

Kenneth Brezinski, PhD, MSc, EIT, CTech, CIT, PMP

Water Treatment Systems Designer

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Work Experience

Instrumentation and Controls Designer

11/24-present

WSP Canada, Vancouver, Canada

- Specified analytical and process instrumentation (pH, ORP, turbidity, residual chlorine, ozone gas analyzers) and integrated sensors into automated PLC/SCADA control loops.
- Conducted pilot and field assessments of water and wastewater treatment performance, correlating analytical data with operational conditions to validate process efficiency.
- Selected and configured materials, pumps, and instrumentation for chemically aggressive or corrosive environments (acidic tailings, oxidants, caustic reagents) that meet NSF certification for water treatment.
- Authored technical reports, Process Control Narratives, and SCADA Masterplans detailing chemical treatment strategies, instrumentation calibration, and safety protocols.
- Collaborated with multidisciplinary teams to ensure chemical dosing, process control, and monitoring systems met environmental and drinking-water regulatory standards.

Systems Designer, Water & Wastewater

05/23-11/24

WSP Canada, Winnipeg, Canada

- Work with the Water & Wastewater Treatment group on water and wastewater solutions for the prairie region of Canada.
- Designed and optimized chemical treatment processes including ozonation, lime neutralization, ion-exchange, and caustic blending systems for municipal and industrial clients.
- Developed mass balance and process flow diagrams (PFDs) linking chemical reactions, dosing rates, and process performance for full-scale design and pilot treatment operations.
- Modeled aqueous equilibria, pH control, and precipitation kinetics using Geochemist Workbench and Aspen HYSYS to evaluate contaminant removal and corrosion potential.
- Authored technical reports and design memoranda summarizing chemical modeling results, treatment performance data, and system optimization recommendations.

Teacher's Assistant

09/16-05/22

University of Manitoba

- Served as Teaching Assistant for undergraduate courses, supporting instruction, grading, and laboratory supervision for the following courses over 20+ appointments:

CHEM 1300 – Chemistry

CHEM 1122 – Introduction to Chemistry Techniques for Engineering 1

CHEM 1126 - Introduction to Chemistry Techniques for Engineering 2

ENG 3000 - Engineering Economics

ECE 3740 - Systems Engineering Principles 1

CIVL 3700 - Environmental Engineering Design

MECH 4860 - Engineering Design

CIVL 3690 - Environmental Engineering Analysis

CIVL 4100 - Engineering Management and the Environment

ENG 2040 - Engineering Communication: Strategies, Practice and Design

ENG 2030 - Engineering Communication: Strategies for the Profession

Research Experience

Investigate ion-exchange as an effective treatment for Trihalomethane and DOC reduction using high performance size exclusion chromatography

University of Manitoba

- Investigated the correlation between trihalomethane formation potential and multi-wavelength absorbance spectra using high-performance size exclusion chromatography
- Collected samples and measured various water quality parameters from 7 Manitoba surface waters of varying levels of TOC, Alkalinity and SUVA; conducted ion-exchange jar tests to compare removal based on resin type and dosage
- Applied numerical methods and statistical analysis using MatLab in order to predict and model the correlation between 3D spectra and trihalomethane formation, TOC and SUVA
- Disseminated the research findings through 2 publications published in peer-reviewed periodicals and master thesis.

Evaluation of a pilot scale Nanofiltration and Ion-Exchange contactor for the Waterhen, Manitoba water treatment plant

University of Manitoba in tandem with KGS Group

- Optimized hydraulic and operational parameters for a custom built nanofiltration and ion-exchange unit for seasonal operations. Included weeklong trips to target site for extended pilot testing lasting several days
- Reduced DOC levels (<0.04mg/L), trihalomethanes (<0.014mg/L) and haloacetic acids (<0.04mg/L) following ion-exchange treatment tested with four resins with several flowthrough rates and regeneration cycles
- Consulted with operators, engineers, and municipal officials to coordinate the needs for all parties towards the implementation of a potential new upgrade
- Submitted a technical report to KGS. Group and to Manitoba Aboriginal and Northern Affairs

Journal Publications

Sadrnourmohamadi, M., **Brezinski, K.**, Gorczyca, B., "Ozonation of natural organic matter and aquatic humic substances: the effects of ozone on the structural characteristics and subsequent trihalomethane formation potential", 2020. *Water Quality Research Journal of Canada*; DOI: <https://doi.org/10.2166/wqrj.2020.011>

Brezinski, K., Gorczyca, B., "An overview of the uses of high-performance size exclusion chromatography (HPSEC) in the characterization of natural organic matter (NOM) in potable water, and ion-exchange applications", 2018. *Chemosphere*; DOI: <https://doi.org/10.1016/j.chemosphere.2018.10.028>

Brezinski, K., Gorczyca, B., "Multi-spectral characterization of natural organic matter (NOM) from Manitoba surface waters using high performance size exclusion chromatography (HPSEC)", 2019. *Chemosphere*; DOI: <https://doi.org/10.1016/j.chemosphere.2019.02.176>

Brezinski, K., Gorczyca, B., "Ion-Exchange for Trihalomethane control in potable water treatment – A municipal water treatment case study in Rainy River, Ontario, Canada", *Water Quality Research Journal of Canada*, 2018. DOI: <https://doi.org/10.2166/wqrj.2018.134>

Winning, L.D., **Brezinski, K.**, Gorczyca, B., "Effect of Total Organic Carbon and Aquatic Humic Substances on the Occurrence of Lead at the Tap", *Water Quality Research Journal of Canada*, 52(10), DOI: [10.2166/wqrj.2017.028](https://doi.org/10.2166/wqrj.2017.028)

Presentations

Brezinski, K., Gorczyca, B., "High-performance size exclusion chromatography (HPSEC) as an indicator for THM formation in ion-exchange applications". Western Canada Water Annual Conference & Exhibition, 2017, SK, Canada.

Brezinski, K., Gorczyca, B., "HPSEC-PDA and the Spectral Slope Parameter as a NOM Propriety Indicator". International Prairie Student Conference, 2016, MB, Canada.

Brezinski, K., Gorczyca, B., "THMs Reduction Feasibility Study for the Town of Rainy River Water Treatment Plant Using Ion Exchange Resins". Western Canada Water Conference, 2015, MB, Canada.

Goss, C., **Brezinski, K.**, Gorczyca, B., "Determination of Extreme Trihalomethane (THM) Concentrations at the Waterhen Water Treatment Plant in Manitoba, Canada". Create H₂O Water Rights Conference, 2015, MB, Canada.

Goss, C., **Brezinski, K.**, Epp, T., Gorczyca, B., "Monitoring the Natural Organic Matter Composition of Lake Winnipegosis Using Solid Phase Extraction". International Prairie Student Conference, 2014, ND, United States.

Technical Skills

Analytical Chemistry

Experienced in laboratory practices, compliance standards, and QA/QC procedures. Skilled in conducting jar tests, sample handling, and classical analyses including titration, filtration, and pH measurement using certified reagents and standards.

Instrumentation

Operational and method development experience with HPLC, GC-MS, FAAS/FAES, GFAAS, FIA, and TOC/TN/TC analyzers using oxidation and combustion methods. Developed analytical procedures for water quality and contaminant characterization.

Field Analysis Techniques

Operational knowledge of UV-Vis spectrophotometry, fluorometry, FTIR, and HACH field instrumentation for rapid chemical and physical water quality testing.

Professional Memberships

ISA	Member , Industrial Society for Automation
EngGeoMB	Engineer In-Training (EIT) , Engineers Geoscientists Manitoba
ASTTBC	Certified Technician (C.Tech.) , Applied Science Technologists & Technicians of BC
CTTAM	Certified Technician (C.Tech.) , Certified Technicians & Tech. Association of MB
PMI	Project Management Professional (PMP) , Project Management Institute
ACPA	Chemist in Training (C.I.T.) , Association of the Chemical Profession of Alberta
WCW	Member , Western Canada Water
WEF	Member , Water Environment Foundation
AWWA	Member , American Water Works Association Member
05/17 – 9/22	Reviewer , Journal of Desalination and Water Treatment
11/17 – 9/22	Reviewer , Journal of Journal of Water Science and Technology

Education

08/18-08-24	Doctor of Philosophy , <i>University of Manitoba</i> , Winnipeg, MB. Electrical and Computer Engineering
01/16-09/18	Master of Science , <i>University of Manitoba</i> , Winnipeg, MB. Civil Engineering
08/10-08/15	Bachelor of Science , <i>University of Winnipeg</i> , Winnipeg, MB. Chemistry