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THM PRECURSOR REMOVAL IN RAW WATER BY UP-FLOW PELLETIZATION PROCESS

Miss Pornpimon Limtrakul

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To reduce, trihalomethane (THM) formation in drinking water treatment, the presence of THM precursors in raw water must be minimized. This paper describes pilot scale studies carried out raw waters from Pra-Pa canal to assess the effectiveness of up-flow pelletization in THM precursors removal. The experiments were conducted with different dosages of coagulant (Polyaluminium chloride) and coagulant aid (nonionic polymer). In addition, the effects of number of paddles and up-flow velocity on the performance of the pelletizer were investigated. Process effectiveness was evaluated in terms of effluent turbidity, THM precursors removal and characteristics of pellets. Three parameters were used to quantify THM precursors concentration: total organic carbon (TOC), trihalomethane formation potential (THMFP) and ultraviolet absorbance at 260 nm (UV260). An up-flow velocity of up to 10 m/h, together with lower dosages of PACl and nonionic polymer found to be 5 mg/L and 0.2 mg/L, respectively was shown to be effective in the process. The removal efficiencies up to 43.2% THMFP, 48.6% TOC, 78.9% UV260 and 98.0 % turbidity were obtained. The diameter and settling velocity of pellets created in this study were 0.19-0.33 mm and 19.66-53.96 m/h, respectively

Inter-department Environmental Management Student's signature.....
Field of study Environmental Management Advisor's signature.....
Academic year 2001

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ABBREVATIONS AND SYMBOLS

Al	=	Aluminium
$AlCl_3$	=	Aluminium chloride
Al_2O_3	=	Aluminium oxide
$Al(OH)_3$	=	Aluminium hydroxide
$Al_2(SO_4)_3$	=	Aluminium Sulfate
BAC	=	Biologically activated carbon
Br	=	Bromine
$CaCO_3$	=	Calcium carbonate
$CHCl_3$	=	Chloroform
$CHCl_2Br$	=	Bromodichloromethane
$CHClBr_2$	=	Dibromochloromethane
$CHBr_3$	=	Bromoform
Cl	=	Chlorine
cm	=	Centimeter
°C	=	Degree Celsius
DBPs	=	Disinfection-by products
D/DBP	=	Disinfectants/Disinfection By-Products
DOC	=	Dissolve Organic
EBCT	=	Empty-bed contact time
$FeCl_3$	=	Ferric chloride
GAC	=	Granular activated carbon
h	=	Hour
HAA	=	Haloacetic acid
HAAFP	=	Haloacetic acid Formation Potential
HCl	=	Hydrochloric acid
HOBr	=	Hypobromous acid
H_3PO_4	=	Phosphoric acid
H_2SO_4	=	Sulfuric acid

I	=	Iodine
IARC	=	The International Agency of Research on Cancer
kd	=	Kilodalton
kg/L	=	Kilogram /liter
KHP	=	Potassium hydrogen phthalate
L/mg-m	=	Liter/ milligram-meter
m	=	Meter
m/h	=	Meter/hour
MCL	=	Maximum contaminant level
MCLs	=	Maximum contaminant levels
mg/L	=	Milligram/liter
MF	=	Microfiltration
MWCO	=	Molecular weight cut-off
MWCOs	=	Molecular weights cut-off
µg/L	=	Microgram/liter
µm	=	Micrometer
$Na_2S_2O_8$	=	Sodium Persulfate
Na_2CO_3	=	Sodium carbonate
NF	=	Nanofiltration
NH_3Cl	=	Ammonium chloride
nm	=	Nanometers
NPTOC	=	Non-Purgable Total Organic Carbon
NOM	=	Natural Organic Matter
NTU	=	Nephelometric turbidity unit
PAC	=	Powdered activated carbon
PACl	=	Polyaluminium chloride
ppm	=	Part per Million
rpm	=	Rotation per minute
RO	=	Reverse osmosis
SUVA	=	specific ultraviolet absorbance
THM	=	Trihalomethane
THMFP	=	Trihalomethane formation potential
THMP	=	Trihalomethane precursor

THMs	=	Trihalomethanes
TOC	=	Total organic carbon
TOXFP	=	Total organic halogen formation potential
TTHMP	=	Total trihalomethane precursors
TTHMs	=	Total trihalomethanes
UF	=	Ultrafiltration
USA	=	United States of American
USEPA	=	United States Environmental Protection Agency
USSR	=	Union of Soviet Socialist Republics
UVA	=	Ultraviolet absorbance
UV260	=	Ultraviolet absorbance at 260 nm
WHO	=	World Health Organization
WTPs	=	Water Treatment Plants