

Muhammad Arshad Khosa (PhD, P. Chem, PMP)

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Highlights

- PhD in **physical chemistry** with research specialization in separation of heavy metal ions and colored organic dyes from water using surfactants & polymer (Adsorption Phenomenon)
- Two (2) years' postdoctoral experience from the department of AFNS, University of Alberta
- Six months research experience of Research Assistant (RA) at AFNS, University of Alberta
- Three-year industrial experience in water treatment chemicals and ion-exchanged water treatment plant
- Ten years (10) experienced in research, production and manufacturing of chemicals
- Ability of processing and utility of chemical products
- Experienced in surfactant and polymer product handling and solution preparation
- Project management Professional (PMP) credential holder
- Ten years' overseas experience of teaching chemistry to undergraduate students
- One-year training of Project Management Certification (PMC) from NAIT
- Experienced in quality assurance or control of experimental designing
- Experienced in development of test methods to evaluate emulsion breakers and de-oiling chemicals
- Setting up and maintaining the research laboratory, including MSDS and chemical inventory
- Supporting the product development activities in mobile lab and fixed lab
- Preparing technical recommendation reports after each project is significantly advanced or completed
- WHIMS and First Aid Training completed along with Class 2 professional driving license
- Ability to manage budgets on research projects while spending in-line with conditions of the grants

Education

1. Postdoc (2 years)

Department of Agriculture, Food & Nutritional Sciences, University of Alberta, Canada (2012-2014)

2. PhD (Physical Chemistry)

Split Program (a) Chemistry Department, Quaid-i-Azam University Islamabad, Pakistan (2007-2010)

(b) Chemical Engineering Department, University of Waterloo, Canada (2010-2011)

3. Masters (Physical Chemistry)

(a) M.Sc (2 years) Chemistry Department BZU, Multan, Pakistan (1993-1995)

(b) M.Phil (2 years) Chemistry Department BZU, Multan Pakistan (2003-2005)

Dissertation

PhD Separation of Heavy Metals and Dyes from Aqueous Solution by Biopolymer and Surfactant Supported Ultrafiltration

Master Assessment of Quality Parameters in Groundwater of D.G. Khan (City)

Research Training and Projects

- **Research Assistant (RA) Department of AFNS, University of Alberta, Canada** (2015-2016)
(Research Group of Dr. Aman Ullah: <https://sites.ualberta.ca/~ullah2/>)

Project I: Removal of Naphthenic Acids (NAs) from Oil Sand Process Affected Water (OSPW)

Outline of Research Work:

- Sampling and testing of oil sand process affected water (OSPW)
- Processed chicken feathers to use them as biosorbent for removing NAs
- FTIR technique was employed for quantitative measurement of NAs
- Modification of Keratin (powdered chicken feather) was carried out
- Biosorption and isotherm study was made to interpret experimental data

Contribution and Achievements:

- Skilled in characterization techniques like FTIR, UV-Vis, NMR and XPS

- Wrote a manuscript and got it published in refereed journal Chemosphere
- Wrote a project for funding competition under the guideline of supervisor
- Wrote a review paper on this study.
- Trained lab staff on quality assurance and quality control

- **Postdoctoral Fellow (PDF) Department of AFNS, University of Alberta, Canada (2012-2014)**
(Research Group of Dr. Aman Ullah: <https://sites.ualberta.ca/~ullah2/>)

Project II: Preparation of novel arsenic removal filters using chicken feathers as biosorbent

Outline of Research Work:

- Processed, modified and applied raw chicken feathers as biosorbent
- Designed research experiments, analyzed and interpreted research data
- Modified and characterized biosorbent by SEM, FTIR, XRD, DSC, TGA, ¹³CNMR
- Determined arsenic (As) and competing metal ions concentration by ICP-MS
- Studied thermodynamics, kinetics and Isotherm models of adsorption
- Applied modified biosorbent in arsenic removal filter

Contribution and Achievements:

- Designed and mechanized arsenic removal filter for water purification
- Trained graduate students in research group
- Wrote articles of research findings and managed lab/inventory work
- Published papers in Journal of hazardous materials, Journal of RCS Advances
- Wrote a review paper for journal of food processing beverages

Project III: Extraction and Modification of Protein for the Preparation of Bio-adhesive

Outline of Research Work:

- Extraction of protein from soybean, spent hen and canola by pH control
- Chemical modification of extracted protein by organic reactions
- Synthesis, cross-linking, bio-conjugation of protein products
- Application of modified protein in preparation of bioadhesives
- Measurement of adhesion strength wood veneers by ASTM method
- Application of Automated Bonding Evaluation System (ABES-II) for the measurement of adhesive strength
- Characterization of wood adhesive by FTIR, NMR, TGA and DSC analysis

Contribution and Achievements:

- Learned and skilled on Automated Bonding Evaluation System (ABES-II) instrument.
- Wrote project proposal for industrial funding under the guideline of supervisor
- Trained lab staff and gave presentations in conferences.
- Wrote a review article on bio-adhesives using modified protein products.

- **PhD (Part I) Course Work&Research at Chemistry Dept. QAU Islamabad, Pakistan (2007-2010)**
(Supervisor Dr Syed Sakhawat Shah: <https://scholar.google.co.uk/citations?user=02kj9foAAAAJ>)

Dissertation (Part- I): Separation of dyes from H₂O by surfactant supported ultrafiltration

Outline of Academic and Research Work:

- Studied courses of Colloid & Surfactant, Molecular Spectroscopy, Nuclear Chemistry, Polymer Chemistry, Statistical Mechanics, Biophysical Chemistry and gave seminar.
- Prepared surfactant solutions and determined their CMC by conductivity method
- Studied rejection efficiency of different surfactants in ultrafiltration of organic dyes
- Gave spectroscopic evidence by UV-Visible spectra of dyes
- Compared UV-spectra of different organic colored dyes before and after their removal
- Determined & compared physical parameters rejection percentage and permeate flux

- Removed selective metals and dye simultaneously by micellar enhanced ultrafiltration

Contribution and Achievements:

- Passed PhD course work of 18 credit hours with **3.60 GPA**
- Wrote and published **five (5)** papers in refereed journals such as Colloids and dispersion Sciences, Journal of surfactants and detergents, separation science and technology from the finding of this study.
- Wrote a review article entitled “Microemulsion in Enhanced Oil Recovery” in the journal of petroleum science and technology.
- Wrote a project for research funding from Pakistan Science Foundation (PSF)

- **PhD (Part II) Research at Engineering Department, University of Waterloo, Canada (2010- 2011)**
(Research group of Dr. Xianshe Feng <https://uwaterloo.ca/chemical-engineering/profile/xfeng>)

Dissertation (Part-II): Separation of heavy metals from H₂O by biopolymer Ultrafiltration

Outline of Research Work:

- Studied chemistry of biopolymer, phase and polyethersulfone membrane separation
- Processed and applied biopolymer sericin for removal of heavy metal ions
- Studied physical parameters such as rejection percentage and permeate flux,
- Discussed thermodynamic aspect of separation of two phases
- Performed ultrafiltration of heavy metal ions and compared rejection data of all metals
- Determined heavy metal concentration by ICP-MS

Contribution and Achievements:

- Learned and skilled on Ultrafiltration cell , Tensiometer, viscometer and ICP-MS
- Wrote article in journal of separation science and technology from finding of this study
- Wrote article in Journal of membrane Science from the finding of this study
- Wrote article in Chemical Engineering Journal from the finding of this study

- **Master (M.Phil.) Research at Chemistry Department B.Z.University Multan, Pakistan (2003-2005)**
(Supervisor Dr. Muhammad Aslam Malana)

Dissertation: Assessment of Water Quality Parameters of Groundwater in D.G.Khan (city)

Outline of Academic and Research Work:

- Studied course work of 24 credit hours and gave seminar
- Carried out groundwater sampling of 100 sites in D.G.Khan City- Pakistan
- Preserved and performed qualitative analysis of water samples
- Assessed physical, chemical and microbiological quality parameters of groundwater

Contribution and Achievements:

- Passed course work of 24 credit hours with **3.63 GPA** and pursued for research
- Figured out reasons of high concentration of quality parameters of water & gave practical suggestions for mitigation
- Wrote an article in Journal of Saudi Chemical Society from this dissertation.

Awards

- A Research Support Funded Project of Pakistan Science Foundation (PSF), Pakistan (2009)
- IRSIP Scholarship of HEC, Pakistan (2010)

I. Journal Articles

1. Shruti Sarode, Punita Upadhyay, **MA Khosa**, Tony Mak, Abdus Shakir Sandra Song, and Aman Ullah (2018) "Overview of wastewater treatment methods with special focus on biopolymer chitin-chitosan" "*International Journal of Biological macromolecules*" **IF= (3.9)** (Accepted and in Press).
2. **Khosa MA** and Ullah A (2018) "Mechanistic insight into protein supported biosorption complemented by kinetic and thermodynamic perspectives" *Advances in colloid and interface science* **IF= (7.3)** (Accepted and In Press).
3. Arshad M, **Khosa MA**, Siddique T, Ullah A (2016) "Modified biopolymers as sorbents for the removal of naphthenic acids from oil sands process affected water (OSPW)" *Chemosphere*, 163: 334-341. **(IF=4.4)**
4. **Khosa MA**, Shah SS, Feng X (2014) "Thermodynamic functions of metal-sericin complexation in ultrafiltration study" *Journal of Membrane Science*, 470: 1-8. **(IF=6.6)**
5. **Khosa MA** and Ullah A (2014) "In-situ modification, regeneration, and application of keratin biopolymer for arsenic removal" *Journal of Hazardous Materials*, 278: 360-371. **(IF=6.4)**
6. **Khosa MA**, Shah SS and Feng X (2014) "Metal sericin complexation and ultrafiltration of heavy metals from aqueous solution" *Chemical Engineering Journal*, 244: 446-456. **(IF=6.7)**
7. **Khosa MA** and Ullah A (2013) "A Sustainable Role of Keratin Biopolymer in Green Chemistry: A Review" *Journal of Food Processing Beverages*, 1: (1) 8. **(IF=0.15)**
8. **Khosa MA**, Wu JP and Ullah A (2013) "Chemical Modification, Characterization and Application of Chicken Feathers as Novel Biosorbent" *RSC Advances*, 3: 20800-20810. **(IF=3.1)**
9. **Khosa MA**, Shah SS and Feng X (2012) Micellar Enhanced Ultrafiltration of Organic Dyes. *Separation Science and Technology*, 48: 1315-1323. **(IF=1.2)**
10. Mehmood RF, Mehmood F, Akhtar J, Shah SS and **Khosa MA** (2013) Adsorption of Cd ions by Sol-Gel Silica doped with *N*-(dipropylcarbamothioyl) thiophene-2-carboxamide" *J. Dispersion Science and Technology*, 34:153-160. **(IF=1.5)**
11. **Khosa, MA**, Shah SS and Nazar MF (2011) UV-Visible Spectrometric study and Micellar Enhanced Ultrafiltration of Alizarin Red S Dye. *Journal of Dispersion Science and Technology*, 32: 1-7. **(IF=1.5)**
12. **Khosa MA** and Shah SS (2011) Micellar enhanced ultrafiltration of Reactive Black-5 from aqueous solution by cationic surfactants, *Journal of Dispersion Science and Technology*, 32: 1002-1007. **(IF=1.5)**
13. Raheel M, Shah SS and **Khosa, MA** (2011) Thermodynamics of surfactant micellization in presence of benzamide derivatives, *Journal of Dispersion Science and Technol.*, 32 (4): 507-511. **(IF=1.5)**
14. **Khosa MA**, Shah SS and Nazar MF (2011) Application of micellar enhanced ultrafiltration methylene blue from aqueous solution. *Journal of Dispersion Science and Technology*, 32: 1002-1007. **(IF=1.5)**
15. Nazar MF, Shah SS and **Khosa MA** (2011) Microemulsion in Enhanced Oil Recovery: A review. *Petroleum Science and Technology*, 29, (13): 1353-1365. **(IF=0.98)**
16. **Khosa MA** and Malana MA (2011) Groundwater Pollution with special focus on arsenic, Dera Ghazi Khan- Pakistan. *Journal of Saudi Chemical Society*, 15 (01): 39-47. **(IF=2.45)**
17. Nazar MF, Shah SS and **Khosa MA** (2010) Interaction of Azo Dye with Cationic Surfactant under Different pH Conditions. *Journal of Surfactant and Detergents*, 13, (4): 529-537. **(IF=1.71)**

II. Book

1. **Khosa MA** (2012) Polymer and Surfactant Supported Ultrafiltration- Water Purification, Lambert Academic Publishing (LAP), Germany.

III. Conference Proceedings/Presentations

- 1 **Khosa MA** and Aman Ullah (2013) "Novel poultry feather filter for arsenic contaminated water" *Poultry Research Center (PRC) Annual Meeting* University of Alberta, Edmonton AB, Canada, May 28-29, 2013
- 2 **Khosa MA** and Shah SS (2012) "Thermodynamics Insight into Surfactant Supported Ultrafiltration of Wastewater" 37- 118, *19th International Symposium on Surfactants In Solution (SIS)-CONFERENCE*, University of Alberta, Edmonton AB, Canada, June 24 – 28, 2012
- 3 **Khosa MA** (2012) participated in "Symposium on Hydrogen and Fuel Cell" Quaid-i-Azam University, Islamabad, Pakistan, July 9-11, 2012

- 4 **Khosa MA**, Shah S and Feng X (2011) "Removal of heavy metals from aqueous solutions by sericin-enhanced ultrafiltration" 21st Annual North American Membrane Society Meeting, LasVegas, NV, June 4-8, 2011
- 5 **Khosa MA** (2010) "Removal of inorganic and organic pollutants from water by MEUF" 8th International and 18th national chemistry conference, Chemistry Department, Quaid-i-Azam University-Islamabad, Pakistan, Feb.17-20, 2010

IV. Referee of (reviewed) Articles

1. Manuscript ID: ie2010-02424v, ACS Journal of Industrial and Engineering Chemistry Research
2. Manuscript ID: HAZMAT-D-13-01092, Elsevier Journal of Hazardous Materials
3. Manuscript ID: JECE-D-14-00354, Elsevier Journal of Environmental Chemical Engineering
4. Manuscript ID: SAA-D-14-00754, Elsevier Journal Spectrochimica Acta Part A

Teaching Interests in the Courses

Colloid and Surfactants, Surface Chemistry, Polymer Chemistry, Solution Chemistry, Advanced Materials, Solid State, Bio-Physical Chemistry, Electrochemistry, Molecular Spectroscopy, Nuclear Chemistry, Chemical Kinetics, Chemical and statistical thermodynamics

Professional Experience

- **Academic** **1) Senior Lecturer in Chemistry at Ghazi University, Pakistan** **(2016-2018)**
 - Taught general chemistry to BS (4 years) students
 - Taught spectroscopy to master chemistry students
 - Taught colloid and surfactants master chemistry students
 - Taught thermodynamics and chemical kinetics to master students
 - Taught polymer chemistry to master students
 - Did research and lab work with master students
 - Supervised master students for completing their thesis

- 2) Chemistry Lecturer at Government College D.G. Khan, Pakistan** **(1997-2007)**
 - Taught under-graduation courses of physical, inorganic and organic chemistry
 - Conducted lab experiments and held discussion groups of students
 - Maintained and calibrated instruments used in terminal examination
 - Prepared, graded and marked class assessment tests
 - Conducted college and university practical examination on under-graduation level
 - Purchased laboratory glassware and instruments on behalf of chemistry department
 - Counseled students on course, research, academic and career decisions
 - Participated in teacher training courses on district and provincial level
 - Gave concrete ideas and views for curriculum planning and syllabi improvements

- **Industrial** **Chemist at Water and Power Development Authority, Pakistan** **(1995-1997)**
 - Worked at water treatment plant based on ion-exchange removal technique
 - Operated hydrogen plant for producing hydrogen and oxygen by electrolysis
 - Conducted laboratory tests for the assessment of water, steam and oil
 - Employed analytical techniques such as UV-spectrophotometer, atomic absorption, and Thin Layer chromatography (TLC) instruments at Thermal Power Station
 - Worked in oil testing laboratory for measurement of viscosity, flash point, fire point of oil
 - Supervising role of demineralization plant and desalination plant

Professional Regulation/Membership/Degree Equivalence

- **Professional Chemist (P. Chem.) (Membership #M0842)** regulated by **Association of the Chemical Profession of Alberta (ACPA)**
- **Project Management Professional (PMP) (Membership #4027686)** regulated by **Project Management Institute (PMI), USA.**
- All educational degrees/transcripts recognized /assessed by **IQAS** for equivalence in Canadian institutes

Skills

- **Management**

- Project Management Professional (PMP) credential holder (2015)
- Project Management Certification (PMC) from NAIT (2015)
- Project Leadership certification from NAIT (2014)
- Project management of cost, time, scope, human resources, and procurement management
- Experience of technical writing of project proposals/grants, budget preparation
- Software application of MS-Project 2010 and Primavera Pro 6 for project writing

- **Computer:**

- Computer skills in MS-Word, MS- Excel spread sheet, Power Point with 50-60 WPM typing speed
- Chem Draw, Origin 9.0, SPSS and EndNote applications for data interpretation and graphics

- **Driving**

- Holding Alberta **Class-2** professional license with air brake and school bus endorsement (Q, S)

- **Languages**

- English, Urdu and Punjabi with high speaking and writing proficiency

Hobbies

- Internet browsing, listening to music, travelling, driving, walking and chatting on social media
- Reading books/articles related to science fictions, discoveries and international politics

References

Available on request

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