular Activated Carbon

Removal of Organic Contaminants from Drinking Water Using Techniques Other Than Granular Activated Carbon Alone

Progress Report No. 2 : Comparison of Carbon Performances

Granular Activated Carbon Adsorption of Organics from Drinking

Water

An Installation with Onsite Regeneration