

ANOTHER OUTSTANDING ACHIEVEMENT OF THE MACEDONIAN CHEMISTRY TEAM AT THE INTERNATIONAL CHEMISTRY OLYMPIAD. THIRD-BEST EXPERIMENTAL RESULT IN THE WORLD

Each year, the Macedonian chemistry team continues to reach new heights at the International Chemistry Olympiads.¹⁻⁸ This year marks a historic milestone: for the first time since Macedonia began participating at the International Mendeleev Chemistry Olympiad (IMChO), the team won two bronze medals. At the same time, the team achieved its best-ever results at the International Chemistry Olympiad (IChO), securing one silver medal, one bronze medal, and one honorable mention.

Even more remarkable was the performance of Mario Vančoski in the practical part of the IChO exam. His outstanding result placed him third overall in this segment, highlighting his exceptional experimental skills and placing Macedonia among the respected participants.

The success at the International Mendeleev Chemistry Olympiad – IMChO

From May 5th to 13th, 2025, the 59th Mendeleev Chemistry Olympiad took place in Belo Horizonte, Brazil.⁹ With 192 participants representing 39 countries, this year's event marked the largest edition since its beginnings. The Olympiad was jointly organized by the Chemistry Department of the Moscow State University (MSU) and the Melnichenko Foundation, with support from the Federal University of Minas Gerais as a partner host. Since 2023, the event has been held within the framework of the Decade of Science and Technology, as proclaimed by the President of the Russian Federation.

For the first time, Macedonia was represented by six individual students and one team leader (mentor). These participants were selected through a rigorous preparation program and a national selection competition. The official team members were (Fig. 1):

1.	Petar Mirčevski	IV year	Municipal High School “Mirče Acev”	Prilep
2.	Mario Vančoski	IV year	Municipal High School “Slavčo Stojmenski”	Štip
3.	Elena Živaljević	IV year	Private High School “Yahya Kemal College”	Skopje
4.	Teona Ana Georgievska	III year	Private High School “Yahya Kemal College”	Skopje
5.	Ivan Kostevski	IV year	Municipal High School “Slavčo Stojmenski”	Štip
6.	Daniel Hristov	III year	Municipal High School “Slavčo Stojmenski”	Štip

The participation of the Macedonian team at the 59th Mendeleev Chemistry Olympiad was partially supported by the Embassy of the Russian Federation in Skopje and the Lukoil company, marking their third contribution since 2019. Historically, the Macedonian delegation has often encountered various logistical and organizational challenges during both the preparation process and travel to distant locations. This year, such difficulties arose after the end of the competition on our way back to Macedonia. Complications related to airline communication and the connecting flights resulted in a departure delay of approximately 36 hours on the way back from Brazil.



Fig. 1. After the closing ceremony of IMChO-2025 in Belo Horizonte, Brazil. From left to right: Ivan Kostevski, Elena Živaljević, Mario Vančoski (**bronze medal winner**), Petar Mirčevski (**bronze medal winner**), Teona Ana Georgievska, Daniel Hristov, Miha Bukleski (team leader).

Regarded as one of the most difficult international chemistry competitions, the International Mendeleev Chemistry Olympiad (IMChO) consists of three parts: two theoretical rounds and one experimental round.¹⁰ The first theoretical round presents eight problems from various fields in chemistry. The second round, which is more advanced, is structured into five sections, each containing three problems. Students are required to solve one problem from each section. The experimental part consists of two or three tasks. Participants have five hours to complete them.

Following the completion of all three segments, two students of the Macedonian team succeeded in achieving scores sufficient to win their first Mendeleev medals. The winners of these medals were Mario Vančoski and Petar Mirčeski.

Participation at the International Chemistry Olympiad – IChO

Following the conclusion of IMChO, the attention shifted toward preparing the remaining eight students for the upcoming challenge that was the International Chemistry Olympiad (IChO) 2025. Due to the short time-interval between the two Olympiads and the need to comply with the application deadlines, the second selection process was conducted immediately prior to the team's departure to Belo Horizonte.

Out of the eight students engaged in an intensive training program, four were selected to represent Macedonia at IChO 2025 (Fig. 2). The final ranking was determined based on the cumulative points earned throughout the overall selection and preparation process:

- **Mario Vančoski**, 4th year student at Municipal High School “Slavčo Stojmenski”, Štip
- **Petar Mirčevski**, 4th year student at Municipal High School “Mirče Acev”, Prilep
- **Teona Ana Georgievska**, 3rd year student at Private High School “Yahya Kemal”, Skopje,
- **Elena Živaljević**, 4th year student at Private High School “Yahya Kemal”, Skopje.



Fig. 2. After the closing ceremony and the IChO-2025 in Duabi, United Arab Emirates. From left to right: Slobotka Aleksovska (mentor), Elena Živaljević, Mario Vančoski (**silver medal**), Petar Mirčevski (**bronze medal**), Teona Ana Georgievska (**honorable mention**), Miha Bukleski (mentor).

The 57th International Chemistry Olympiad (IChO) was held in Dubai, United Arab Emirates, from July 5th to 14th, 2025.¹¹ This year, Dubai hosted 354 student participants from 90 countries, making it the largest IChO event to date. Over 250 mentors, 140 members of the scientific committee, 100 members of the organizing committee, and more than 400 volunteers contributed to the realization of this extensive and meticulously coordinated competition.

The practical part of the competition took place in an open-hall venue, where all 354 participants conducted their practical work simultaneously. The experimental challenges demanded a high level of skills in synthesizing chemical compounds, performing both qualitative and quantitative analyses, including titrations, and developing TLC plates.

Considering the level of technical skill required and the limited resources available for the team's preparation, the results achieved by Macedonian participants were outstanding. Mario Vančoski delivered an exceptional performance, securing third place overall in the experimental category. Furthermore, Petar Mirčevski also attained a high ranking in the same segment, making his result the second-best among Macedonian competitors since the beginning of our participation. Their accomplishments reflect not only individual excellence but also the growing capabilities of the national team (Fig. 3).

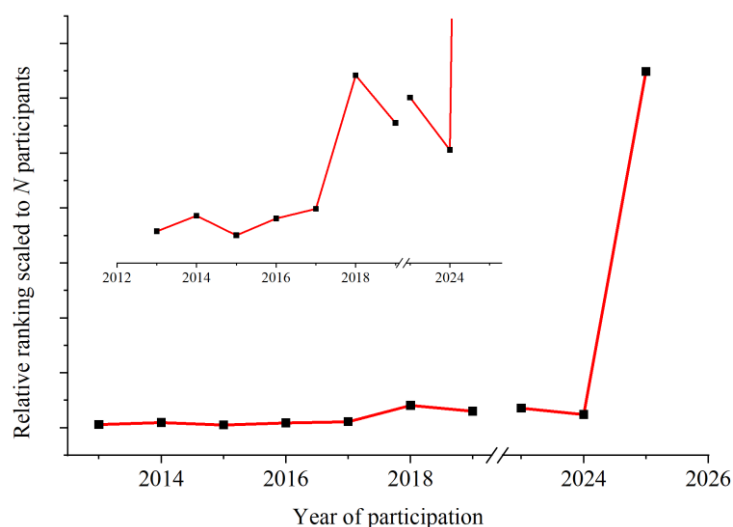


Fig. 3. Best relative ranking improvement over the years for the student with the highest score for the practical part, scaled to the number of participants and the maximal number of points won by the highest ranked student. The inset shows the achievements until 2024, where the improvements till that year can clearly be seen.

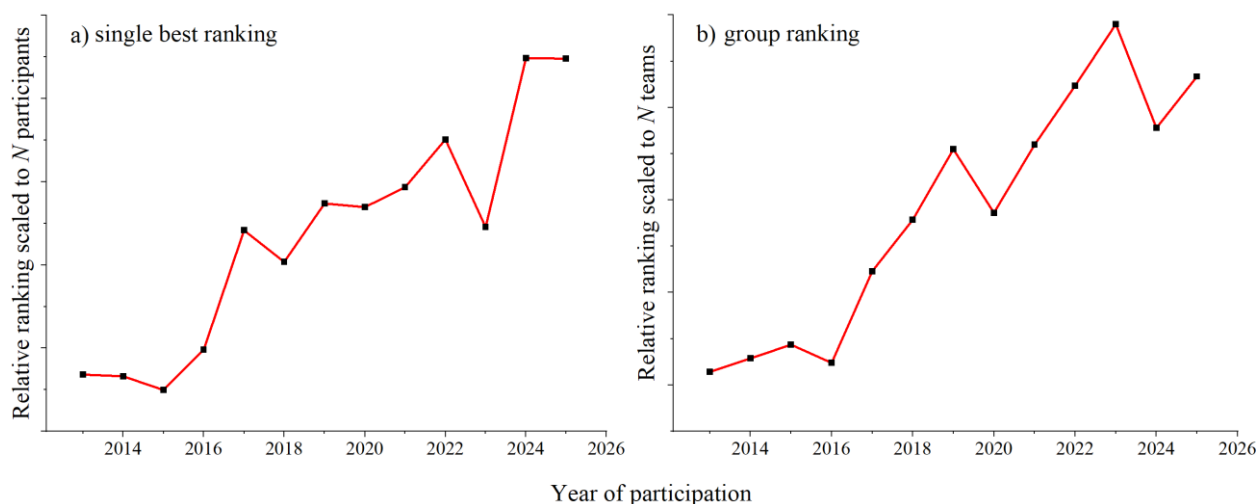


Fig. 4. Best relative ranking improvement over the years of the (a) student with the highest overall score; (b) cumulative results of all students, scaled to the number of participants and maximal number of points won by the highest ranked student.

The International Chemistry Olympiad is composed of two five-hour exams, one practical and one theoretical. This year's theoretical exam featured nine lengthy and challenging problems covering various fields of chemistry. Despite the complexity, our students handled the tasks well and achieved good results. They secured a silver medal and the second-highest team ranking overall, which is comparable to last year's outcome. One participant also achieved a notable individual placement, standing among the highest-ranked Macedonian competitors to date (Fig. 4).

The preparation and selection process for this year's Olympiad activities involved four professors and two teaching assistants from the Institute of Chemistry at the Faculty of Natural Sciences and Mathematics. As in previous years, three former IMChO and IChO participants contributed actively for the training and team selection. Also, several sponsors, municipalities, and individuals supported the successful participation in both Olympiads. Notably, for the first time, the SCTM received partial financial support from the Ministry of Education to cover travel expenses and participation fees for IChO.

The progress over the years has been obvious and can clearly be seen from Fig. 4a and b. From the very first participation at the international Olympiads, SCTM has continued to invest in laboratory facility development, and this investment has led to notable results. SCTM noted the weak points in the process of the preparations based on the first year's results and has worked actively in securing projects in order to overcome the gap. After the "Science and me" project by Johnson Matthey,¹² the Institute of Chemistry got a modernized laboratory for training talented students. Since great attention has been addressed on the weak points, the Macedonian teams have consistently delivered strong performances in the practical part of the competition. These outcomes suggest that targeted investment, strategic leadership, and alignment with the evolving structure of the IChO, combined with continued communication with international mentors and delegations, can lead to sustained improvement.

The team's achievements to date include 2 silver medals, 14 bronze medals, and 3 honorable mentions at IChO, as well as 4 bronze medals at IMChO. This year's performance at IMChO marked a high point in students' results, further underscored by the third-best individual experimental ranking globally.

Conclusion

The participation of the Macedonian chemistry team in IMChO and IChO 2025 highlights ongoing efforts to strengthen the country's presence at international science competitions. The

results achieved this year, marked by multiple medals and an exceptional experimental ranking, are a reflection of the commitment from those involved in the training (professors, assistants, former Olympiad participants) as well as the support from both the public and private sectors.

The evolution in team preparation, logistical coordination, and laboratory resources has been evident, particularly through the steady improvements in practical problem-solving performance. Looking ahead, the experience gained through this year's participation provides a strong foundation for further development. Continued investment in infrastructure, mentorship, and capacity-building, combined with a stable and transparent support system, will be essential for sustaining and enhancing the achievements of the Macedonian team at the international competitions.

References

- (1) M. Bukleski, Achievements of the Macedonian Olympiad Team at the International Chemistry Olympiad, *Maced. J. Chem. Chem. Eng.* **36** (2), 291–294 (2017), DOI: 10.20450/mjce.2017.1347.
- (2) M. Bukleski, 50th Anniversary of the International Chemistry Olympiad successful for the Macedonian Olympiad team, *Maced. J. Chem. Chem. Eng.* **37** (2), 231–234 (2018), DOI: [10.20450/mjce.2018.1662](https://doi.org/10.20450/mjce.2018.1662).
- (3) M. Bukleski, Macedonian Olympic Team with total of three bronze medals in the International Year of the Periodic Table, *Maced. J. Chem. Chem. Eng.* **38** (2), 307–310 (2019), DOI: 10.20450/mjce.2019.1977.
- (4) M. Bukleski, Great Achievements of the Macedonian Olympic Team in extraordinary conditions, *Maced. J. Chem. Chem. Eng.* **39** (2), 281–285 (2020), DOI: 10.20450/mjce.2020.2228.
- (5) M. Bukleski, The Macedonian Team Continues the Success at the International Chemistry Olympiad 2021, *Maced. J. Chem. Chem. Eng.* **40** (2), 349–351 (2021), DOI: 10.20450/mjce.2021.2443.
- (6) M. Bukleski, The first female student from Macedonia to win a medal at International Chemistry Olympiad, *Maced. J. Chem. Chem. Eng.* **42** (2), 293–295 (2023).
- (7) M. Bukleski, The best achievement of the Macedonian chemistry team at the International Chemistry Olympiad 2023, *Maced. J. Chem. Chem. Eng.* **42** (2), 297–300 (2023).
- (8) M. Bukleski, Macedonian chemistry team makes history with its first silver medal at the International Chemistry Olympiad, *Maced. J. Chem. Chem. Eng.* **43** (2), 309–313 (2024).
- (9) International Mendeleev Chemistry Olympiad for School Students, <https://mendeleevolympiad.org/en> (last accessed 17.07.2025).
- (10) V.G. Nenajdenko, A.K. Gladilin, M.K. Beklemishev, *The Most Interesting in Chemistry, Mendeleev Olympiad, Practical problems 2002-2018*, PublIt, Moscow, 2019.
- (11) International Chemistry Olympiad, <https://www.icho2025.ae/> (last accessed 16.07.2025).
- (12) Преку проектот „Науката и јас“ од Џонсон Мети, обновена студентска лабораторија на Институтот за хемија, https://sctm.mk/Naukata_i_jas.html (last accessed 20.07.2025).

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