

Chemistry
Education (CE)
11th July 2017
Golden Hall 8
15:00 PM

Chemistry Olympiads

20 Years of the São Paulo Model where
Authors of the Best Thematic Essays
Qualify for a Final Examination Based
on Live Chemistry Demonstrations



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20 Years of the São Paulo Model where
Authors of the Best Thematic Essays
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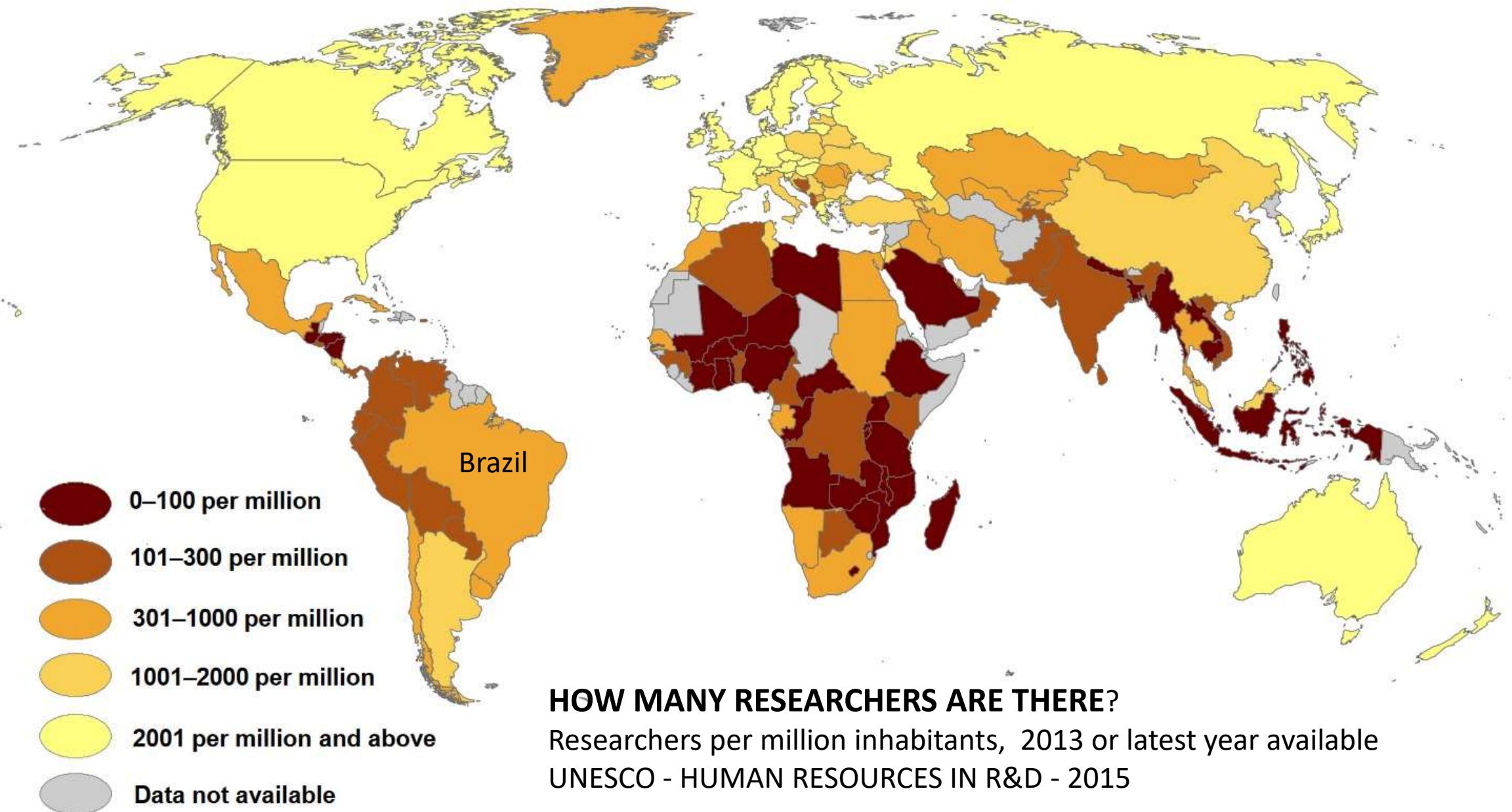


***Ivano G. R. Gutz, Omar A. El Seoud, Mauro Bertotti,
Lúcio Angnes, Márcia L. A. Temperini, Fernando S. Lopes***

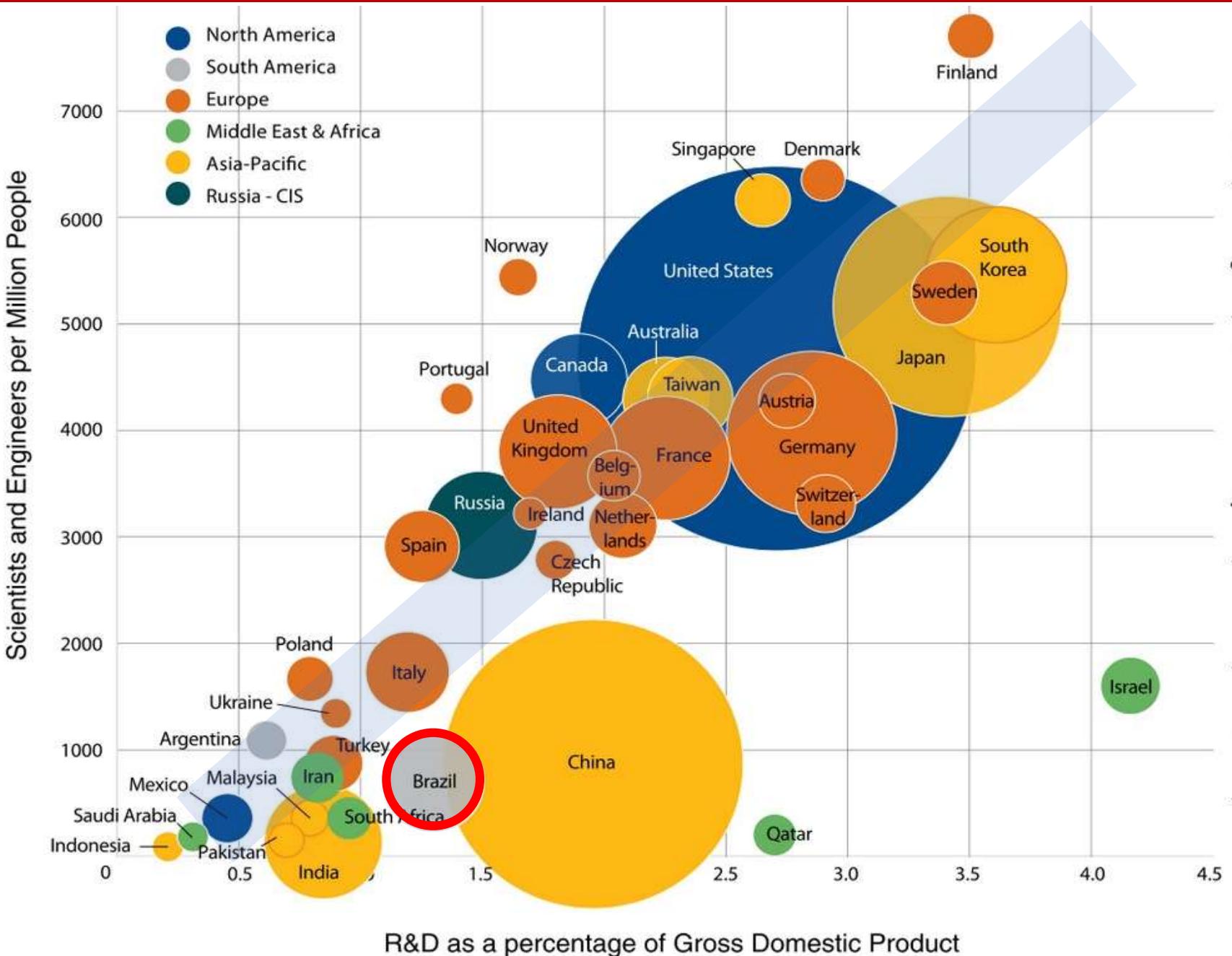
[Instituto de Química – Univ. de São Paulo, São Paulo, SP] and ***Jairo J. Pedrotti***
[Mackgraphe – Univ. Presbit. Mackenzie, São Paulo, SP]

The authors are the organizers of the Chemistry Olympiad of the State of São Paulo
(OQSP), promoted by the Brazilian Association of Chemistry – São Paulo Region (**ABQ-SP**)

Scarcity of Scientists/Researchers in Brazil



Scarcity of Researchers & Engineers & Funding in Brazil

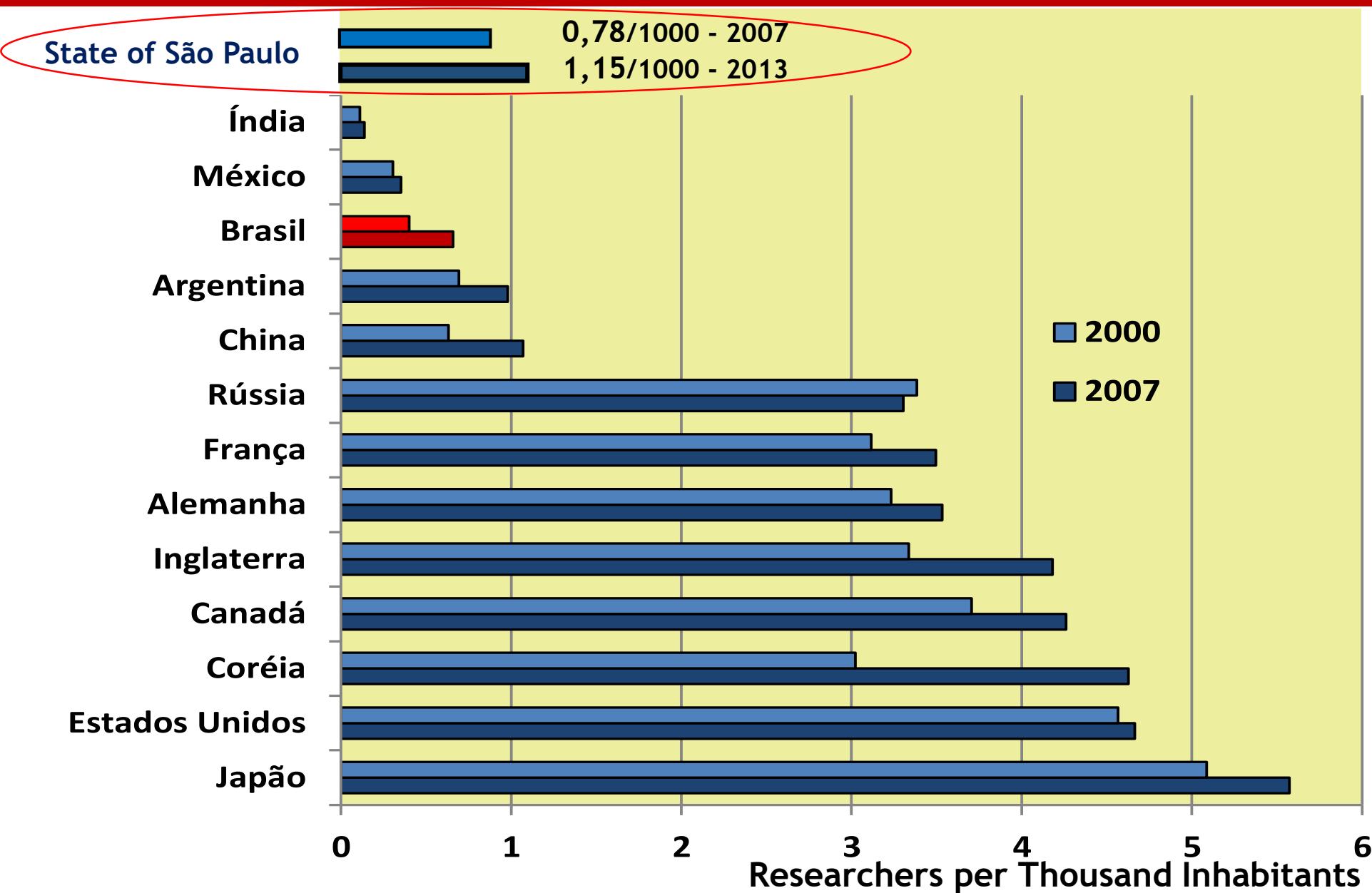


Size of the circle:
relative amount of
annual R&D
spending

Source: Battelle, R&D Magazine, International Monetary Fund, World Bank, CIA Fact Book, OECD

<http://www.rdmag.com/articles/2013/12/2014-r-d-magazine-global-funding-forecast>
<http://www.battelle.org/media/global-r-d-funding-forecast>

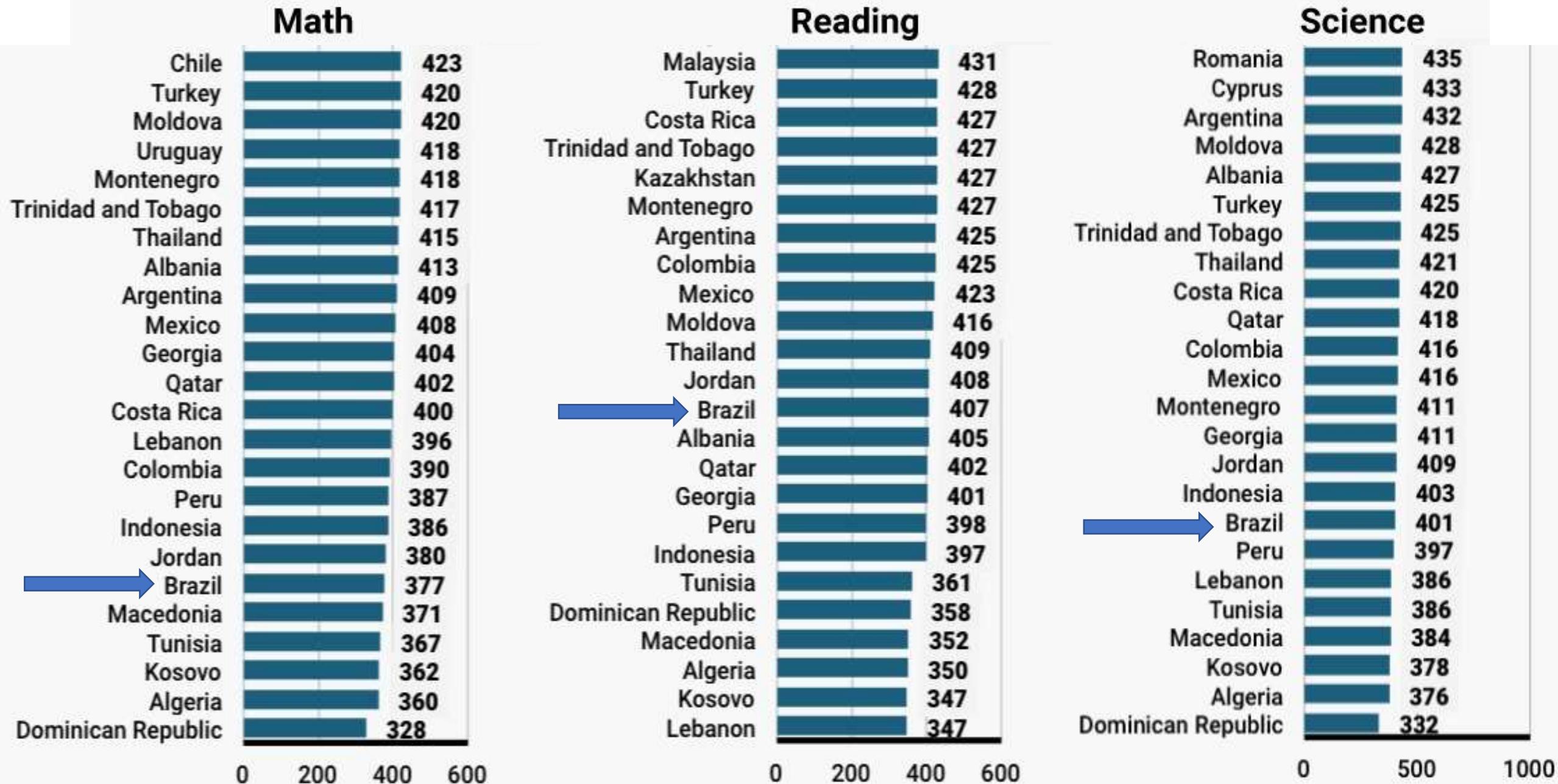
Scarcity of Scientists in Brazil



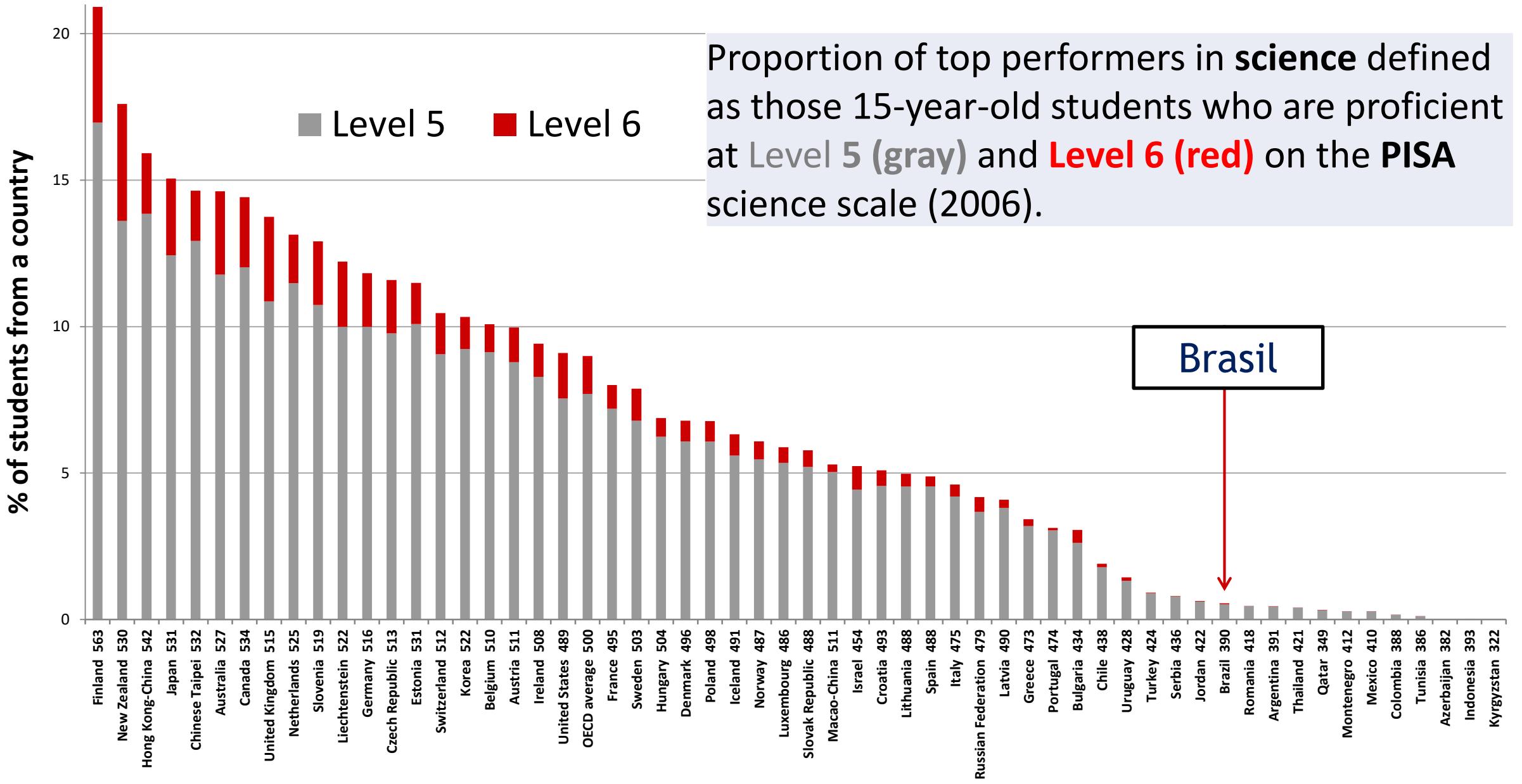
2015 PISA TOP Scores (above OECD average) 540,000 15-year-old students



2015 PISA Lowest Scores of 72 participating countries



PISA Top Performer in Science

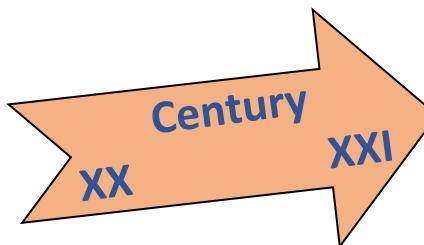


Search for Talents in Hard Sciences



αber Einstein

[http://artic.ac-besancon.fr/college_gerome/
trav_eleves/site_3_1tr/groupe34/ledessin.htm](http://artic.ac-besancon.fr/college_gerome/trav_eleves/site_3_1tr/groupe34/ledessin.htm)



βbert Zweisteine

<http://donna.hu/cikk/u/640%22>

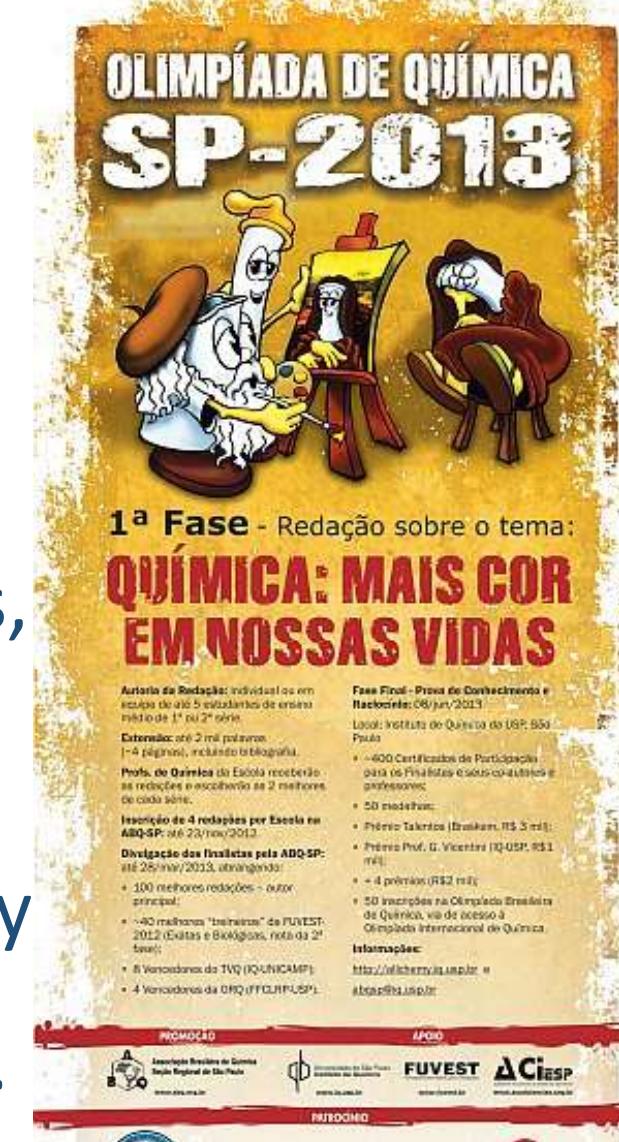
Objectives of OQSP

- i) Promote interest for Chemistry and its interrelations with other sciences and the society;
- ii) Attract talented students for studies and careers in the industry and academy dedicated to Chemistry (and Chemical Engineering, Biochemistry, Pharmacy, Environmental Sciences, Material Sciences, etc.);
- iii) Select and award medals to 50 students yearly, entitling them to represent São Paulo in the Brazilian Chemistry Olympiad;
- iv) Improve the society's perception of the contributions of Chemistry to quality of life and sustainability.

Annual topics of OQSP - examples



Aiming to catch the attention and interest of more students than just those willing to take conventional examinations of Science Olympiads, in the First Phase of the OQSP they are asked to write a four-page essay on a context-oriented annual topic.



Examples of Themes of Chemistry Olympiad of the State of São Paulo



Nine thousand printed banners and folders are posted to three thousand schools (end of August).

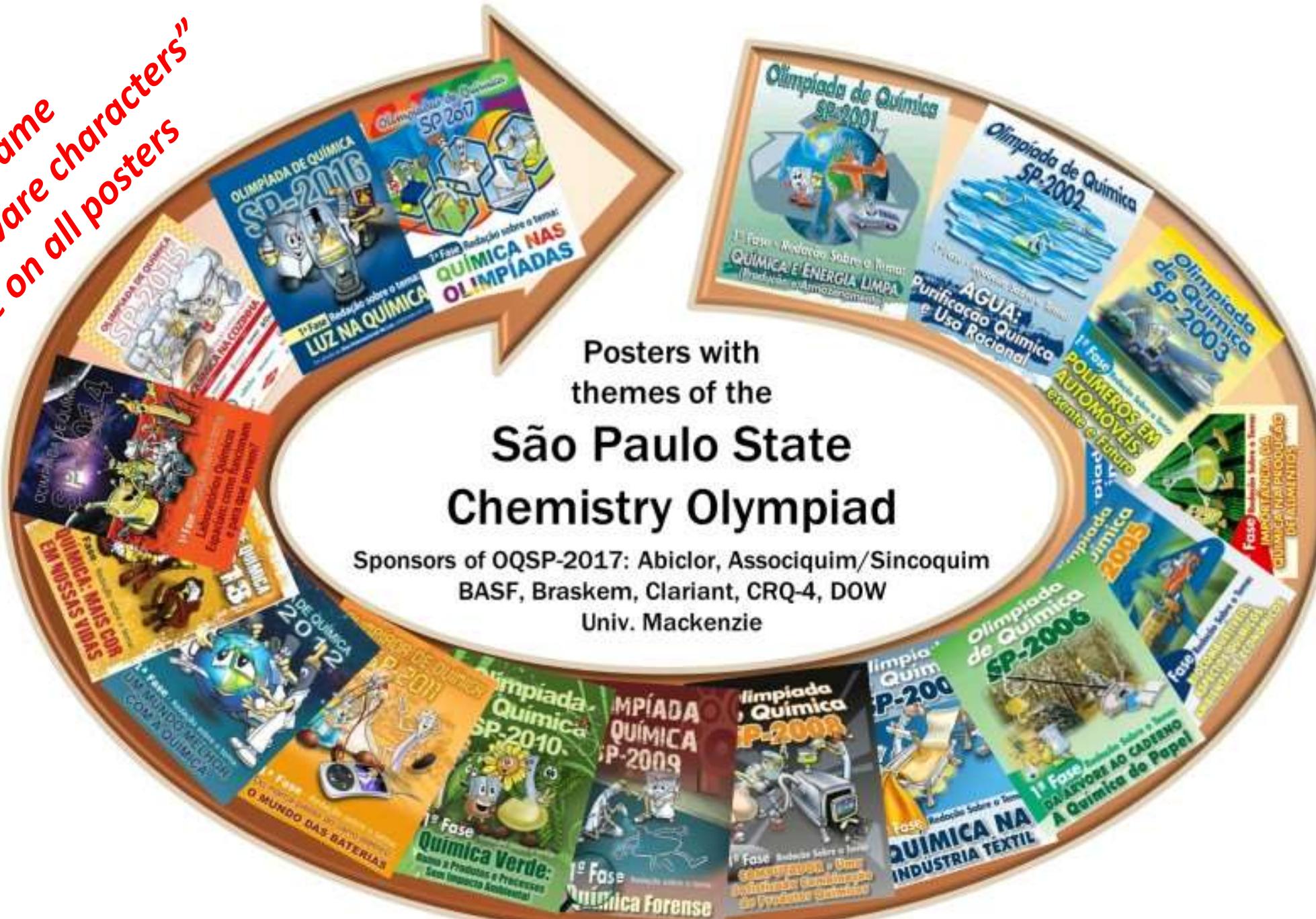
Complete information about the OQSP is published on the website [<allchemistry.iq.usp.br>](http://allchemistry.iq.usp.br), as well as the 20 best Essays of the year, chosen by a team of 60 PhDs in Chemistry.



The same
“lab glassware characters”
are on all posters

Posters with
themes of the
**São Paulo State
Chemistry Olympiad**

Sponsors of OQSP-2017: Abiclor, Associquim/Sincoquim
BASF, Braskem, Clariant, CRQ-4, DOW
Univ. Mackenzie



OQSP-2017 - Essays Evaluation Commission (Jan /Feb summer vacations)

Profs. Drs. from IQ-USP, São Paulo: Atualpa A. C. Braga; Bayardo Baptista Torres; Breno Pannia Espósito; Carmen Fernandez; Cassiana S. Nomura; Cassius Vinicius Stevanis; Claudio Di Vitta; Dalva Lucia A. Faria; Erick L. Bastos; Fábio Rodrigues; Flávio A. Maximiano; Fernando Silva Lopes (especialista não docente); Ivano G. R. Gutz; Leandro de Andrade; Liane Márcia Rossi; Liliana Marzorati; Lucas C. Veloso Rodrigues; Marcia L. A. Temperini; Maria Teresa Machini; Mauro Bertotti; Mauro Santos (pós-doc.); Paola Corio; Patricia B. Di Vitta; Paulo A. Porto; Paulo Celso Isolani; Pedro V. Oliveira; Peter Tiedeman; Renato S. Freire; Silvia H. P. Serrano; Silvia Maria L. Agostinho; Thiago R. L. C. Paixão; Viktória Lakatos Osório; Wanda de Oliveira; **IAG-USP**, São Paulo: Adalgiza Fornaro; Thiago Nogueira (pós-doutor); **EACH-USP**: Andrea Cavicchioli; **IQSC-USP**, São Carlos: Elisabete Frollini; Ernesto Rafael González; Salete L. Queiroz; **DQ-FFCL-USP**, Ribeirão Preto: José Fernando de Andrade; **CENA-USP**, Piracicaba: Fábio R. Piovezani Rocha; **IQ-UNICAMP**, Campinas: Dosil Pereira de Jesus; José Alberto Fracassi; Marco A. Zezzi Arruda; Regina Buffon; **IQ-UNESP**, Araraquara: Assis V. Benedetti; Massao Ionashiro; **DQ-UFSCar**, São Carlos: Joaquim A. Nóbrega; Vania Zuin; **DQ-Mackenzie**, São Paulo: Sérgio H. Domingues; **CCNH-UFABC**, Santo André: Ivanise Guabeur; Patrícia Dantoni; **UNIFIEO**, Osasco: Silvio Miranda Prada; **UNIFESP**, Mauro Aquiles La Scalea; **Univ. Federal Lavras**, Lavras: Fabiana Felix; **Instit. Mauá de Tecnologia**, São Caetano do Sul: Patrícia A. Menezes Freitas; **UNESP**, Jaboticabal: Marcio Augelli; **IPEN-CNEM**, São Paulo: Maria Inês C. Cantagallo; **ITA-CTA**, S. José dos Campos: Koshun Iha; **FACCAMP**, Campo Limpo Paulista: Lisete Maria Fischer.

AllChemey publishes 20 selected essays yearly since 1997

1ª página
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Coordenação:
Ivano Gutz

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1º site abrangente de Química no Brasil

— Online desde fevereiro de 1995 —

OQSP Redações

Busca



Olimpíadas de Química



Redação selecionada e publicada pela Olimpíada de Química SP-2017

Autor: Isabella Branco Renolphi

Série: primeira (2016) do Ensino Médio

Profa.: Sandra Regina Pereira

Colégio: EE. Profa. Theodora de Camargo Ayres

Cidade: Piedade

Olímpiadas: A Química por trás do Espetáculo

Enquanto festejávamos com cada uma das medalhas de ouro, prata e bronze que o Brasil ganhava na Rio 2016, nem nos demos conta de quanta química fora usada para tal. A verdade é que há muita ciência nas estruturas, nas instalações, nos equipamentos esportivos, na alimentação e vestimenta dos atletas, na identificação do uso de substâncias ilícitas, etc.

Olimpíada de Química do Estado de São Paulo OQSP-2017 - Química nas Olimpíadas

Publicação completa das redações
sobre o tema: "Química nas Olimpíadas"
selecionadas entre as 100 redações finalistas

Clique ou toque no nome do autor para ver sua redação. Todas estão no formato PDF e podem ser lidas com o [Adobe Acrobat Reader](#) (gratuito) ou outros programas/aplicativos compatíveis como formato pdf.

Alunos da 1ª série do Ensino Médio em 2016 (2ª série em 2017):

NOME	ESCOLA	CIDADE
Daniel Yuji Tokuda	Col. Emilie de Villeneuve	São Paulo
Fabricio Meyer Trevisan	Col. Caranda VivaVida	São Paulo
Gabriele de Andrade Barbi	Col. Puríssimo Coração de Maria	Rio Claro
Gustavo Mariano Barros	EE. Prof. Silvério Monteiro	Itapeva
Isabella Branco Renolphi	EE. Profa. Theodora de Camargo Ayres	Piedade
Lais Rodrigues Migliorini	Col. Vital Brazil	São Paulo
Lucas Carrit Delgado Pinheiro	Col. Cristo Rei	Marília
Pedro Anequini Nogueira	Col. Bandeirantes	São Paulo
Raquel Belline Cruci	Col. Albert Sabin	São Paulo

Alunos da 2ª série do Ensino Médio em 2016 (3ª série em 2017):

NOME	ESCOLA	CIDADE
André Cheker Burihan	Col. Singular	São Bernardo do Campo
Anna Karolina Tasaka de Melo	ETEC. Benedito Storani	Jundiaí
Bárbara de Melo Codinhoto	Col. Votuporanguense de Ensino	Votuporanga
Beatriz Freschi Vollet	Puríssimo Coração de Maria	Rio Claro
Carolina Lago Pena Maia	Col. Agostiniano São José	São Paulo
Gabriel Caleb	ETEC. Prof. Basilides Godoy	São Paulo
Matheus Takayasu	Col. Etapa	São Paulo
Pietro de Camargo Palma	Col. Bandeirantes	São Paulo
Victor Roberto Neri Veltmeyer	Col. Etapa	Valinhos
Victoria Padilha Zanon	Escola de Educação Passo a Passo	Votuporanga

São Paulo State Chemistry Olympiad – Selection of Finalists

Circa **150 students** are selected for the **Finals** of the OQSP, always in June

1st Authors of best ranked Essays on the Annual Theme

50 + 50 finalists of OQSP from approximately 4 Thousand participants

40 Best “trainees” of the FUVEST (Exact and Biological Sciences)

~20 + ~20 finalists of OQSP from approximately 8 Thousand participants

Winners from São Paulo of the Virtual Chemistry Tournament

(IQ-UNICAMP)

4 + 4 finalists of OQSP

Winners of the Regional Chemistry Olympiad (DQ-USP Ribeirão Preto)

2 + 2 finalists of OQSP

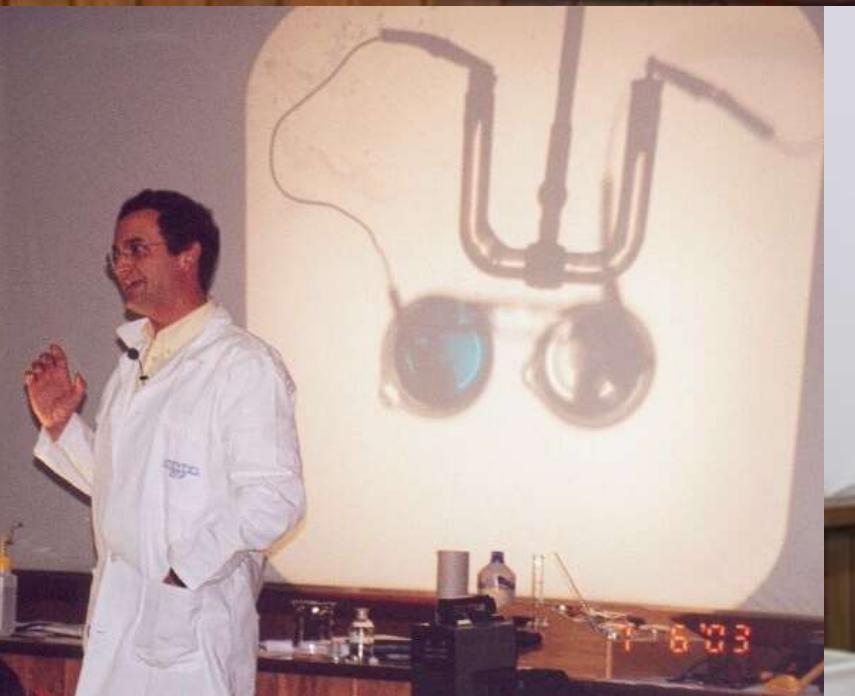
OQSP-2017 – Live Experiments Related to the Exam



Students' teachers watching a projection of the experiments



OQSP-2004 – Live Experiments Related to the Exam



OQSP – Live Experiments Related to the Exam



OQSP-2017 – Live Experiments Related to the Exam



Lucas Rodrigues
OQSP 2002 – Gold Medal



Lucas Rodrigues
OQSP 2017 - PhD



OQSP – Examples of Publications originated from the Experiments

In the Classroom

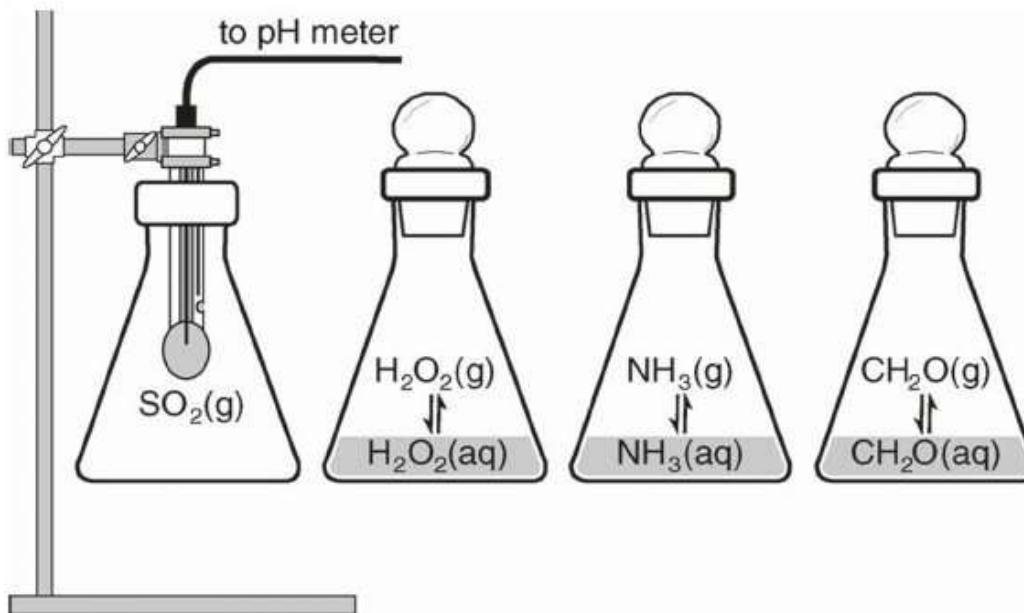
Tested Demonstrations

Unraveling the Role of Sulfur Compounds in Acid Rain Formation: Experiments on a Wetted Glass pH Electrode

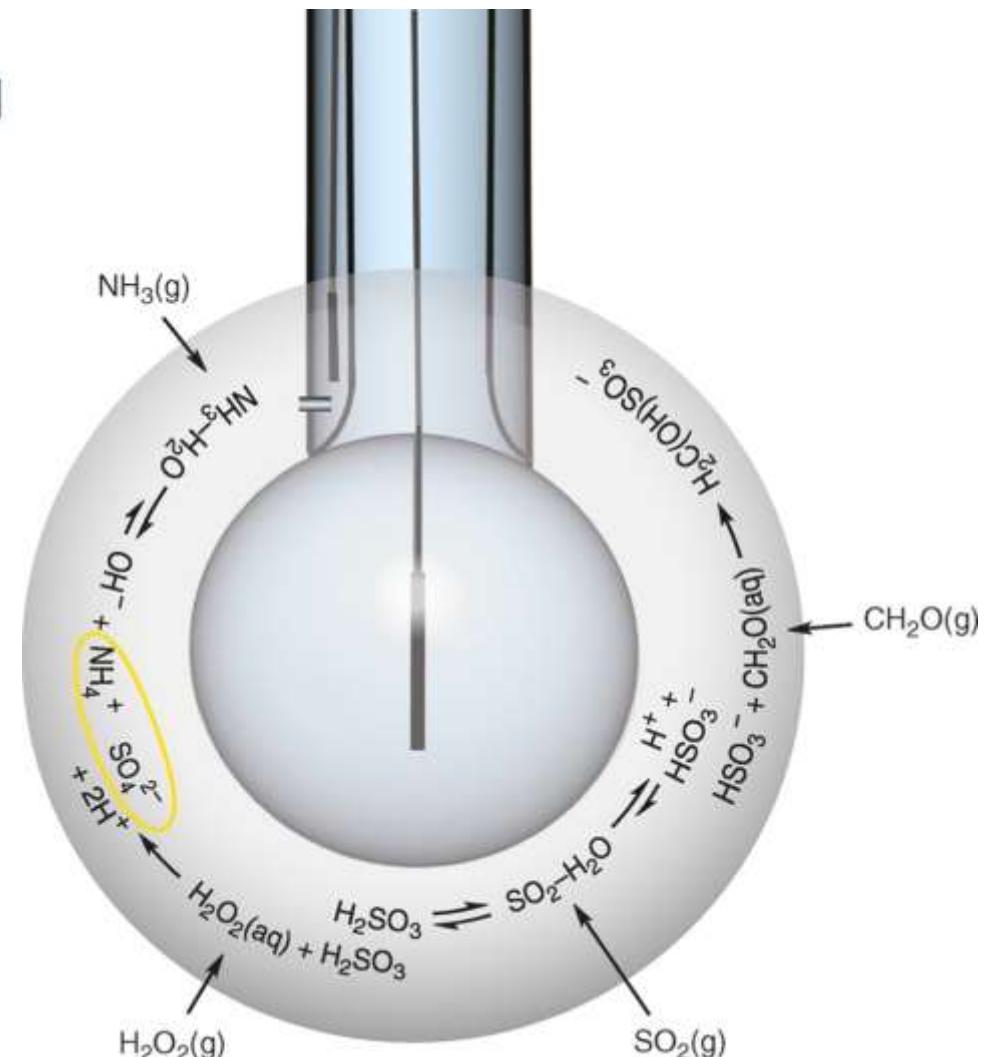
Fernando S. Lopes, Lúcia H. G. Coelho, and Ivano G. R. Gutz*

Instituto de Química, Universidade de São Paulo, Av. Prof. Lineu Prestes, 748. 05508-000,
São Paulo, SP, Brazil

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edited by
Ed Vitz
Kutztown University
Kutztown, PA 19530



UM EXPERIMENTO-CHARADA USANDO DATA-SHOW E RESINAS DE TROCA IÔNICA

Viktoria Klara Lakatos Osorio, Miuaco Kawashita Kuya, Alessandra de Souza Maia e Wanda de Oliveira*

Instituto de Química, Universidade de São Paulo, CP 26077, 05513-970 São Paulo - SP

Recebido em 30/10/02; aceito em 20/3/03

A QUIZ-EXPERIMENT USING DATA-SHOW AND ION EXCHANGE RESINS. A demonstrative experiment was proposed in order to verify students' abilities in recognizing the presence and nature of ions in solutions, before and after their passage through ion-exchange columns. The students have no previous contact with ion-exchange resins, so they must deduce how they work and explain the experimental facts. The performance of classes, at different stages of learning, is compared and discussed.

OQSP – Examples of Publications originated from the Experiments

Educación Química (2017) xxx, xxx–xxx



educación
Química

www.educacionquimica.info



DIDÁCTICA

Compostos coloridos do ferro: uma proposta de experimentação utilizando materiais de baixo custo

Simone Garcia de Ávila* e Jivaldo do Rosário Matos

Departamento de Química Fundamental, Instituto de Química, Universidade de São Paulo, 05508-000, São Paulo – SP, Brasil

Recebido a 22 de dezembro de 2016; aceite a 4 de abril de 2017

Have Biofuel, Will Travel: A Colorful Experiment and a Different Approach To Teach the Undergraduate Laboratory

Omar A. El Seoud^{*†}, Carina Loffredo[†], Paula D. Galgano[†], Bruno M. Sato[†], and Christian Reichardt[‡]

Institute of Chemistry, University of São Paulo, P.O. Box 26077, 05513-970 São Paulo, S.P., Brazil

Fachbereich Chemie, Philipps-Universität, Hans-Meerwein-Strasse, 35032 Marburg, Germany

J. Chem. Educ., 2011, 88 (9), pp 1293–1297

DOI: 10.1021/ed1009464

Publication Date (Web): July 22, 2011

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E-mail: elseoud@iq.usp.br.



OQSP-2013 – Immediate correction of finalists' exams



Double-blind evaluation and classification of the written exams of the participants by a team of circa 20 PhDs in Chemistry (from postdocs to full professors), on Saturday afternoon, while students have lunch

OQSP-2017 – Final Exam Correction of finalists' exams



OQSP – Lunch Time



OQSP – Visits to Undergraduate Chemistry Laboratories



OQSP – Visits to Undergraduate Chemistry Laboratories



OQSP-2017 Exposition + VR Presentation by the Chemical Industry



Chemistry in Action – Theater Group of Undergraduates at IQ-USP



OQSP – 2012 – Gold Medal Winners



OQSP – 2017 – Gold Medal Winners

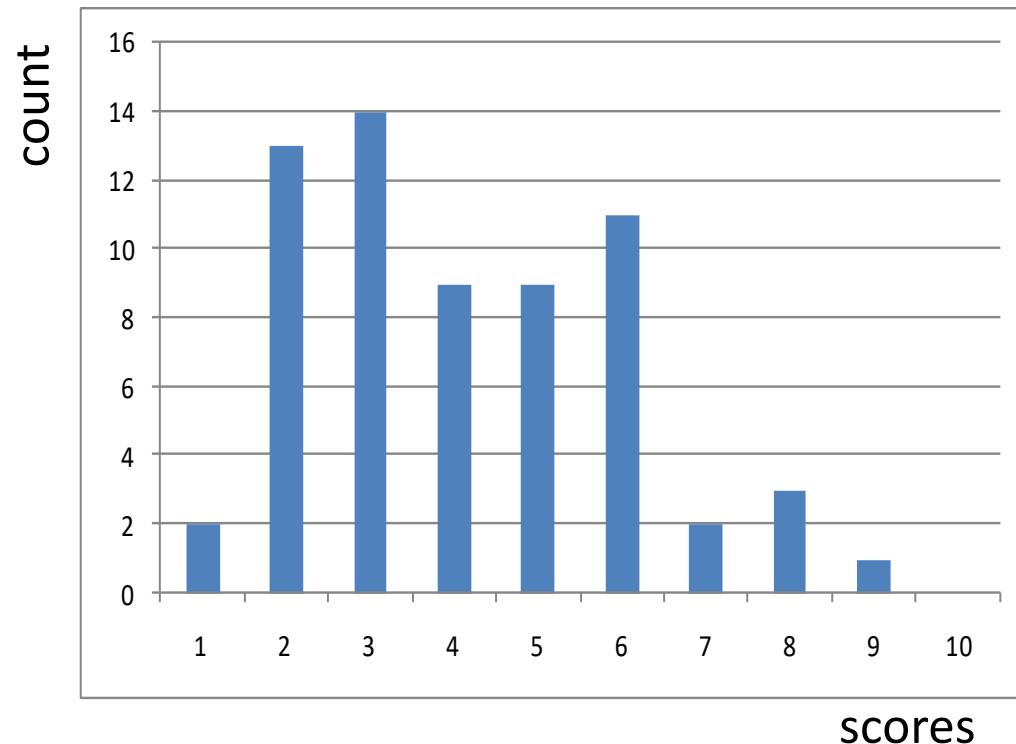


Histograms of Students Scores in OQSP Final Exam

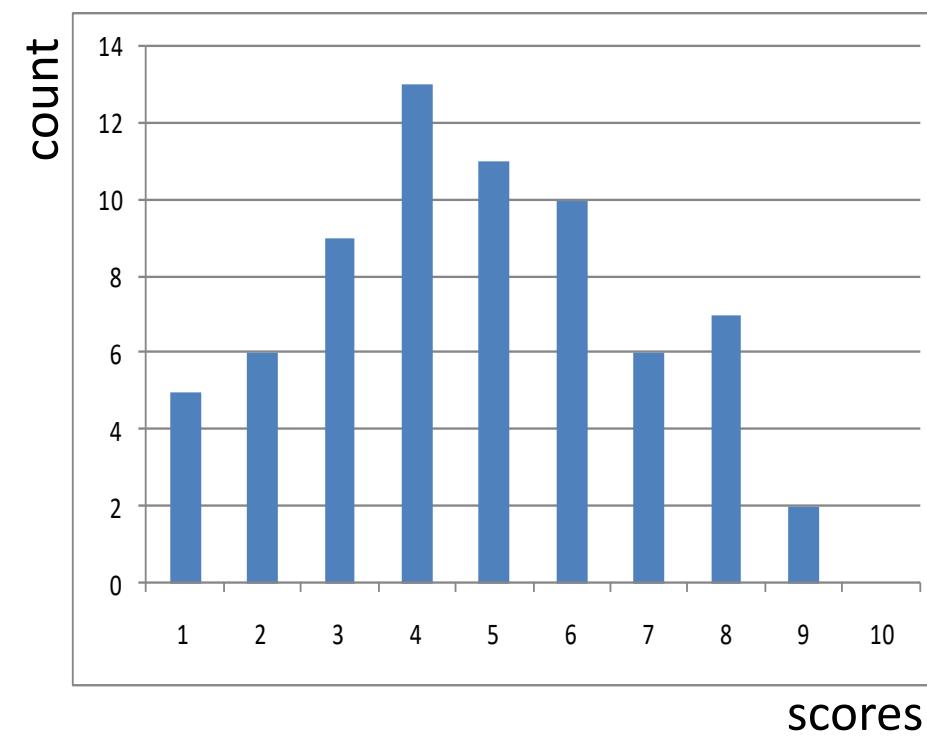
Histograms of grades of the Final Written Examination of the OQSP-2013

The OQSP exam is the same for all students (11th and 12th graders)

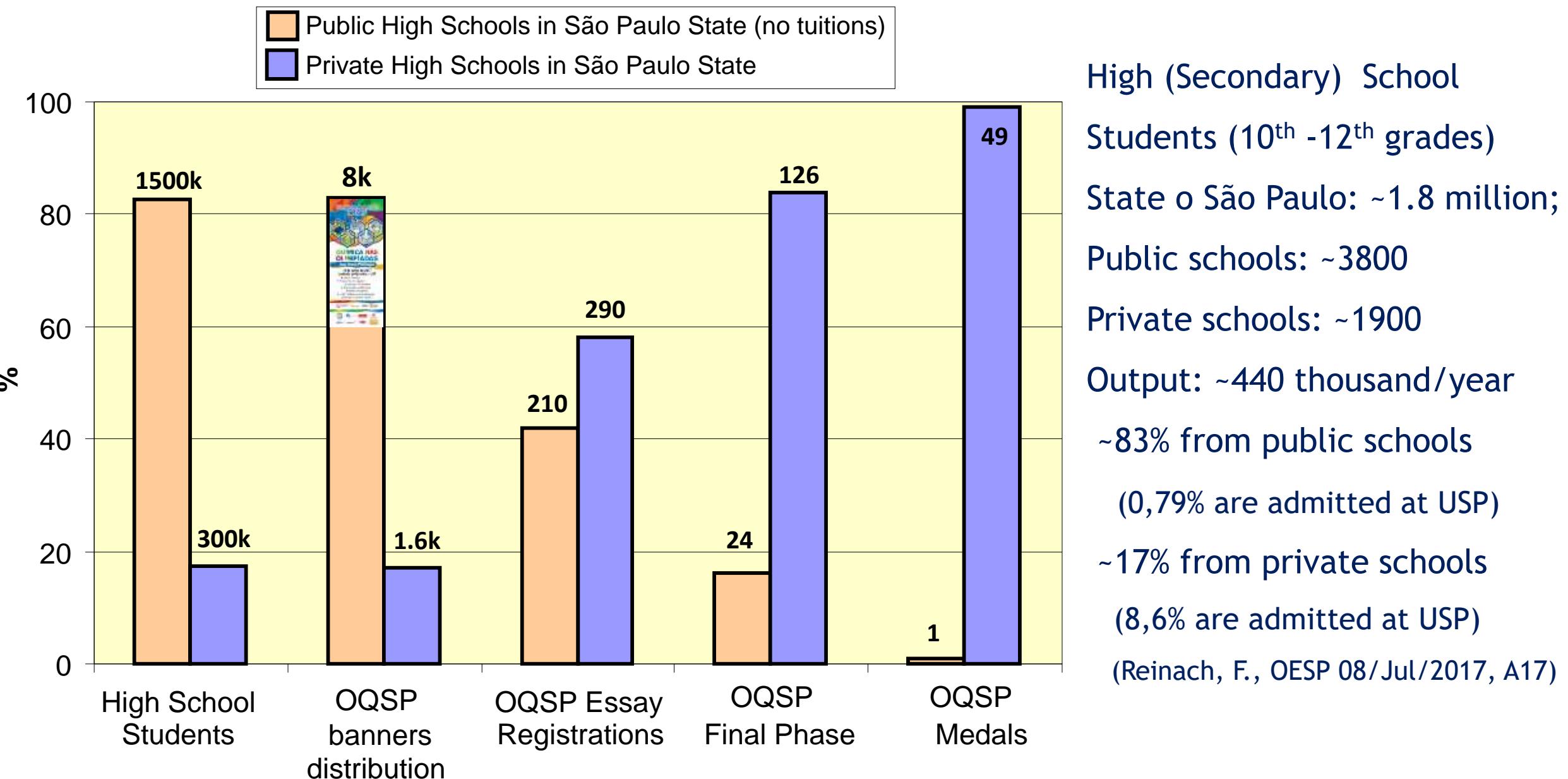
2nd Year (11th grade) Finalists



3rd Year (12th grade) Finalists



Origin of OQSP Participants - State of São Paulo



Olympic School of Chemistry – IQ-USP



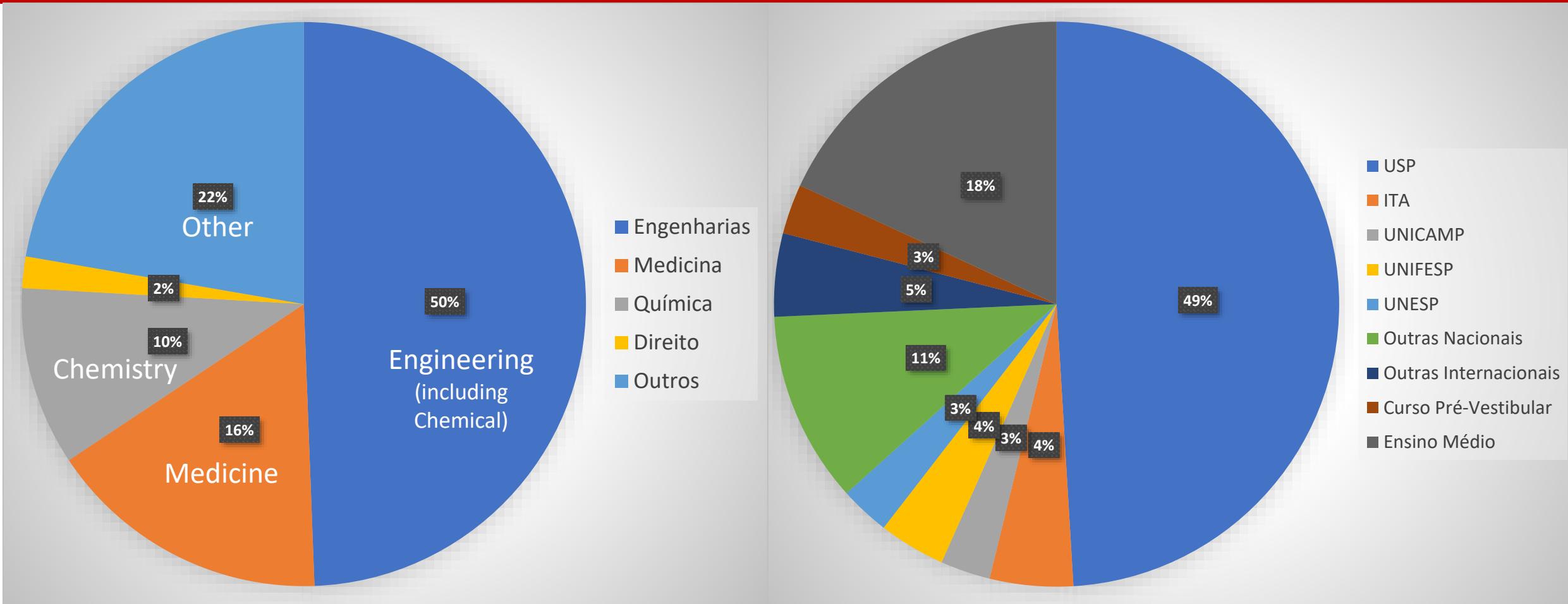
Every month of July (since 2011) there is a one week (66 hours) intensive winter course of preparation of OQSP winners for the National Examinations of the Brazilian Chemistry Olympiad, that take place at the end of August.

Veterans of the Chemistry Olympiads serve as instructors of the course. Professors of IQ-USP present seminars and organize laboratory experiments.

7th Olympic School of Chemistry – IQ-USP – 3-8 July 2017

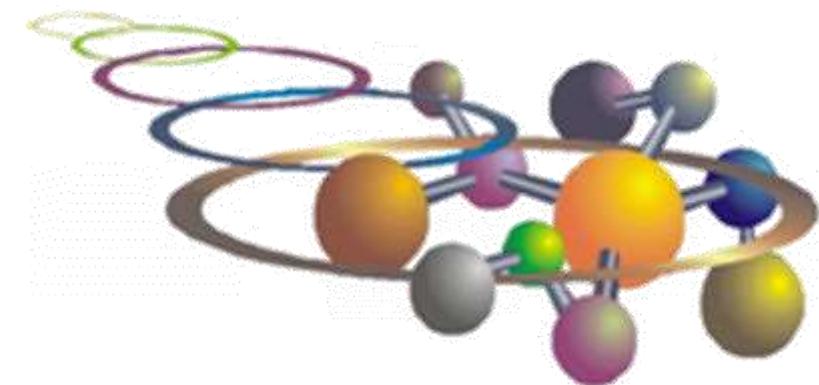
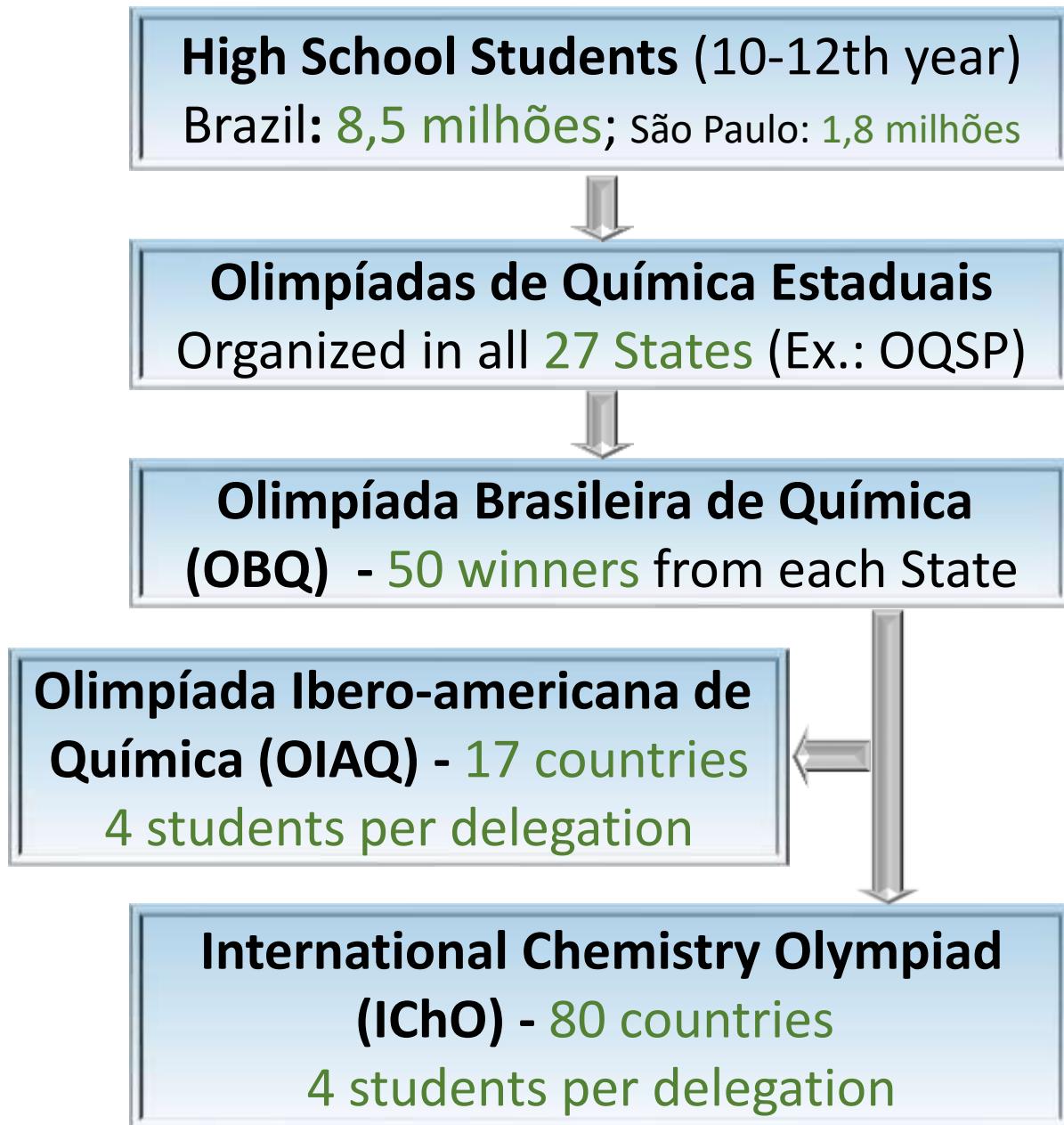


Courses and Universities chosen by former participants of EOQ



The former participants of EOQ are, for the most part, medal winners of the OQSP thus the graphics reflect also the courses chosen by top participants of the OQSP

Chemistry Olympiads Flow Chart



CHEMISTRY OLYMPIADS

NATIONAL PROGRAM

Coordinator: Prof. Sérgio Melo (UFC)

Main sponsor: CNPq

41st IChO Practical Exam (Cambridge University, 2009, photo: Nathan Pitt)



OQSP winner's first IChO Medals - 2010 - 2012



The OQSP started in 1997; the first IChO medals were conquered in 2010



42nd International Chemistry
Olympiad - July 2010
Tokyo - Japan
SP: 2 x Bronze

43th International Chemistry
Olympiad - July 2011
Ankara - Turkey
SP: 1 x Bronze
CE: 1 x Silver + 1 x Bronze

44th International Chemistry
Olympiad - July 2012
Washington - EUA
SP: 1 x Silver
CE: 2 x Bronze

2016 - Brazil's best IChO results so far



46th International Chemistry
Olympiad - July 2014
Hanoi - Vietnam
SP: 2 x Bronze



47th International Chemistry
Olympiad - July 2015
Baku - Azerbaijan
SP: 1 x Silver + 1 x Bronze
CE: 1 x Bronze



48th International Chemistry
Olympiad - July 2016
Tbilisi - Georgia
SP: 2 x Silver
CE: 2 x Bronze

Annual Meeting of the Brazilian Chemical Industry

Since December 2004, medal winners, especially in the International Chemistry Olympiads
are honored during the Annual Meeting of the Brazilian Chemical Industry
ENAIQ - ABIQUIM



Foto: Alberto Murayama



International Chemistry Olympiad

Medalhas de Prata em 2015 e 2016

Olimpíada Ibero-americana de Química

Medalhas de Ouro em 2015 e 2016

Olimpíada Brasileira de Química

Medalhas de Ouro em 2014, 2015 e 2016

Olimpíada de Química do Estado de São Paulo

Medalha de Ouro em 2015

Vitor Gomes Pires

3ª série - Ensino Médio

Colégio Etapa - São Paulo (SP)

Conclusion

The OQSP model has been approved and praised by high school students and teachers for the last two decades mainly because:

- During the essay preparation, the theme motivates discussion and study of chemistry subjects in classroom and at home;
- The final exam, largely based on the demonstrated experiments, fosters the observation and interpretation capacity;
- Participants come to a University Campus, visit a Chemistry Institute and interact with professors and undergraduates;
- Six prizes and 50 medals are awarded on the same day of the exam;

However the model is laborious and requires a large and qualified team.



University of São Paulo

Coat of Arms

LATIN: *Scientia Vinces*

PORTUGUÊS: *Vencerás pela Ciência*

ENGLISH: *Science will Conquer*

Sponsors and supporters
e.g.: OQSP-2017



Scientia Vinces



Ivano Gutz

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Thank you!

IUPAC 2017 – Chemical Education (CE) – Abstract 1708

Chemistry Olympiads – 20 Years of the São Paulo Model where Authors of the Best Thematic Essays Qualify for a Final Examination Based on Live Chemistry Demonstrations

Ivano G. R. Gutz*, Omar A. El Seoud*, Mauro Bertotti*, Lúcio Angnes*,
Márcia L. A. Temperini*, Fernando S. Lopes* and Jairo J. Pedrotti**

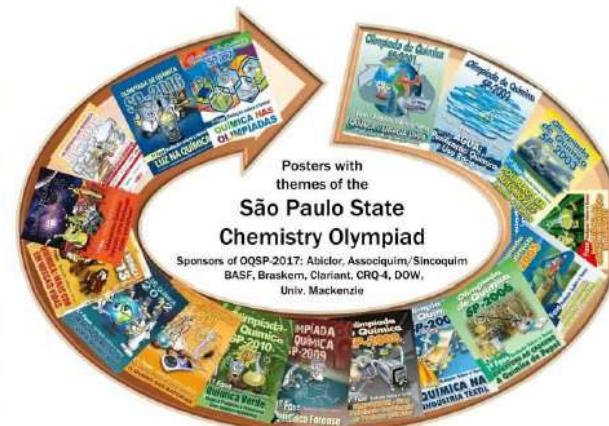
* Instituto de Química – Universidade de São Paulo

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** Mackgraphe- Universidade Presbiteriana Mackenzie, São Paulo, SP
gutz@iq.usp.br

The International Chemistry Olympiad (IChO) has a successful history of nearly half a century of stimulation of activities of secondary (high) school students interested in chemistry and promotion of international contacts, cooperation and international understanding among the delegations from, presently, 80 countries. Brazilian students participate regularly since 1999 and were awarded several bronze and silver medals. This achievements contrast with the low overall scores in science, mathematics and reading of Brazilian fifteen-years-old students in the Programme for International Student Assessment (PISA–OECD). The four students sent to IChO yearly are selected by the Brazilian Chemistry Olympiad, which has as participants the 50 best ranked students in each of the 27 Chemistry Olympiads carried out in all states of Brazil. In São Paulo – the most populous state of the country with 1.9 million secondary students mostly enrolled in public schools – the olympiad know by the initials OQSP follows an original model devised and successfully applied since 1996 by the São Paulo chapter of the Brazilian Association of Chemistry, as will be presented.

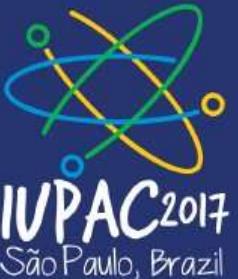
Aiming to catch the attention and interest of more students than just those willing to take conventional examinations of science olympiads, in the First Phase of the OQSP they are asked to write a four page essay on a context-oriented annual topic, e.g. Chemistry in the Olympic Games, Light in Chemistry, Chemistry in the Kitchen, Chemistry Labs in Space, etc. Printed banners and folders are posted to three thousand schools while complete information about the OQSP is published on the website <allchemy.iq.usp.br>.



It is up to the school teachers to select and submit to the OQSP the four best essays from their school. A team of some sixty PhDs in chemistry reads and grades the essays during the summer vacation and unveils a list of one hundred authors that are invited to the Final Phase of the OQSP together with 50 students selected by three minor access routes based on exams. Since 1997, twenty preferred essays are added yearly to those already published on AllChemistry.

During the full day Final Phase the 150 students first attend a session of demonstrations of chemistry experiments in a lecture hall of the Institute of Chemistry – USP, in São Paulo, SP. They take notes of their observations on a printed guide and can use them during the 90 min written exam that follows. The grading of the exams by a team of fifteen PhDs (mostly associates and professors) starts short after. Meanwhile the students have lunch, visit laboratories and attend to a talk or a chemistry show played by undergraduates. At the end of the day, the results are announced along with the distribution of medals and prizes that are awarded by the sponsors' representatives. The fifty highest ranked students are entitled to represent the São Paulo state in the Brazilian Chemistry Olympiad (funded by the CNPq) and may attend a one week Olympic School of Chemistry. Many original experiments devised for the OQSP demonstrations have been published in journals of education in chemistry.

The adopted model, although laborious and requiring a large qualified team, has been approved and praised by high school students and teachers for two decades because the competition motivates discussion and study of chemistry subjects in classroom and at home during the essay preparation. Additionally, it fosters the observation and interpretation capacity during the final exam, largely based on the demonstrated experiments and previously studied concepts.



46th World Chemistry Congress
40^a Reunião Anual da Sociedade
Brasileira de Química
JULY 9 TO 14, 2017 - SÃO PAULO - BRAZIL
IUPAC 49th General Assembly
JULY 7 TO 13, 2017 - SÃO PAULO - BRAZIL
SUSTAINABILITY & DIVERSITY THROUGH CHEMISTRY

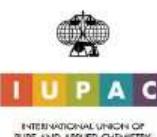
Certificate

The Brazilian Chemistry Society (SBQ) and the IUPAC – International Union of Pure and Applied Chemistry certify that

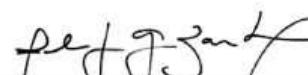
**IVANO GEBHARDT ROLF GUTZ; OMAR ABOU EL SEOUD; MAURO BERTOTTI; LUCIO ANGNES; MARCIA
LAUDELINA ARRUDA TEMPERINI; FERNANDO SILVA LOPES; JAIRO JOSE PEDROTTI**

presented the paper **CHEMISTRY OLYMPIADS - 20 YEARS OF THE SÃO PAULO MODEL WHERE AUTHORS OF THE
BEST THEMATIC ESSAYS QUALIFY FOR A FINAL EXAMINATION BASED ON LIVE CHEMISTRY DEMONSTRATIONS**
in the **46th World Chemistry Congress, 40^a Reunião Anual da Sociedade Brasileira de Química and IUPAC 49th
General Assembly** held from July 7th to 14th, 2017 in São Paulo - Brazil.

São Paulo, July 14th, 2017.




Adriano D. Andricopulo
Organizing Committee
Chairman


Aldo José Gorgatti Zarbin
SBQ - Brazilian Chemical Society
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