

Chemistry in Paris and all around the world in 2019!

Paris will celebrate chemistry in 2019,
with the **IUPAC 47th World Congress**
from the 7th to the 12th of July 2019,
and the 51st International Chemistry Olympiad,
from the 21st to the 30th of July 2019.

UNESCO declared 2019 the International Year of the Periodic Table! 1869 is regarded as the year Dmitri Mendeleev discovered the Periodic System. 2019 will be the 150th anniversary of the Periodic Table of Chemical Elements! The International Year of the Periodic Table of Elements will be a worldwide initiative highlighting the importance of the Periodic Table in science, technology, and in the sustainable development of humankind.

**Because chemistry is so important,
the 2018-2019 French school year
will be entitled “The Year of Chemistry,
from Primary School to University”!**

Researchers, engineers, teachers and students will organize a flurry of events and lessons in schools, universities, chemical companies and museums, in order to highlight the role of chemistry, both in academic science and in industry, through its contributions to technological, economic and sustainable development.



Paris, city of science, city of students

Paris is the largest student city in France and the second largest one in the world. Each year, more than 600,000 undergraduates study in the 7 universities located in the centre of France's capital city and in the 10 universities of the Ile-de-France region. Thanks to the attractiveness of the capital, 14% of the city's students have crossed borders to come and study here. Not only can a quarter of France's universities and its most prestigious schools be found in the Paris region, but also 40%

of its national research potential, thanks to a high concentration of technology companies (corporate groups, SMEs and start-ups) and internationally renowned competitive clusters. Two of the 20 most prestigious French Chemistry schools, Chimie ParisTech and ESPCI, have their campus in the heart of Paris. French and foreign students can also benefit from the excellent curricula provided by the École Polytechnique and the École Normale Supérieure.

making science together!

Reference partners

The Foundation of the “Maison de la Chimie”

aims to contribute to the progress of chemical science in all of the academic and industrial fields of research and application in order to facilitate dialogue between the general public, researchers, teachers and industrialists, and to promote the use of chemistry in the interest of people, society and the environment.

<http://www.maisondelachimie.com>

The “Union des industries chimiques”, UIC

is the professional organisation of chemical companies in France. It is active on local, national and European levels and plays a federating role, promoting sustainable growth of the chemical industry and of French industry in general. UIC also promotes the image of chemistry and emphasizes the eminent role chemistry has to play in our complex world.

<http://www.uic.fr>

The French Chemical Society, SCF

brings together thousands of French chemists, including researchers, teachers, industrialists and students. SCF's purpose is to represent French chemists, promote their work, and publish scientific information through its website, its newsletter and its monthly publication called “l'Actualité Chimique”.

<http://www.societechimiquedefrance.fr>

www.icho2019paris.com

Facebook : IChO2019 Paris

Twitter : IChO2019

Instagram : IChO2019



**POUR L'ÉCOLE
DE LA CONFIANCE**



© Philippe Devernay / MEN

Jean-Michel Blanquer
Minister of Education

It is a great honour for France to host the 51st International Chemistry Olympiad, and I am very happy to see the Ministry of Education directing the organisation of this important event. The development of science as a whole, and of chemistry in particular, is an essential step in the technological and social progress of humanity and in the protection and the future of our planet. That is why I place my faith in the younger generation of scientists who, I know, will rise to the challenges of the 21st century, and lead the ecological transition and digital revolution that will ensure a more balanced world.

The three hundred and more IChO candidates, from eighty countries on five continents will “make science together”. As well as chemistry connects a variety of scientific fields, such an event also helps to sustain the international scientific community and to build new partnerships that go beyond borders. The 51st edition of The International Chemistry Olympiad will also allow young scientists to discover our capital city and its surroundings, and to meet key players from the French and international chemistry communities. They have worked with the Ministry of Education to ensure the success of this event, and I

want to thank them very warmly for their cooperation. Our steering committee will undoubtedly make IChO in Paris an enriching and truly memorable event.

In 2019, Paris will be at the centre of international chemistry. Shortly before the IChO opens, the 47th IUPAC World Congress, will celebrate the centenary of IUPAC in Paris. Furthermore, on the 29th of January 2019 “the International Year of the Periodic Table” (IYPT) will be launched at the UNESCO headquarters to celebrate the 150th anniversary of Dmitri Mendeleev's paper on his periodic system. In honour of these events the French 2018-2019 school year has been declared “The Year of Chemistry, from Primary School to University”. The objectives are first and foremost to encourage pupils and students to discover or explore chemistry but also to introduce chemistry to the general public, to audiences in primary and secondary schools, universities and Grandes Écoles, and through museums or centres of scientific culture.

We look forward to participants in the 51st International Chemistry Olympiad experiencing ten remarkable days of science and true cultural exchange in the heart of Paris, the capital of our country, with its proud tradition of warmth and hospitality.





Jean-Pierre Sauvage

Nobel Prize in Chemistry 2016,
Honorary President of the Scientific Committee

© C. Schröder, UNSITRA

International Chemistry Olympiads, July 2019

As the Honorary President of the Scientific Committee of these Olympiads, I am happy to greet you all and to welcome the many participants and their delegations. It is indeed wonderful that such an event can bring together hundreds and hundreds of young people who are full of passion for chemistry and who devote much of their time to this beautiful and important science.

Paris is certainly a very special location when it comes to chemical science. Although it is virtually impossible to rank scientists according to the importance of their contribution to science, it must be recognised that Antoine-Laurent de Lavoisier occupies a special place since he is one of the fathers of modern chemistry. Lavoisier was born in Paris (1743). It is also in Paris that he was beheaded in 1794, just a few years after he published his "Traité Élémentaire de Chimie" ("Elementary Treatise of Chemistry").

This opus was literally revolutionary in the sense that it presents chemistry as a real science, with rules and the quantitative treatment of various phenomena.

Today, chemical industry is everywhere in our surroundings and it plays a crucial role in our everyday life. Major French chemical companies have always played and continue to play an important role today. They have strong international influence in several fields of activity.

There is no doubt that the serious environmental problems that mankind has to face today will have to be resolved in the near future, at least in part. It is with chemistry, along with other sciences and technologies, that these difficulties will be resolved through the new mild techniques that industry is in the process of developing with the help of researchers from various origins and cultures. This multinational and multi-science approach should ensure the essential transition towards environmentally friendly behaviour.

France has a long tradition of advanced teaching and research in chemistry. The dual teaching system involving Universities and "Grande Ecoles" (or Engineering Schools) opens up a wealth of possibilities for motivated students. This diversity of opportunities is reflected in the research orientations of these institutions: often basic-science oriented in Universities, it can use a more applied approach in Engineering Schools.

Finally, I would like to stress that the Olympiads represent an important event directed at you, the young people interested in science. It is indeed reassuring to observe that many young women and men have a rational approach to the world and have a strong respect for science and knowledge, recognising that facts must predominate over opinions.

I would like to wish you all a very pleasant moment in Paris on the occasion of this unifying and important event. It is undeniably a competition but I am confident that it will be a fair and friendly one.



Pierre-Gilles de Gennes High School, host of the two scientific exams

The NSPCB (National School of Physical Chemistry and Biology) is a state school founded in the 1950s that trains laboratory technicians in different scientific fields. The current building situated at the heart of the 13th district of Paris was erected at the beginning of the 1970s and provides a spectacular view of the city. The school became a general and technological high school in 2010: it is now called NSPCB – Pierre-Gilles de Gennes High School. The school welcomes 2000 students divided into two sections: one half at the high school (STL, S, ST2S) and the

other half for post-graduate studies (CPGE, BTS, Professional Degree) with European sections and established partnerships with a number of universities (ENS Cachan, Paris VII). The building is home to a scientific equipment complex that is unique in France, and that houses equipment for engineering science, biology and chemistry (CPG, HPLC, RMN, CPG-SM...) as well as semi-industrial equipment (distillation and 10m high extraction columns, 30 to 50L reactors). The school was also used as a film location (Hidden, by Michael Haneke).

ICHO France 2019: Programme preview, July 2019



ICHO
51st — International
Chemistry Olympiad
France — Paris — 2019

The History of the "ICHO 2019" logo

When non-chemistry students show us
what they think about chemistry!

Rather than hiring a professional graphic designer, the Ministry of Education offered a second-year graphic design class from the Estienne School in Paris the opportunity to work on the IChO France 2019 graphic charter. With the help of their teachers Raphaël Lefevre and Sophie Perret, students worked on 20 individual and group projects. After two project reviews, the jury and the DELCOM (Ministry of Education Delegation for Communication) selected the project proposed by Coline Vignaud.

"Chemistry has its own universal language shared by all chemists, a language that brings them together in their work and sets them apart from the uninitiated. The IChO embodies a project built by chemists for chemists, so the decision to select from the chemistry graphic universe for the creation of its logo seemed an obvious one.

The letters of the framed acronym remind us of the periodic table of Mendeleev, one of the fundamental pillars of chemistry. The logo was then associated with a contrasted colour gradient. These gradients come from my own high school chemistry lessons, when I was studying acidity with pH paper sensors! The graphic charter as a whole is based on the pre-existing chemistry graphic, with all of its wealth of meaning."

This language based on the Periodic Classification of Elements is being honoured in 2019 by UNESCO's "International Year of the Periodic Table". The end result is a logo reminiscent of the Classification of Elements but also including images of open windows which mirror one of the goals of the IChO: the successful bringing together and exchanges between the 80 national delegations participating in the event. Stimulating, graphic, clear, this logo can be understood by everybody. Coline Vignaud benefited from a month-long internship at the DELCOM in July 2017 which allowed her to pursue her work and extend it to the communication about the operation "2018-2019: The Year of Chemistry, from Primary School to University".

The Ministry would like to thank all of the students who participated in this educational project, their teachers Raphaël Lefevre and Sophie Perret for their valuable input, and extend hearty congratulations to Coline Vignaud for her crucial and highly appreciated contribution!



From Interlocking Rings to Molecular Machines

Jean-Pierre Sauvage

Institut de Science et Ingénierie Moléculaire (ISIS) - University of Strasbourg
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The area referred-to as "Chemical Topology" is mostly concerned with molecules whose molecular graph is non-planar, i.e. which cannot be represented in a plane without crossing points. The most important family of such compounds is that of **catenanes**. The simplest catenane, a [2]catenane, consists of two interlocking rings. **Rotaxanes** consist of rings threaded by acyclic fragments (axes). These compounds have always been associated to catenanes although, strictly speaking, their molecular graphs are planar. Knotted rings are more challenging to prepare. One of the most spectacular topologies in this respect is the trefoil knot. Our group has been much interested in knots and, in particular, in their properties in relation to coordination chemistry or chirality.

Since the mid-90s, the field of **artificial molecular machines** has experienced a spectacular development, in relation to molecular devices at the nanometric level or as mimics of biological motors. In biology, motor proteins are of utmost importance in a large variety of processes essential to

life (ATP synthase, a rotary motor, or the myosin-actin complex of striated muscles behaving as a linear motor responsible for contraction or elongation). Many examples published by a large number of highly creative research groups are based on complex rotaxanes or catenanes acting as switchable systems or molecular machines. Particularly significant examples include a "pirouetting catenane", "molecular shuttles" (Stoddart and others) as well as multi-rotaxanes reminiscent of muscles. More recent examples are those of multi-rotaxanes able to behave as compressors and switchable receptors. The molecules are set in motion using electrochemical, photonic or chemical signals. Particularly impressive light-driven rotary motors have been created by the team of Feringa.

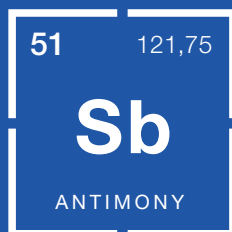
Finally, potential applications will be mentioned as well as possible future developments of this active area of research.

J.-P. SAUVAGE, "From Chemical Topology to Molecular Machines", *Angew. Chem. Int. Ed.*, **2017**, 56, 11080.

Periodic ID card of the day

51 . Antimony

Discovery: 300 BC
by Babyloniens
Family: Pnictogen
Period: 5th



A few of its properties

Its name means "not alone" in Latin, and indeed antimony is often combined with another element. Its most abundant ore is stibine (Sb_2S_3), that gave the symbol Sb. Addition of antimony to lead hardens the latter; Gutenberg used such an alloy to create clear and reusable typefaces for printing. In ancient times, antimony compounds were powdered and used as cosmetics. Today, it is mainly used in its oxide form, in lead batteries (30%), from which it is well recycled, flame retardants (50%), but also in fireworks! Its production is 170kt/year.

making science together!

2018-2019 in France: School year of Chemistry, from primary school to university



IYPT2019, IUPAC Congress, 51st IChO in Paris: the French 2018-2019 school year has been declared "The Year of Chemistry, from Primary School to University", in order to encourage pupils and students to discover or explore chemistry but also to introduce chemistry to the general public, with audiences in primary and secondary schools, universities, and through museums, centers of scientific culture and also chemical companies.

Researchers, engineers, teachers and students organized many events or lessons in schools, universities, chemical companies and with museums, in order to highlight the role of chemistry in academic science, in industry and its contributions to technological, economical and sustainable development.

Many events of this "year of chemistry" are of course relevant to IYPT2019! For instance, we can mention the "Mendeleev contest" which is organized by the French physics and chemistry teachers' society, and gathers 437 candidates from all types of schools and colleges. On Avogadro's day (6th February, at 10.23), the French Ministry of Education and Youth turned into a short-lived chemistry lab, welcoming students who allowed pupils from primary and low secondary schools to do chemical experiments on dyes, pigments and aromas.

icho2019.paris



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Twitter: @icho2019paris

Instagram: @icho.official

POUR L'ÉCOLE
DE LA CONFIANCE

1 catalyzer



© Philippe Devernay / MEN

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IChO
51st — International
Chemistry Olympiad
France — Paris — 2019



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Reference partners

Representing a French leading industry

France Chimie is the professional body that helps to develop and enhance the competitiveness of the chemical industry and its applications in France. It takes action at regional, national and European levels, bringing stakeholders together and actively driving chemical industry's sustainable development in France.

French chemical industry, the 2nd largest in Europe, employs 167,000 persons in 3,300 companies.

France boasts several major chemical industry parks that benefit from some

of the world's top infrastructures, which put them in direct contact with both European and global markets.

For further information, please visit: www.francechimie.fr

In addition to the support of the national node of France Chimie, several regional France-Chimie support the IChO as well: France Chimie Île-de-France (see below), France Chimie Nord-Pas-de-Calais and France Chimie Picardie-Champagne-Ardennes!



"Engaged entrepreneurs!"

France Chimie Île-de-France, affiliated with France Chimie, serves Chemical Industry's interests and represents its companies on a regional level.

Île-de-France chemistry is employing more than 50,000 people, half of whom are women, representing an important part of national chemical industry. These companies are committed to improve health, safety and to protect the environment by providing solutions to the biggest technological issues such as global warming or energy transition.

They are also concerned to pass on to younger generations their passion for chemistry, an innovative science that contributes to the well-being of each and every one of us in our daily life. Therefore they developed a strong bond with colleges and schools, leading young people to Chemistry and allowing them to enhance their taste for this science.

Île-de-France chemical companies are very tied to the "Olympiades de la Chimie" (French national contest in chemistry) and have been successfully supporting it for the last 35 years. Naturally they put the same energy to promote the IChO.

Besides, France Chimie Île-de-France has joined the "Lavoisier challenge" to choose four items, representing the works of this great chemist, made by art school students. You will find one of those items in your welcome bag!

We are thrilled and proud of the enthusiasm around this event, that shows the strong interest of young people in Chemistry and the tremendous commitment of their teachers, all around the world.

Long live the IChO!

Gilles le Maire
Executive Director



The Foundation's Goals in Education

Chemistry can be found in all sectors and as such it is important that the Foundation's endeavors and initiatives be well known. The Foundation acts in many ways, some of them target students and teachers more specifically. Among them, we can highlight the Conferences "Chemistry and..." and the "Mediachimie.org" web site.

"Chemistry and...", conference cycles, are organized and funded by the Foundation and aim to:

- Spread the current and estimated contribution of science in the future
- Address the public questionings with honesty and the highest scientific rigor expected
- Open students to professions and innovation
- Promote cross-border exchanges between Industries and Academies in the same field, since the conferences have a transdisciplinary focus.

Each conference is recorded, broadcasted on the Foundation's website and can be found in bookshops: <https://maisondelachimie.com>

"Mediachimie.org", the website founded and financed by the Foundation, is the library dedicated to chemistry in all its aspects such as innovation, trainings, teachings and professions. It is a wealth of resources as the Foundation invests in high-quality tools and scientific resources to ensure that teachers and students are provided with everything they need to complete their education:

<http://www.mediachimie.org>



Fondation de la Maison de la Chimie

French Chemical Society

Created over 160 years ago, the French Chemical Society is a scientific society. It is the network of French chemists, and it connects them to the worldwide chemists' community (researchers, teachers, scholars and students, engineers...). Our missions are to promote the image of chemistry to a wide audience and to defend its power and benefits. To achieve these objectives, we organize and support international conferences and interdisciplinary

events. The monthly journal, L'Actualité Chimique, and the bimonthly newsletter, SCF info en ligne, are platforms to inform and share with our community. The French Chemical Society builds awareness toward public authorities and promotes initiatives of the Young Chemists Network, in particular in the field of sustainability.

www.societechimiquedefrance.fr
@reseau_SCF



Société Chimique de France
Le réseau des chimistes

DAY 2: Monday, 22 July

STUDENT

- 9:30 a.m. – 12:00 a.m.
Opening ceremony
› Maison de la Chimie
- 12:00 a.m. – 2:00 p.m.
Welcome cocktail
› Maison de la Chimie
- 2:30 p.m. – 5:30 p.m.
Guided tour of the Louvre
Museum and the Tuileries
garden

MENTOR

- 9:30 a.m. – 12:00 a.m.
Opening ceremony
› Maison de la Chimie
- 12:00 a.m. – 1:30 p.m.
Welcome cocktail
› Maison de la Chimie
- 2:30 p.m. – 3:45 p.m.
Lab inspection
› Pierre-Gilles de Gennes
Highschool
- 4:30 p.m. – 6:30 p.m.
Discussion with authors of
the experimental tasks
- from 8:00 p.m.
Jury meeting n°1



Maison de la Chimie

Birthday

Ali Shalanzada Azerbaidjan Student

Meteo



32°C
sun

making science together!

Chemistry of painting

Until the 19th century, the ultramarine blue pigment was extracted from lapis lazuli, a semi-precious stone from Afghanistan; the extraction process was long and difficult, which made this pigment particularly expensive! Consequently, it was mainly intended for the painting of religious scenes in the illuminations of the Middle Age. The depth and intensity of its colour prompted the National Chemical Society to open a competition in 1824 to synthesize an ultramarine blue at a lower cost. The laureate was Jean-Baptiste Guimet, a French chemist from Lyon. We now know that the essential constituent of ultramarine blue is Lazurite ($(\text{Na}, \text{Ca})_3[(\text{AlSiO}_4)_3(\text{SO}_4)_2\text{S}_2\text{Cl}]_2$). What is obvious in seeing this formula is that it does not contain any copper and therefore the origin of the Lazurite colour remained a mystery... even for its inventor. It has only been known since 1970 that the colour is due to the trisulphide radical anion: $\text{S}_3^{\bullet-}$ trapped in an aluminosilicate zeolite. If you want to observe the intense colour of the trisulphide radical anion, we recommend the famous painting: "Anthropometry of the Blue Age" from French painter Yves Klein.

Dow, a leader in materials science

With more than 120 years of successful R&D, Dow's ambition is to be the most **innovative, customer-centric, inclusive** and **sustainable** materials science company in the world – one that is driven by world-class talent and enabled by leading products and technologies. Our core values of integrity, respect for people and protecting our planet guide each of our actions and behaviors. We are convinced that STEM are essentials to achieve this vision and as such, we are proud to partner with the 2019 IChO.




icho2019.paris



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 Twitter: @icho2019paris

 Instagram: @icho.official

POUR L'ÉCOLE
DE LA CONFIANCE

2



catalyzer

Welcome to Paris!



Yesterday, all participants arrived in Paris to take part in the 51st International Chemistry Olympiads.

I^TC^hO
51st — International
Chemistry Olympiad
France — Paris — 2019

The Louvre and Tuileries



The medieval Louvre is the work of Philip II Augustus, who built in the twelfth century a fortress with a dungeon (currently under the square court) to defend Paris. For several centuries, successive kings enlarged the Louvre castle, but it is François the 1st who, in 1527, decided to build a modern palace in the spirit of the Renaissance.

From 1564, Queen Catherine de Medicis favored the construction of a new palace with a large pleasure garden: the Tuileries Gardens. Abandoned by Louis XIV in favor of Versailles, the Louvre is quickly deserted.

During the French revolution, the Louvre is preserved despite being a symbol of the monarchy to accommodate the treasures confiscated to the clergy.

Napoleon III decided to organize the 1855 Universal Exhibition in Paris and asked that the Louvre's building was completed. But in 1871, a fire destroyed the Tuileries and the north wing of the Louvre: the new republican government rebuilt the Louvre and gave it its current form. Finally, in 1989, François Mitterrand added the famous and at the time controversial glass pyramid, which now leads to the National Museum.

If Paris were told to us in a few words



The tribe of Parisii settled in the 3rd century BC on the island of the city, fortified it and called it Lutetia. During the barbarian invasions Clovis seized Paris and made it the capital of the kingdom of the Franks. The strategic position of Paris, between fluvial and land trade, will greatly enrich and develop the city throughout the Middle Ages. It became the richest city in Europe, as evidenced by the Notre Dame Cathedral and the Holy Chapel built under Louis IX. Louis XIII created new fortifications to allow the city to expand: new districts replaced the countryside, but the structures of the city were still those of the Middle Ages and Paris became an overpopulated and unhealthy city. During the French Second Empire, Paris was transformed and given its current aspect, Napoleon III entrusting Georges Haussmann with the direction of the New Paris building from 1853 to 1869. Paris was relatively spared by the two world wars destructions, which preserved a unique and coherent architectural ensemble making Paris – according to the French – the most beautiful city in the world.

Periodic ID card of the day

53 . Iodine

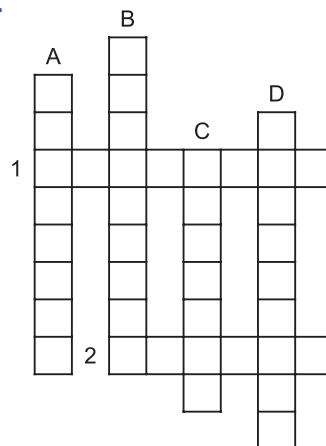
Discovery: 1811
by B.Courtois (Paris, France)
Family: Halogen
Period: 5th

53	126.90
I	
IODINE	

A few of its properties

Iodine is mostly found as I⁻ or IO₃⁻ and I₂, a bright black solid that easily sublimates into a violet gas. Iodide ions are essential for the synthesis and functioning of thyroid hormones. Lack of iodine is the leading cause of mental retardation in the world. Natural iodide tablets are used to saturate the thyroid gland in the event of a nuclear accident. In aqueous solutions, iodine compounds are used as contrast agents in medical imaging. Iodine is also used as a catalyst in the industrial production of acetic acid and some polymers.

Game of the day



The names of some elements

A) derived from the latin name of Paris, was also named Cassiopeium when discovered

B) the heaviest element in the table formally named in 2016 by UIPAC

C) so famous that a valley bears its name

D) previously named Glucine because of the sweet taste of its salts

1) previously named Wolfram as you can see from its symbol

2) derived from the daughter of Tantalus because of its similarity with Tantalum

Vocabulary



Bienvenue !	Welcome!
Bonjour	Hello
Bonsoir	Good evening
S'il vous plaît / s'il te plaît	Please
Merci	Thanks
De rien	You're welcome
Au revoir	Goodbye

Arrivals in Paris!



Students gave their phone away for the competition. They will get them back at the Reunion party, on Friday 26 July!

Students and guides are meeting and getting to know each other!



Students are arriving at their accommodation, at the CIS Paris Kellermann.

DAY 3: Tuesday, 23 July

STUDENT

MENTOR

10:00 a.m. – 3:00 p.m.
Guided tour of Versailles
Palace and its garden
Picnic in the gardens

4:30 p.m. – 6:00 p.m.
Presentation of safety
measures
› Pierre Gilles de Gennes
Highschool

from 7:00 p.m.
Diner/Manipulation of
some material useful for
the practical exam
› Housing place garden

All day long
Translation
of experimental exam

7:00 p.m. – 12:00 p.m.
Happy hour



Château de Versailles

Birthday

Milana Azerbaidjan Mentor

Meteo



37°C
sun

making science together!

Chemistry in the time of Louis XIV... or the “pre-Chemistry” period

Under the reign of Louis XIV, the scientists of the time were engaged in the practice of alchemy rather than chemistry! The most emblematic goal of alchemy was the making of the philosopher's stone, or “great work”, supposed to be able to transmute common metals into gold, or silver. Other aims of alchemy were essentially therapeutic, with the search for the elixir of immortality and Panacea (universal medicine). The alchemists believed that there were four elements: water, air, earth and fire, and three principles: sulfur, mercury and salt. By combination they could, with the aid of hermetic theories, explain the formation of the objects which surrounded them. There was also a fire-like element: the phlogiston supposed to represent the lost part of combustion. During the 18th century, a Frenchman, Antoine Laurent de Lavoisier, thanks to experiments of unprecedented precision, stated that “water is not a simple substance, it is capable of decomposition and re-composition”, and therefore that: “nothing is created, nothing is lost, everything is transformed”. He is regarded as the father of modern chemistry. Unfortunately for him, he was a great scientist in a troubled time and was executed during the French Revolution in 1794.

Sanofi

Sanofi is dedicated to supporting people through their health challenges. We are a global biopharmaceutical company focused on human health. We prevent illness with vaccines, provide innovative treatments to fight pain and ease suffering. We stand by the few who suffer from rare diseases and the millions with long-term chronic conditions. With more than 100,000 people in 100 countries, Sanofi is transforming scientific innovation into health-care solutions around the globe. Sanofi, Empowering Life.



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POUR L'ÉCOLE
DE LA CONFIANCE

3



catalyzer

The IChO 2019 are now opened!



Yesterday, the Opening Ceremony of the IChO 2019 took place at the Maison de la Chimie, located at the heart of Paris. Let the IChO 2019 begin!

IChO
51st — International
Chemistry Olympiad
France — Paris — 2019

How the Hall of Mirrors came into being



In 1660, Louis XIV decided to develop a French national industry for lace, cloth, glasses, mirrors and silk stockings. At that time, even the smallest mirror was a real luxury, making mirrors was very difficult and expensive! The most famous glass blowers were all Venetians, and their secrets were well-guarded.

From 1664 to 1666, French secret agents attracted Venetian glass blowers to France with promises of wages and special justice, in order to create the Royal Mirror Factory. Their secret of glass fabrication finally known, the French Royal Manufacture then

joined forces with a Norman industrialist and produced the 357 mirrors for the Hall of Mirrors in Versailles. It was the beginning of a French monopoly in Europe for almost a century.

At that time, the master blowers produced a cylindrical glass bottle that was up to 1 m long. This bottle was then cut and unfolded hot, and rolled on a metal plate with a copper cylinder.

As of today, you can still admire their work, since 70% of the hall's mirrors are still the original parts, blown from 1678 to 1684.

The International University Campus in Paris (or IUCP)



The mentors of the 51st IChO are housed in the International University Campus in Paris... But what is this place?

Ever since the Middle Ages, the University of Paris has always welcomed students from all over the world, in what they used to call the "College of Nations". When the International University Campus in Paris (a private foundation, recognized as being in the public interest) was created in 1925, it continued this tradition of welcome.

The International Campus is endowed with an exceptional built architectural heritage, characterised by the diversity of styles, which combine national references and modernist design. Constructed between 1925 and 1969, the 40 residences of the International Campus bear witness to the architectural diversity of the 20th century.

Since its inception, the founders of the International Campus have wanted to contribute to the creation of peace in the world by creating a place dedicated to exchanges between people from different nations. Nowadays, these are still the core ideals of the Campus and many cultural events carry on the tradition of the founders' ideals.

Periodic ID card of the day

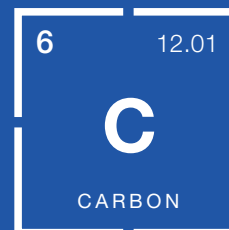
6 . Carbon

Discovery: exact date unknown

by prehistoric men

Family: Crystallogens

Period: 2nd



A few of its properties

No need to introduce Carbon, the most famous element: main constituent of organic matter, whose degradation products are coal and oil, it is also blamed as mainly responsible for global warming in the form of CO₂... Carbon's native states are graphite (C sp², conductive) and diamond (C sp³, metastable, insulating, the hardest natural mineral), but can also be found and used in newly discovered polymorphic graphite varieties: fullerenes, carbon nanotubes and graphene. Used in dating with ¹⁴C, Carbon is also full of promises for the future!

Game of the day

Funny mnemonics for the periodic table

The sentence "Little Ben became Charlie's number one fighting nemesis" helps English students memorize the first elements of the periodic table. Try to recognize the language and translate more examples below. Ask other delegations for help and discover more funny mnemonics!

- Lili bebía Barrilitos cada noche ó frío Nescafé
- Liebe Betty bitte (c)komm nicht ohne frische Nelken
- Lily bêchait bien chez notre oncle François Nestor

Answer – Game of Monday, 22 July

A) Lutetium - B) Oganesson - C) Silicon - D) Beryllium - 1) Tungsten - 2) Niobium

Vocabulary



Petit-déjeuner	Breakfast
Déjeuner	Lunch
Dîner	Dinner
Bon appétit !	Enjoy your meal!
Manger	To eat
Boire	To drink
Santé	Cheers!
Mettre de l'eau dans son vin	Literally: Put water in his wine Meaning: To moderate oneself

IChO 2019 Opening Ceremony

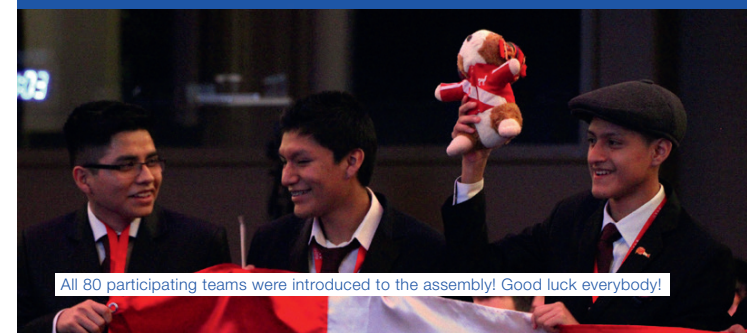


Jean-Michel Blanquer, French Minister of National Education and Youth officially declared the 51st edition of the IChO opened!



What an honour to assist to one of Jean-Pierre Sauvage's conference, Nobel Prize in Chemistry in 2016 and Honorary President of the IChO 2019 Scientific Committee.

The assembly had the chance to assist to interactive conference and cultural breaks!



All 80 participating teams were introduced to the assembly! Good luck everybody!

DAY 4: Wednesday, 24 July**STUDENT****MENTOR**

9:30 a.m. – 2:30 p.m.
Practical exam
› Lycée Pierre Gilles de
Gennes Highschool

5:00 p.m. – 7:30 p.m.
Free time/Animation

9:00 a.m. – 12:00 p.m.
Free visit of Palais de
la découverte

2:00 p.m. – 6:00 p.m.
Discussion with authors
of the theoretical tasks

From 8:00 p.m.
Jury meeting n°2



Palais de la Découverte



Lycée Pierre Gilles de Gennes

Meteo

38°C
sun

making science together!

The laboratory of Antoine-Laurent de Lavoisier

During the French Revolution, at the instigation of Father Gregoire, the creation of the "Conservatoire des arts et métiers" was voted in 1794 to transmit the knowledge and technical know-how, bringing together new tools and machines. Among other things, it contains a large part of the instruments confiscated from Lavoisier in 1794.

Lavoisier's contribution to the evolution of the scientific instrument is considerable. His laboratory shows us some aspects of it: meteorologist, geologist, chemist and physiologist, he has exercised everywhere the same modern spirit of rigor in the method and precision in the measurements.

Between 1785 and 1787, he built two large gasometers to carry out the water synthesis experiment. With a high precision, he weighted the two gases – dihydrogen and dioxygen – which he then introduced into a flask to recombine (thanks to an electric spark), thus obtaining few grams of water and demonstrating the law of mass conservation.

The inventory also included pneumatic machines, a calorimeter, a pneumatic pump, two electric pistols, but also 20 thermometers, 37 hydrometers, 20 scales, a dozen barometers and many other instruments: in total, 13,000 chemical apparatus and 250 physical instruments!

VWR, essential to practical tasks!

VWR International is a company acquired by Avantor® in 2017 and involved in the distribution of research laboratory products, with over 1,200,000 proposed to their 250,000 customers. Their deep customer relationship strengthens Avantor®'s abilities, adding a vital new dimension to the scope of solutions provided – from discovery to delivery. VWR is one of the main partners of the 51st IChO and provided most of the chemicals and labware used in the practical task: nothing would have been possible without their support!



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POUR L'ÉCOLE
DE LA CONFIANCE

4



catalyzer

Back in time at the Château de Versailles!



Yesterday, students enjoyed the sunny day to visit the Château de Versailles, official residence of French Kings, and its gardens.

I^TC_hO
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The “Musée des arts et métiers”



Founded in 1794 by Henri Grégoire, the Conservatoire national des arts et métiers (National Conservatory of Arts and Trades) was then “a store of new and useful inventions”, and is now a museum of technological innovation. The Musée des arts et métiers (museum of Arts and Trades) exhibits over 2,400 inventions, split into seven collections: Scientific instruments, Materials, Energy, Mechanics, Construction, Communication and Transport. It is furthermore housed in a beautiful priory, the priory of Saint-Martin-des-Champs. You can find for example old bikes, the ancestors of planes, but also a Foucault

pendulum, the first cameras, the first computers... and Lavoisier’s lab! The students of four art schools in Paris took part in the “Lavoisier challenge” (another event of the “The Year of Chemistry” in France). They had to design an art object based on Lavoisier’s lab in the museum. The four winners of the challenge had their objects reproduced... and you all have one of them in your welcome bag! Mentors, your IChO badge gives you free access to this museum: don’t hesitate to enjoy it between Tuesday, 23 July and Sunday, 28 July!

Second time hosting IChO exams...

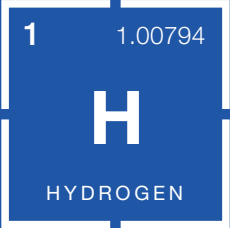


The National School of Physical Chemistry and Biology – Pierre-Gilles de Gennes High School, is a state school founded in the 1950s that trains laboratory technicians in different scientific fields. The current building situated at the heart of the 13th district of Paris was erected at the beginning of the 1970s and provides a spectacular view of the city. The school welcomes 2000 students divided into two sections: one half at high school level and the other half for post-graduate studies with European sections and established partnerships with a number of universities. The building is home to a scientific equipment complex unique in France, and houses equipment for engineering science, biology and chemistry (GC, HPLC, NMR, GC-MS) as well as semi-industrial equipment (distillation and 10 m high extraction columns, 30 L to 50 L reactors). The school is also linked to the history of IChO: it hosts the 51st IChO exams, after hosting the 22nd IChO exams in 1990 – you can still admire the stained glass made for the occasion in the entrance hall.

Periodic ID card of the day

1 . Hydrogen

Discovery: 1766
by H. Cavendish (London UK)
Period: 1st



A few of its properties

Only one electron and one proton, and still so important! The most abundant element in the universe (92% in number of atoms), the first one formed after the Big Bang, the main constituent of stars, it also combines with most of the other elements and is used in numerous processes, such as Haber-Bosch process for ammonia synthesis. As fuel for rockets and hydrogen cars, and reactant in the Fischer-Tropsch process to produce hydrocarbons fuels from a mixture of carbon monoxide (CO) and dihydrogen (H₂), H is also a source of energy.

Game of the day

A record city in the periodic table

Today, we propose a quiz. Do you know which city is represented 4 times in the table thanks to its name?

Answer – Game of Tuesday, 23 July

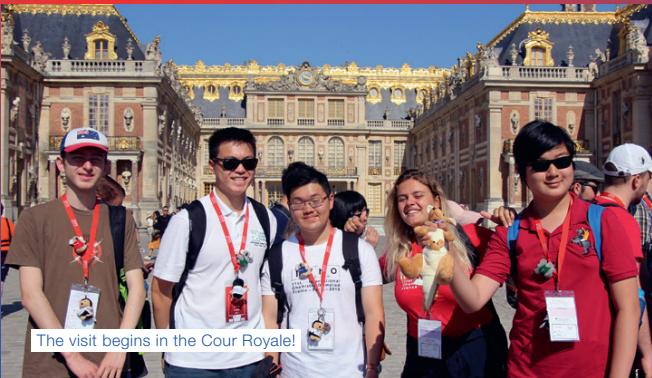
- 1) Spanish = Lili used to drink Barrilitos, every evening, or cold Nescafé
 - 2) German = Dear Betty please don't come without fresh clove pink
 - 3) French = Lily was hard digging at our uncle François Nestor's
- [adapted from JCE 2007, 84, p.1918 and JCE 2008, 85, p.1489]

Vocabulary

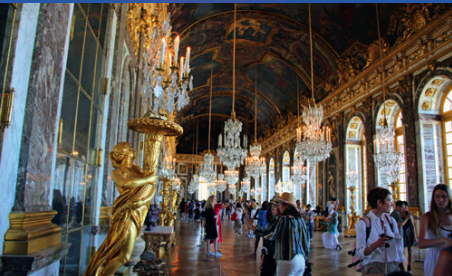


Épreuve	Task
Difficile	Difficult
Repos	Rest
Détente	Relaxation
Se concentrer	To concentrate
Réfléchir	To think
Réussir	To succeed
Mettre les bouchées doubles	Literally: To put double bites Meaning: Put the extra effort

Visiting the Château de Versailles!



The visit begins in the Cour Royale!



Students had the chance to discover the outstanding Hall of Mirrors!



Teams, always accompanied by their mascots.



Meanwhile and following the first Jury Meeting, mentors worked all day on the experimental exam translations.

DAY 5: Thursday, 25 July

STUDENT

- 9:00 a.m. – 12:00 a.m.
Free time / animation
- 2:00 p.m. – 6:00 p.m.
City bus tour

MENTOR

- All day long
Translation
of theoretical exam
- 7:00 p.m. – 12:00 p.m.
Happy hour



Notre-Dame de Paris

Birthdays

Erwin Rait *Austria* Student

Joao Paulo *Brazil* Scientific observer

Jahongir Bobojonov *Tajikistan* Student

Sandrina Frunza *Bulgaria* Student guide

Teresa *Italy* Student

Meteo



41°C
sun

making science together!

The chemistry of Eiffel Tower

The Eiffel Tower, the great iron lady, symbol of Paris will celebrate its 130th birthday this year! The Eiffel Tower was built by Gustave Eiffel in 1889, in puddled iron, a special iron, containing less carbon than cast iron. Puddling is a method of refining cast iron by oxidation of carbon by stirring it in an oven. Containing 0.025% carbon, the puddled iron provides a mean breaking strength of 32 kg.mm⁻¹. It is a material whose longevity is recognized... but only if it is repainted regularly! As Gustave Eiffel himself once wrote: "the painting is the essential element of the conservation of a metal work". Indeed, several factors can jeopardize this metal: rust, pollution due to a large city... The Eiffel Tower has been repainted nineteen times since its construction, a painting campaign requiring 60 tons of paint, costing about 4 million euros and lasting about 18 months. Even today, the Eiffel Tower is hand-painted!

The color of the Eiffel Tower has changed over the time, originally it was red-brown because the paint used as antirust contained minium, a lead-based pigment (Pb₃O₄) mixed with linseed oil. It was ochre-yellow in 1899, and has been since 1968 "Eiffel Tower brown", a color specially designed for it and used only on it.

Universcience

Created in 2010, **Universcience**, is a public organization uniting the "Palais de la découverte" and the "Cité des sciences et de l'industrie", two high places of scientific culture in Paris! You had or will have the opportunity to visit both, and the farewell banquet will be at the "Cité des sciences et de l'industrie"!

Its ambition is to promote scientific and technical culture, and to impart and endear today's sciences to the public. They do so through innovation and pedagogy.



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POUR L'ÉCOLE
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5



catalyzer

Things are getting serious with the Practical exam!



Yesterday, all students participated in the Practical exam at the Pierre-Gilles de Gennes Highschool. Five hours of hard work!

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Problem P1: Environmental-friendly oxidation



Chemists are always looking for efficient ways to oxidize molecules: this is a most convenient method to convert functional groups in organic syntheses. These reactions occur quite softly in living organisms, especially in fundamental metabolic reactions such as Calvin and Krebs cycles. However, when a chemist performs oxidation reactions in a laboratory, reagents such as chromium- or manganese-based compounds in harsh conditions are often used in spite of their harmful character for the environment.

Some reagents, such as potassium peroxy-monosulfate, circumvent this issue. Indeed,

this compound, often called by one of its commercial names (Oxone®), is a strong oxidizing agent ($E^\circ = 1.81 \text{ V}$) that releases only non-toxic sulfate salts as side products. Moreover, it is a versatile reagent that oxidizes numerous compounds ranging from alcohols (preparatory problem P2) and aldehydes (problem P1), to widespread species such as phosphines and thioethers.

In everyday life, Oxone® is used in swimming-pools and water-waste treatment: associated to a metal cation such as Co^{2+} , it is an efficient sanitizing agent.

Problems P2 and P3: To learn everything about wine!



Wine is one of the symbols of France... Contrarily to most countries where beer is the most encountered alcoholic beverage, French people drink an average of 42 liters of wine per year. Red, white, rosé... some parts of France (Bordeaux, Bourgogne) are known worldwide for their production. Wine is also an interesting aqueous solution, that is a wide subject of study for chemists. Its constituents (ethanol in preparatory problem 7 or iron in problem P2) are monitored to ensure a good quality, and some additives are used to protect it (such as sulfur dioxide studied in problem P3). Chemical analysis uses traditional methods (redox titrations) and modern ones (spectroscopy) to quantify accurately all these compounds, and to control the application of the numerous rules that apply to foodstuffs. Did you know, for instance, that mass spectrometry is used to study aroma in wines, but also to determine the place of production of used grapes?

Vineyard is also part of the French landscape and its protection is a challenge for chemists (as illustrated for instance in preparatory problem P5).

Periodic ID card of the day

8 . Oxygen

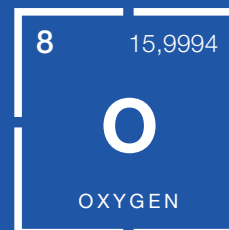
Discovery: 1774

by J.Priestley (UK) and

C.W.Scheele (Sweden)

Family: Chalcogens

Period: 2nd



A few of its properties

Dioxygen O_2 is full of contradiction: by-product of the photosynthesis of green plants, it is essential to survive, but also a powerful oxidant that corrodes every living form. 2.4 billion years ago, after the oxidation of telluric iron was done, the molar fraction of oxygen in the air increased by 2% in 200 million years, causing the first of the major ecological disasters. Surviving species protected themselves by producing peroxidases and by hosting a symbiote, the mitochondria. Oxygen represents half the Earth's mass, and 86% of ocean's.

Game of the day

The element that counts for the Eiffel tower

Gustave Eiffel chose puddled iron (>99% Fe) to build the tower strong and flexible enough to reach its record 324 meters height. There are more iron atoms in its metallic structure (it weights about 7,300 tons) than its total 300 million visitors since 1889. But exactly how many digits are needed to write this number of iron atoms? (assume Fe has an atomic weight of 56 and don't hesitate to take even bigger approximates to solve it without a pencil).

Answer – Game of Wednesday, 24 July

The city of Ytterby near Stockholm in Sweden gave its name to the elements Yttrium (Y), Ytterbium (Yb), Erbium (Er) and Terbium (Tb).

Vocabulary



Traduction	Translation
Visiter	To visit
Toilettes	Restroom (WC)
Se balader	To stroll
Faire la grasse matinée	To lie in
Bateau-mouche	Riverboat
Croisière	Cruise
Appuyer sur le champignon	Literally: To press the mushroom Meaning: To accelerate

Practical exam and visit of the Palais de la Découverte!



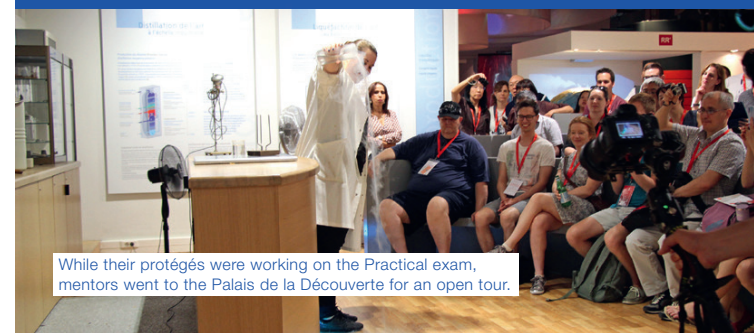
Students are waiting in the amphitheater to be called to their labs.



Jean-Michel Blanquer, French Minister of National Education and Youth, was here to greet all participants and to wish students good luck!



Discovering the subjects of the Practical exam!



While their protégés were working on the Practical exam, mentors went to the Palais de la Découverte for an open tour.

DAY 6: Friday, 26 July**STUDENT****MENTOR**

9:30 a.m. – 2:30 p.m.
Theoretical exam
› Lycée Pierre Gilles de
Gennes Highschool

7:00 p.m. – 1:00 a.m.
Reunion party et
Partners' forum
› Polytechnique School

10:00 a.m. – 3:00 p.m.
Visit of Versailles palace
and its garden

7:00 p.m. – 1:00 a.m.
Reunion party et
Partners' forum
› Polytechnique School



Château de Versailles

**Birthday**

Paolo Italy Student

Meteo

28°C
sun & clouds

making science together!

You want to discover Paris? Walk along the river Seine's banks!

The river Seine has always been crucial for the Paris' development and prosperity, providing water, defense and a way to bring merchandises in and out of the city... In particular, dyers, launderers and other trades had taken up residence on its banks. Nowadays, only booksellers still retain the right to hold shops on the quays.

You can discover almost all of Paris by walking along the river Seine's banks, which are now almost entirely forbidden to cars, thus making a nice promenade: three parks, two train stations, one ministry, the city hall, two theaters, two universities, many museums among which the Louvre and Orsay's, the Invalide Hotel, the "Petit Palais" and "Grand Palais" and, of course, the gothic jewel of Paris, the cathedral "Notre Dame de Paris".

Its construction began in 1163 and lasted more than 170 years. It is 130 m long, 48 m wide, 69 m high for the tower. Composed of 10 bays for the nave and 5 for the choir, its interior was majestic with a roof height of 43 meters, 500 tons of wood and 250 tons of lead... before the fire on April the 15th 2019. Fortunately, the structure was saved and will allow Notre-Dame to be restored... so come back in a few years to see it as beautiful as before!

Bayer: innovation is our moto!

Population growth and aging represent real tomorrow challenges, and we are uniquely positioned to rise up to this challenge thanks to our positioning in life science. Our activities cover sectors as different as pharmaceuticals, medicines, dietary supplement... but for all of them, innovation is the foundation of our strategy and our company ideal.

This innovation is present in R&D, but also at every echelons of our enterprise, as all our employees are constantly searching new improvement for our products and services.



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POUR L'ÉCOLE
DE LA CONFIANCE

6



catalyzer

Relaxing break!



Between the practical and theoretical exams, students are enjoying the sunny day and their free time at CIS Kellerman, their accommodation place.

I^TC^HO
51st — International
Chemistry Olympiad
France — Paris — 2019

École Polytechnique 225 years old



The "Ecole Polytechnique" was founded in Paris in 1794 during the French revolution and became a military school during the Napoleonic period. Nicknamed "l'X", it is a highly selective scientific and engineering school. Moved to Palaiseau in the south of Paris since 1976, the Ecole Polytechnique has grown as an international university, offering top-level research (22 laboratories), academics (Bachelor, Master's, PhDs), and innovation (including startup incubators) with foreign students and researchers from all around the world (as of today, 36% of students and 39% of faculty members).

The school's heritage and traditions are numerous, and among its famous students are Henri Becquerel (he shared the Nobel Prize in Physics with Pierre and Marie Curie for discovering radioactivity), Louis Joseph Gay-Lussac (famous in Physics for his gas law, he co-discovered the hydrogen/oxygen composition of water, the element Boron, identified Iodine as a new element and synthesized cyanogen) and Henry Le Chatelier (famous for his principle on chemical equilibrium, he almost discovered the synthesis of ammonia).

Tonight!



We are sure you can hardly wait until tonight: the task being done, meeting with your mentors/students again, enjoying the dinner and the evening... we'll get there soon! However, tonight will also be the stage for the partners' forum.

As you can easily imagine, this International Chemistry Olympiad couldn't have taken place without our numerous sponsors and partners. You have heard about some of them already, but they are many more to have contributed to this fantastic event – from giving money, to offering the free use of space – like the École Polytechnique for the reunion party tonight – and donation in kind – the glassware and products for the experimental task for example!

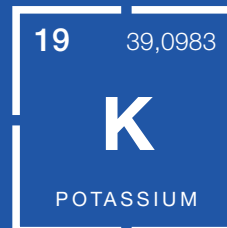
Tonight, you will have the opportunity to meet them, and they are eager to meet you as well. They will take part in the Reunion party and dinner, and they will have a stand ready to talk to you about what they do, and how they support the 51st IChO, and science in general.

Don't miss the opportunity to talk with all the representative of museums, French schools and labs, and international chemistry companies.

Periodic ID card of the day

19 . Potassium

Discovery: 1807
by Sir Humphry Davy
(London UK)
Family: alkali metals
Period: 4th



A few of its properties

First metal to be isolated by electrolysis, metallic potassium is white, very light and very reactive: oxidized by air, it has to be kept in oil. Therefore potassium is seldom used in its metallic form but rather as ionic compounds: potassium nitrates are found in black powder, potassium carbonate in soap, potassium nitrates in fertilizers – at an industrial scale.

The right ratio between K⁺ and Na⁺ ions is essential for the functioning of the nervous system, heart and muscles. Should you miss some K⁺, bananas are the right diet for you!

Game of the day

The name of your country, state, region, city...

The name of many elements was chosen from a place, or a geographical region. Including the record 4 times for Ytterby, a total of 32 elements are named after a location: from small villages to large continents. Five elements are named after currently existing countries, can you list them?

Answer – Game of Thursday, 25 July

The number of iron atoms has 32 digits = 4 digits (mass of Iron in tons) +6 (into grams) -1 (into moles) +23 digits (into number of atoms). You can solve in a different way of course.

Vocabulary



Fête	Party
C'est fini !	It's over!
Soulagement	Relief
S'amuser	To have fun
Profiter	To enjoy
Retrouvailles	Reunion
Fatigué	Tired
Donner sa langue au chat	Literally: giving one's tongue to the cat - Meaning: not knowing

Free time at CIS Kellerman!



... and some unwind with yoga!



DAY 7: Saturday, 27 July

STUDENT

- 10:00 a.m. – 12:00 a.m.
Free visit of la Cité des Sciences et de l'Industrie
- 3:00 p.m. – 7:30 p.m.
Free time with the guides

MENTOR

- 7:00 a.m. – 12:00 a.m.
Rating review
- 1:30 p.m. – 5:30 p.m.
City tour by bus
- From 8:00 p.m.
Jury meeting n°3



Cité des Sciences et de l'Industrie

Birthdays

Bénédicte Colnet *France* Problem supervisor
Frederik Søndergaard-Pedersen *Denmark* Mentor
Fernando J. J. Rodriguez *Venezuela* Student
Lara Nobili *Italy* Mentor

Meteo



21°C

clouds & showers

making science together!

Two scientific museums, one goal: bringing science to people!

The Palais de la découverte ("Discovery palace") and the Cité des sciences et de l'industrie- ("City of sciences and industry") are two scientific museums in Paris you will have – or have had – the occasion to discover.

Both places are really exciting and inspiring, with demonstrations, conferences and interactive exhibits.

The Palais de la découverte, situated in the Grand Palace, was opened for the World exhibition of 1937, for the purpose of "getting the science out of the labs". It was so successful that the French government of the time decided to sustain it. Nowadays, it welcomes more than 600,000 visitors each year, and is the origin of many scientific vocations!

It will close in 2020 to be entirely renovated. During the works, the exhibitions will be in the Cité des sciences et de l'industrie, both being managed by Universcience.

The Cité des sciences et de l'industrie opened in 1986 in the Park de la Villette, formerly slaughterhouses. Its purpose is, from the beginning, to give access to scientific and technical knowledge to a large audience, especially children and teenagers, and to spark their interest for the society challenges related to science, research and industry. The farewell dinner will take place there, we hope you'll like it!

PerkinElmer For A Healthier World

PerkinElmer enables researchers, scientists, and clinicians to address their most critical challenges across science and healthcare. With a mission focused on innovating for a healthier world, we deliver unique solutions to serve the life sciences, diagnostics, food and applied markets. We partner with customers to enable earlier and more accurate insights supported by deep market knowledge and technical expertise with our team of 12,500 employees worldwide.



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POUR L'ÉCOLE
DE LA CONFIANCE

7



catalyzer

Second and last exam!



Yesterday, students were back at the Pierre-Gilles de Gennes High School to work all morning on the theoretical exam.

I^TC^hO
51st — International
Chemistry Olympiad
France — Paris — 2019

Problem T6: A physicist who deals with chemistry

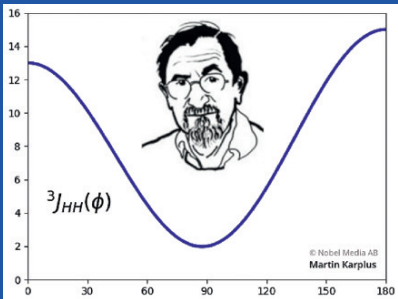


The school where the practical and theoretical exams took place was named after Pierre-Gilles de Gennes, a brilliant French physicist. He worked on many different topics, such as superconductors, liquid crystals, wetting and adhesion. In 1991, he was awarded the Nobel Prize for his research on polymer physics. During his long and fruitful career, he often tried to bring researchers from different scientific fields together to comprehend complex systems such as adhesion between polymers and glass.

If the Nobel committee described him as "the Isaac Newton of our time" for the wide

span of his research subjects, de Gennes found himself not worthy of this name and attributed it to a certain "Northern romanticism"! He preferred to see himself as someone trying to find simple models for complex problems and to describe nature without caricaturing it. For example, when describing the behavior of concentrated polymer solutions, he invented an easy model that he named "blob". After receiving the Nobel Prize, de Gennes used his fame to pass on his passion for science to the youngest: no better name could have been chosen for a school!

Problems T1 and T8: Nuclei and electrons positions



What is the link between cooking and particle positions? A chemist, Martin Karplus, currently working in the University of Strasbourg! Both a theoretical and physical chemist, he says that the only real chemistry he does is in the kitchen. One of his best-known contributions is the Karplus' equation. This powerful relation determines the relative position of vicinal hydrogen atoms by studying the coupling constants measured between them by

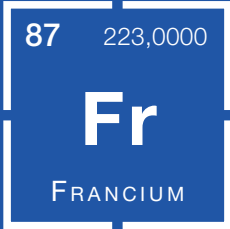
NMR spectroscopy: its use was illustrated in problem T8. Many refinements have been made to this equation, and Karplus feels like a "proud father", saying that it has now grown up, and that it lives its own life, a life of few failures and many successes!

Due to his numerous contributions to multi-scale modeling in chemistry, he was conjointly awarded the Nobel Prize in 2013. The methods he developed lead to a description of chemical systems, associating classical and quantum descriptions, to explain chemical properties on several scales. For instance, the notion of delocalization is defined more accurately, such as in problem T1 and preparatory problems T1 to T3.

Periodic ID card of the day

87 . Francium

Discovery: 1939
by Marguerite Perey
(Paris France)
Family: alkali metals
Period: 7th



A few of its properties

It is said there is only 30 g of Francium on the earth's crust. It is the most electropositive alkali and the last element discovered in nature. It was identified by Marguerite Perey, protégée of Marie Curie. She discovered and monitored its radioactive signature during actinium purification, and was the first woman elected to the French Academy of Science. She died in 1975 from cancer due to the ingestion of Actinium. The most stable isotope of Francium has a half-life of 22 minutes, and is produced by the disintegration of Actinium-227.

Game of the day

Playing with the elements from the ID cards

You have noticed that the periodic table of the elements was a common theme to our games and the above "Periodic ID card of the day". Looking back at the 7 past elements in sequential order, can you guess why we chose these ones and no others?

Answer – Game of Friday, 26 July

Polonium (Poland), Francium and Gallium (France), Nihonium (Japan) and Germanium (Germany). Among the 32 are also Americium (Americas), Europium (Europe), Scandium (Scandinavia) and latin-derived Copper (Cyprus) and more with states and cities...

Vocabulary

Correction	Grading
Amitié	Friendship
Bus	Bus
Métro	Subway
Combien ça coûte ?	How much does it cost?
Pain	Bread
Eau	Water
Avoir un poil dans la main	Literally: to have a hair in the hand - Meaning: To be lazy

Theoretical Exam for some, Versailles for the others!



Guides are always here to cheer the students before the exam!



Everybody is carefully listening to the regulations.

As for the practical exam, students have been working for five hours on the theoretical exam problems!



After students on Tuesday, it was mentors' turn to visit the Château de Versailles, its gardens and the outstanding Hall of Mirrors!

DAY 8: Sunday, 28 July**STUDENT****MENTOR**

- 10:00 a.m. – 12:00 a.m.
Free visit of Palais de la Découverte
- 4:00 p.m. – 6:00 p.m.
Round-table discussions
› Lycée Pierre Gilles de Gennes Highschool

- All day long, with time slots
Arbitration
- 9:00 p.m. – 1:00 p.m.
or 2:00 p.m. – 6:00 p.m.
Free visit of Cité des Sciences et de l'Industrie (optional, by registrations)
- From 8:00 p.m.
Jury meeting n°4



Cité des Sciences et de l'Industrie

**Meteo**
23°C
clouds

making science together!

The International Union of Pure and Applied Chemistry

The IUPAC – for International Union of Pure and Applied Chemistry – is the world-wide authority on chemical nomenclature. It chooses the name of new elements in the periodic table and defines their atomic weights, the name of organic and inorganic compounds and many other data.

It was established in 1919 as a neutral and objective scientific organization for the advancement of the chemical sciences via collaboration and free exchange of scientific information.

More than 55 countries, 31 associated organizations, about 58 company associates are participating in IUPAC activities. Professor Qi-Feng Zhou (China) is the current president.

Before the creation of IUPAC, the first attempt at organizing organic chemical nomenclature was started by Kekulé in the 1860s in Geneva. Later in Paris in 1911, a predecessor of IUPAC – the International Association of Chemical Societies – met and proposed a new association to work on international collaboration and standardization in chemistry.

Created exactly on July, 28, 1919, IUPAC is nowadays about much more than nomenclature, promoting the service of chemistry to society and to global issues. You can discover its wide range of activities here: <https://iupac.org>

Île-de-France Regional council

Île-de-France Regional Council (Paris Region) covers as little as 2% of France's territory, but gathers 18% of its population and 30% of its GDP. It manages many aspects of 12 million people's life: transportation, high schools, environment, economic growth... Following the #Leader regional strategy, it supports Research and Innovation activities and finances major scientific networks, among which RESPORE, a network in porous solids science... and it also supports the 51st IChO, since the tasks take place in a high school!



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**POUR L'ÉCOLE
DE LA CONFIANCE**

8

**catalyzer**

**First comes work,
then comes fun!**



Let's have a flashback on the Reunion Party that happened Friday evening at Polytechnique School. Everybody gathered after 4 days of translations and exams. It's now time to party!

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Problem T3: About Gay-Lussac



Joseph Louis Gay-Lussac (1778-1850) was a French chemist and physicist, pioneer in several topics that were highly studied in the early 19th century, such as the elucidation of gas properties, of the composition of the atmosphere and of the elemental analysis. He thereby discovered (with Humboldt) that water is made of 2 hydrogens and 1 oxygen.

Gay-Lussac was appointed professor of chemistry at the École Polytechnique in 1808. He was appreciated by his students and was famous for his rigor and accuracy. He never wrote a manuscript gathering all his teaching. Thankfully, a stenographic

transcription allows us to read the 33 lessons he gave during the first trimester of 1828.

This work falls into 3 parts: vegetal, animal chemistries, and history of salts. This latter inspired the problem T3 which dealt with silver chloride. Gay-Lussac exposes the features of this milk-white solid, from its ways of syntheses to its physical properties. We also discover delightful details: when put on the tongue it has no taste! And do not use a silver bowl to evaporate seawater, you will precipitate silver chloride as well as sodium chloride!

Problem T2: Dihydrogen, a useful energy vector?



Because its use in fuel cells (preparatory problem 4) is quite straightforward, dihydrogen could be used as an energy vector. Several technological barriers are nevertheless still encountered and chemistry could lead to significant improvements. Two of them are especially important: the issue of H₂ storage (preparatory problem 5) and its production also.

Dihydrogen is easily produced by reaction of a reducing metal and a strong acid, but this reaction is not efficient enough for mass production. Other processes include catalytic reforming from natural gas or use of algae for photolysis of water.

This last method can be mimicked by using water-splitting (i.e. electrolysis of water). Problem T2 studies this method in the context of photocatalysis, using two different production modes. More generally, water-splitting is a very versatile method: each time a primary energy source is present (nuclear energy close to water, solar energy in sunny countries, etc.), dihydrogen can be produced and used as an energy vector. This method allows both flexibility and an efficient centralized production.

Periodic ID card of the day

9 . Fluorine

Discovery: 1886
by Henri Moissan
(Paris France)
Family: Halogens
Period: 2nd

9	18,9984
F	
FLUORINE	

A few of its properties

The most electronegative and oxidative element of the periodic table, Fluor has many uses due to its strong interaction with other elements. F₂(g) is indeed one of the only chemicals to react with xenon!

Its derivatives have a wide variety of uses: in fuel cells with fluorinated proton exchange membranes, in lithium-ion batteries (liquid electrolytes, fluorinated electrodes) – both useful in hybrid vehicles –, in mobile phones... Fluorinated polymers are heat stable, inert, hydro- and oleophobic: polytetrafluoroethylene is the most famous one!

Game of the day

Four elements for life

Carbon, Hydrogen, Oxygen and Nitrogen are 4 basic elements that play a crucial role in biochemistry. Their combinations are infinite and generate countless organic compounds, some of them very important for human life.

Associate the 5 different compounds with their respective combinations (molecular formula):

A) aspirin, S) sucrose, N) nylon, P) paracetamol, D) DHA (omega-3 fatty acid)

1) C₁₂H₂₂N₂O₂ - 2) C₉H₈O₄ - 3) C₂₂H₃₂O₂ - 4) C₁₂H₂₂O₁₁ - 5) C₈H₉NO₂

Answer – Game of Saturday, 27 July

You will recognize "51 IChO 19 Fr(ance)" with the atomic numbers or names of the elements.

Vocabulary

Où est... ?	Where is...?
Cadeau souvenir	Souvenir gift
Avoir la flemme	To be lazy
Sortir	To go out
Soleil	Sun
Pluie	Rain
Couper les cheveux en quatre	Literally: To cut the hair in four Meaning: Being too precise

Reunion Party!



On the occasion of the Reunion Party, students and mentors met again after being separated and were allowed to pick up their phone and electronic devices.



Participants also had the chance to discuss with the IChO 2019 partners. Thanks again to all for their support!

Let's not forget the 150th anniversary of the Periodic Table of Chemical Elements!



After the party, there was still some work yesterday for mentors with the rating of the exams.

DAY 9: Monday, 29 July**STUDENT****MENTOR**

-  8:30 a.m. – 11:30 a.m.
Free time,
luggage preparation
-  3:30 p.m. – 6:30 p.m.
Closing ceremony –
Maison de la Chimie
-  8:00 p.m. – 1:00 a.m.
Farewell diner
› Cité des Sciences
et de l'Industrie

-  8:30 a.m. – 11:30 a.m.
Free time,
luggage preparation
-  3:30 p.m. – 6:30 p.m.
Closing ceremony –
Maison de la Chimie
-  8:00 p.m. – 1:00 a.m.
Farewell diner
› Cité des Sciences
et de l'Industrie



Maison de la Chimie

Birthday

José Roberto Vega-Baudrit *Costa Rica* Head mentor

Meteo

27°C
sun

making science together!

The IChO 2019 in pictures

We are sure everybody has lots of fun memories of this week in Paris. Share yours with us on social media with the hashtag #IChO2019!

Discover the 11 Conti Museum!

The 11 Conti Museum offers a unique experience involving metal, know-how, and heritage. Thanks to many interactive devices, the Museum takes its visitors behind the scene of Monnaie de Paris' manufacture, temple of coinage and workmanship. Bringing together art, chemistry, history and economy, it reveals the wealth of talent in the workshops and the richness of the collections. It's in this manufacture, in the heart of the capital, that the IChO's medals have been created.


For more information, visit monnaieparis.fr



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**POUR L'ÉCOLE
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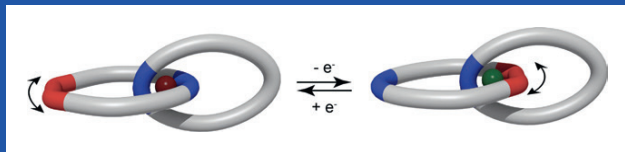
9

**catalyzer****Scientific visit of Paris!**

This week-end, participants had the occasion to visit the Cité des Sciences et de l'Industrie of Paris and the Palais de la Découverte. Two iconic places for science lovers!

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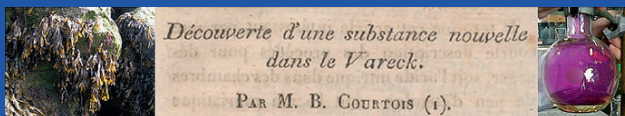
Problem T7: Swinging of a [2]-Catenane



In the early 80's, Jean-Pierre Sauvage (University of Strasbourg) designed an efficient metal templated strategy for the synthesis of catenanes. He had been inspired by the concepts of supramolecular chemistry developed by his PhD advisor and 1987 chemistry Nobel Prize winner J.-M. Lehn. As explained in Catalyzer (n°1), such a molecule is constituted of two interlocked rings like two chain links. The versatile coordination-based strategy developed by J.-P. Sauvage enables an easy access to a wide variety of interlocked molecules such as rotaxanes, catenanes or molecular

knots. Molecular machines such as switches, rotors, motors or muscles were then developed by controlling the position and motion of their inner components using chemical, electrochemical or photochemical stimuli. Directional motions, both linear and circular, emerge from a variety of complex chemical interactions introduced in preparatory problem 23 and problem T7. In 2016, along with his friends and colleagues Sir J. F. Stoddart and B. L. Feringa, J.-P. Sauvage was awarded the Nobel Prize in Chemistry "for the design and synthesis of molecular machines".

Problem T4: Violet serendipity



As you read in Catalyzer (n°2), iodine was discovered in 1811 by Bernard Courtois. As explained in problem T4, this discovery took place by chance, when Courtois had just started to use varec as a source of potassium to produce black powder.

He isolated crystals of iodine by condensation of the violet gas he observed. Then, in 1812, he asked two colleagues (N. Clément and B. Désormes, whom he met at the École Polytechnique) to investigate on this new substance and report it to the Académie. It took more than a year to get it published in Annales de la Chimie. Indeed, the work on this discovery needed the visit of a British scientist, Sir Humphrey Davy, to catalyze the work of the academician J. L. Gay-Lussac who did not want to let the English chemist collect all the glory for this discovery, at these remote times of tension between the two countries.

The new substance was finally named iodine because of its color: in ancient Greek, ἰώδης means violet. This reminds what caught Courtois' attention in the first place and outlines that, as Pasteur said later: "Chance favors the alert mind".

Periodic ID card of the day

88 . Radium

Discovery: 1898

by Pierre and Marie Curie
(Paris France)

Family: Alkaline earth metal

Period: 7th



A few of its properties

The words "radium" and "radioactivity" were born together, and the discovery of the first led to the discovery of the latest and started the radiochemistry. The activity of 1 g of Radium gave the unit of measure for radioactivity: the curie. Radium is a white and soft metal, darkening when exposed to air. It is found in infinitesimal quantities (production 10 g/year) in uranium ores such as pitchblende (3 tons processed per 1 g of isolated radium). It is the only radioactive alkaline earth metal (half-life 1,600 years) producing radon by decay.

Game of the day

The two missing letters in the table of the elements

The symbols for the chemical elements in the periodic table are formed by one or two letters from the Latin alphabet. We celebrate 150 years of the table and its first 7 rows and 118 elements have now all been named. Interestingly, you can find all the letters of the Latin alphabet in the periodic table except two! Do you know which ones are missing?

Answer – Game of Sunday, 28 July

A) 2 - S) 4 - N) 1 - P) 5 - D) 3

Vocabulary



Dernier jour	Last day
Garder contact	To keep in touch
Se revoir	To meet again
Semaine	Week
Mois	Month
Année	Year
À bientôt	See you soon!
Le revers de la médaille	Literally: the reverse of the medal Meaning: the bad side of a good thing

Last experiences in Paris!



Thanks to the interactive activities, students can keep learning!



Always having fun with the guides!



Students experienced the famous Géode of the Cité des Sciences.



After rating the exams, mentors and authors discussed the students' final grades before the Closing Ceremony and the results announcement.

Medals



Absolute Winners

- 1 • Liu He China
- 2 • Zijie Deng China
- 3 • Hyeokgyu Choi Korea

Best Practical Exam

- Liu He China
- Tan Ba Tran Vietnam
- Andrej Kovács Slovakia

Best Theoretical Exam

- Zijie Deng China

Meteo



25°C
sun & clouds

making science together!

The 51st IChO in figures

- 578 participants
- 273 organizers
- 35 partners
- 800 pencils to-be-planted, and 800 reusable flasks
- 1,193 stacked boxes
- 25,000 e-mails (starting in January 2014, and counting!)
- some all-nighters, despite 16,000 coffees
- a lot of fun!

And a huge thanks to our Catalyzer volunteers

- Anne Pansu
- Catherine Palacin
- Jean-Guy Boiteau
- Damien Lavergne

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DE LA CONFIANCE

10



catalyzer

Award Results



Congratulations to all!

IChO
51st — International
Chemistry Olympiad
France — Paris — 2019

Gold Medals

1	Liu He	CHN	20	Paolo Giaretta	ITA
2	Zijie Deng	CHN	21	Evgeni Mihaylov Stelov	BGR
3	Hyeokgyu Choi	KOR	22	Oleksandr Volodymyrovych Kudryk	UKR
4	Tan Ba Tran	VNM	23	Mudita Goyal	IND
5	Mikhail Matveev	RUS	24	Takumi Nishino	JPN
6	Ilkyu Choi	KOR	25	Nikita Chernov	RUS
7	Mircea Raul Bodrogean	ROU	26	Mahiro Suematsu	JPN
8	Jingcheng Yang	CHN	27	Juhan Hong	KOR
9	Dhyey Sankalp Gandhi	IND	28	Anton Zane Ni	USA
10	Jan Obořil	CZE	29	Lun-Hsin Kuo	TPE
11	Thomas Bro Falkenberg	DEN	30	Edward Hua Jin	USA
12	Andrej Kovács	SVK	31	Mostafa Moghimi Kheirabady	IRN
13	Jiwoo Kim	KOR	32	Peter Rukovanský	SVK
14	Yongao Hu	SGP	33	Yong Xiang Ng	SGP
15	Nicolás Adriél Manno	ARG	34	Pichamon Assawaphadungsit	THA
16	Gustavs Jānis Mežciems	LVA	35	Yu-Hsiang Wang	TPE
17	Daniil Bardonov	RUS	36	Nguyen, Van Chi Nguyen	VNM
18	Aleksei Shishkin	RUS	37	Richard Danylyuk	GBR
19	Yajvan Milind Ravan	USA			

Silver Medals

38	Richard Yanzhou Huang	AUS	59	Albert Cheng Liu	USA
39	Cholapat Varongchayakul	THA	60	Islomjon Karimov Ganijon Ogli	UZB
40	Marceau Jeanjean	FRA	61	Ali Jahromi	IRN
41	Alexander James Newton Byrne	GBR	62	Ryoichi Hirashima	JPN
42	Ygor De Santana Moura	BRA	63	Ke Fun Aw	SGP
43	Maksim Sysoenkov	BLR	64	Masahiro Ofuchi	JPN
44	Giovanni Pellegrino	ITA	65	Yong Yi Tan	SGP
45	Pakaphol Thadawasins	THA	66	Ioana Maria Popa	ROU
46	Joaquín Baixeras	ESP	67	Sanprem Taechawichian	THA
47	Ádám Kapdos	HUN	68	Samuel Novák	SVK
48	Hoang, Dinh Nguyen	VNM	69	Kamen Pavlinov Petrov	BGR
49	Yauheni Malich	BLR	70	Miroslava Novoveská	CZE
50	Chin-En Shen	TPE	71	Filip Svěrák	CZE
51	Magdalena Lederbauer	AUT	72	Roi Peer	ISR
52	Muhender Raj Rajvee	IND	73	Grzegorz Procyk	POL
53	Nikita Žoglo	EST	74	Daniele Furlanetto	ITA
54	Justas Terentjevas	LTU	75	Arina Augusta Schober	DEU
55	Tudor Lile	ROU	76	Shaoyan Chen	CHN
56	Joaquim Miguel Moreira Santiago	BRA	77	Lidiia Dubenska	UKR
57	Sebastian Witte	DEU	78	Jonathan Benjamin Rowlands	GBR
58	Ana Florescu Ciobotaru	ROU	79	Richard Vesely	CZE

Silver Medals (continued)

80	Dominik Oskar Balaban	POL	92	Mokhira Boltavaeva Matyoqub Qizi	UZB
81	Yusa Can Dinc	TUR	93	Winston Cahya	IDN
82	Ferdane Cetin	TUR	94	Igor Topalović	SRB
83	Stanislavs Kurašs	LVA	95	Joshua Jun Lin	AUS
84	Eric Meng Shen	CAN	96	Lam, Thanh Pham	VNM
85	Hanna-Riia Allas	EST	97	Bence Balazs Mészáros	HUN
86	Bakuh Danang Setyo Budi	IDN	98	Tsung-Hung Wu	TPE
87	Hordii Andrusiv	UKR	99	Arthur Reiner Ventura De Belen	PHL
88	Ali Aliyev	AZE	100	Vladislav Cherdantsev	KAZ
89	Osama Mohammed Al-Ali	SAU	101	Kordian Wojciech Głabowski	POL
90	Amirreza Bagheridelouee	IRN			
91	Michal Chovanec	SVK			

Bronze Medals

102	Thomas Edward Harrison-Brown	AUS	130	Jessica Mary Listijo	IDN
103	Iván Andrés Kozák	HUN	131	Palvan Jumayev	TKM
104	Madhav Mittal	IND	132	Soresu Juyo	CAN
105	Tobias Viola Aprea	ARG	133	Thiago Oliveira Sousa	BRA
106	Ashid Amarsanaa	MNG	134	Olzhas Nurpeisov	KAZ
107	Mikolaj Wawrzyniec Poplawski	POL	135	Daniel Alejandro Rosa Aparicio	SLV
108	Hallel Shohat	ISR	136	Berdiglych Rejepbayev	TKM
109	Deniz Guner	TUR	137	Ulugbek Boyirbekov Zayniddin Ogli	UZB
110	Barbara Sumic	HRV	138	Māris Koniševs	LVA
111	Athanasios Fokaidis-Psyllas	GRC	139	William Liu	AUS
112	Phol Wehaprasirtsak	GBR	140	Daniil Melnichenko	KAZ
113	Olavs Rāciņš	LVA	141	Israel Mina Aguba	PHL
114	Dorian Hugo Elliott Bischoff	FRA	142	Victor Baerle	MDA
115	Mislav Baric	HRV	143	Gerardo Manuel Ramirez Valladares	SLV
116	Aleh Karatkou	BLR	144	Lucas Yutaka Kuroishi	BRA
117	Ron Raphaeli	ISR	145	Connor Matthew Gallagher	NZL
118	Khaitov Diyor Kushakovich	UZB	146	Alexis François Mohamed Dougha	FRA
119	Anatolii Kuznietsov	UKR	147	Victor Crasco	MDA
120	Benedek László Juhász	HUN	148	Karam Wafek Khaddour	SYR
121	Rokas Vilnius Sidlauskas	LTU	149	Tijan Prijon	SVN
122	Kasper Krunderup Jakobsen	DEN	150	Julius Domack	DEU
123	Ivor Vavra Plavsic	HRV	151	Melanie Kiem	AUT
124	Rabab Ali Al-Rufayi	SAU	152	Saba Gogichaishvili	GEO
125	Mihailo Milošević	SRB	153	Mikaella Ty Ngo	DEN
126	Farid Aliyev	AZE	154	Nurlykhan Kopenov	KAZ
127	Amirali Ahrabi	IRN	155	Chekirbaev Mirkhad	KGZ
128	Anna Reinhold	NLD			
129	Rayman Tang	NZL			

Bronze Medals (continued)

156	Hung Nguyen Nguyen	CAN	176	Damyan Stoyanov Frantzov	BGR
157	Ron Shprints	ISR	177	Mikael Rinne	EST
158	Stefan Stojkovikj	MKD	178	Daniel Ulibarri	ESP
159	Erwin Victor Rait	AUT	179	Mohtad Farhan Allawala	PAK
160	Mitja Koderman	SVN	180	Yusup Dovletmyradov	TKM
161	Andreas Simson	EST	181	Rasmus Vester Munkner	DEN
162	Paul Beurich	DEU	182	Björn Axel Rudolf Diemer	SWE
163	Modar Monzer Alali	SYR	183	Erik Nils Axel Sundén	SWE
164	Lasha Khutsishvili	GEO	184	Aleš Globočnik	SVN
165	Avgoustinos Ioannou	CYP	185	Hector Jair Jimenez Garcia	MEX
166	Joseph Dorfer	AUT	186	Mihailo Mirković	SRB
167	Luka List	HRV	187	Mihail Borislavov Paskalev	BGR
168	Jaqlin Anne Van Schalkwyk	NZL	188	Arvin Bilegsaikhan	MNG
169	Lukas Supragonas	LTU	189	Fabrizio Salas Ramírez	CRI
170	Muhammed Hisham Al-Khurisi	SAU	190	Dren Gruden	SVN
171	Bayu Dwiputra	IDN	191	Valentine Madeleine Fournier	FRA
172	Kevin Arturo Urrutia Alvarez	SLV	192	Ivan Mamchyts	BLR
173	Muhammad Hakim Bin Muhamad Adzrill	MYS	193	Anton Richard Wallin	SWE
174	Brian David Durkan	IRL	194	Stefan Damchevski	MKD
175	Movses Aghekyan	ARM	195	Altı Olavi Juhanpoika Mäkelä	FIN
			196	Sergio Sanjurjo	ESP

Honorable Mentions

197	Berjan Stouwie	NLD	209	Victor Ulises Plascencia	MEX
198	Daniel Joon Ahn	NZL	210	Fernando Juan José Rodríguez González	VEN
199	Levon Kharatyan	ARM	211	Julius De La Rosa Macling	PHL
200	Laurens Smulders	NLD	212	Zhan Yi Chng	MYS
201	Ting Feng Ho	MYS	213	Guillermo Jesus Alanya Yangali	PER
202	Hovhannes Matevosyan	ARM	214	Johannes Salomonsen Løken	NOR
203	Aleksandra Ljubenović	SRB	215	Sheza Munir	PAK
204	Nojus Radzevicius	LTU	216	Adelina Andrei	MDA
205	Jamill Jean Paul Loayza Erme	PER	217	Yover Daniel Nuñez Perez	PER
206	Mel Kluivert Russel Capcha Chanca	PER	218	Muaz-Bin-Moeen	PAK
207	Atabay Allamyradov	TKM	219	Eyad Abdullah Al-Salhi	SAU
208	Teresa Guidone	ITA			