

BOOK of ABSTRACTS

26th Congress of Chemists and Technologists of Macedonia

26th Конгрес на
Хемичари и
Технолози
на Македонија

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Сојуз на хемичарите и технолозите на Македонија
Society of Chemists and Technologists of Macedonia

**26th Congress of
SCTM
with International Participation**

BOOK of ABSTRACTS

**20–23 September 2023
Metropol Lake Resort
Ohrid, N. Macedonia**



Сојуз на хемичарите и технолозите на Македонија

Society of Chemists and Technologists of Macedonia

20–23 September 2023, Metropol Lake Resort, Ohrid

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**РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА
МИНИСТЕРСТВО ЗА ОБРАЗОВАНИЕ И НАУКА**

Ss. Cyril and Methodius University in Skopje



The 26th Congress of SCTM is a



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recognized event.

Dear Esteemed Colleagues and Participants,

It is with great pleasure that we present the Book of Abstracts for the 26th Congress of the Society Chemists and Technologists of Macedonia, which was originally scheduled for 2020 but, due to the global pandemic caused by Covid-19, has been rescheduled to this momentous occasion. As we gather here in the breathtaking backdrop of the historic city of Ohrid, Macedonia, we reflect not only on the innovative strides made in the field of chemistry and chemical engineering, but also on the unwavering spirit of resilience that has brought us together despite the challenges that have beset us. The world has experienced an unprecedented disruption, testing the limits of our adaptability and resolve. Yet, as chemists and chemical engineers, we have shown that the pursuit of knowledge and advancement knows no bounds. Our ability to transcend obstacles, adapt methodologies, and harness innovation in the face of adversity is a testament to the invincible human spirit.

Within the pages of this Book of Abstracts with 15 invited lecturers and almost 200 presentations from 174 authors and 570 coauthors from the region and much wider making it a really international meeting, you will find a diverse array of topics that reflect the vigor and dedication of the scientific community. From breakthroughs in green chemistry to pioneering developments in materials science, from the forefront of pharmaceutical research to cutting-edge advancements in nanotechnology, each abstract showcases the remarkable flexibility and ingenuity of our colleagues.

We extend our deepest gratitude to Prof. Jadranka Blaževska Gilev and Prof. Biljana Angjuševa, the organizers of this meeting who have dedicated all their efforts and time to make this meeting possible. Our gratitude goes to all members of the scientific and organizational committees who have been in the background making sure things flow seamlessly, especially to Assoc. Prof. Vojo Jovanov, Iva Dimitrievska and Marija Prosheva for managing the web page, Book of Abstracts etc. Also, our appreciation goes to the reviewers and all participants who have come together to give the substance to this Congress. Your commitment to the scientific endeavor underscores the importance of collaborative efforts in times of uncertainty. It is through the exchange of ideas, the sharing of knowledge, and the fostering of connections that we fortify ourselves and drive the progress of our disciplines. Furthermore, our deepest gratitude goes to the sponsors given at the end of the book and most of all to the Organization for the

Prohibition of Chemical Weapons who have always given their support to our meetings.

As we come together in Ohrid, we do so with renewed appreciation for the importance of shared experiences and face-to-face interactions. We eagerly anticipate the discussions, debates, and collaborations that will shape the future of our disciplines. Let us seize this opportunity to learn, inspire, and foster connections that will resonate long after the congress concludes.

We hope that this Book of Abstracts serves as a source of inspiration and a record of the remarkable work presented at the 26th Congress of SCTM. Let us seize this opportunity to celebrate not only our achievements, but also our resilience, determination, and enduring commitment to the pursuit of knowledge. Let us navigate the challenges together, and through our collective efforts, continue to inspire innovation that transforms the world in a positive way.

With warm regards,

Prof. Zoran Zdravkovski, president

Society of Chemists and Technologists of Macedonia

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The aim of this paper is to show the possibility of using waste materials, blends of (wood ash, fly ash, from thermal power plant, and metakaolin) for the production of alkali activated materials that can be used to purify wastewater from different kinds of pollutants such as heavy metals. Heavy metals are toxic, especially cadmium, so they must be removed from wastewater to prevent or minimize contact with the environment and humans. The synthesis of the alkali activated materials was performed by mixing solid precursors with a liquid alkali activator. Two- and three-component systems of wood ash, fly ash and metakaolin (wood ash/fly ash, wood ash/metakaolin, fly ash/metakaolin and wood ash/fly ash/metakaolin) were used as precursor materials. The alkali activator solution was a mixture of sodium silicate solution and sodium hydroxide solution of concentrations (6M and 12M). The characterization of alkali activated materials was studied by X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, Scanning electron microscopy and energy-dispersive X-ray spectroscopy (SEM/EDS). XRD measurements of investigated samples showed a characteristic halo between 18° and $35^\circ 2\theta$ with a dominant crystal phase of quartz. FTIR spectroscopy showed that the main vibration band of all investigated samples appeared between 1037-996 cm^{-1} , and corresponds to Si-O-Si/Si-O-Al bands. SEM/EDS analysis was used to determine the microstructure of the samples. The adsorption efficiency of the investigated alkali activated materials for removing cadmium ions from aqueous solution was tested under different conditions: initial concentration of cadmium ions in the range of 20-100 mg/l, pH values from 3 to 7 and mass of adsorbents from 0.02-0.05 g.

Keywords: wood ash, fly ash, metakaolin, alkali activated materials, adsorption, cadmium

n.b.: Manuscripts submitted to this Congress were not subjected to language or other corrections, except in some extreme cases. Authors are fully responsible for the content of their Abstracts.

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