Dr. John Mburu Kiratu

Department of Physical Sciences

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PROFESSIONAL SUMMARY

- Over 8 years of extensive experience in analytical chemistry & green chemistry
- Extensive knowledge of, and experience in chromatographic, and spectroscopic techniques, sample preparation, and characterization
- Experienced in using HPLC, LC/MS, GC/MS, GC/FID, UV-VIS, FTIR, SFE, SPE, SPME, ASE, UHPLC-DAD
- Extensive experience in supercritical fluid extraction
- Extensive experience in design of experiment
- Excellent analytical, scientific and troubleshooting skills
- Strong written, verbal and interpersonal communication skills

ACADEMIC PROFILE

- **PH.D. Analytical Chemistry,** South Dakota State University, Brookings, SD, USA, Spring, 2016

  Dissertation: Environmentally benign extraction processes in analytical separation of essential oils.

  Advisor: Dr. Douglas E. Raynie

- **M.Sc. Analytical Chemistry,** University of Nairobi, Kenya, Sept. 2010

Thesis: Electrochemical and spectroscopic characterization of

Ferrocene-Thiosemicarbazone ligand and copper complexes

Advisors: Prof. Geoffrey Kamau

Prof. Lydia Njenga

Dr. Peterson Guto

- **BSc, CHEMISTRY,** University of Nairobi, Kenya, Sept. 2007

EXPERIENCE

- **May 2017** - to date, **Lecturer,** Physical Sciences Department, University of Embu, Kenya.

- **August 2016 - May 2017**, **Part Time Lecturer**, Egerton University, Main Campus, Technical University of Kenya, Main Campus.

- **2010-May 2016,** Chemistry & Biochemistry Department, South Dakota State University, Brookings, SD, USA.

♦ **Graduate Research Assistant**

- Designed supercritical fluid extraction experiments that can be adopted to teaching undergraduate the application of green chemistry principles
- Utilized supercritical carbon dioxide in extraction of essential oils from plants
- Quantified essential oils using GC-MS and GC-FID
- Quantified resveratrol in wine using HPLC-UV, LC-ELSD, UHPLC-DAD
- Explored solvent and solid phase trapping of volatile and semi volatile compounds after supercritical fluid (CO_2) extraction
- Designed experiment using response surface methodology to screen the interaction and significance of solvent parameters used in trapping volatile and semi-volatile compounds after supercritical (CO_2) extraction

♦ **Graduate Teaching Assistant**

- Taught undergraduate chemistry laboratory classes
  General Chemistry I Laboratory (CHEM 112L)
  General Chemistry II Laboratory (CHEM 114L)
  Organic and Biochemistry Laboratory (CHEM 108L)
  Chemistry Survey Laboratory (CHEM106L)
  Elementary Organic Chemistry Laboratory (CHEM 120L)

Sept. 2007-2010, Chemistry Department, University of Nairobi, Kenya

♦ Graduate Teaching Assistant

- Duties included: Lab Supervision and grading laboratory reports

July-October, 2006, Kenya Industrial Research & Development Institute (K.I.RD.I), Nairobi, Kenya Internship under directorate of industrial training program, July-October, 2006

Techniques Learnt.

- Determination of BOD, COD, oil and grease, total hardness and sulphates in water and waste (effluent),
- Determination of active matter in detergents,
- Determination of peroxide value, refractive index, iodine value, free fatty acids, and melting point in oils and fats.
- Determination of oil content, fiber content, moisture, ash, and protein in food and feeds,
- Determination of sulphur and phosphorus in fertilizers.

SOFTWARE

DOE++, ChemDraw, chemstation, OpenLAB CDS and Chromeleon

HONORS/AWARDS and AFFILIATIONS

- National Science Foundation travel Award to 19th Annual Green Chemistry & Green Engineering Conference, North Bethesda, MD, July, 2015

- Graduate Teaching Certification of Highest Excellence, South Dakota State University center for Enhancement of Teaching and Learning, Brookings, SD, USA, Spring 2015

- Competitive scholarship from ACS to attend the ACS Green Chemistry Summer School, 2012

- Graduate Teaching Assistant Excellence, Department of Chemistry & Biochemistry, South Dakota State University, Brookings, SD, USA, Spring 2012

- Master of Science (M.Sc.) scholarship, University of Nairobi, Kenya, 2007

- American Chemical Society member (ACS)

PRESENTATIONS

- Virtual Chemical Sciences Conference, **March, 2022**, Alternative Environmentally Benign Extraction Solvent: Supercritical Carbon Dioxide
- Machakos University 2nd Annual International Conference, **April 2019**, Machakos, Kenya. *Alternative extraction benign solvent.*
- Pan Africa Chemistry Network Congress, **Nov, 2018**, Nairobi, Kenya (Oral Presentation) *Environmentally Benign Extraction Processes in Analytical Separation of agricultural products*
- The international ESAECC-TCCA Conference, **Sept, 2018**, Mombasa, Kenya (Oral presentation) *Environmentally Benign Extraction Processes in Analytical Separation of Essential Oils.*
- 19th Annual Green Chemistry & Green Engineering Conference, North Bethesda, MD, USA, **2015**, (Poster presentation) *Experimental Design Approach for the Optimization of Extraction and Collection of Volatile Compounds using Supercritical Carbon Dioxide*
- ACS National meeting, Denver, CO, USA, **March, 2015** (Oral presentation) *Title Experimental Design Approach for the Optimization of Extraction and Collection of Volatile Compounds using Supercritical Carbon Dioxide*
- ACS Midwest Regional meeting, in Colombia, MO, USA **November 2014** (Oral presentation) *Trapping of Volatile Compounds after Supercritical fluid*

CO_2 Extraction and Application to Extraction of Essential Oils

- PITTCON conference & exposition on Analytical Chemistry, Chicago Illinois, USA, **March 2014**, (Oral presentation) *Supercritical Carbon Dioxide Extraction of Essential Oil from chrysothamnus nauseous (Rabbit Brush) and rhus aromatic (Skunk Brush)*
- ACS Midwest Regional meeting, **October 2013**, in Springfield, MO, USA, (Oral presentation Title*: Supercritical Carbon Dioxide Extraction of Essential Oil from chrysothamnus nauseous (Rabbit Brush) and rhus aromatic (Skunk Brush)*

WORKSHOPS ATTENDED

- Breaking Bad Chromatography Habits Seminar, Minneapolis, MN. Sponsored by Agilent Technologies, **June 2014**
- Annual Diversity Summit, Rapid City, SD, USA. Sponsored by SD EPSCoR, **Feb. 2014**
- Science: Becoming the Messenger Workshop, Chamberlain, SD, USA. Sponsored by SD EPSCoR, **June 2012**
- ACS Midwest Regional meeting, October 2012, Omaha, NE, USA
- ACS Green Chemistry Summer School, Colorado School of Mines, Golden, CO, USA. **July 2012**
- Life after Graduate School workshop, Chamberlain, SD, USA. Sponsored by SD EPSCoR and ACS, **June 2011**
- ACS Midwest Regional meeting, October 2011, St. Louis, MO, USA
- 32nd Minnesota Chromatography Forum Spring Symposium, Minneapolis, MN, USA. **May 2011**
- Adding Value Through Green Chemistry, Minneapolis, MN, USA. **Jan. 2011**
- Green Chemistry Conference on Sustainability, Sioux Falls, SD, USA. **Sept. 2010**

Publications:

- George S. Nyamato, Kelvin Wambugu, **John Kiratu,** Stephen O. Ojwach; Liquid-liquid extraction of copper(II), zinc(II), cadmium(II), and lead(II) from aqueous solution and sewage effluent using phenoxy-amino ligands. *Water Sci Technol* **2022;**
- S Sayo, **JM Kiratu**, GS Nyamato. Heavy metal concentrations in soil and vegetables irrigated with sewage effluent: A case study of Embu sewage treatment plant, Kenya. - Scientific African, **2020** – *Elsevier*.
- FK Migwi, JA Ogunah, **JM Kiratu**. Occurrence and spatial distribution of microplastics in the surface waters of Lake Naivasha, Kenya. - Toxicology and chemistry, **2020** - Wiley Online Library.
- Ogunah, J., Migwi, F., & **Kiratu, J**. (**2020, January**). Are Kenyan Fresh Water Lakes Safe? First evidence of microplastic pollution in L. Naivasha. In *13TH INTERNATIONAL CONFERENCE*.
- **Kiratu, John**. *Environmentally benign extraction processes in analytical separation of essential oils*. South Dakota State University, **2016** (Doctoral dissertation)
- Huang, Y., Wei, L., Zhao, X., Julson, J., Qiu, C., Dharmarajan, S., **Kiratu, J**., Raynie, D., Dubey, A. and Qiao, Q**., 2016.** Biofuel production using Pd/Zn synergistically catalyzed hydrodeoxygenation applied at bio oil extracted in biomass pyrolysis process. *International Journal of Energy Research*, *40*(12), pp.1724-1730.
- **Kiratu, J.;** Raynie D.; *Aiding the Development of Extraction Procedures with Response Surface Methodology*. LCGC North America (July, **2015**) Volume 33, Issue 7, pg. 454–463
- Shouyun Cheng 1 , Lin Wei 1,*, Xianhui Zhao [1] , Yinbin Huang [1] , Douglas Raynie [2] , Changling Qiu [2] , **John Kiratu [2]** , and Yong Yu [3]; *Directly catalytic upgrading bio-oil vapor produced by prairie cordgrass pyrolysis over Ni/HZSM-5 using a two stage reactor*. AIMS Energy, **2015**, 3(2): 227-240.

- **J. M. Kiratu**, P. M. Nguto, G. N. Kamau L.S, Daniel, EMR Kiremire, K. Kambafwile, K. Chibale, P.J. Rosenthal. *Cyclic voltammetry electrochemical studies of Thiosemicarbazone and Semicarbazone ligands derieved Ferrocene and Pyridyl fragments.* International Journal of Biochemiphysics, (2011) 19,47-55.
- Guto, P. M., **J. M. Kiratu,** L. S. Daniel, E. M. R. Kiremire, and G. N. Kamau. "electron transfer properties of 2-acetylferrocenyl-2-thiophenecarboxylsemicarbazone and its copper (ii) complex." *Tapping Nuclear Energy for peaceful purpose* **(2011):** 47.
- L.S. Daniel, EMR Kiremire, K. Kambafwile, K. Chibale, P.J. Rosenthal, **J. M. Kiratu**, P. M. Nguto, G. N. Kamau. *The FT-IR and malarial biological*

studies of copper (II) complexes containing Thiosemicarbazone and semicarbarzone ligands derived from Ferrocene and Pyridyl fragments. International Journal of Biochemiphysics, (2010) 18 (1), 8-19