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## Chemical Society Annual Report to the EuCheMS Division of Chemical Education for 2020-2021

### 1. Abstract

In 2020 and 2021 the Division of Chemical Education and Dissemination of the Portuguese Chemical Society (DCED-SPQ), carried out activities intending to promote chemistry's teaching and learning and Chemistry disclosure/ dissemination in Society. In 2020 and 2021 the activities of the Division were hindered by the impact of COVID and limited to non-presential activities.

As an outline of our activities, we would like to point out the regular and institutional cooperation with the Portuguese Ministry of Education regarding curriculum implementation and development in the middle school and students' assessment.

Regarding Chemistry teachers' professional development and support, SPQ handles short courses through the "Centro de formação da SPQ". In this context, the IX Meeting of the Division of Chemical Education and Dissemination of the Portuguese Chemical Society will take place in the last trimester of 2021.

Concerning the promotion of chemistry in middle schools (secondary and basic school), Chemistry Olympiads were carried out as also the *ChemRus* competition in collaboration with the Young Chemists Group collaboration of the Portuguese Chemical Society.

It is also important to highlight that DCED-SPQ is accompanying the implementation of innovators projects, regarding chemical education and science skills development in the schools.

### 2. National educational policy

#### *Institutional Cooperation - Ministry of Education*

Keeping the commitment started in 2010, the Portuguese Chemical Society continued to integrate the Consultative Committee of the IAVE (Institute for Educational Evaluation), taking part in regular meetings with the National Examinations Commission where are prepared and emitted assessments of curricula and programs, among other matters. The Portuguese Chemical Society representative at the Scientific Council of the IAVE, Dr Fernando Santos, held its participation during 2019-2021.



SPQ, in collaboration with the General Directorate of Education (DGE) and the Portuguese Society of Physics, continues to monitor the implementation of essential learning outcomes in the disciplines of Physical-Chemical Sciences, Physics and Chemistry A, Chemistry and Physics. In 2019/2020 the new “essential learning outcomes”, generalized to all schools during 2018/2019, was scrutinized by the Portuguese Chemical Society representatives in the continuous evaluation of the implementation process. The Portuguese Chemical Society representative that is accompanying this process is Dr Adelino Galvão.

The Ministry of Education is now replicating the new curriculum for the XXI century student in the parallel system of Professional Schools. The Portuguese Chemical Society was invited to lead the process regarding the Chemistry Curricular Units: The previously drawn “Constitutional” principles defining, broadly, the transdisciplinary skills a student must develop, civic education and citizenship, as well as inclusion, will be translated to the core curriculum braiding the actual subjects of each curricular unit with competences and attitudes. The project was submitted to ANQEP (the Professional Schools tutelary agency) and is implemented in the 2020/2021 academic year. The Portuguese Chemical Society representative that is accompanying this process is Dr Adelino Galvão.

### 3. Events in chemical education

#### ***XXVII National Meeting of the Portuguese Chemical Society (2020) and 2021***

The XXVII edition of the National Meeting of the Portuguese Chemical Society will take place at the University of Minho, in Braga, from 14 to 16 July 2021. (<https://xxviienspq.events.chemistry.pt/>)

Following a year in which society has been, and continues to be, shaken by an unprecedented pandemic with serious economic, social and health consequences, chemists are called to be part of the solution in such areas as the environment, energy, food, health, and water, among many others.

Thus, for this National Meeting, under the theme "Chemistry and Opportunities in the Global Society", a scientific program consisting of international and nationally renowned speakers is being prepared that will address the central role of Chemistry and its contribution to dealing with the challenges and opportunities in a global society.

This XXVII National Meeting of SPQ will be an excellent opportunity to resume some normality in the dissemination and sharing of science so that the entire national chemical community is invited to participate and (re)establish links, assisting the latest developments in various areas of chemistry.



In this meeting, a Training course for middle school teacher professional development intitled Motivar para a aprendizagem da Química – desafios atuais (Motivate for the learning of Chemistry - current challenges) will be handle. This training action included in the XXVII ENSPQ, presupposes assistance to some plenary lessons and selected oral communications, participation in the debate "The public perception of science in times of pandemic" and the participation of several workshops (13 hours course).

***1<sup>st</sup> National meeting of Chemistry history in 17 and 18 de September 2021-Aveiro***

This meeting aims to aggregate and disseminate research works developed in the history of chemistry. The objective of this meeting will be to enhance the history of science, technology, and medicine, and to constitute a critical forum on the development of sciences and their impact on society. This meeting will take place exclusively online through zoom session, considering the historical moment that is experienced.

***IX Meeting of the Division of Chemistry Education and dissemination of The Portuguese Chemical Society (26 and 27 of November 2021)***

The National Meeting will take place in the last 2021 trimester This meeting is for teachers, researchers, and disseminators, who wish to present the results of their research and projects in the field of chemistry, education and Science didactics, experimental work, and promotion of chemistry at all levels of education, as well as exchange experiences and promote science learning outcomes in formal and non-formal contexts of teaching.

During the various sessions, there will be the opportunity to discuss novelties in the field of education and dissemination/promotion of chemistry, as well as outline possibilities for future cooperation. The main topics of the meeting were:

- Scientific literacy and STREAM
- Sustainable development and green Chemistry
- Inclusion in Chemistry teaching and learning process
- Teaching, curriculum management and assessment in Chemistry
- Pedagogical innovations in chemistry teaching
- Experimental and laboratory work and chemistry teaching-learning
- Chemical education in the digital age
- Chemistry education in non-formal spaces

This Meeting will be proposed to be certified, through the new Portuguese Chemical Society formative centre as a 12-hour teacher's training course, contributing to the scientific and didactic updating of the teaching staff.



#### 4. Activities of the National Chemical Society

##### 4.1 At students' level

##### **Chemistry Olympiads**

The Portuguese Chemistry Olympiads, also known as Chemistry Olympiads, has been organized by the Portuguese Society of Chemistry (<http://olimpiadas.chemistry.pt>). It is a competition where students, from middle and secondary schools, need to be able to solve theoretical and practical problems of Chemistry. The objectives of these Chemistry Olympiads are a) stimulate the study and teaching of Chemistry; b) provide a closer approach between schools and universities; c) generate interest in chemistry among students, disseminate chemistry as a science and attract vocations to scientific and technological careers. Currently, the Chemistry Olympiads include three types:

1. *Chemistry Olympiads Plus* – directed to secondary education;
2. *Chemistry Olympiads Junior* – directed to basic education;
3. *International Chemistry Olympiads (IChO)*, *Latin American Chemistry Olympiads (OIAQ)* and the *European Science Olympiads (EUSO)* – international competitions in which the *Portuguese Society of Chemistry* ensures the representation of Portugal.

##### **ChemRus – 2020 and 2021**

The Young Chemists Group (GQJ) of the Portuguese Chemical Society has held the *ChemRus* competition targeted at students up to 12th grade, which aimed to promote their interest in chemistry. *ChemRus* is an annual competition for chemistry students up to high school. This competition intends to reward a chemistry experience developed by the students and uploaded as a Youtube® video. **Site:**[www.gqj.spq.pt/#chemrus](http://www.gqj.spq.pt/#chemrus)

In 2020, the 9th edition (2020) addressed climate change, being the theme "Become a climate scientist".

The 10th edition (2021) addressed the 17 Sustainable Development Goals (SDGs) established by the United Nations in 2015 and known as the 2030 agenda. The theme of the edition was "Chemistry for a better world".

##### 4.2 At teachers' level: **Continuous Professional Development Courses**

The SPQ Centre for Continuous Professional Development of Chemistry school teachers was certified by the Conselho Científico-Pedagógico da Formação Contínua (CCPFC) in 26-03-2018 (CCPFC/ENT-AC-0001/21). One of this SPQ structure goal is to support Chemical teachers. The training courses proposed allows teachers scientific update and deepen



knowledge. This is relevant for teacher professional evaluation and development and to create learning environments.

As in the last years, SPQ continues to promote training actions that contribute to the valorisation and motivation of chemistry teachers. In this context, SPQ offers small courses which are an aid for the teacher to organize their classes in an innovative way. During 2020 and 2021 it had four short courses (25 hours)

- **A tabela Periódica: um Ícone na Centralidade da Química** (CCPFC/ACC-101645/18) (A Periodic table: an Icon in the Centrality of Chemistry)
- **Nomenclatura química: adequação das regras da IUPAC à língua portuguesa** (CCPFC/ACC-102892/19) (Chemical nomenclature: adequacy of the Rules of the IUPAC to the Portuguese language)
- **Conhecer a Luz para uma Cidadania Ativa** (CCPFC/ACC-104322/19) (Knowing the Light for Active Citizenship)
- **Humanidades, Artes e Ciências: A transdisciplinaridade no Ensino da Química** (CCPFC/ACC-109498/20) (Humanities, Arts and Sciences: Transdisciplinarity in The Chemistry Teaching).

Due to the pandemic in 2020 and 2021, all training courses were online (till 21 July 2021).

During this year's new teacher training courses will be proposed with the aim of promoting classroom innovative environments, the development of students' scientific skills and to endorse in teachers a holistic view of science-based on STREAM (Science & Technology, interpreted through Engineering & the Arts, all based in reading/writing and Mathematical elements).

#### **4.3 Research level**

Recognizing the potential of the Olympics, to disseminate science, motivate students to scientific fields, stimulate new learning, help apply new teaching and learning methodologies and identify problems in science education, a pilot studio is being implemented in 2020/2021 to conduct, for the first time, in Portugal, the "Experimental mini-Olympiads of science" within the scope of the discipline of "Estudo do meio" of the 1<sup>st</sup> cycle of Portuguese basic education (students age between 9 years old).

Preliminary research regarding Chemistry teaching and learning will start in September 2021. The goals of this project called " Flipped classroom with laboratory stations. Students "learning and (self)regulation in Chemistry and physics" are developing students' scientific



skills, increasing motivation and involvement of students in the physics and Chemistry learning process.

This research project aims to deepen the knowledge regarding self-regulation, self-efficacy and the instrumentality of self-regulation learning and the learning results of chemistry and physics (school success). It will use hybrid learning environments based on practical work by stations and formative assessment. Hybrid teaching environments will use different approaches to STREAM education (Science - Technology - Reading - Engineering - Arts - Mathematics) to promote learning and enjoyment for Chemistry and Physics.

This project will be carried out in a secondary school near Lisbon, in the 10th and 11th grades, during the school year, 2021/2022, and be accompanied, by the Portuguese Chemical Society, through Isabel Ribau Coutinho.

## 5. SPQ Meetings organization

The *Portuguese Chemical Society* organized in 2020 and 2021 the following international and national meetings:

### In 2020

- 13.º Encontro Nacional de Química Orgânica / 6.º Encontro Nacional de Química Terapêutica- from January 15 to 17(2020)
- 10º Encontro da Divisão de Química Analítica da SPQ – Virtual meeting- from 26 to 28 October 2020

### In 2021

- 14º Encontro de Química Física- from 29 to 31 Mars (Coimbra)
- 7th Portuguese Young Chemists Meeting- From 19 to 21 May (Bragança)
- 1st Spring Virtual Meeting on Medicinal Chemistry- May 26 (online Symposium)
- 2º Encontro do Grupo de Químicos no Estrangeiro da SPQ- 10 Jun (Aveiro)
- XXVII Encontro Nacional da Sociedade Portuguesa de Química- from 14 to 16 July (Braga)
- 1º Encontro Nacional de História da Química- 17 to 18 September (Aveiro)
- XV Encontro de Química dos alimentos- From 5 to 8 September (Funchal)
- XI Encontro Nacional de catálise e materiais porosos (XI ENCMP) & II Reunião do grupo do carbono (II RGC) - 9 to 10 December (Aveiro)
- IX Meeting of the Division of Chemistry Education and dissemination of The Portuguese Chemical Society- From 26 to 27 November.



### ***Bilateral meetings 2021***

- International Symposium on Synthesis and catalysis 2021, from 31 agosto a 3 de Setembro 2021 em Évora
- 12<sup>th</sup> Ibero American Congress on Sensors, from September 1 to 4 (Aveiro).
- XXII International Symposium on Homogeneous Catalysis from 5 to 10 Of September
- XXVI Encontro Luso Galego de Química Dia 17 November 2021.

## **6. Meetings sponsorship**

SPQ has pursued an effort of sponsoring non-SPQ chemistry meetings or activities with special emphasis to the ones related to Chemistry or Chemical Education. In this context and with the aim of inform, SPQ uses internet page to defund, not only national but also international, activities and meetings regarding chemistry. This is a simple way of disseminating indirectly knowledge in society.

### *In 2020*

- 4th International Caparica Symposium on Nanoparticles/Nanomaterials and Applications (20/1/2020)
- International Workshop on Chemistry of Group 11 Elements (30/1/2020)
- Laboratórios Abertos do Departamento de Engenharia Química do IST (3/1/2020)
- First ChemBioChem Virtual Symposium - Chemistry Europe (27/5/2020)
- Chemistry Europe: 3rd EurJOC Virtual Symposium (1/6/2020)
- Chemistry Europe: 2nd ChemBioChem Virtual Symposium (8/7/2020)
- 3rd International Caparica Conference in Splicing (13/7/2020)
- 4th International Caparica Conference on Ultrasonic-based Applications: from analysis to synthesis (20/7/2020)
- UK Colloids 2020 Virtual Poster Session (21/7/2020).
- 25th Anniversary Virtual Symposium of Chemistry – A European Journal (31/8/2020)
- 1st ChemMedChem Virtual Symposium (4/09/2020)
- 1st ChemPlusChem Virtual Symposium: Young Talents and Mentors (22/9/2020)
- 1st ChemPhysChem Virtual Symposium on CO2 Reduction (29/9/2020)
- VIII Encontro Nacional de Estudantes de Química – 2020 (9/10/2020)
- 1st Batteries & Supercaps Virtual Symposium on "Machine Learning Applied to Batteries" (13/10/2020)
- 2nd ChemPhysChem Virtual Symposium (on Supramolecular Chemistry) (22/10/2020)



- 2nd International Caparica Conference on Leishmaniasis (26/10/2020)
- 4th International Caparica Conference on Chromogenic and Emissive Materials 2020 (9/11/2020)
- 4th International Caparica Christmas Conference on Sample Treatment (30/11/2020)

### In 2021

- 15th German Peptide Symposium (04/3/2021)
- VII Jornadas da Química (22/3/2021)
- EurJOC Virtual Symposium - Special Edition: Journée DCO (23/3/2021)
- Colóquio Digital de Estudantes de Química em Portugal (26/3/2021)
- 9º Encontro Nacional de Estudantes de Engenharia Química (29/3/2021)
- Pré-conferência XXVII Encontro Nacional da SPQ: PC1- Jose Luis Díaz de Tuesta (21/4/2021)
- The Carbon element – Key towards a sustainable society (22/4/2021)
- SCF-ChemBio Inaugural Symposium - ChemBioChem (27/4/2021)
- Virtual Event: Modern Organic Synthesis (9/4/2021)
- A QUÍMICA PARA A VIDA (12/5/2021)
- Automated Synthesis: From Planning to Execution (12/5/2021)
- ICNF 2021 - 5th International Conference on Natural Fibers (17/5/2021)
- 7th European Chemical Biology Symposium ECBS (26/5/2021)
- Symposium on Chemical and Biological Engineering – DCE21 (28/6/2021)
- 8th Conference of the Federation of European Zeolite Associations (5/7/2021)
- International Symposium on Solubility Phenomena and Related Equilibrium Processes (12/7/2021)
- 6th International Congress on Water, Waste and Energy Management (21/7/2021)
- 5th International Conference on Green Chemistry and Sustainable Engineering (21/7/2021)
- International Conference on Materials and Nanomaterials (26/7/2021)
- International Conference on Green Energy and Environmental Technology (28/7/2021)
- IUPAC | CCCE 2021 (13/8/2021)
- EuropaCat 2021 (29/8/2021)
- International Symposium on Synthesis and Catalysis 2021 (ISySyCat2021) (31/8/2021)
- 12th Ibero-American Congress on Sensors (01/9/2021)





- 4th Virtual Conference on Organometallic Chemistry (EuCOMC XXIV) (1/9/2021)
- XV Encontro de Química dos Alimentos (5/9/2021)
- YEuCat better together - an EFCATS-supported event for young researchers (6/9/2021)
- 5th EuChemS Conference on Green and Sustainable Chemistry (26/9/2021)

## 7. Publications

### ***Chemistry – the bulletin of the Portuguese Chemical Society***

The *Portuguese Chemical Society* publishes *Bulletin of Chemistry*, (ISSN 0870-1180), a quarterly magazine, published in Portuguese. This review has news from the society and publishing popular science articles, some scientific articles on specific subject and articles devoted to chemical education and to help teachers from the secondary school. The *Chemistry* is distributed free of charge to members of the *Portuguese Society of Chemistry* and shared with some international and national associations. The average print run was 1500 copies. The volumes are available electronically to the public through the portal of the Portuguese Society of Chemistry (<http://www.spq.pt/magazines/bspq>).

The *Portuguese Chemical Society* is co-owner of ChemistryEurope which are responsible for the publication of several journals.

### ***Meetings resume book and abstract Book***

The SPQ National Meetings publish a book of resumes in English. In the Meeting of the Division of Chemistry Education and dissemination of SPQ, a book of resumes is published in Portuguese.

## 8. SPQ Liaison with the chemical industry

In the Portuguese Chemical Society, the liaison with industry is made through its “Industrial Chemistry” Group held by Professor Alberto Canelas Pais.

## 9. SPQ International and European initiatives

Organization of the 8<sup>th</sup> EuChemS Chemistry Congress from 28 de Agosto a 1 de setembro 2022 em Lisboa.



## 10. Other events and activities

SPQ disseminate chemistry through arts namely by promoting concerts), editing books ("Chemistry in opera – João Paulo André") and theatre plays ("The periodic table neighbourhood").

## 11. Name of delegate and deputy

**Delegate** – Isabel Ribau Coutinho      **Deputy** – Teresa Maldonado Sousa Conceição

## 12. Contact details of delegates

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## 13. CV of delegate and deputy

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