Dr. Muhammad Adnan Ayub

Ph.D. Chemistry
Specialization: Analytical Chemistry
Lecturer
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Gender Male | Date of Birth 15-Feb-1987 | Nationality Pakistani

Personal Statement

Self-motivated, reliable and forward thinking professional with demonstrated success in previous organizations. A proactive and collaborative multi-task team player skilled with excellent communication, decision making and interpersonal aptitude, ability to build rapport with the team and creative to ensure positive outcomes.

Education

Doctor of Philosophy (PhD) – Chemistry Sep 2012 - Feb 2018
Specialization Analytical Chemistry
Institute University of Agriculture Faisalabad, Pakistan
Thesis Bioactivity guided isolation of anticancer compounds from oleoresins of *Boswellia* and *Pinus* species.
Marks 74.54 % CGPA 3.56/4.00

Master of Philosophy (M.Phil) – Chemistry Sep 2009 - Sep 2011
Specialization Analytical Chemistry
Institute Government College University Faisalabad, Pakistan
Thesis Characterization and biological potential of different extracts and essential oils from two *Tagetes* Species.
Marks 78.12 % CGPA 3.48/4.00

Master of Science (M.Sc) – Chemistry Sep 2007 – Sep 2009
Specialization Analytical Chemistry
Institute University of Agriculture Faisalabad, Pakistan
Thesis *Trans* contents in vegetable ghee marketed in Punjab.
Marks 72.41 % CGPA 3.40/4.00

Bachelor of Science (B.Sc) – Chemistry, Zoology, Geography Sep 2005 – Aug 2007
University Government College University Faisalabad, Pakistan
Marks 523/800 Percentage 65 %

Higher Secondary School Certificate (F.Sc) – Pre-medical Aug 2003 – Aug 2005
Institute Board of Intermediate and Secondary Education Faisalabad.
Marks 562/1100 Percentage 51 %

Secondary School Certificate (Matric) – Science Mar 2001 – Mar 2003
Institute Board of Intermediate and Secondary Education Faisalabad.
Marks 527/850 Percentage 62 %

Experience

Teaching Experience Mar 2020 – Continue
Position Lecturer
Institute University of Sahiwal, Pakistan
Responsibility Teaching chemistry subjects to BS Chemistry, Zoology and Botany students. Supervise and assist students in laboratory experiments.

Teaching Experience Feb 2019 – Feb-2020
Position Assistant Professor (IPFP)
Institute University of Okara, Pakistan
Responsibility Teaching chemistry subjects to BS Chemistry, Zoology and Botany students. Supervise and assist students in laboratory experiments.

Teaching Experience Oct 2018 – Feb 2019
Position Assistant Professor (Visiting)
Institute University of Okara, Pakistan
Responsibility Teaching chemistry subjects to BS Chemistry, Zoology and Botany students. Supervise and assist students in laboratory experiments.

Teaching Experience Mar 2018 – Oct 2018
Position Assistant Professor
Institute Radiant College Nankana Sahib, Pakistan
Responsibility Teaching chemistry subjects to BS Chemistry, Zoology and Physics students. Supervise and assist students in laboratory experiments.

Research Experience Mar 2017 – Sep 2017
Position Researcher
Institute The University of Queensland, Australia.
Supervisor Dr. Joanne Blanchfield
Responsibility Isolation of triterpene resin acids from *Boswellia serrata* oleogum resin by using state of art chromatographic techniques such as flash chromatography and semi preparative-reverse phase HPLC and their characterization through LC-MS and NMR.

Research Experience Sep 2012 – Feb2018
Position Researcher
Institute University of Agriculture Faisalabad, Pakistan.
Supervisor Dr. Muhammad Asif Hanif
Responsibility Optimize the extraction conditions for isolation of essential oil from oleoresins of *Boswellia* and *Pinus* species by using hydro, steam and supercritical fluid extraction.

Separation, purification and characterization of pure compounds from essential oil by using vacuum fractional distillation, column charomatrography, HPLC, GC-MS and NMR.
Evaluation of biological potential (*in vitro* antioxidant, antimicrobial and antitumor activities) of essential oils, fractions and pure compounds.

Teaching Experience — Sep 2014 – Sep 2015
Position: Lecturer (Chemistry)
Institute: Punjab College of Science Faisalabad, Pakistan.
Responsibility: Teaching chemistry subjects to O-level & A-level students.
Supervise and assist students in laboratory experiments.

Teaching Experience — Sep 2013 – Mar 2014
Position: Teacher assistant
Institute: University of Agriculture Faisalabad, Pakistan.
Responsibility: Teaching chemistry subjects to undergraduate students and guiding postgraduate students in research.

Research Experience — Sep 2010 – Aug 2011
Position: Researcher
Institute: Government College University Faisalabad, Pakistan.
Supervisor: Dr. Abdullah Ijaz Hussain.
Responsibility: Preparation of different solvent extracts of *Tagetes erecta* and *Tagetes Patula* species and determined their biological potential though different *in vitro* antioxidant and antimicrobial assays.

Teaching Experience — Mar 2010 – Mar 2011
Position: Lecturer/Lecturer Internee
Institute: Government Islamia College for Boys, Faisalabad, Pakistan.
Responsibility: Teaching chemistry subjects to undergraduate and graduate students.

Research Experience — Sep 2008 – Aug 2009
Position: Researcher
Institute: University of Agriculture Faisalabad, Pakistan.
Supervisor: Dr. Farooq Anwar.
Responsibility: Determination of *Trans* contents in hydrogenated vegetable oil, margarine, cheese and butter marketed in Punjab, Pakistan through FTIR and GC-FID.

Courses Taught

Course Title	Credit Hours
Analytical Chemistry-I	(2-1)
Analytical Chemistry-II	(3-1)
Advanced Separation techniques	(3-0)
Atomic Spectroscopy	(3-0)
Inorganic Chemistry-I	(2-1)
Inorganic Chemistry-II	(3-1)
Physical Chemistry-I	(2-1)
Biochemistry-I	(2-1)

Technical and Instrumental Skills

I hold the expertise to run various state of the art chromatographic techniques independently. Some of the sophisticated instruments I can operate, are listed below.

- Gas Chromatography (GC-FID).
- Gas Chromatography-Mass Spectrometry (GC-MS).
- Liquid Chromatography-Mass Spectrometry (LC-MS).
- Analytical, Semi Preparative, Normal and Reverse Phase-High Performance Liquid Chromatography (NP-HPLC & RP-HPLC).
- Column Chromatography (CC).
- Flash Chromatography (FC).
- Gel Electrophoresis.
- Microtitre Plate Reader.
- Atomic Absorption Spectrophotometer (AAS).
- Analytical and Pilot scale Hydro, Steam, Microwave assisted distillation extractor.
- Pilot scale Supercritical Fluid CO_2 Extractor

Research Interests

- **Isolation of pure compounds from plant materials:** I believe that I am reasonably efficient in the processes of extraction, fractionation and isolation of pure compounds from plant materials. During the course of my PhD research work, I achieved expertise in hydro distillation, steam distillation, microwave assisted extraction, solvent extraction, soxhlet extraction, sub-critical and supercritical fluid extraction for extraction of volatile (essential oils) and non-volatile from plant materials. I further employed column chromatography, flash chromatography, vacuum fractional distillation and HPLC for fractionation and isolation of pure compounds. Moreover, the specialization in by GC-MS, LC-MS and NMR was also obtained through the characterization and structure elucidation of volatile and non-volatile extracts and pure compounds.
- **Optimization of extraction for essential oil:** The optimization of extraction conditions and extraction methods plays pivotal role in the better quality and quantity of aroma oil as cost and quality of aroma are the key parameters in perfume industry. I feel pleased to mention here that I have loads of experience in optimizing the extraction parameters for extraction of essential oil from oleogum resins, leaves, seeds oleoresins and stems through hydro distillation, steam distillation, sub-critical and supercritical fluid extraction methods.

- **Role of micronutrients on yield and chemical composition of essential oil**: There are many factors that affect the chemical composition and yield of essential oil such as season, extraction methods, geological conditions, plant genotype and soil type. I have studied in detail the effects of micronutrients on the essential oil yield, plant growth and chemical composition of basil. It has been observed that Zn and Cu concentrations significantly enhance the essential oil yield, plant growth and limonene concentration in basil plant.
- **Isolation of pure crystal compounds:** Essential oils are the mixture of volatile aromatic compounds that can be separated on the basis of their boiling points. During my PhD research work, I have isolated menthol and thymol crystals from two different essential oils by freezing method**.**
- ***Trans* contents in hydrogenated vegetable oils/fats and related products:** During my Masters' degree, I have worked on determination of fatty acid profile and *Trans* contents in hydrogenated vegetable oils, margarines, cheeses and butters marketed in Punjab by FTIR and GC-FID.
- **Biological activities:** I also have expertise in various biological activities such as in vitro antibacterial and antifungal activity (Disc diffusion assay, Microdilution broth susceptibility assay, Resazurin microtiter plate assay) antioxidant activity (DPPH assay, ABTS assay, Ferric reducing antioxidant power assay, Percentage inhibition in linoleic acid system, Hydrogen peroxide scavenging activity) and antitumor activity (Crown gall tumor inhibition assay).

Publications (Research Articles and Book Chapters)

1. **Muhammad Adnan Ayub**, Muhammad Asif Hanif, Muhammad Shahid, Raja Adil Sarfraz**.** Biological activity of *Boswellia serrata* Roxb. oleo gum resin essential oil: Effects of extraction by supercritical carbon dioxide and traditional methods**.** International Journal of Food Properties. 21 (2018) 808-820.
2. **Muhammad Adnan Ayub**, Abdullah Ijaz Hussain, Muhammad Asif Hanif, Shahzad Ali Shahid Chatha, Ghulam Mustafa Kamal, Muhammad Shahid and Omar Janneh. Variation in Phenolic Profile, b-Carotene and Flavonoid Contents, Biological Activities of Two Tagetes Species from Pakistani Flora. Chemistry and Biodiversity. 14:6 (2017) 1-8.
3. Haq Nawaz, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Faiqa Ishtiaq, Nazish Kanwal, N. Rashid, M. Saleem. Raman spectroscopy for the evaluation of the effects of Cu on the chemical composition and biological activity of basil essential oil. Spectraochimica Acta Part A; Molecular and Biomolecular spectroscopy, 185 (2017) 130-138.
4. **Muhammad Adnan Ayub**, Muhammad Asif Hanif, Muhammad Shahid, Raja Adil Sarfraz, Effects of extraction temperatures on essential oil yield, antioxidant and

antibacterial activity of *Boswellia serrata* roxb. oleogum resin. Oxidation Communication. 3 (2017) 1081-1095**.**

5. Muhammad Asif Hanif, Haq Nawaz, **Muhammad Adnan Ayub**, Nayla Tabassuma, Nazish Kanwal, Nosheen Rashid, Muhammad Saleem, Mushtaq Ahmad. Evaluation of the effects of Zinc on the chemical composition and biological activity of basil essential oil by using Raman spectroscopy. Industrial Crops and Products, 96 (2017) 91–101.
6. Muhammad Asif Javaid, Sofia Nosheen, **Muhammad Adnan Ayub**, Majid Mustafa, Adil Naseer, Amer Iqbal and Waheed Arshad. Optimization of Operational Conditions for Maximum Biodecolorization of Orange C2RL Dye. Journal of Bioremediation & Biodegradation, 2016, 7,1-8.
7. Efstratios Efstratiou , Abdullah I. Hussain , Poonam S. Nigam , John E. Moore, **Muhammad A. Ayub**, Juluri R. Rao **(2012).** Antimicrobial activity of Calendula officinalis petal extracts against fungi, as well as Gram-negative and Gram-positive clinical pathogens. Complementary Therapies in Clinical Practice, 18 (3):173-176.
8. Asthma weed: Bazgha Ijaz, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Asma Hanif. Medicinal Plants of South Asia: Novel Sources for Drug Discovery, 2020: 13-27. Elsvier.
9. Bay leaf: Saima Batool, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub.** Medicinal Plants of South Asia: Novel Sources for Drug Discovery, 2020: 63-73. Elsvier.
10. Chamomilla: Shaheera Rehmat, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Muhammad Zubair. Medicinal Plants of South Asia: Novel Sources for Drug Discovery, 2020: 101-112. Elsvier.
11. Chili pepper: Saba Idrees, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Asma Hanif and Tariq Mahmood Ansari. Medicinal Plants of South Asia: Novel Sources for Drug Discovery,2020: 113-124. Elsvier.
12. Cubeb: Hafsa Ahmad**,** Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub**. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:149-164.Elsvier.
13. Cumin: Zarghouna Chaudhry, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub**. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:165-178.Elsvier.
14. Curry leaf: Saima Batool, Rasheed Ahmad Khera, Muhammad Asif Hanif**, Muhammad Adnan Ayub,** Shahabuddin Memon. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:179-190.Elsvier.
15. Datura: Muhammad Saboor Nayyar, Muhammad Asif Hanif*, Muhammad Irfan Mjaeed, **Muhammad Adnan Ayub**, Rafia Rehman. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:207-216.Elsvier.

16. Demask rose: Fariha Shabbir, Muhammad Asif Hanif and **Muhammad Adnan Ayub**, Muhammad Idrees Jilani, Shafiqur Rahman. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:217-230.Elsvier.
17. Dill: Muhammad Mubeen Mohsin, Muhammad Asif Hanif, **M. Adnan Ayub**, Ijaz Ahmad Bhatti, Muhammad Idrees Jilani. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:231-239.Elsvier.
18. Fennel: Rafia Javed, Muhammad Asif Hanif, **Muhammad Adnan Ayub,** Rafia Rehman. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020:241-256. Elsvier.
19. Fenugreek: Sidra Sarwar, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Yaw Duah Boakye, Christian Agyare. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020: 257-271. Elsvier.
20. Frangipani: Saba idrees, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Muhammad Idrees Jilani, Najma Memon. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 287-300, Elsvier.
21. Ginseng: Muhammad Mubeen Mohsin, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, R.M. Dharmadasa Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2019: 331-340. Elsvier.
22. Henna: Shaheera Rehmat, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub** and Abdullah Ijaz Hussain. Medicinal Plants of South Asia: Novel Sources for Drug Discovery.2019: 355- 368. Elsvier.
23. Indian Senna: Huma Naz , Haq Nawaz, Muhammad Asif Hanif, **Muhammad Adnan Ayub**. Medicinal Plants of South Asia: Novel Sources for Drug Discovery 2019: 439-449. Elsvier.
24. Jujube: Zunaira Irshad, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Asma Hanif and Hassan Imran Afridi. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2019: 451-463. Elsvier.
25. Ma-Huang: Adan Iqbal, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Muhammad Nadeem Zafar. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2019: 479 – 494. Elsvier.
26. Oleander: Asma Seher, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Muhammad Idrees Jilani and Mohamad Fawzi Mahomoodally. Medicinal Plants of South Asia: Novel Sources for Drug Discovery.2020: 525- 539. Elsvier.
27. Olive: Ayesha Mushtaq, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Ijaz Ahmad Bhatti, Mehrez Romdhane. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020: 541- 555. Elsvier.
28. Saffron: Maryam Khan, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Muhammad Idrees Jilani and Shahzad Ali Shahid Chatha. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020: 587- 600. Elsvier.
29. Sesame: Ayesha Mushtaq, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Ijaz Ahmad Bhatti, Muhammad Idrees Jilani. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020: 601- 614. Elsvier.

30. Sweet lemon: Adan Iqbal, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub** and Abdullah Mohammed Al-Sadi. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020: 617- 630. Elsvier.
31. Vanilla: Hafsa Ahmad, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Muhammad Idrees Jilani. Medicinal Plants of South Asia: Novel Sources for Drug Discovery.2020: 657- 669. Elsvier.
32. Walnut: Zarghouna Chudhary, Rasheed Ahmad Khera, Muhammad Asif Hanif, **Muhammad Adnan Ayub**, Lamia Hamrouni. Medicinal Plants of South Asia: Novel Sources for Drug Discovery. 2020: 671- 684. Elsvier.
33. Guava: Zunaira Irshad, Muhammad Asif Hanif, Muhammad Adnan Ayub,Muhammad Idrees Jilani,Vahid Tavallali. Medicinal Plants of South Asia: Novel Sources for Drug Discovery.2020: 341-354. Elsvier.

34. Muhammad Adnan Ayub, Muhammad Asif Hanif, Saima Naz, Muhammad Shahid, Abdul Hamid. Superheated water extraction of *Boswellia serrata* Roxb. oleo-gum-resin essential oil: Chemical composition and biological potential. LWT-Food Science and Technology.2019. Manuscript LWT-D-19-03756. (Under Revision).

Participation in International & National Conferences/Symposia/Workshops

1. **2nd International Conference on Future Perspectives of Food Processing Industry in Pakistan and 2nd Food and Nutrition Expo**, December 11-12, 2012, Government College University Faisalabad, Pakistan.
2. **12th International and 24th National Chemistry Conference,** October 28-30, 2013, Bahauddin Zakariya University, Multan, Pakistan.
3. **Workshop on "Writing Scientific Research"**, February 26th 2018. Department of Chemistry, University of Agriculture, Faisalabad, Pakistan.
4. **Training Workshop on "Bioassays for Exploration of Bioactivities"** 20th March, 2018, Department of Biochemistry, University of Agriculture, Faisalabad, Pakistan
5. **1st National Conference on Multidisciplinary Research (NCMR-2019),** 27th-28th March, 2019, University of Okara, Okara, Pakistan. (Paper presentation)
   Optimization of extraction temperature for industrially important aroma oil from *Boswelliaserrata* oleo gum resin by using superheated water extraction and its biological potential.

References

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