12th ICNTC CONFERENCE
INTERNATIONAL CONFERENCE ON NEW TRENDS IN CHEMISTRY

12th INTERNATIONAL CONFERENCE ON NEW TRENDS IN CHEMISTRY
10-12 APRIL 2026

12th ICNTC BOOK OF PROCEEDING

10-12 APRIL 2025 BARCELONA – SPAIN

International Conference on New Trends in Chemistry

12th INTERNATIONAL CONFERENCE ON NEW TRENDS IN CHEMISTRY
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http://www.icntcconference.com/

ICNTC Conference 2026

12th International Conference on New Trends in Chemistry

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Prof. Dr. Dolunay ŞAKAR

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http://www.icntcconference.com

Conference organised in collaboration with Monre Academy

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Yıldız Technical University – Turkey
Chemistry Department
Conference Chair

Prof. Dr. Yelda Yalcin Gurkan
Tekirdag Namik Kemal University – Turkey
Chemistry Department
Conference Cochair

Dear Colleagues,

I am honoured to invite and send you this call for papers on behalf of Conference Organisation Board of " **12th International Conference on New Trends in Chemistry**", to be held in Barcelona, Spain on the dates between April 10-12, 2026

Limited number of Papers and Posters with the below mentioned topics will be accepted for our conference:

Analytical Chemistry
Bio Chemistry
Computational Chemistry
Chemistry Education
Environmental Chemistry
Food Chemistry
Forensic chemistry
Inorganic Chemistry
Material Chemistry
Organic Chemistry
Physical Chemistry
Polymer Chemistry and Applications
Pharmaceutical Chemsitry

The selected papers which are presented as oral in the conference will be published in an international peer-reviewed journal which is indexed by SCOPUS as Q4. Each manuscript will have doi Numbers.

We kindly wait for your attendance to our conference to be held on 10-12 April 2026 in Barcelona, SPAIN

All informations are available in conference web site. For more information please do not hesitate to contact us.
info@icntcconference.com

Respectfully Yours,

On Behalf of the Organization Committee of ICNTC Conference

Prof. Dr. Dolunay ŞAKAR
12th ICNTC 2026 | Conference Chair
Yıldız Technical University – Istanbul / Türkiye
Chemistry Department

Prof. Dr. Yelda YALCIN GURKAN
12th ICNTC 2026 | Conference Co Chair
Tekirdağ Namik Kemal University – Tekirdağ / Türkiye
Chemistry Department

ICNTC CONFERENCE

INTERNATIONAL CONFERENCE ON NEW TRENDS IN CHEMISTRY

CONFERENCE VENUE

TEMBO HOTEL BARCELONA

10 APRIL 2026 FRIDAY

Welcome Speech (08:50 - 09:00)

Prof. Dr. Dolunay SAKAR, Yıldız Technical University

Conference Co Chair

SESSION A (09:00 – 10:40)

SESSION CHAIR: Prof. Dr. Sevil YÜCEL

09:00 – 09:20

PAPER TITLE : CARBON DIOXIDE-BASED FUNCTIONAL CYCLIC CARBONATES: AMINO ACID-BASED IRON(III) AND COBALT(III) COMPLEXES CATALYSED COUPLING OF CO2 AND EPOXIDES

AUTHOR(S) : **Adnan S. ABU-SURRAH**, Jumana N. AYYAD

09:20 – 09:40

PAPER TITLE : BIOMASS ENERGY PRODUCTION FROM SUNFLOWER PLANT

AUTHOR(S) **: Emek MOROYDOR DERUN**, Shalala HABIBZADE, Deniz UYGUNÖZ

09:40 – 10:00

PAPER TITLE : SYNTHESIS AND CHARACTERIZATION OF ECO-FRIENDLY EDIBLE FILMS BASED ON PISTACHIO SHELL AND PEANUT OIL

AUTHOR(S) : Kerem AKDEMIR, Hilal GÖNÜLTAİ, Burge KÖSE IŞIK, **Nurcan TUGRUL**

10:00 – 10:20

PAPER TITLE : UTILIZATION OF SUGAR BEET PULP AS AN AGRICULTURAL BY-PRODUCT IN VEGAN LEATHER PRODUCTION

AUTHOR(S) : Alize MENEKSE**, Burge KÖSE IŞIK**, Nurcan TUGRUL

10:20 – 10:40

PAPER TITLE : NATURAL PIGMENTS DOPED POLYMER FILMS SYNTHESIS BY SOLUTION CASTING METHOD AND CHARACTERIZATION

AUTHOR(S) : **Deniz UYGUNÖZ**, Ibrahim ŞENGÖR, Emek MOROYDOR DERUN

TEA & COFFEE BREAK 10:40 – 11:00

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SESSION B (11:00 – 13:00)

SESSION CHAIR: Prof. Dr. Emek MOROYDOR DERUN

11:00 – 11-:20

PAPER TITLE : A NEW APPROACH TO THE SYNTHESIS OF A SELENIUM-DOPED BIOACTIVE GLASS SYSTEM: IMPLICATIONS FOR BIOACTIVITY AND DEGRADATION BEHAVIOR

AUTHOR(S) : **Sevil YÜCEL**, Yeşim AYIK, Şeref YILDIRIM, Sinem ARSLAN, Doğa Berşan GÜNEŞ, Esra Nur TURAL, Alperen ARICI, Cem ÖZEL, Deniz SAKARYA, Ali Can ÖZARSLAN

11:20 – 11:40

PAPER TITLE : SYNERGISTIC THERMAL–UV STRESS ACCELERATES HBCD RELEASE FROM BACK-COATED TEXTILES: VOLATILE AND NANOSCALE PARTICULATE PATHWAYS

AUTHOR(S) : **Raed GHANEM**

11:40 – 12:00

PAPER TITLE : EFFECTS OF STRONTIUM AND SELENIUM-DOPED BIOACTIVE GLASSES ON SOFT TISSUE APPLICATIONS: AN IN VITRO EVALUATION

AUTHOR(S) : **Cem ÖZEL**, Semanur ERCAN, Yeşim AYIK, Şeref YILDIRIM, Sinem ARSLAN, Doğa Berşan GÜNEŞ, Esra Nur TURAL, Deniz SAKARYA, Ali Can ÖZARSLAN, Merve ERGİNER HASKÖYLÜ, Sevil YÜCEL

12:00 – 12:20

PAPER TITLE : EFFECT OF TANNIC ACID CONCENTRATION ON MECHANICAL AND STRUCTURAL PROPERTIES OF POLYVINYL ALCOHOL/CHITOSAN/POMEGRANATE PEEL POWDER BASED BIOCOMPOSITE FILMS

AUTHOR(S) : Neşe İŞMAN, **Pınar TERZİOĞLU**

12:20 – 12:40

PAPER TITLE : THE EFFECTS OF H_2O:TEOS RATIO ON THE COMPOSITION AND MORPHOLOGY OF BIOACTIVE GLASSES SYNTHESIZED BY THE STÖBER METHOD

AUTHOR(S) : **Yeşim AYIK**, Doğa Berşan GÜNEŞ, Sinem ARSLAN, Şeref YILDIRIM, Esra Nur TURAL, Alperen ARICI, Cem ÖZEL, Deniz SAKARYA, Ali Can ÖZARSLAN, Sevil YÜCEL

12:40 - 13:00

PAPER TITLE : ACTIVATED CARBON FROM GYPSOPHILA ROOTS: A SUSTAINABLE ADSORBENT FOR DYE REMOVAL

AUTHOR(S) : **Sena Nur KARABEKİROĞLU**, Meral KOCAOĞLU

LUNCH BREAK 13:00 – 14:00

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INTERNATIONAL CONFERENCE ON NEW TRENDS IN CHEMISTRY

SESSION C (14:00 – 16:00)

SESSION CHAIR: Prof. Dr. Adnan S. ABU-SURRAH

14:00 – 14:20

PAPER TITLE : THE EFFECTS OF HELICHRYSUM ARENARIUM EXTRACT ON CALCIUM OXALATE CRYSTALLIZATION AS NATURAL INHIBITOR

AUTHOR(S) : Sinan ŞİMŞEK, Osman Yahya USOĞLU, **Emel AKYOL**

14:20 – 14:40

PAPER TITLE : SYNTHETIC METHODS FOR THE PREPARATION OF CYANO SUBSTITUTED OXAZOLO[4,5-b]PYRIDINES

AUTHOR(S) : **Jurja VUKOVİNSKİ**, Marijana Hranjec

14:40 – 15:00

PAPER TITLE : RAPID AND HIGH-ACCURACY CARBON DETERMINATION METHODS FOR SUSTAINABLE CARBON FARMING: IMPLICATIONS FOR NORTH MACEDONIA'S AGROECOSYSTEMS

AUTHOR(S) **: Biljana BALABANOVA**, Verica ILIEVA, Sasa MITREV

15:00 – 15:20

PAPER TITLE : SUPRAMOLECULAR INTERACTION OF GABAPENTIN AND LACTAM WITH CUCURBIT[N]URIL HOST MOLECULES

AUTHOR(S) : **Lubna ALRAWASHDEH**, Bayan F. KULAIB, Khaleel I. ASSAF , Musa I. EL-BARGHOUTHI,

Khaled BODOOR , Osama M. ABUHASAN , Ahmad A. ABDOH

15:20 – 15:40

PAPER TITLE : ENZYME-ASSISTED SOXHLET EXTRACTION OF HELICHRYSUM ARENARIUM AND INVESTIGATION OF THE EFFECT OF ENZYMES (CELLULASE, PECTINASE, XYLANASE) ON TOTAL FLAVONOID CONTENT

AUTHOR(S) : **Sinan ŞİMŞEK**, Emel AKYOL, İlknur KUCUK

15:40 – 16:00

PAPER TITLE : INVESTIGATION OF TORREFACTION PROCESS CONDITIONS FOR BIOCHAR PRODUCTION AS AN ALTERNATIVE RENEWABLE ENERGY SOURCE

AUTHOR(S) : Sakine MIZRAK, Merve ŞANALAN, **Hediye İrem ÖZGÜNDÜZ**

TEA & COFFEE BREAK 16:00 – 16:20

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POSTER SESSION A (16:20 – 17:20)

SESSION CHAIRS: Prof. Dr. Sevil YÜCEL, Prof. Dr. Adnan S. ABU-SURRAH, Prof. Dr. Dolunay ŞAKAR

PAPER TITLE : SYNTHESIS AND APPLICATION OF PENTAAMMINEACETATOCOBALT(III) NITRATE AS A LOW-TEMPERATURE BLEACHING CATALYST IN DISHWASHING DETERGENTS
AUTHOR(S) : **Abdullah AVŞAR** , Bilgehan GÜZEL

PAPER TITLE : SYNTHESIS, SPECTROSCOPIC CHARACTERIZATION AND TITRATIONS WITH METAL CATIONS OF PYRIDINE HYDRAZONES
AUTHOR(S) : **Antonija MAMIĆ**, Marijana HRANJEC

PAPER TITLE : SYNTHESIS AND SUBSTITUENT-DEPENDENT TAUTOMERISM OF BENZOTHIAZOLYL AZO DYES DERIVED FROM 2-NAPHTHOL
AUTHOR(S) : **Anja BEČ**, Robert VIANELLO, Helena CERIĆ, Livio RACANÉ

PAPER TITLE : REMOVAL OF ACETAMIPRID FROM WATER BY ADVANCED TREATMENT PROCESSES: EFFICIENCY AND ECOTOXICOLOGICAL ASPECTS
AUTHOR(S) : **Bruna BABIĆ VISKOVIĆ**, Danijela AŠPERGER, Anica PAVLINOVIĆ, Davor DOLAR

PAPER TITLE : INVESTIGATION OF THE CORRELATION BETWEEN SKIN PERMEATION AND GLOBAL REACTIVITY DESCRIPTORS IN PHENOLIC ANTIOXIDANTS: A COMPARATIVE DFT AND ADMET STUDY
AUTHOR(S) : **Beyza KEMANCI**, Şimal KURUMOĞLU, Burak GÜRKAN

PAPER TITLE : BRAIN PENETRATION IN CNS AND NON-CNS DRUGS USING MOLECULAR ELECTRONIC PARAMETERS
AUTHOR(S) : **Ceren ERGÜL**, Şimal KURUMOĞLU, Yelda Yalçın GÜRKAN

PAPER TITLE : REMOVAL OF FLUTAMIDE FROM AQUEOUS SOLUTIONS USING ACTIVATED CARBON DERIVED FROM LAVENDER: AN ADSORPTION STUDY
AUTHOR(S) : **Derya ALTINTAŞ**, Esra KULAKSIZ ALAYONT, Ozan YÖRÜK, Yüksel BAYRAK

PAPER TITLE : FORENSIC IDENTIFICATION OF PEN INK PIGMENTS USING DUAL-WAVELENGTH RAMAN SPECTROSCOPY COMBINED WITH CHEMOMETRICS
AUTHOR(S) : **Dilek SALKIM İŞLEK**, Eda KİRİŞ, Ayşegül Şen YILMAZ, Erdoğan KÖSE

PAPER TITLE : SUSTAINABLE HEAVY METAL ION DETECTION OF WASTE-BASED CARBON QUANTUM DOTS
AUTHOR(S) : Nour alhuda SALEHA, **Emel AKYOL**

PAPER TITLE : PERFORMANCE ASSESSMENT OF FAUJASITE VARIANTS FOR MULTI-METAL ADSORPTION: IMPACT OF MINERAL TYPE AND COMPETITIVE HEAVY METAL INTERACTIONS

AUTHOR(S) : **Enas N. MAHMOUD**, Sawsan JAAFREH, Khalil M IBRAHIM, Maram Na'es, Rawan Abu SARHAN

PAPER TITLE : MODIFICATION OF BITUMEN BY ADDING REACTIVE TERPOLYMER, POLYOLEFIN ELASTOMER, AND THERMOPLASTIC
AUTHOR(S) : **Hediye İrem ÖZGÜNDÜZ**, Burcu Didem ÇORBACIOĞLU, Seyfullah KEYF

PAPER TITLE : REMOVAL OF SELECTED POLLUTANTS FROM TEXTILE WASTEWATER USING A HYBRID MBR–NF SYSTEM
AUTHOR(S) : **Iva ĆURIĆ**, Anica PAVLINOVIĆ, Davor DOLAR

PAPER TITLE : SYNTHESIS OF A NOVEL SYMMETRICAL SILICON PHTHALOCYANINE PHOTOSENSITIZERS CONTAINING CARBOXYLIC ACID BASED AXIAL ANCHORING GROUPS
AUTHOR(S) : **Gülnur KESER KARAOĞLAN**, Gülşah GÜMRÜKÇÜ KÖSE

PAPER TITLE : SYNTHESIS AND CHARACTERIZATION OF A NOVEL SILICON PHTHALOCYANINE CONTAINING CARBOXYLIC ACID GROUPS
AUTHOR(S) : **Gülşah GÜMRÜKÇÜ KÖSE**, Gülnur KESER KARAOĞLAN

PAPER TITLE :PHOTOINDUCIBLE DECARBOXYLATION IN REACTIONS WITH ALKYNES: REGIOSELECTIVE ADDITION OF ALKYL RADICALS TO THE TRIPLE BOND
AUTHOR(S) : **Kinga PİOTROWSKA**, Sebastian BAŚ

PAPER TITLE : DOUBLE-SIDED CONTROL OF PRODUCT TYPE PREFERENCE IN THE VISIBLE-LIGHT INITIATED REACTION OF 1,3-DICARBONYL COMPOUNDS WITH ALKENES
AUTHOR(S) : **Małgorzata PAŁYGA**, Jan RZEPIELA, Sebastian BAŚ

PAPER TITLE : CHEMICAL CHARACTERIZATION OF PM2.5 IN THE URBAN AIR OF TIRANA: SOURCES, CHEMICAL MARKERS AND ATMOSPHERIC SECONDARY PROCESSES
AUTHOR(S) : **Megi CAUSHAJ**, Florian MANDIJA, Dhurata PREMTI, Spiro DUSHKU

PAPER TITLE : THE INFLUENCE OF THE EXPANSION OF THIOPHENE SUBSTITUENTS ON THE PHYSICOCHEMICAL PROPERTIES AND APPLICATION POSSIBILITIES OF FLUORENE DERIVATIVES
AUTHOR(S) : **Paweł KALARUS**, Agata SZLAPA-KULA, Michał FILAPEK, Sławomir KULA

PAPER TITLE : ANTIOXIDANT ACTIVITY OF BLACK CABBAGE *(Brassica oleracea L. var. sabellica)* FLOWERS
AUTHOR(S) : **Yeşim YEŞİLOĞLU**, Bircan ENGİN

PAPER TITLE : COMPUTATIONAL TOXICOLOGY of FLUFENAUXIRIM and AMINOCYCLOPYRACHLOR: A DFT REACTIVITY and ECOTOXICITY COMPARISON
AUTHOR(S) : Goncagül TUMTUM, Kaan DEMİR, Şimal KURUMOĞLU, **Yelda YALCIN GURKAN**

PAPER TITLE : DETERMINATION OF THE CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF THE RUBIA TINCTORUM PLANT
AUTHOR(S) : **Temine SABUDAK**, Bahar EREN, Cansu ÖZÇELİK

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PAPER TITLE : SYNTHESIS OF N-METHYL-GLUCAMINE VIA REDUCTIVE AMINATION OF GLUCOSE USING CARBON NANOTUBE-SUPPORTED PALLADIUM CATALYST

AUTHOR(S) : **Tuğba BAYCAN**, Abdullah AVŞAR, Halil KAVRAMA, Bilgehan GÜZEL

SOCIAL PROGRAM

HOTEL DEPARTURE 19:45

Will be organised as part of conference dinner program
Please have your ticket with you

Venue : Tablao de Carmen / Poble Espanyol
Dress Code Smart Casual

Dinner Starting Time : 20:30 / Flamenco Show Starting Time :21:00

ICNTC CONFERENCE

INTERNATIONAL CONFERENCE ON NEW TRENDS IN CHEMISTRY

11 APRIL 2026 SATURDAY

SESSION D (08:20 – 11:00)

SESSION CHAIR: Prof. Dr. Emel AKYOL

08:20 – 08:40

PAPER TITLE : STABILITY AND ACTIVITY OF BETA-GALACTOSIDASE IMMOBILIZED ON POLYVINYL ALCOHOL-SODIUM ALGINATE HYDROGELS

AUTHOR(S) : **Doruk AKDOĞAN**, Ayşegül PEKSEL

08:40 – 09:00

PAPER TITLE : EFFECT OF HEMP FILLER ON THE MECHANICAL AND PHYSICAL PROPERTIES OF PLA/PBAT COMPOSITE FILMS

AUTHOR(S) : İlknur KÜÇÜK, **Oğuzhan TAVLIBIYIK**

09:00 – 09:20

PAPER TITLE : SYNTHESIS, STRUCTURAL CHARACTERIZATION AND BIOLOGICAL EVALUATION OF AMINO SUBSTITUTED BENZOXAZOLE DERIVATIVES

AUTHOR(S) : **Marina GALIĆ**, Viktoria RAVLIĆ, Leentje PERSONS, Dirk DAELEMANS, Mihailo BANJANAC, Marijana HRANJEC

09:20 – 09:40

PAPER TITLE : DEVELOPMENT OF A DEP-IMPRINTED GQD@PHEMA-PPIM NANOPARTICLE-BASED SURFACE PLASMON RESONANCE SENSOR FOR DIETHYL PHTHALATE (DEP) DETECTION

AUTHOR(S) : **Monireh BAKHSHPOUR-YUCEL**, Bilgen OSMAN, Cevher Gündoğdu HIZLIATEŞ, Elif TÜMAY ÖZER

09:40 – 10:00

PAPER TITLE : OPTIMIZED FABRICATION OF BIOPOLYMER-DERIVED HYBRID AEROGELS AS SMART DRUG CARRIERS

AUTHOR(S) : Didem AYCAN, Yaşar Andelib AYDIN, **Müge SENNAROĞLU BOSTAN**

10:00 – 10:20

PAPER TITLE : DEGRADATION MECHANISMS of SELECTED AMINOPOLYCARBOXYLIC ACID MOLECULES by DFT METHOD

AUTHOR(S) **: Bahar EREN,** Ayşe Handan DÖKMECİ

10:20 – 10:40

PAPER TITLE : SYNTHESIS AND BILOGICAL ACTIVITY OF 1,2,3-TRIAZOLE COUMARIN HYBRIDS

AUTHOR(S) : **Petra KOVAČEC**, Leentje PERSOONS, Dirk DAELEMANS, Tatjana GAZIVODA KRALJEVIĆ

10:40 – 11:00

PAPER TITLE : NICKEL SULFIDE QUANTUM DOTS ANCHORED ON ZIF-67 AS AN EFFICIENT ELECTROCATALYST FOR HYDROGEN EVOLUTION REACTION

AUTHOR(S) : **Yaren ERDAG MADEN**, Özge KERKEZ KUYUMCU

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TEA & COFFEE BREAK 11:00 – 11:20

SESSION E (11:20 – 13:00)

SESSION CHAIR: Dr. Bahar EREN

11:20 – 11:40
PAPER TITLE : PRODUCTION AND CHARACTERIZATION OF A DOUBLE-LAYERED WOUND DRESSING CONTAINING ELECTROSPUN POLYLACTIC ACID AND HYPERICUM-INFUSED ALGINATE HYDROGEL
AUTHOR(S) : **Seniyecan KAHRAMAN,** Seniye UZUN, Emine ÖZBEY, Filiz UĞUR NİGİZ

11:40 – 12:00
PAPER TITLE : FABRICATION OF ACID-MODIFIED CLINOPTILOLITE DOPED PVDF NANOFIBER MEMBRANES AND OPTIMIZATION OF NITRATE ADSORPTION USING RSM
AUTHOR(S) : **Ayşenur KATIRCI**, Filiz UĞUR NİGİZ

12:00 – 12:20
PAPER TITLE : SYNTHESIS AND IN VITRO CHARACTERIZATION OF QUERCETIN-LOADED ALGINATE-KERATIN COMPOSITE HYDROGELS FOR ENHANCED WOUND HEALING APPLICATIONS
AUTHOR(S) : **Sezer YİĞİT**, Tijen Ennil BEKTAŞ, Seniyecan KAHRAMAN, Filiz UĞUR NİGİZ

12:20 – 12:40
PAPER TITLE : FROM ORANGE PEEL TO SUSTAINABLE BIOCOMPOSITE: PRODUCTION AND CHARACTERISATION OF PECTIN/CMC FILMS WITH MATCHA TEA EXTRACT
AUTHOR(S) : Buse Okyay, **Özde İPSALALI**, Filiz Uğur Nigiz

12:40 – 13:00
PAPER TITLE : PREPARATION AND CHARACTERIZATION OF ELECTROSPUN ZR-BASED UIO-66/SULFONATED PPSU PROTON EXCHANGE MEMBRANES FOR VANADIUM REDOX FLOW BATTERIES
AUTHOR(S) : **Elif ÇOLAK**, Buse ÇETİN, Derya ÜNLÜ, Filiz UĞUR NİGİZ

LUNCH BREAK 13:00 – 14:00

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SESSION F (14:00 – 15:20)

SESSION CHAIR: Prof. Dr. Dolunay ŞAKAR

14:00 – 14:20

PAPER TITLE : PHENYLBORONIC ACID-ENHANCED BENZOXAZINE RESINS AS PROMISING MATRICES FOR THERMAL PROTECTION COMPOSITES

AUTHOR(S) : **Ruveyda ÖZDEMİR**, Derya UNLÜ

14:20 – 14:40

PAPER TITLE : SESAMOL-FUNCTIONALIZED CYCLOPHOSPHAZENES: SYNTHESIS, STRUCTURAL CHARACTERIZATION, AND BIOLOGICAL EVALUATION

AUTHOR(S) : **Şule ŞAHİN ÜN ,** Hanife İBİŞOĞLU ,Yunus ZORLU , Devrim ATİLLA , Gülşah TOLLU, Ersin KILINÇ , Sadin ÖZDEMİR

14:40 – 15:00

PAPER TITLE : SUSTAINABLE AND BIOACTIVE CHITOSAN/PVA HYDROGELS INCORPORATING ALLANTOIN FOR WOUND HEALING APPLICATIONS

AUTHOR(S) : **Miray ÖZBAKIŞ**, Dea ISMAILI, Yusuf SICAK, Pınar TERZİOĞLU

15:00 – 15:20

PAPER TITLE : COMPARATIVE EVALUATION OF INFRARED AND MICROWAVE DRYING OF BERRIES: KINETICS, DIFFUSIVITY, AND MODELING APPROACHES

AUTHOR(S) : **Ekin KIPÇAK**

TEA & COFFEE BREAK 15:20 – 15:40

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POSTER SESSION B (15:40 – 16:40)

SESSION CHAIRS: Prof. Dr. Emel AKYOL, Prof. Dr. Temine ŞABUDAK, Prof. Dr. Yelda YALÇIN GÜRKAN

PAPER TITLE : EFFECT OF AROMATIC RING NUMBER AND SUBSTITUENT ARRANGEMENT ON THE PROPERTIES OF PHENANTHRO[9,10-D]IMIDAZOLE DERIVATIVES FOR OLEDS
AUTHOR(S) : **Agnieszka KRAWIEC**, Jaijanarthanan Lingagouder, Agata Szlapa-Kula, Michał Filapek, Karol Erfurt, Przemyslaw Data, Slawomir Kula

PAPER TITLE : PRODUCTION OF DESALINATION MEMBRANES FROM RECYCLED PVDF POLYMERS
AUTHOR(S) : **Ayşenur KATIRCI**, Filiz UĞUR NİGİZ

PAPER TITLE : CHEMICAL CHARACTERISATION OF MADDER (Rubia tinctorum L.), DETERMINATION OF ANTIOXIDANT ACTIVITY AND DFT STUDIES ON SELECTED COMPOUNDS
AUTHOR(S) : **Bahar EREN,** Temine ŞABUDAK, Hülya ORAK, Cansu ÖZÇELİK

PAPER TITLE : SYNTHESIS OF BIO-POLYOLS FROM AGRICULTURAL WASTE FOR SUSTAINABLE INSULATION PANEL APPLICATIONS
AUTHOR(S) : **Bilgehan GÜZEL**, Sinem TÜMÜK, Erdem DELİL

PAPER TITLE : SYNTHESIS AND CHARACTERIZATION OF N-METHYL-D-GLUCAMINE USING PD/C-SUPPORTED RANEY NICKEL CATALYST
AUTHOR(S) : Tuğba BAYCAN, Burak AY, Abdullah AVŞAR, **Bilgehan GÜZEL**

PAPER TITLE : INFLUENCE OF EXTRACTION TECHNIQUE ON THE POLYPHENOLIC COMPOSITION OF SOLIDAGO CANADENSIS L. AERIAL PARTS
AUTHOR(S) : **Cornelia FURSENCO**, Violeta Alexandra ION, Oana-Crina BUJOR, Simona MARCU, Tatiana CALALB, Alina ORȚAN, Liliana BĂDULESCU, Livia UNCU

PAPER TITLE : REMOVAL OF BISPHENOL A FROM WATER
AUTHOR(S) : **Demet AÇIKGÜL**, Nuran KINACIOĞLU, Dilek DURANOĞLU

PAPER TITLE : PREPARATION AND ANALYSIS OF A HERBAL EXTRACT SOLUTION HAVING RESTORATIVE EFFECTS POTENTIAL AGAINST RADIATION DERMATITIS
AUTHOR(S) : Ayşe Beril DEMİR, Duru BAHÇECİ, Sinem ÖZER, Öznur YAŞA ŞAHİN, **Dolunay ŞAKAR**

PAPER TITLE : REMOVING DISPERSE ORANGE 30 DYE FROM SIMULATED WASTEWATER WITH QUINCE LEAVES BIOADSORBENT
AUTHOR(S) : Zeynep Berra BAĞ, Hüsnü Kemal GÜRAKIN, **Dolunay ŞAKAR**

PAPER TITLE : INVESTIGATION OF THE EFFECT OF ULTRASONIC PRETREATMENTS ON THE OVEN DRYING OF ARONIA BERRIES
AUTHOR(S) : Esra Eylem ŞİMŞEK, **Ekin KIPÇAK**

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Contents

CHEMICAL CHARACTERIZATION OF $PM_{2.5}$ IN THE URBAN AIR OF TIRANA: SOURCES, CHEMICAL MARKERS AND ATMOSPHERIC SECONDARY PROCESSES

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Abstract
This pilot study presents a detailed chemical characterization of fine particulate matter with an aerodynamic diameter of 2.5 micrometres collected in an urban area in Tirana, aiming to identify the sources and atmospheric processes influencing its composition. The analyses of water-soluble ions and carbohydrates indicates that this particulate matter consists of a combination of primary sources and products of secondary transformations. Elevated concentrations of sulphates, nitrates and various organic acids indicate advanced oxidation of organic and inorganic matter. The presence of specific markers such as levoglucosan, mannosan and mannitol suggest contributions from biomass combustion, biological activity, and plant materials. The results demonstrate the complexity of urban particulate matter and highlight the importance of chemical analysis for the assessment of pollutant sources, as well as for supporting receptor models such as positive matrix factorisation in understanding the dynamics of particulate matter with an aerodynamic diameter of 2.5 micrometres in the atmosphere.

Key Words: *Fine particulate matter; chemical composition; water-soluble ions and carbohydrates; primary sources; secondary transformations.*

1. Introduction

Particulate matter PM is emitted directly into the atmosphere (primary particles) or is formed in the atmosphere through the transformation of gases into particles (secondary particles).[1] [2] [3] Examples of secondary particle formation from chemical transformations of gases include the formation of nitrates, sulfates [1] and nitrates formed from the transformations of primary VOCs [4].

Formation of nitrates: NO_2 reacts with OH groups to form nitric acid (the main homogeneous mechanism of acid formation during the day in the troposphere) [5][1]. $NO_2 + OH + M \rightarrow HNO_3 + M$

Nitric acid can be converted to nitrate forms through reactions with ammonia, amines, dust, and sea salts in the aerosol phase. In the urban atmosphere, NH_4NO_3 represents the main chemical form of nitrate in fine particles PM [1]. $HNO_{3\,(g)} + NH_{3\,(g)} \leftrightarrow NH_4NO_{3(s)}$

Depending on the relative humidity RH, the ammonium nitrate formed in the above reaction exists either in a solid state or as an aqueous solution composed of NH_4^+ and NO_3^- ions. Meanwhile, N_2O_5 plays an important role at night [3].

$NO_2 + O_3 \rightarrow NO_3 + O_2$ [6] [7] $\quad NO_3 + NO_2 \rightleftharpoons N_2O_{5(g)}$ [8] [9] $\quad N_2O_{5(g)} + H_2O_{(l)} \rightarrow 2H^+ + 2NO_{3\,(l)}^-$ [5] [1]

Particles with an aerodynamic diameter Dp < 2.5μm are defined as fine particles and are also known as $PM_{2.5}$ particles [10]. The main sources of $PM_{2.5}$ are traffic, industry, combustion of fuels for domestic use, as well as natural sources such as volcanoes, soil dust and marine aerosols [11]. Another source of $PM_{2.5}$ is particle formation through the growth of condensable vapors in the atmosphere [12], during which photocatalytic [13] and free radical oxidation reactions [14] occur, increasing the chemical complexity of $PM_{2.5}$. Determining the chemical composition of $PM_{2.5}$ is essential for understanding new particles formation mechanisms [10], as $PM_{2.5}$ are characterized by their very small size, large specific surface area and long residence time in the atmosphere [15] [1]. $PM_{2.5}$ and its chemical components impair atmospheric visibility by enhancing light scattering and absorption [10] and pose significant risks to human health [16] [17] [18]. $PM_{2.5}$ is a complex mixture mainly composed of water-

soluble inorganic ions, carbonaceous compounds, and trace elements, with water-soluble inorganic ions account for 20-60% of the particle mass and increasing with increasing pollution levels [15].
Sulfate (SO_4^{2-}), nitrate (NO_3^-), ammonium (NH_4^+), organic matter (OM), black carbon (BC), and crustal elements are the dominant components of $PM_{2.5}$ influencing climate [19] [20] [21] by degrading air quality [1] [22] and causing adverse health outcomes [23]. Carbonaceous compounds EC (BC) and OC mainly originate from biomass, fossil fuels combustion and other carbon-containing materials [24], with OC comprising diverse organic compounds such as PAHs, saccharides such as levoglucosan, mannosan, etc [25]. Although $PM_{2.5}$ has overall mixed effects, its individual components exhibit distinct roles due to their different physicochemical properties; for example, BC mainly absorbs solar radiation, while SO_4^{2-} mainly scatters it, resulting in opposite climate effects; carbonaceous materials are probably more toxic than SO_4^{2-} and therefore have different health impacts [26]. Trace heavy metals, despite constituting 7-8% of $PM_{2.5}$ mass, pose significant carcinogenic risks due to their high toxicity and environmental presistence [26] [27]. Organic aerosols (OAs) can contribute up to 75% of $PM_{2.5}$ mass and significantly affect human health, atmospheric visibility, and climate change [28] [22] [29], modify particle hygroscopicity due to their water solubility [30]. Organic aerosols originate from various sources, some of which are emitted directly from the sources (these are called primary organic aerosols POA), while some are formed by being involved in some atmospheric processes (secondary organic aerosols SOA), which are mainly formed by the oxidation of volatile organic compounds (VOCs) [4].

Carbohydrates are water-soluble organic compounds present in the atmosphere and emitted through biomass burning, soil resuspension, and plant emissions [31]. Fatty acids are abundant in urban organic aerosols, contribute more than 50% of the organic compounds detected from various emission sources, e.g. biological activities, biomass burning, and cooking activities [32] [33]. Biomass contains oligo- and polysaccharides (e.g. cellulose, lignin, and starch) that generate significant amounts of monosaccharides, disaccharides, sugar alcohols, and anhydro sugars [34] which are widely used as aerosol biological tracers [35] [36]. Due to their wide distribution and chemical composition sensitive to particle size they offer the possibility to estimate the atmospheric trajectory and sources of aerosol particles [37] [38]. Anhydro sugars levoglucosan, mannosan and galactosan originate from cellulose and hemicellulose combustion and are established biomass-burning markers [39] [40] [41], while primary saccharides (glucose, sucrose,fructose) are characteristic of materials such as pollen, fruits and plant fragments [42], while sugar alcohols (mannitol and arabitol) are characteristic of fungal spores [43].

In this context, chemical composition of $PM_{2.5}$ is essential for understand particle sources and formation processes. Accordingly, this pilot study presents laboratory analyses of $PM_{2.5}$ filters collected in Tirana, focusing on inorganic ions and organic compounds as indicators of atmosphere chemical transformations and natural anthropogenic sources.

2. Methodology

$PM_{2.5}$ samples were collected at un urban background site in Tirana, located in the vicinity of Faculty of Natural Science of the University of Tirana. Sampling campaigns were conducted during two different periods, March-Aprile 2024 and April-May 2025, as part of a pilot study, aimed at characterizing the chemical composition of $PM_{2.5}$ and identifying key chemical markers, rather than performing quantitative interpretation of detailed interannual comparisons of concentration levels.

Particulate matter samples were collected using low-volume air sampler equipped with Teflon filters, operating over 24- hour at a controlled flow rate 2.3 m^3h^{-1}, in accordance with standard air quality monitoring procedures [44] *CEN, EN 12341:2014*. The sample site was selected to represent urban background conditions, minimizing the influence of immediate point source. Following sampling, filters were weighed before and after collection to determine $PM_{2.5}$ mass. The water-soluble fraction of this particle was extracted using deionized water and analyzed for major inorganic ions and carbohydrates. Ion chromatography was employed for the determination of cations and anions, while water-soluble carbohydrates were analyzed using high-performance anion-exchange chromatography with pulsed amperometric detection (HPAEC-PAD).

3. Results and Discussion

The analysis of water-soluble ions in $PM_{2.5}$ particles provides an overview of the inorganic and organic

chemical composition of urban aerosols. Within the framework of this pilot study, the results are interpreted qualitatively, focusing on compositional patterns and the identification of source-related chemical markers, rather than on quantitative evaluation of absolute concentration levels or the relative contributions of individual $PM_{2.5}$ components.

Table 1: Identified cations during the March–April 2024 sampling period

Filters 2024	Volume (m^3)	Sodium ($\mu g/m^3$)	Ammonium ($\mu g/m^3$)	Potassium ($\mu g/m^3$)	Magnesium ($\mu g/m^3$)	Calcium ($\mu g/m^3$)
1	55.2	1.572	0.396	1.071	0.601	10.196
2	55.2	3.391	0.169	1.084	0.241	1.087
3	55	2.693	2.904	1.686	0.282	3.423
4	55.19	7.691	1.563	4.113	0.791	7.730
5	55.2	1.942	0.501	0.446	0.087	0.514
6	55.2	0.627	1.459	0.912	0.162	1.771
7	54.76	1.755	1.229	0.579	0.162	0.553
8	55.2	1.439	1.353	0.852	0.083	0.455
9	55.2	0.958	4.609	1.042	0.181	2.442

Table 2: Identified cations during the April-May 2025 sampling period

Filters 2025	Volume (m^3)	Sodium ($\mu g/m^3$)	Ammonium ($\mu g/m^3$)	Potassium ($\mu g/m^3$)	Magnesium ($\mu g/m^3$)	Calcium ($\mu g/m^3$)
1	55.19	1.886	0.528	0.315	0.183	0.608
2	55.2	BDL	BDL	BDL	BDL	BDL
3	55.18	BDL	BDL	BDL	BDL	BDL
4	55.17	0.568	3.222	0.398	0.042	0.364
5	33.9	1.015	4.819	0.493	0.073	0.809
6	55.2	0.374	3.415	3.173	0.513	20.915
7	55.19	1.197	5.606	2.626	0.272	20.163

The presence of the analyzed ions indicates a mixed contribution of natural and anthropogenic sources to $PM_{2.5}$ composition in the urban environment. Na^+ and Mg^{2+} are mainly associated with marine aerosols with marine aerosols and mineral dust resuspension from road dust and construction activities, reflecting natural sources and atmospheric transport processes [15] [45]. Ca^{2+} is a well-established tracer of soil resuspension and construction-related activities [15] [45]. NH_4^+ represents secondary aerosol formation through reactions between atmospheric NH_3 and inorganic acids, indicating active chemical transformation processes [1]. K^+ is commonly used as a qualitative marker of biomass burning, suggesting contributions from combustion processes of organic materials originating from local or regional sources [46]. Overall, the ionic composition reflects the combined influence of natural sources, anthropogenic activities, combustion processes and secondary atmospheric formation. Although possible variations cannot be precisely quantified, the presence and qualitative distribution of these ions is consistent with the literature on urban-industrial $PM_{2.5}$ studies [15] [46] [45].

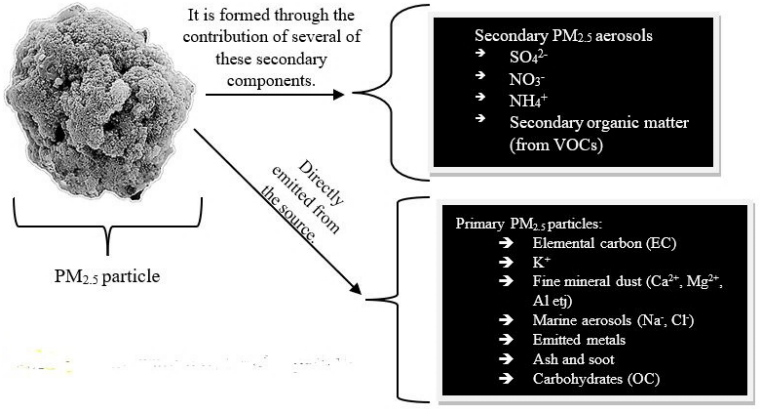

Fig. 1. Composition of a $PM_{2.5}$ particle *($PM_{2.5}$– Artwork by Bryan Fisher (2016))*

Table 3: Identified carbohydrates during the March-April 2024 sampling period.

Filters 2024	Volume (m^3)	Levoglucosan ($\mu g/m^3$)	Mannitol ($\mu g/m^3$)	Mannosan ($\mu g/m^3$)	Galactosan ($\mu g/m^3$)	Glucose ($\mu g/m^3$)	Mannose ($\mu g/m^3$)
1	55.2	3.27×10^{-5}	BDL	2.52×10^{-6}	5.54×10^{-7}	4.13×10^{-7}	BDL
2	55.2	BDL	BDL	BDL	BDL	BDL	BDL
3	55	6.21×10^{-5}	BDL	4.52×10^{-6}	7.96×10^{-7}	2.13×10^{-6}	BDL
4	55.19	3.52×10^{-6}	BDL	4.41×10^{-6}	BDL	4.21×10^{-5}	BDL
5	55.2	BDL	BDL	BDL	BDL	BDL	BDL
6	55.2	1.79×10^{-5}	BDL	2.6×10^{-6}	3.36×10^{-7}	BDL	BDL
7	54.76	BDL	BDL	BDL	BDL	BDL	BDL
8	55.2	2.25×10^{-5}	BDL	5.83×10^{-6}	2.28×10^{-7}	BDL	BDL
9	55.2	BDL	BDL	3.78×10^{-6}	BDL	2.87×10^{-6}	BDL

Table 4: Identified carbohydrates during April-May 2025 sampling period.

Filters 2025	Volume (m^3)	Levoglucosan ($\mu g/m^3$)	Mannitol ($\mu g/m^3$)	Mannosan ($\mu g/m^3$)	Galactosan ($\mu g/m^3$)	Glucose ($\mu g/m^3$)	Mannose ($\mu g/m^3$)
1	55.19	0.018	0.001	BDL	8×10^{-4}	0.003	BDL
2	55.2	0.047	0.015	BDL	0.002	0.003	5×10^{-4}
3	55.18	0.023	7×10^{-4}	0.001	9×10^{-4}	0.031	0.34
4	55.17	0.024	0.002	BDL	8×10^{-4}	0.005	BDL
5	33.9	BDL	0.001	BDL	BDL	0.01	0.007
6	55.2	4×10^{-4}	7×10^{-4}	BDL	BDL	0.008	BDL
7	55.19	BDL	BDL	2×10^{-4}	1.08×10^{-5}	0.006	5×10^{-4}

Water-soluble carbohydrates detected in $PM_{2.5}$ samples from 2024 and 2025 include levoglucosan, mannitol, mannosan, galactosan, glucose, and mannose, which are wildely used tracers of organic aerosols sources. Levoglucosan is well-established global marker of biomass burning from wood, agricultural residues, and plant material combustion [47] [48] [49]. Mannosan and galactosan, formed during hemicellulose pyrolysis, act as auxiliary indicators of ligno-cellulosic material combustion, with mannosan also supporting the identification of softwood burning sources [42] [47] [48] [49]. Mannitol represents a characteristic biomarker of fungal spores and biological activity, while glucose and mannose reflect contributions form plant material, pollen and microbial sources [42] [43] [50].

The anionic composition (tables 5&6) further highlights the combined influence of primary emissions and secondary atmospheric processes, providing insight into aerosol origin and oxidative transformations.

Sulphates and nitrates constitute the dominant secondary fraction of $PM_{2.5}$, formed through oxidation of SO_2 and NOx and reflecting anthropogenic emissions and advanced photochemical processes [3] [1] [4]. Dicarboxylic acids such as oxalate, malonate, and succinate further indicate intensive multi-step oxidation of organic matter involving VOCs, including biogenic hydrocarbons and terpenes [51] Chloride derives from biomass burnin industrial activities, waste and marine aerosols, and releasing gaseous HCl [52] [53]; chloride-containing aerosols are important components of fine particulate in industry, marine and biomass burning environments [54] [55]. Nitrite formed via heterogeneous NO_2 reactions on particle surface, is unstable and rapidly oxidized to nitrate, providing insight into short-time atmosphere processes [5]. Fluoride occurs at trace levels in $PM_{2.5}$ and is mainly associated with coal combustion and industrial emissions involving fluorinated compounds such as PFAS [56].

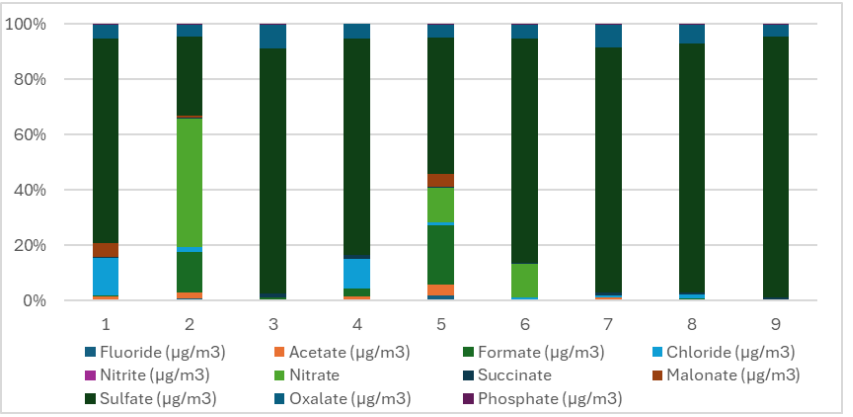

Figure 1. Relative composition of anions in $PM_{2.5}$ samples during March-April 2024.

As this study represents a pilot investigation, the focus was not placed on detailed quantitative interpretation. Nevertheless, the dominant pollutant can still be identified based on its relative contribution. It should be noted that the 2024 filters were stored under controlled temperature and isolated conditions; however, considering the different stability and lifetime of atmospheric species, partial losses or transformations—particularly for more volatile or reactive compounds—may have occurred during storage. Therefore, the results should be interpreted primarily in terms of relative composition rather than absolute concentration.

Among the analyzed species, sulfate is clearly observed as the dominant component in the 2024 samples, accounting for the highest relative contribution across all filters.

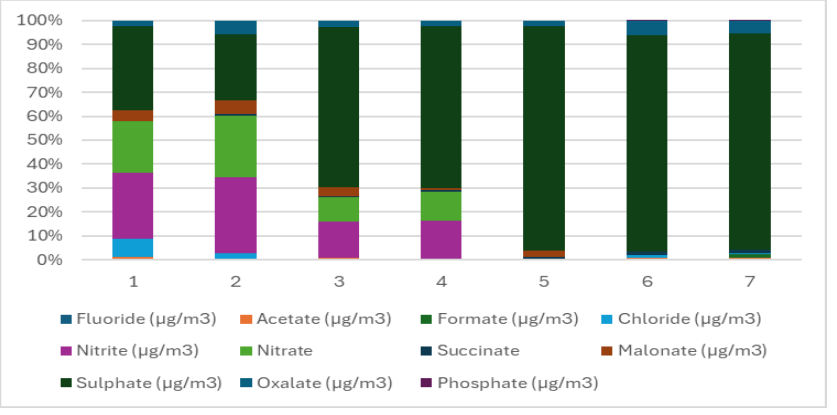

Figure 2. Relative composition of anions in $PM_{2.5}$ samples during April-May 2025

The relative contribution (%) of measured anions in $PM_{2.5}$ samples collected during 2025 is presented. Sulfate remains the dominant species across all samples, while other ions such as nitrate, chloride, and organic acids show variable but lower contributions. Values below detection limit (BDL) were treated as zero.

Conclusion

The investigation of the chemical composition of $PM_{2.5}$ demonstrated that the analysis of inorganic and organic species is essential for the identification of particulate matter sources through receptor models such as Positive Matrix Factorization (PMF). The results revealed that $PM_{2.5}$ is not composed solely of primary emissions, but it's largely formed through secondary transformations of primary gaseous pollutants, particularly via the oxidation of SO_2, NO_X, volatile organic compounds etc. This highlights the importance of monitoring primary

pollutions, as their abundance and reactivity largely determine the potential for $PM_{2.5}$ formation in the atmosphere. The presence of sulfates, nitrates and dicarboxylic acids indicate advanced oxidation of both inorganic and organic matter, while specific tracers such as levoglucosan, mannosan, and mannitol identify contributions from biomass burning, biological activity, and plant-derived sources. In addition, ions such as Na^+, Ca^{2+}, K^+, and NH_4^+ reflect combined influences from urban and natural sources, as well as secondary atmospheric processes involving chemical transformations.

Overall, this study demonstrates that $PM_{2.5}$ in urban environments represents a complex mixture arising from the interaction between atmospheric chemical processes and natural and anthropogenic sources. These findings emphasize the necessity of a multidisciplinary approach in the assessment and management of air quality.

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