

EuCheMS



European Chemical Sciences

Working Party on History of Chemistry

EuChems Survey: History of Science in Europe, 2015

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I am deeply grateful to all the people (almost fifty), who have contributed to the survey. I also want to thank Brigitte van Tiggelen for her help with this EuCheMS project. I am also in debt to José Ramón Bertomeu-Sánchez for his work done in a previous report (http://www.euchems.eu/fileadmin/user_upload/binaries/Nov07TeachingHistReport_tcm23-108306.pdf).

This work is opened to improvements, updates, and the inclusion of surveys of other European countries.

Ignacio Suay-Matallana, CIUHCT, i.matallana@fct.unl.pt
Version: March 2016

AUSTRIA

1- Country. Austria

2- Details of the researcher/professor filling this form.

The information related to this country has been edited thanks to the information kindly provided by:
Univ. Doz. Dr Rudolf W Soukup; rudolf.werner@kabelnet.at, <http://www.rudolf-werner-soukup.at/index.htm>.

3- Which centres or departments offer courses in the history of chemistry?

4- General information on professors, students, teaching materials, etc.

Overall, the situation of chemical history in Austria is quite inconvenient - especially regarding Austrian universities. In 2013, the vice chancellor of the Technical University Vienna cancelled all teachers' training courses in mathematics, physics, and chemistry. As a consequence, it is no longer possible to give lectures, seminars, or *privatissima* in chemical history.

Univ-Doz Dr Rudolf Werner Soukup, who has been in possession of a *venia legendi* in chemical history since 2000, was forced to leave TU Vienna, where he had been responsible for the following master's and doctoral theses:

- 2001 Andrea Kästner ; Österreichische Beiträge zur Entdeckung des Elementes Astat
- 2003 Andreas Schober; Kurzbiografien der Autoren von Werken der Privatbibliothek
- 2004 Martina Kolbinger; Astra Solis und andere geheime Rezepturen. Die anonymen alchemistischen Manuskripte MS 498 – MS 504 aus der Bibliothek des Wiener Schottenstiftes.
Teilweise Transkription und Kommentar
- 2005 Susann Paul Gelmo; Österreichischer Farbenchemiker – Entdecker der Sulfonamide Kleinbichler
- 2005 Isabella Stadler; Wissenschaftliche Kontakte österreichischer Chemiker und Physiker zu ausländischen Gelehrten um 1900
- 2006 Marie Theres, Den allergeheimsten und berühmtesten Alkahest zu machen“. Medved
Chemiehistorische Untersuchungen zum Manuskript 11.352 der ÖNB
- 2007 Sylvia Leskova Chemiegeschichte an österreichischen Universitäten in der ersten Hälfte des 20. Jahrhunderts
- 2008 Margit Angerer Das chemisch-pathologische Laboratorium am k.k. Allgemeinen Wiener Krankenhaus unter den Vorständen Johann Florian Heller und Ernst Ludwig mit besonderer Berücksichtigung der Werke Vincenz Kletzinskys
- 2009 Roland Zenz; Das Netzwerk des Robert Wilhelm Bunsen – Ansätze einer Rekonstruktion des Netzwerkes R. W. Bunsens unter spezieller Berücksichtigung der Lehrtätigkeit in Heidelberg
- 2011 Michaela Kaiser; Die Geschichte der Lehrkanzel für Technische Elektrochemie an der Technischen Hochschule Wien in der ersten Hälfte des 20. Jahrhunderts
- 2012 Michaela Wirth László Zechmeister; From Pioneering Work in Chromatography to the Foundation of the Series „Progress in the Chemistry of Organic Natural Products“
- 2014 Dr. Gerd Löffler; Carl Auer von Welsbach und sein Beitrag zur frühen Radioaktivitätsforschung und Quanten theorie, Dissertation, University Klagenfurt
- 2015 Alexandra Stephanos von Alexandria. Über die Kunst des Goldmachens Traktat 5.
Kombholz Eine kommentierte Übersetzung

Since 2014, teachers' training courses are held only at the University of Vienna, where Prof. Dr. Adolf Mikula has been in charge of the lecture in chemical history (1 ECTS) since winter semester 2013/2014, thereafter followed by Doz. Dr. Soukup. The 650th anniversary of the foundation of the University of Vienna will be celebrated by the commemorative publication „650 Jahre Universität Wien“. Dr. Robert Rosner, who himself is celebrating his 93th birthday this year, and Doz Soukup have authored a paper on the history of the chemical institutes, which will be printed in Volume IV “Reflexive Innensichten aus der Universität Wien - Disziplinengeschichten zwischen Wissenschaft, Gesellschaft und Politik“ in 2015.

At the University Innsbruck, currently no lecture in chemical history is being held. Prof. Dr. Gerhard Oberkofler retired and Doz. Dr. Gerhard Pohl - as a consequence of his illness - is no longer giving lectures on chemical history at the Johannes Kepler University in Linz.

Owing to his *venia* for Austrian history including science history, Prof. Dr. Alois Kernbauer sometimes offers courses in chemical history at the Karl-Franzens-University of Graz. In 2005, a center of science history was founded at Karl-Franzens-University: <http://wissenschaftsgeschichte.uni-graz.at/> Prof. Dr. Simone De Angelis is director of this center. As a staff member, Mag Johannes Uray, wrote there his thesis “Das Fach Chemie an den technischen Lehranstalten der Habsburgermonarchie bis zur Mitte der 1860er Jahre”.

-5 List other forms of teaching and popularization with strong history of chemistry contents

At the Austrian Academy of Sciences, the commission on history of science, mathematics, and medicine has organized several symposia with some reference to chemical history:

- 2008 Styles of Thinking in Science and Technology. 3rd International Conference of the European Society for the History of Science
- 2008 Carl Freiherr Auer von Welsbach: 150. Geburtstag
- 2008 Ruđer Bošković und sein Modell der Materie. Zur 250. Wiederkehr des Jahres der Erstveröffentlichung der Philosophiae Naturalis Theoria (Wien 1758).
- 2010 Kaleidoskop zu den Ideen und Visionen des Theophrastus Bombast von Hohenheim, genannt Paracelsus, der sich vor 500 Jahren in Wien aufhielt
- 2014 Hundert Jahre Biologische Versuchsanstalt

Some Papers of this symposia were printed in the following booklets:

H. Grössing, H. Ullmaier (eds.), Ruđer Bošković und sein Modell der Materie, ÖAW, Wien 2009.

M. P. Schuster, Carl Freiherr Auer von Welsbach, ÖAW, Wien 2011.

- 6 List other institutions where there is a presence of history of chemistry

Chemists, interested in the history of chemistry, and historians are trying to compensate the unsatisfying situation of chemical history at Austrian universities. In 1993, Doz. Dr. Gerhard Pohl founded the working party “chemical history” within the Society of Austrian Chemists (GÖCh). Ing. Werner Kohl, a prominent member of this working party who was especially interested in the history of Austrian chemical factories, died unexpectedly in January 2015. The results of his research were published on a digital platform of the Carl Auer von Welsbach Museum in Treibach (Carinthia). This museum, founded in 1998 by Prof. h.c. Roland Adunka, has become a centre of historical investigation. The museum houses not only exponents from Carl von Auer’s laboratory and library but also Robert Bunsen’s valuable private collection of books and preprints.

-7 What are the local, regional and national associations on history of chemistry & science?

In March 2012, the first issue of the electronic ÖGW –information-platform „Res Novae“ appeared. Since March 2015, one can read Volume VII online: http://wissenschaftsgeschichte.ac.at/files/resnovae/07_2015.pdf

The address of the homepage of the society is: <http://www.wissenschaftsgeschichte.ac.at/>

Not only during the “History of Physics” conference (Innsbruck, 2009), but also at a similar symposium in Pöllau (Styria), papers of interest regarding the history of chemistry were presented:

R. W. Soukup: “The Scientific Network around Robert W. Bunsen, Founder of Spectrum Analysis, in the Light of his Private Library”.

R. W. Soukup: “Robert Bunsens Forschungskonzept”.

R. W. Soukup: “Some New Insights into the Scientific Network of Robert W. Bunsen: Alpinism, Glaciology, Physiology, & Chemical Thermodynamics”.

The papers were printed in the proceedings of these conferences, edited by Peter Maria Schuster. Looking across the Austrian border, the question as on the role of scientists (geologists, botanists, geographers, chemists, physicists) involved in the foundation of European alpine clubs, was a major point of discussion during a meeting on the occasion of the 150th anniversary of the Italian Alpine Club (CAI) at Varallo (Italy). The contributions to this meeting were published in 2015 in the booklet “Come Nacque l’Alpinismo”, edited by Riccardo Cerri (Edizioni Zeisciu).

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

(see point 7).

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

(see point 7).

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

(see point 6).

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

Within the last years, workshops and symposia have been organized by the Ignaz Lieben-Gesellschaft (ILG), founded in 2004:

- 2004 Mäzenatentum und wissenschaftliche Forschung in Österreich.
- 2005 Universitäre naturwissenschaftliche Forschung in Cisleithanien um 1900: Karrierewege und Mobilität.
- 2006 Exploring Science in Central Europe around 1900: Circles – Schools – People.
- 2007 Science and Industry in Central Europe around 1900.
- 2008 On the occasion of Prof. Carl Djerassi’s 85th birthday: Roots of Sexual Hormone Research.
- 2009 Central European Science and Technology in the Interwar Period –Continuities and Discontinuities– a Comparative Approach.
- 2010 Networks of Communication and Mobility in the Sciences and Technology. Central Europe in the Interwar Period.
- 2011 Science and Technology in Successor States of the Habsburg Monarchy, 1918- 1938: Transformations, Networks, Mobility.
- 2013 Science, Technology, Industry, and the Military in the Habsburg Monarchy during the First World War.

Some of the papers presented at these meetings were published on the homepage of the society (<http://www.i-l-g.at/programmaktuell.htm>), others were printed in the following books:

- R. W. Soukup and Ch. Noe (eds.), *Pioniere der Sexualhormonforschung*, ILG, Gumpoldskirchen 2010.
- H. Matis, J. Mikoletzky, and W. Reiter, *Wirtschaft, Technik und das Militär 1914-1918*, LIT, Wien 2014.

On the occasion of the symposium held in 2013 a huge amount of documents concerning chemical weapons used by the k.k. Army during WW1 was discovered. Prof Dr Mitchel Ash from the institute of history at the University of Vienna and Doz. Soukup are establishing a research project relating to this issue.

It should be mentioned that in 2012, Mag Johannes Uray was the winner of the Bader Award of Scientific History for his research project “Antiphlogistik‘ an der Peripherie. Die Schemnitzer Chemievorlesungen des Nikolaus Joseph Jacquin aus der Mitte des 18. Jahrhunderts”. This award is granted by the Austrian Academy of Sciences.

Within the last years, the Austrian Society for the History of Science(ÖGW) published the following papers of relevance regarding chemical history in “Mensch – Wissenschaft – Magie”. Mitteilungen der Österreichischen Gesellschaft für Wissenschaftsgeschichte, erasmus Wien:

- 2009 I. Stadler, R. W. Soukup; Das Gästebuch der Familie Lieben als Dokument der Kontakte dieser Wissenschaftlerfamilie zu in- und ausländischen Gelehrten vor und nach dem 1. Weltkrieg.
- 2010 R. Werthmann; Neuere Erkenntnisse über den Alchemisten Johann Rudolph Glauber (1604-1670) und sein Verwandtschaftsverhältnis zum Maler Johannes Glauber (1646-1726).
- 2010 R. W. Soukup; Paracelsus und der Paracelsimus in Österreich. Neuere Forschungsergebnisse.
- 2011 H. W. Flügel; Briefe von Joseph von Leithner an Sigmund Freiherr von Zois 1792 -1800 .
- 2012 F. P. Springer; Über Hypothesen und Theorien zur Entstehung der Metalle von Georg Agricola bis Georg Ernst Stahl.
- R. Rosner Frauen in den Naturwissenschaften an der Universität Wien und an der Deutschen Universität Prag 1900 – 1919.
- 2013 T. Langebner; Über das Luftsaltzwasser des Baron von Hirschen. Rekonstruktion der Karriere eines Geheimmittels .

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

BELGIUM

1- Country. Belgium
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: -Professor Annemie Adriaens, Department of Analytical Chemistry, Ghent University, annemie.adriaens@ugent.be -Professor José Martins, Department of Organic and Macromolecular Chemistry, Ghent University, jose.martins@ugent.be -Professor Katrien Strubbe, Department of Inorganic and Physical Chemistry, Ghent University, katrien.strubbe@ugent.be -Professor Danny Segers, Director of the History of Science Museum, Ghent University, danny.segers@ugent.be
3- Which centres or departments offer courses in the history of chemistry? Title of course: History of Chemistry. Programme type: Master of Science in Chemistry. Institution: Ghent University. ECTS credits: 3. Type of course: (a) lecture (15 hours) and (b) self-reliant study activities (10 hours).
4- General information on professors, students, teaching materials, etc. History of chemistry lectures are trained as chemists (Ghent University). History of chemistry is taught as an independent course (Ghent University). The status of the course is: optional (Ghent University). The level of history of chemistry students is: graduate (Ghent University). The main audiences for the history of chemistry lessons are: chemists (Ghent University).
-5 List other forms of teaching and popularization with strong history of chemistry contents Ghent University has a history of science museum http://www.sciencemuseum.ugent.be
- 6 List other institutions where there is a presence of history of chemistry like museum
-7 What are the local, regional and national associations on history of chemistry & science? The Royal Flemish Chemical Society – division of history, http://www.kvcv.be/index.php/en/secties/sectie-historiek The Sarton Centre for History of Science, http://www.sarton.ugent.be/
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?
-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?
-10 Which are the most important challenges/problems to the history of chemistry in your local context?
-11 Which are the most recent achievements/progresses in the history of chemistry in your local context? This year we celebrate 150 years of benzene structure developed by August Kekulé at Ghent University in 1865.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

CZECH REPUBLIC

1- Country. Czech Republic
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: -Soňa Štrbáňová, Associate Prof., RNDr., PhD, Center for History of Science Institute for Contemporary History, Czech Academy of Sciences, Prague, sonast2@gmail.com I am also grateful to Dr. Miroslav Novák, University of Chemistry and Technology in Prague, novaks@vscht.cz , http://www.vscht.cz/document.php?docId=2418
3- Which centres or departments offer courses in the history of chemistry? -Department of Education and Human Sciences of the University of Chemistry and Technology in Prague organizes a semester course titled “History of Chemistry”, 3 ECTS, 28 hours of lectures, type of examination: written test. - Department of Philosophy and History of Science, Charles University in Prague offers courses on history of science, but not specialized courses in history of chemistry. For more information contact stanislav.komarek@email.cz , https://www.natur.cuni.cz/biology/philosophy - Institute for Contemporary History does not offer courses in history of science.
4- General information on professors, students, teaching materials, etc. -“History of chemistry”, University of Chemistry and Technology in Prague, course for Bachelor students offered to the all four faculties of the University. Teaching materials in the form of copies of presentations are placed on the school intranet.
-5 List other forms of teaching and popularization with strong history of chemistry contents
- 6 List other institutions where there is a presence of history of chemistry -The Prague National Technical Museum has a permanent exhibit on chemistry and organizes popularization workshops about chemistry. For more information contact Dr. Ivana Lorencová, ivana.lorencova@ntm.cz
-7 What are the local, regional and national associations on history of chemistry & science? Czech Chemical Society, Working group on history of chemistry. For more information contact pavel.zachar@vscht.cz
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country? - Chemické Listy (Chemical Letters), occasional historical papers published in Czech with English summaries The following journals publish historical articles; occasionally on history of chemistry, as well. - Dějiny věd a techniky (History of Science and Technology), papers published mostly in Czech with English or German summaries. - Folia Mendeliana, papers published in English.

- Acta Universitatis Carolinae – Historia Universitatis Carolinae Pragensis, papers in Czech with German summaries.

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

- Biographies of Czech chemists.
- History of chemical industry as well as applied chemistry in the Czech lands.
- History of chemistry in the Czech Lands in the 19th and 20th centuries in the international context.
- Chemistry in the Czech National Revival.
- History of world biochemistry and molecular biology.
- Czech chemists in exile (especially during WW2 and during the communist regime after 1948).

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

Mapping of the most important events and personalities in chemistry in the Czech Lands in the 19th and 20th centuries.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

This is partial information only. Complete information is not available.

DENMARK

1- Country. Denmark
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Asbjørn Petersen, Lektor, Hvidovre Gymnasium, ap@esteban.dk
3- Which centres or departments offer courses in the history of chemistry? There is none history of chemistry course at Denmark.
4- General information on professors, students, teaching materials, etc.
-5 List other forms of teaching and popularization with strong history of chemistry contents Almost non existing, except as noted in point 6, 7 and 8. Sometimes there might be an article in the popular magazines “Illustreret Historie” (“Illustrated History”) and “Illustreret Videnskab” (“Illustrated Science”). But this is not the main focus of these magazines. In upper secondary school the students in the final year must make a project combining two A-level subjects. For students with chemistry this is quite often a project in chemistry and history.
- 6 List other institutions where there is a presence of history of chemistry “HITEK” (formal name: “IDA-Historisk Teknologi”) is an open organisation under IDA (Union of engineers). One of their points of interest is chemistry. http://english.ida.dk/ “Teknisk Museum” is the Danish museum of technology with a little chemistry. http://www.tekniskmuseum.dk/ “Medicinsk Museion” is a museum of pharmacy and medicine. Various exhibitions - some with a chemical content. http://www.museion.ku.dk/
-7 What are the local, regional and national associations on history of chemistry & science? On national scale: “Dansk Selskab for Historisk Kemi” (“The Danish Society of the History of Chemistry”) is a section under “Kemisk Forening” (The Danish Chemical Society). http://www.chemsoc.dk/
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country? There are no periodicals with systematic content of chemical history. Semipopular articles might occur in the papers “Dansk Kemi” (Danish Chemistry) and “Ingeniøren” (“The Engineer”). “Dansk Selskab for Historisk Kemi” publish almost once a year a small book on a historical/chemical subject. Only in a very small amount do these books find way to the general public.
-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?
-10 Which are the most important challenges/problems to the history of chemistry in your local context?

The history of chemistry is generally omitted in the curricula on all levels of education in Denmark - that is a problem.

Most of the people interested in the subject is quite old. It is of vital importance to recruit younger persons now.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

“Dansk Selskab for Historisk Kemi” has been alive for more than 25 years and does still fulfill the formal goals: Make publications, present speakers at the yearly meeting in “Kemisk Forening”, make trips.
<http://www.historisk-kemi.dk/>

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

The very low level of historical chemistry in Denmark has made it difficult to answer all of your points exactly according to the question. Hopefully it is OK.

ESTONIA

History of Chemistry is taught at the University of Tartu in Estonia. The name of the teacher is Lembi Tamm lembi.tamm@ut.ee

I am grateful for the information kindly provided by prof. Peeter Mürsepp, Department of International Relations, Tallin University of Technology.

FRANCE

1- Country. France			
2- Details of the researcher/professor filling this form.			
The information related to this country has been edited thanks to the information kindly provided by: Dr. Danielle Fauque, past president of the Société Chimique de France, fauque.dme@orange.fr			
I am also grateful to Dr. Virginie Fonteneau, Université Paris Sud, virginie.fonteneau@u-psud.fr			
3- Which centres or departments offer courses in the history of chemistry?			
It is difficult to separate history of chemistry from history of science. University centres incorporating a department of the history of science in which there is a little bit of history of chemistry are Nantes (Centre François Viète), and Paris Sud (GHDSO). These centres bring together researchers who do not necessarily offer teaching in the history of science. No programme specifically in the history of chemistry exists in any university. A number of options in the general history of science are available at university level, but hardly any of these treat the history of chemistry.			
There are several researchers in <i>the Centre national de la recherche scientifique</i> (CNRS) with posts in the history of science, but nobody explicitly in history of chemistry. A monthly research seminar on History of chemistry will be held from 2015-16 onward at the <i>Centre Alexandre Koyré</i> , and also included in the programme of two Masters in History of science and Cultural History of the <i>Ecole des hautes études en sciences sociales</i> (EHESS).			
4- General information on professors, students, teaching materials, etc.			
-5 List other forms of teaching and popularization with strong history of chemistry contents			
- 6 List other institutions where there is a presence of history of chemistry			
French historians working in the history of chemical sciences			
NAME, First name	Location	Statute	Speciality
LESTEL, Laurence	Department of studies of water and industrial pollution. Univ Pierre et Marie Curie), Paris	Dr. CNRS	Environmental history (all periods), specialized in chemical pollution
FONTENEAU Virginie,	Department Studies on science GHDSO. Univ Paris Sud	Dr. Maître de conférences	History of teaching (chemistry), in engineering schools (19 th -20 th centuries)
LETTE, Michel	CNAM	Dr. Maître de conférences	History of chemistry, and industrial pollution (19 th -20 th centuries)
LE ROUX, Thomas		Dr. CNRS	History of industry (especially industrial risks)
TESSIER, Pierre	Centre François Viète Univ of Nantes	Dr. Maître de conférences	History of solid chemistry (20 th century)
FRANCKOWIAK, Rémi	Univ Lille 1	Dr. Professor	History of alchemy and chemistry (17 th 18 th century)
PETERSCHMITT, Luc	Univ Paris Ouest	Dr.	Philosophy of chemistry (17 th 18 th century)
THEBAUD-SORGER, Marie	Centre Alexandre Koyré, Paris	Dr. CNRS	History of cultural history (especially chemistry and technology) (18 th 19 th 20 th)

			century)
Held posts but Now RETIRED			
EMPTOZ, Gérard	Centre François Viète Univ of Nantes	Emeritus Professor	History of chemistry and chemical industry (19 th -20 th centuries)
JOLY, Bernard	Univ of Lille	Emeritus Professor	History of alchemy (17 th -18 th centuries)
BENSAUDE-VINCENT, Bernadette	Univ Paris-Sorbonne	Emeritus Professor	History of chemistry (18 th century) and nanotechnologies
NOEL, Yves	Univ of Caen	Honorary Professor	History of chemistry (18 th 18 th 19 th -20 th century) and metrology
Held post in other areas			
FAUQUE, Danielle	Department Studies on science GHDSO. Univ Paris Sud	Dr. Has been teacher in a secondary school	History of chemistry (18 th -19 th -20 th centuries)
BRET, Patrice	Centre Alexandre Koyré, Paris	Dr. Has been in post at CNRS and Ministry of defense department of History of Armament)	History of science at war (especially chemistry and technology) (18 th -19 th -20 th centuries)
LEHMAN, Christine	Univ Paris Sorbonne	Dr. Has been teacher in a secondary school.	History of chemistry (18 th century)
TOMIC, Sacha	Univ Paris Sorbonne	Dr. Teacher in secondary school.	History of chemistry (18 th -19 th centuries)
PEPIN, François	Centre CIRPHLES -ENS	Dr. Teacher in secondary school.	Philosophy of chemistry (18 th century)
LLORED, Jean-Pierre		Dr. Teacher in a secondary school.	Philosophy of chemistry
BREYSSE, Jacques	Club d'histoire de la chimie	Industrial consulting engineer. (DEA in history of technology, CNAM).	History of chemical industry (Engineering and technology in chemistry - 20 th century)
LANGLINAY, Erik	EHESS	Student training for Ph.D. Teacher in a secondary school.	History of chemical industries (20 th century), social aspects
LE ROUX, Muriel	ENS	Dr. ENS	History of pharmaceutical industry
LE MEUR, Laurent	Department Studies on science GHDSO. Univ Paris Sud	Ph.D. candidate.	History of chemistry (19 th -20 th centuries)
PETIT, Axel	Centre François Viète Univ of Nantes	Dr.	History of physical chemistry (19 th -20 th centuries)
MARTIN, Philippe	Centre François Viète Univ of Nantes	Ph.D. candidate.	History of local chemical industries (Nantes)

A number of historians of chemistry who have held posts in the subject and are now retired continue to work and participate in national and international activities. These include: Gerard Emptoz, Bernard Joly and Bernadette Bensaude-Vincent.

Other historians of chemistry who have pursued careers in other areas remain active. These include Danielle Fauque, Patrice Bret, Christine Lehman. Others again are professionally employed as teachers in the French

secondary school system (Erik Langlinay, Laurent Le Meur, Axel Petit, Philippe Martin).

-7 What are the local, regional and national associations on history of chemistry & science?

The official site concerning the history of sciences in France is CNFHPS (national committee on history and philosophy of sciences, DHST/IUHPS) at Académie des sciences. On History of chemistry see:

http://www.cnfhps.org/annuaire/moteur-de-recherche-thematique?field_themes_de_recherche_value=histoire_de_la_chimie_alchimie&field_periodes_regions_value=All&field_type_approche_value=All&type_1=All

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

History of science is gradually disappearing as a discipline in its own right but finding its place in other fields such as environmental history, economic history, and the history of medicine or industry... In this way, the history of science is surviving as a focus for research that draws in researchers from other specialities and with diverse disciplinary backgrounds. But it is notable to remember that *History of science* is one of the three components of a section (72th) in the structure of the *Comité national des universités* (CNU) that is devoted to the organisation of academic disciplines in France.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

In 2015, the history of chemistry in France appears rather done by personal research than as a department subject. And historians of chemistry hold their career in other ways than pure history of chemistry.

GERMANY

1- Country. Germany
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: -Prof. Dr. Christoph Meinel, Universität Regensburg, History of Science, christoph.meinel@ur.de -Dr. Gisela Boeck, Universität Rostock, Chemistry Department, gisela.boeck@uni-rostock.de
3- Which centres or departments offer courses in the history of chemistry? <u>Research institutions:</u> The Max Planck Institute for History of Science has research group, directed by Prof. Ursula Klein, devoted to the history of chemistry, materials, and materials related practices, predominantly in the early modern period. <u>Universities/Science Departments:</u> At present, only two Chemistry Departments offer lecture courses (1-4 hours a week) on the history of chemistry on a more or less regular basis, viz. Rostock (Dr. G. Boeck) and Ulm (Dr. J. Holtzbock). These courses are optional; historical issues are not a normal feature of a science programme, neither for science students nor for future science teachers. <u>Universities/Humanities:</u> History of science is taught as part of a B.A. course at 7 German universities, 6 universities offer M.A. courses in history of science, but only Bielefeld, Braunschweig and Regensburg offer at least some courses related to the history of chemistry.
4- General information on professors, students, teaching materials, etc. Courses leading to a degree in “history of chemistry” do not exist in Germany; however, the few universities offering BSc, BA, MSc or MA degrees in history of science may include at least some history of chemistry. The most widely used textbook is the German version of William H. Brock’s well known History of Chemistry (Heidelberg: Springer, 2013).
-5 List other forms of teaching and popularization with strong history of chemistry contents There are no such institutions in Germany. Institutions devoted to popularise chemistry, such as the highly successful <i>Chemikum</i> in Marburg < http://www.chemikum-marburg.de/ > do not address historical issues. Likewise, history of science/chemistry is no normal part of the training of future science teachers; the leading <i>Institut für Pädagogik der Naturwissenschaften</i> (IPN) in Kiel has completely ceased to deal with historical issues decades ago. However, the <i>Kerschensteiner Kolleg</i> at the <i>Deutsches Museum</i> < http://www.deutsches-museum.de/en/information/education/ >, an institution of continuing education, offers a wealth of courses, including historical ones.
- 6 List other institutions where there is a presence of history of chemistry The <i>Deutsches Museum</i> in Munich, one of the leading science museums worldwide, is famous for its collections historical artefacts, documents, and literature on all branches of science and industry, including the history of chemistry. The Chemistry Gallery is currently under reconstruction and will be re-opened in 2016.
-7 What are the local, regional and national associations on history of chemistry & science? There are two general history of science societies in Germany, viz. <i>Deutsche Gesellschaft für Geschichte der Medizin, Naturwissenschaft und Technik</i> < www.dggmnt.de > and <i>Gesellschaft für Wissenschaftsgeschichte</i> <

www.gewige.de>, both of which have annual meetings.

The German Chemical Society (GDCh) has a History Division *Fachgruppe Geschichte der Chemie* (400 members) which meets biannually, sometimes in conjunction with the general GDCh congresses; see <<https://www.gdch.de/netzwerk-strukturen/fachstrukturen/geschichte-der-chemie.html>>.

The *Fachgruppe* has a subdivision, called *Industriekreis* <<https://www.gdch.de/netzwerk-strukturen/fachstrukturen/geschichte-der-chemie/industriekreis.html>>, devoted to the history of 20th-century chemical industries and corporations. Both *Fachgruppe* and *Industriekreis* publish their work (see question 8.)

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

History of science journals:

NTM: Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin (Heidelberg: Springer, since 1960/2008) <<http://www.springer.com/new+%26+forthcoming+titles+%28default%29/journal/48>>

Berichte zur Wissenschaftsgeschichte (Weinheim: Wiley-VCH, since 1978) <<http://www.wiley-vch.de/publish/en/journals/alphabeticIndex/2031/>>

History of chemistry journal:

Mitteilungen, GDCh-Fachgruppe Geschichte der Chemie (Frankfurt/Main: GDCh, since 1988). The content of all back issues from 1 (1988) to 24 (2014) is available from the Group's homepage:

<https://www.gdch.de/netzwerk-strukturen/fachstrukturen/geschichte-der-chemie/mitteilungen-der-fachgruppe-online.html>

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

CHEM-HIST <<https://www-mailman.uni-regensburg.de/mailman/listinfo/chem-hist>>: established in 1997 and administered at the University of Regensburg, Germany. The list is an international, not a national mailing list.

In addition, most announcements relevant for historians of science and chemistry are also posted through H-Soz-Kult <<http://www.hsozkult.de/>>, an electronic platform for the historical sciences in general.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

At present, no history of science professorship in Germany is especially devoted to the history of chemistry. This is partly due to the fact that old-fashioned disciplinary historiography is no longer given much credit by the history of science and the science studies communities alike; as a consequence, university positions in the history of science will normally not be created for merely discipline-oriented specialties. However, the complete disappearance of a professional historiography of chemistry at university level is a major loss, particularly for a country that can boast of such a rich tradition in both chemistry and historiography of chemistry.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

The German Chemical Society (GDCh) has a very popular program *Historische Stätten der Chemie* (historical sites of chemistry) which honours distinguished sites of chemical excellence. In addition to awarding a commemorating badge, a conference is organised and a documentary brochure published; see <<https://www.gdch.de/gdch/historische-staetten-der-chemie.html>>

GREECE

1- Country. Greece
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Prof. Dr. Efthymios P. Bokaris, Assistant Professor, Department of Chemistry, University Ioannina.
3- Which centres or departments offer courses in the history of chemistry? In Greece there are five universities that offer chemical studies. However only in three of them History of Chemistry is taught concerning graduate and postgraduate studies. It should be mentioned that the duration studies in the chemistry departments is 8 semesters. Courses on history and philosophy of chemistry are also integrated in the proposed curriculum of chemistry teachers which are institutionalized by 2013. At the Chemical Department (curriculum dating from 2014) of the National and Kapodistrian University of Athens there is, at undergraduate level, the optional course 'History of Natural Sciences', mainly focused on the history of physics (taught by F. Penelopoulou), during 6th semester. Moreover in the framework of the postgraduate program 'Didactics of Chemistry and New Educational Technologies', in collaboration with the University of Thessalonica and the School of Chemical Engineering at the Technical University of Athens, it is offered the course 'History of Chemistry' (taught by P. Akrivos and E. Varela, curriculum dating from 2011). At the Chemical Department (curriculum dating from 2010) of the Aristotle University of Thessalonica there is the optional undergraduate course 'History and Epistemology of Chemistry' (taught by P. Akrivos). At postgraduate level, 'History and Epistemology of Chemistry' is taught as part of a master program titled 'Chemical Education and Information and Communications Technologies' (curriculum dating from 2014). At the Chemical Department of the University of Ioannina, 'History of Chemistry' is taught since 1996. The lectures are based on the book 'History and Epistemology of Chemistry', written by the chemist and historian of science E. Bokaris. According to the newly formed undergraduate curriculum of Chemical Department, dating from 2012, there are optional courses 'History of Chemistry' and 'Epistemology of Chemistry', during the 2nd and 8th semester respectively. Furthermore 'History of Chemistry' and 'Epistemology of Chemistry-(Theory of the conditions and forms of chemical practice and its history)' are taught since 2014 as part of a master and doctoral program entitled: History, Philosophy and Didactics of Chemistry.
4- General information on professors, students, teaching materials, etc. Lecturers on history of chemistry are mostly chemists.
-5 List other forms of teaching and popularization with strong history of chemistry contents
- 6 List other institutions where there is a presence of history of chemistry
-7 What are the local, regional and national associations on history of chemistry & science?
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?
-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

-10 Which are the most important challenges/problems to the history of chemistry in your local context?
-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?
-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

ITALY

<p>1- Country. Italy</p>
<p>2- Details of the researcher/professor filling this form.</p> <p>The information related to this country has been edited thanks to the information kindly provided by:</p> <ul style="list-style-type: none">-Prof. Marco Beretta, Professor of history of science, Dipartimento di filosofia e comunicazione university of Bologna. imberet@gmail.com-Prof. Maurizio D'Auria, Full professor, Dipartimento di Scienze, Università della Basilicata, maurizio.dauria@unibas.it-Prof. Giorgio G. Mellerio, associated professor, Dept. Chemistry – University of Pavia, giorgiogiaco.mellerio@unipv.it-Dr. Angelo Rapisarda, Liceo Scientifico (Science High School) Boggio Lera, Catania, GANGES@ALICE.IT-Prof. Roberto Zingales, Department of Physics and Chemistry, University of Palermo, roberto.zingales@unipa.it <p>I am also very grateful to Prof. Marco Taddia, Associate Professor in Analytical Chemistry, School of Sciences - University of Bologna, “G. Ciamician” Department of Chemistry., marco.taddia@unibo.it</p>
<p>3- Which centres or departments offer courses in the history of chemistry?</p> <p><u>Bologna</u> Course “From alchemy to chemistry: sites of experimentation”, Department of philosophy and communication, 3 h./week, 60 h/semester, 6 ECTS, based on lectures. There are no courses at the moment offered by the School of Sciences. New proposal for a course in History of Chemistry for the First-level degree in Industrial Chemistry (School of Science). The proposal was well received and approved.</p> <p><u>Palermo</u> Course “History of Chemistry “, Chemistry BSc students, 8 hours/week, 48 h./semester, 6 ECTS, based on lectures.</p> <p><u>Basilicata</u>, No courses.</p> <p><u>Catania</u>, None.</p> <p><u>Pavia</u> Course “Storia della Chimica (History of Chemistry)”, Dip./Dept. Chimica/Chemistry, 26 h./semester, 6 ECTS, based on seminars. Course “Storia della Farmacia (History of Pharmacy), Dip./Dept. Scienze del Farmaco / Drugs Sciences, 24 h./semester, 3 ECTS, based on lectures.</p>
<p>4- General information on professors, students, teaching materials, etc. Please, provide information related to the following points:</p> <p><u>Bologna</u> -History of chemistry professors are trained as philosophers and historians. -History of chemistry is taught as part of history of science courses. -The status of the course is: compulsory. -The level of history of chemistry students is: graduate. -The main audiences for the history of chemistry lessons are: philosophers and historians.</p> <p><u>Palermo</u></p>

- History of chemistry professors are trained as chemists.
- History of chemistry is taught as an independent course.
- The status of the course is: optional.
- The level of history of chemistry students is: graduate (BSc).
- The main audiences for the history of chemistry lessons are: chemists, physicists, biologists, engineers.
- Textbooks in Italian:
 - M. Giua, Storia della Chimica, Chiantore (TO), 1946.
 - I. Asimov, Breve storia della Chimica, Zanichelli, 1994.
 - P. Rossi, Storia della Scienza Moderna e Contemporanea, TEA (MI) 2000.
 - G. Villani, La chiave del mondo, CUEN, Città della Scienza (NA) 2001.
 - G. Villani, Molecole, CUEN (NA) 2001.
- Webpage: http://cheminor.unipa.it/storia_chimica/doku.php?id=start

Basilicata

No courses, no data

Catania

No courses.

Pavia

- History of chemistry professors are trained as chemists and one botanist (related to Storia della Chimica); historian (related to Storia della Farmacia).
- History of chemistry is taught as an independent course (both courses).
- The status of the course is: optional (both courses)..
- The level of history of chemistry students is: Postgraduate (MCs) applying to Ph.D. Programs in Chemistry (related to Storia della Chimica); graduate (BSc) (related to Storia della Farmacia).
- The main audiences for the history of chemistry lessons are: chemists, (related to Storia della Chimica); pharmacy students (related to Storia della Farmacia).

-5 List other forms of teaching and popularization with strong history of chemistry contents, such as: summer schools, continuing secondary education, prospective science teachers.

Bologna

- Guided visit to the Museo di Palazzo Poggi (Bologna), Museo Galileo (Florence) and *Fondazione Scienza e Tecnica* which hold important chemical collections.
- Seminars on science popularization aimed also at local citizens.

Catania

Managing a magazine in history of science and technology (including history of chemistry): European Pupils Magazine. <http://www.epmagazine.org/>

Pavia

A qualification course of history of chemistry, strongly connected with the historical collection, was introduced in the program of scientific teacher (SILSIS) school but now is no more active. Few hours of history of chemistry (6 over 32) were delivered in a school of (science) museum curators (institution: University Museum System - SMA), as well as 40 hours over 72 of training on the job for the students that have chosen mineralogy and chemistry museums.

- 6 List other institutions where there is a presence of history of chemistry.

- The “G. Ciamician” Department of Chemistry holds a collection of historic scientific instruments and laboratory apparatus. <http://www.chimica.unibo.it/it/dipartimento/gallerie-di-immagini/ciamician>
- A permanent exhibition of rare and ancient chemistry books is on display at the library of the School of Science at

the University of Bologna. <http://www.chimica.unibo.it/it/biblioteca/note-storiche>
-Museo Galileo (Florence), <http://www.museogalileo.it/>
-Museum of Chemistry – Department of Physics and Chemistry – University of Palermo, <http://www.chimica.unipd.it/gianfranco.scorrano/pubblica/musei/palermo.htm>
-The Univ. of Pavia (founded in 1361 in a town with a high school from 825) has a Chemistry Museum, a part of the University Museum System (SMA). The Museum is made of different collections in the historical buildings of previous “chemical” Institutes, also of the School of Pharmacy. http://musei.unipv.it/musei/2_musei_8_C.html

-7 What are the local, regional and national associations on history of chemistry & science?

-Società italiana di storia della scienza, <http://www.storiadellascienza.net/>
-Gruppo Nazionale di Fondamenti e Storia della Chimica (GNFSC), a national association of chemistry historians, was founded in 1986. One year prior to its formal establishment, the Group organized its first congress (Turin, 1985). Since then, the congress has been held every two years.

The principal aims of the Group are to provide a collective identity for Italian historians and philosophers of chemistry, to encourage the encounter between scholars of humanistic and scientific training, and to bring a more general public (amateurs, teachers, etc.) and the world of the specialists closer together. For this reason, as on previous occasions, the lectures presented at the Rimini congress will be notable not only for their content and form, but also for their broad objectives. By no means should the generality of these aims be regarded as a limit. On the contrary, it represents a considerable resource for a discipline like chemistry, which is, after all, characterized by an incredible number of philosophical and historical traditions.

GNFSC includes humanists and scientists from academia, industry and secondary school. Members are currently 38. A biennial symposium is organised regularly and proceedings are published, <http://www.gnfsc.it/>

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

Proceedings of GNFSC biennial Congress are the only periodical in Italy entirely devoted to the history of chemistry. <http://www.gnfsc.it/page9/page13/page13.html>

Others periodicals concern with history of science in general:

Nuncius, <http://www.brill.com/publications/journals/nuncius>

Physis. <http://www.olschki.it/riviste/17>

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

-Museo Galileo.

-Società italiana di storia della scienza.

-SCI-list.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

-Lack of coordination and appropriate organization.

-History of photochemistry.

-Find somebody really passionate in this field.

-From a historical point of view, probably, the role of chemists in WW1.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

-Works on Giacomo Ciamician (1857-1922): research and teaching.

-A number of important valuable books have been published by several authors such as, a.o. Michela Pereira, Antonio Clericuzio, Angela Bandinelli and they have been reviewed in Isis and other international journals. However, progress are more the effect of individual efforts than the result of an existing community

-New papers and seminars on the History of Chemistry at the University of Palermo.
-The life and scientific work of Professor Francesco Mauro.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

LITHUANIA

1- Country. Lithuania
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Dr. Birute Railene Wroblewski, Library of the Lithuanian Academy of Sciences, b.railiene@gmail.com
3- Which centres or departments offer courses in the history of chemistry? At the Vilnius University there is a course on “history of chemistry”, with 5 ECTS (48 hours/semester), distributed in lectures + seminars.
4- General information on professors, students, teaching materials, etc. History of chemistry lectures are trained as chemists (Vilnius University). History of chemistry is taught as an independent course (Vilnius University). The status of the course is: optional (Vilnius University). The level of history of chemistry students is: undergraduate (Vilnius University). The main audiences for the history of chemistry lessons are: chemistry students (Vilnius University). Relevant sources for the history of chemistry (Vilnius University): <ol style="list-style-type: none">1. Gylienė L. Vilniaus medicinos draugijos vaidmuo chemijos mokslo vystymui Lietuvoje // Mokslo draugijos Lietuvoje . – Vilnius, 1979, p. 7-30.2. Piročkinas A., Šidlauskas A. Mokslas senajame Vilniaus universitete. – Vilnius : Mokslas, 1984, 327 p.3. Vilniaus universiteto istorija, 1579–1803. – Vilnius : Mokslas, 1976. – 316, [2] p.4. Vilniaus universiteto istorija, 1803–1940. – Vilnius : Mokslas, 1977. – 341, [1] p.5. Railienė, Birutė. Andrius Sniadeckis. - Vilnius : Vilniaus universiteto spaustuvė, 2005. - 269 p.6. Mačionis, Zenonas. Vilniaus universiteto Chemijos fakultetas, 1784-1944-1999. - Vilnius : Vilniaus universiteto leidykla, 2000. - 346 p.
-5 List other forms of teaching and popularization with strong history of chemistry contents, such as: summer schools, continuing secondary education, prospective science teachers, other research institutions, museum, journalism schools, science popularization and awareness.... -Annual conference <i>Scientia et historia</i> . -Biannual conference “ <i>Historiae Scientiarum Baltica</i> ”. The latest was the 26 th in 2014 -Annual readings “ <i>Lectiones Vilnenses Andreae Sniadecki</i> ” introduces the heritage of chemistry.
- 6 List other institutions where there is a presence of history of chemistry -History of chemistry at the University of Vilnius has no permanent exhibitions at present time, but the materials are stored; -History of chemistry is partly introduced in the Museum of medicine in Kaunas city and the Science museum of the University of Vilnius; -Annual readings “ <i>Lectiones Vilnenses Andreae Sniadecki</i> ” introduces the heritage of chemistry.
-7 What are the local, regional and national associations on history of chemistry & science? Association of Chemists of Lithuania (national); Association of the History and Philosophy of Science (national); Association of Teachers of Chemistry of Lithuania (national); Association of Chemical Engineers of Lithuania (national);

Baltic Association for the History and Philosophy of Science (uniting three countries: Estonia, Lithuania, Latvia).

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

-Acta Baltica – international scientific journal, published by several institutions from Estonia, Lithuania, Latvia.

-Mokslo Lietuva – biweekly scientific newspaper, issued by the union of scientists.

-Mokslas ir technika – monthly journal on popular science.

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

There are not mailing lists.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

Lack of teachers – history of science is not among the suggestions at our universities

Not enough teaching time – history of chemistry is given as several hours during the main disciplines of chemistry

Lack of attractive stories on local history of chemistry – it is a possibility and challenge for our enthusiasts to write such stories, or translate from other languages.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

A new fundamental book was published on history of chemistry, from ancient times until 2008:

Lietuvos chemijos istorija : nuo seniausių laikų iki 2008 metų. Vilnius, 2014.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

THE NETHERLANDS

1- Country. The Netherlands

2- Details of the researcher/professor filling this form.

The information related to this country has been edited thanks to the information kindly provided by:
Prof. Rob van Veen, Technische Universiteit Eindhoven, veen1948@xs4all.nl

I am also grateful to Gerard Albers, Frans van Lunteren, Mike Zuber, Ulco Kooystra, Klaas van Berkel, Lissa Roberts, Fokko Jan Dijksterhuis, Christoph Lüthy, Anton Schuurman, Albert Philipse, Ernst Sudhölter, Harry Lintsen, and Ernst Homburg.

3- Which centres or departments offer courses in the history of chemistry?

4- General information on professors, students, teaching materials, etc.

The history of chemistry is not taught at any Dutch university as a separate subject, but it does occur in a variety of other contexts:

At the University of Amsterdam (UvA) Gerard Albers (Faculty of Science; Korteweg-de Vries Instituut) teaches a course called “Science in Action” (BSc Chemistry, 2nd year; 6 ect), about half of which is dedicated to a survey of the history of chemistry. For the philosophical part of the course the following book is used (in Dutch): Chunglin Kwa, *Kernthema's in de wetenschapsfilosofie* [in English this would be *Key themes in the philosophy of science*], 2014. – It is noted that one of Kwa's previous books, in which some attention is paid to the history of chemistry, has now been translated into English: Chunglin Kwa, *Styles of Knowing. A New History of Science from ancient times to the present*, Univ. Pittsburgh Press, 2011. Students of the Free University at Amsterdam also follow this course.

Also at the UvA, but in the Faculty of Humanities, a course on the history of alchemy is regularly taught every other year, usually by Peter Forshaw, at the Center HHP (History of Hermetic Philosophy), entitled “Renaissance Esoterism I” (MA, 6 ect). Additionally, at least one session of the survey course on early-modern esoterism is dedicated to alchemy (Mike Zuber| Professor Wouter Hanegraaff).

At the University of Groningen (RUG) there is some teaching on the history of science, but no attention to speak of is paid to the history of chemistry.

At Twente University (UT) the situation is hardly better: although in Professor Lissa Roberts' research group (part of “Steps” [Science, Technology, and Policy Studies] | Faculty of Behavioural, Management and Social Sciences) chemistry-historical aspects figure prominently, there is no teaching of the history of chemistry as such, but some attention to it is paid, however, in courses on the history of natural science and the technical sciences (Fokko Jan Dijksterhuis, Adri de la Bruhèze).

In some of the science-historical courses that Professor Christoph Lüthy teaches at the Radboud University of Nijmegen (RU).

Some elements of the history of chemistry have found a minor place: a few references to chemistry occur in the Master course “Evolution and the Mind” (at the Faculty of Physics, Mathematics and Informatics [FNWI]).

One session of the course “History of Science” (co-taught with Mrs. Professor C.R. Palmerino in the Master track Philosophy of the Sciences at the Faculty of Philosophy, Theology and Religion Studies [FFTR]) is dedicated to the institutionalisation of chemistry, from the Royal Society *via* Lavoisier to Liebig.

A course on the history of science, in which some chemical topics at least found a home, has been taught for a long time in the past at Wageningen University (WUR), but this has unfortunately been discontinued.

The situation is somewhat better at the University of Utrecht (UU): while there is no teaching at all of the history of chemistry at the time of writing, it is possible, on the one hand, within the Master History and Philosophy of Science, to choose a chemical-historical subject for a Master Thesis, for which Professor Albert Philipse (Professor of Physical Chemistry | Van 't Hoff Lab) is the contact person, and, on the other hand, the same Albert Philipse is aiming at instituting, hopefully by Spring 2017, a course “History of Modern Natural Sciences” (BSc, 3rd year), in which the history of chemistry, biology and physics figure (mainly 19th century).

Professor Frans van Lunteren, at Leiden University (Leiden Observatory; joint appointment with the Free University Amsterdam [Dept. of History and Social Aspects of Science]), offers an ancillary course (in Dutch) on “Turning points in the history of science”, for all science students, of which the history of chemistry is a substantial component – unfortunately, however, the course has not been taken up in the schedule of the Chemistry programmes at Leiden (and Delft: Leiden University and Delft University of Technology now have joint Bachelor’s and Master’s programmes in Chemistry), so that Frans van Lunteren’s public mainly consists of students of mathematics, physics and astronomy, plus a stray student of biology (where the course has not been scheduled either).

For Delft, *vide supra*: Leiden.

Since 2013, the Eindhoven University of Technology (TU/e) has a Bachelor’s programme with a wide-ranging basic package (next to specialisations) for all students – in this basic package figures a course entitled “USE Basis” [5 ects – USE = User, Society, and Enterprise – designed in collaboration with the Foundation for the History of Technology, also based at TU/e]. Half of the course is devoted to history (not necessarily of chemistry), the other half to ethics. The history part concerns a general discussion/analysis of the history of technology and the engineering profession, in relation to USE. During the course students have to execute assignments, and for those assignments they may choose chemical subjects. Such a subject should be related to a current public debate, *e.g.* ‘plastic soup’ (and its history), or ‘doping in sports’ (and its history).

There is also a sequel, within the Bachelor’s programme, to USE-Basic, consisting of 12 courses with titles such as “quality of life”, or “energy”. The history of chemistry is not visible in the course descriptions, and topics from it will certainly not systematically come up for discussion. The history of Chemistry is, on the other hand, completely absent from the Master’s programme. It is said that the subject was of interest mainly to teachers and researchers of an older generation – the younger generation now in charge has a much lower affinity for it.

At Maastricht University a Science College has been erected in 2011. There are no courses in history of chemistry as such, but elements from the history of palaeontology are taught by Professor Ernst Homburg as part of the freshman’s course, and 2nd and 3rd year students can opt for a course on ‘Science and the Visual Arts’ in which there are sessions on the history of pigments and binding media. There are two professors of the history of medicine (one in the Medical Faculty and one part-time in the Faculty of Arts and Social Sciences), who occasionally work on topics from the history of pharmacy. In the Faculty of Arts and Social Sciences there is only research in the history of chemistry (Ernst Homburg; Geert Somsen), but no teaching. There are general courses on the Scientific Revolution and on science and technology in the 19th century (Industrial Revolution; Darwin) for first year humanities students. In later years students can choose optional courses on the history of innovations, on the history of visual perception, etc. Next to that, some Master and PhD students occasionally write their thesis on a topic from the history of chemistry. – Recently, Professor Cyrus Modus has been appointed Chair in History of Science, Technology, and Innovation (starting as of 1 August 2015). He has done work on the history of instrumentation and nanotechnology, at the border between chemistry and physics, and will certainly strengthen the staff in the field of the history of chemistry.

The university also houses the widely-known research institute MERIT, as part of the School of Business and Economics (professors: Luc Soete, Bart Verspagen, Robin Cowan, and many others), which is one of the top institutes on innovation research. Staff members of that institute investigated also numerous cases and patterns of innovation in the chemical industries, often including a historical perspective.

-5 List other forms of teaching and popularization with strong history of chemistry contents

The Netherlands Society of secondary-school Science Teachers organises every year a conference in Woudschoten, and regularly someone, e.g. Ernst Homburg or Albert Philipse, is asked to contribute a lecture on a topic from the history of chemistry – these lectures are always a big success, and the hope is that this will translate one day in more attention being paid to the subject in secondary education.

- 6 List other institutions where there is a presence of history of chemistry

University collections are present in various places, but things chemical do not figure prominently in them, to put it mildly – thus, on the website of the University-museum in Groningen “chemistry” is not to be found among the keywords. – The Delft Mineralogical Geological Museum, now in Leiden (Naturalis), has of course an obvious chemical-historical component, and Sonnenborgh (Utrecht) conserves the physical remains of the underground chemical laboratory of Barchusen (1666-1723). – Details of the university collections can be found at www.academischecollecties.nl (in Dutch).

The two prominent science museums in The Netherlands are Museum Boerhaave in Leiden and Teylers Museum in Haarlem. The former is quite strong on Medicine and Physics, while the latter’s holdings are mainly in Fossils & Minerals and 18th/early 19th C. Physical Instruments (apart from Art, and Coins & Medals), but in both there is some presence of chemical history. Thus, Museum Boerhaave conserves for example the tetrahedral that J.H. Van ‘t Hoff made from paper, to help him in explaining his stereo-chemical ideas.

-7 What are the local, regional and national associations on history of chemistry & science?

The main History of Science society is Gewina (Society for the History of Mathematics and Natural Sciences) – the history of chemistry is not, however, a subject that receives a lot of attention, neither at their meetings, nor in the journal that they publish, *Studium* (in Dutch and French, with summaries in English).

A bunch of people with an interest in the history of chemistry, together with a few professional historians, are organised in the Chemical-Historical Group of the Royal Netherlands Chemical Society. This group is quite active in organising (mostly half-day) meetings on chemical-historical topics for their members, but emphatically also for other interested people.

There is also a yearly combined meeting with its Flemish counterpart. Their website contains, or provides links to a wealth of chemical-historical knowledge (www.kncv.nl/chg [in Dutch]).

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

Studium: Tijdschrift voor Wetenschaps- en Universiteitsgeschiedenis | Revue d’Histoire des Sciences et des Universités (see: <http://www.gewina-studium.nl/>)

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

Digitaal Wetenschapshistorisch Centrum = <dw@huygens.knaw.nl> (see: <http://www.dwc.knaw.nl/?lang=en>)

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

History of chemistry disappeared from almost all the chemistry curricula. The challenge therefore is to interest and attract chemistry students in other ways, such as general courses on ethics and science and society, and the Master program History and Philosophy of Science in Utrecht. The challenge also is to cultivate interest for chemistry inside more general research programs on the history of science and technology.

Another challenge is to have more chemistry included in the exhibitions of the national museum for the history of science Museum Boerhaave.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

The Chemie-Historische Groep (CHG) succeeded in organizing every year an attractive programme of events on history of chemistry for about 15 years at a row. Membership is stable at ca. 75-80 members. This is an achievement as such. Furthermore, over the last 15 years overviews on the national of chemistry & the chemical industry in the 20th century were published.

Moreover, over the last few years new PhD positions in history of chemistry (broadly speaking) were created in Twente, Groningen and Utrecht, after many years without any PhD in history of chemistry.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

NORWAY

1- Country. Norway
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Dr. Annette Lykknes, Associate professor, Norwegian University of science and Technology (NTNU), Programme for Teacher Education, annette.lykknes@ntnu.no
3- Which centres or departments offer courses in the history of chemistry? For each course, include the following specific information. Programme for Teacher Education: Offers a course named “Episodes in the history of the natural sciences”, 7,5 ECTS, lectures and seminars. It includes the history of chemistry, physics and biology, not just chemistry (the same course as was previously offered in the chemistry department)
4- General information on professors, students, teaching materials, etc. Please, provide information related to the following points: History of chemistry lectures are trained as is taught by a professor with a background in chemistry and with a PhD and research in history of chemistry and history of science (NTNU). The status of the course is: optional (NTNU). The level of history of chemistry students is: Master, but also open to others (NTNU). The main audiences for the history of chemistry lessons are: Prospective teachers in the sciences, but open to others (NTNU). Relevant sources for the history of chemistry (NTNU). Bowler and Rhys Morus: Making modern science + a lot of research articles and book chapters and original sources, in English and a few in Norwegian
-5 List other forms of teaching and popularization with strong history of chemistry contents, -A new compulsory course for PhD students in material science, chemistry, physics and biology will be offered from January 2016. It will include two double lectures by me on the history of science at large and examples from the disciplines. -Some history of chemistry is included in the chemistry didactics course for future teachers.
- 6 List other institutions where there is a presence of history of chemistry. A special group under the Norwegian chemical society is dedicated to the history of chemistry. It is chaired by two retired professors of chemistry at the university of Oslo, who are working on the history of chemistry. But it is not being taught.
-7 What are the local, regional and national associations on history of chemistry & science?
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country? None, but articles on the hist of chem do appear in the chemistry journal of the chemical society
-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

There are not many active, only me in a position, the rest are retired, and we all know each other. Information is disseminated through the email list of the special group under the chemical society.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

It is not institutionalized. If I leave my job, then there is no one, it will not be continued.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

Lykknes, Annette; Gusland, Joakim Ziegler, (2015), *Akademi og industry. Kjemiutdanning og -forskning ved NTNU gjennom 100 år*, Fagbokforlaget. [Academy and industry: 100 years of chemistry education and research at NTNU].

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

POLAND

<p>1- Country. Poland</p>
<p>2- Details of the researcher/professor filling this form.</p> <p>The information related to this country has been edited thanks to the information kindly provided by:</p> <p>-Dr Marcin Dolecki, assistant professor at the L. & A. Birkenmajer Institute for the History of Science PAS, Warsaw, maarcindol@wp.pl</p> <p>-Dr hab. Kazimierz Orzechowski, professor of Wroclaw University, Faculty of Chemistry University of Wroclaw, kazimierz.orzechowski@chem.uni.wroc.pl</p> <p>-Dr Andrzej Syroka, Head of the Museum of Pharmacy of Wroclaw Medical University, andrzej.syroka@umed.wroc.pl</p> <p>-Prof. UMCS dr hab. Wiesława Ferenc, Department of General and Coordination Chemistry, Faculty of Chemistry, Maria Curie-Skłodowska University, wetafer@poczta.umcs.lublin.pl</p> <p>I am also grateful to prof. dr hab. Halina Lichočka, Instytut Historii Nauki PAN, halinalichočka@wp.pl, and Dr. Marcin Dolecki, Instytut Historii Nauki PAN, maarcindol@wp.pl, maarcindol@wp.pl</p>
<p>3- Which centres or departments offer courses in the history of chemistry?</p> <p><u>Warsaw</u></p> <p>-<i>Historia chemii (History of Chemistry)</i>, The Faculty of Chemistry of the University of Warsaw, 15 h on a semester (only in a winter semester); 1 ECTS, lecture, independent course, Optional status.</p> <p>-<i>Historia farmacji (History of Pharmacy)</i>, The Faculty of Pharmacy with the Laboratory Medicine Division of the Medical University of Warsaw, 15 h; 1 ECTS, lecture, independent course, compulsory status.</p> <p><u>Wroclaw, Faculty of Chemistry</u></p> <p>History of Chemistry, Faculty of Chemistry, University of Wroclaw, 15 weeks/ 30 hours/ 3 ECTS, lecture.</p> <p><u>Wroclaw, Institute for the History of Science</u></p> <p>There are no separate courses in the history of chemistry, it is being taught only as a part of lectures which are one of the profile activities of the Museum of Pharmacy of Wrocław Medical University.</p> <p><u>Lublin</u></p> <p>Courses taught by the department of General and Coordination Chemistry and the department of Inorganic Chemistry, University of Maria Curie-Skłodowska University, Lublin, mainly optional lectures on the history of chemistry, 2 ECTS credits.</p>
<p>4- General information on professors, students, teaching materials, etc.</p> <p><u>Warsaw</u></p> <p>Background of the <i>Historia chemii</i> professor: Dr Marcin Dolecki: a philosopher (MA), chemist (MSc), and historian of chemistry (PhD). Student's level: graduate. Main audiences: chemists, but theoretically lectures are open also for other students.</p> <p>Background of the <i>Historia farmacji</i> professor: Dr hab. Iwona Arabas, prof. PAN (associate professor): a pharmacist (MSc), and historian of pharmacy (PhD). Student's level: graduate. Main audiences: pharmacists.</p> <p>Texts listed below are only suggestions for students for further reading:</p> <p>Bergandy W., <i>Od alchemii do chemii kwantowej</i>, Poznań 1997.</p> <p>Brock W. H., <i>Historia chemii</i>, translated by J. Kuryłowicz, Warszawa 1999.</p>

Mierzecki R., *Historyczny rozwój pojęć chemicznych*, Warszawa 1987
Lichočka H., *Dzieje chemii [w:] Dzieje nauki. Nauki ścisłe i przyrodnicze*. Warszawa 2011, p. 225-303.
Partington John R., *A Short History of Chemistry*, New York 1960.

Teaching materials:

[https://usosweb.uw.edu.pl/kontroler.php?action=actionx:katalog2/przedmioty/pokazPrzedmiot\(prz_kod:1200-1HISCHEM1\)&lang=2](https://usosweb.uw.edu.pl/kontroler.php?action=actionx:katalog2/przedmioty/pokazPrzedmiot(prz_kod:1200-1HISCHEM1)&lang=2)

Wroclaw, Faculty of Chemistry

- History of chemistry professors are trained as chemists.
- History of chemistry is taught as an independent course.
- The status of the course is: optional.
- The level of history of chemistry students is: BSc+MCs+PhD.
- The main audiences for the history of chemistry lessons are: chemists.

Teaching materials: Improvement of scientific methods of investigation of nature – Bacon, Descartes, Poper. Role of experiments in chemistry. Ethics in science. Chemical technology in ancient times. Nature philosophy in Greece. Early alchemist in Egypt, China and Indie. Arabian alchemy and its influence on Europe. Medieval alchemy and iatrochemistry – Paracelsus, Agricola, Glauber, Van Helmont. Early stage of formation of basic concepts in Chemistry – acid, base, salt, chemical affinity. Atomists of the Renaissance and Baroque. Understanding of concept of molecule. Polish chemists and alchemists of Renaissance – Sedziwój, Zuchta, Barner. Concept of phlogiston. New concepts in chemistry – Boyle, Lavoisier, Priestley, Cavendish. Dalton and the concept of chemical atoms. Electricity and electrochemistry. Theories of structure of chemical compounds- achievements of Berzelius, Dumas, Laurent, Gerchard. The concept of the atomic valence and structural theory of Kekule and Butlerov. The periodic table of elements. The beginning of physical chemistry, chemical thermodynamics, theory of equilibrium. The discovery of natural radioactivity. Biography and achievements of Maria Curie-Sklodowska. Early theories of chemical bonding.

Wroclaw, Institute for the History of Science

- History of chemistry professors are lecturers in the history of pharmacy, employees of the Museum of Pharmacy (historian, ethnologist, philologist), chemistry from the perspective of the elements influencing the development of pharmaceutical knowledge.
- History of chemistry is taught Lecturers in the history of pharmacy, employees of the Museum of Pharmacy (historian, ethnologist, philologist), chemistry from the perspective of the elements influencing the development of pharmaceutical knowledge.
- Status of the course: The history of pharmacy is compulsory, the history of chemistry is not.
- The level of history of chemistry students is: Postgraduate students.
- The main audiences for the history of chemistry lessons are: future MSc in pharmacy, visitors of the Museum.
- The main teaching materials are: Articles and textbooks on the history of pharmacy.

Lublin

- Background of the lectures: There is the tendency to reject the study of the history of chemistry in the University. It is eliminated from the subject courses and it is thought not to be the useful subject in the study programme. Therefore the teaching of chemistry is the individual proposals of lecturers of various fields of chemistry. It happens that way because now the most important in the University is the application and experiments for gathering the points. It results from the modern trends determined by the official procedure of covering science concerning the rule: the cheaper the more uninteresting. It is destructive idea for students and scientists being sensitive to that scientific field.
- Status of the course: The history of chemistry is not taught as an independent course. It is included as a part of some courses as: philosophy of science and other subjects, general chemistry, technology, inorganic chemistry, crystallography and so on. Generally the students are not interested in chemistry because they do not see the financial goods after graduation of that kind of subject.
- The status of the subjects is optional.

-The level of history of chemistry students is: Graduate (BSc)
-The main audiences for the history of chemistry lessons are: General audience. In the lectures called Comprehensive University Lectures there are: chemists, historians, philosophers, biologists, physicists.
-The main teaching materials are: books, lectures, textbooks written in Polish or in English languages.

-5 List other forms of teaching and popularization with strong history of chemistry contents

Warsaw

Marcin Dolecki gives lessons with chemical experiments at the Antonina Leśniewska Museum of Pharmacy in Warsaw (being a division of the Museum of Warsaw). They are organized mostly for middle and high school students. Themes of these lessons concern history of alchemy, chemistry, and history of pharmacy.

Wroclaw, Faculty of Chemistry

Visits to the museum of pharmacy, and elements of history of chemistry in Lower Silesian Science Festival.

Wroclaw, Institute for the History of Science

Museum lessons and workshops for the visitors of the Museum – containing elements of practical use of chemistry in pharmacy and medicine especially in the everyday life (hygiene).

Lublin

Comprehensive University Lectures:

- 1) *Na początku była filozofia...: Od alchemii do chemii, (In the beginning the philosophy was...: from alchemy to chemistry).*
- 2) *Wybrane zagadnienia z dziejów alchemii i chemii, (The selected problems from the history of alchemy and chemistry).*
- 3) The lecture in Polish Radio Lublin: *The hour of music and thoughts.*

Books:

- 1) Wiesława Ferenc, *Na początku była filozofia...: od alchemii do chemii*, Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej, Lublin 1998.
- 2) Wiesława Ferenc, *Wybrane zagadnienia z dziejów alchemii i chemii*, Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej, Lublin 1999.
- 3) Włodzimierz Hubicki, *Z dziejów chemii i alchemii*, WNT, Warszawa 1991.

- 6 List other institutions where there is a presence of history of chemistry.

-Maria Skłodowska-Curie Museum (it belongs to the Polish Chemical Society), Warsaw.
-Museum of the Wrocław University.
-Museum of Pharmacy – Medical University, Wrocław.
-Mineralogical Museum of Wrocław University.

-7 What are the local, regional and national associations on history of chemistry & science?

-The Committee for the History of Science and Technology PAS
-The Institute of the History of Science of the Polish Academy of Sciences, <http://www.ihnpaw.waw.pl/>

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

-Kwartalnik Historii Nauki i Techniki (Quarterly Journal of the History of Science and Technology; texts written mostly in Polish).
-Analecta. Studia i Materiały z Dziejów Techniki (Analecta. Studies and Materials for the History of Science; texts written mostly in Polish).
-Organon (with texts written in English, German, French, Spanish, Italian, and, occasionally, in Latin).

All of these journals are publications of the L. & A. Birkenmajer Institute for the History of Science PAS.

-Wiadomości Chemiczne – “Chaotic Notes” serie written by I. Siemion.

-Journal “Orbital”.

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

-The electronic mailing list of the members of the Committee for the History of Science and Technology PAS

-The list of the employees of the L. & A. Birkenmajer Institute for the History of Science PAS.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

Warsaw

-The most significant issue regarding the history of chemistry in Poland is the very small number of persons who are engaged in research projects on this field.

-The other important issue concerns destruction of a substantial part of chemical heritage during the WWII.

Wroclaw, Faculty of Chemistry

-In a very important period in development of chemistry Poland did not exist as an independent country. From 1772 to 1918 Poland was spitted into Germany, Russia and Austria. Polish chemists work in different countries, their biography and achievements is not generally known, especially to young people. It is still necessary to remind this people and their achievements to polish and international community of scientists.

-History of chemistry is an important background for education of modern chemists.

Wroclaw, Institute for the History of Science

Fragmentary teaching of the history of science in primary and high schools, the lack of courses in the history of science at the universities. The need to establish historical sections by the Scientific Associations concerned with chemistry; also low activity of such sections, lack of information regarding their existence

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

Warsaw

-*Słownik polskich odkrywców, wynalazców i pionierów nauk matematyczno-przyrodniczych i techniki (The Dictionary of Polish Discoverers, Inventors, and Pioneers in Science and Technology – 4 volumes)*, edited by Bolesław Orłowski, being the result of work of more than 100 authors. The dictionary will be published by IHN PAN and Instytut Pamięci Narodowej (the Institute of National Remembrance) in Warszawa 2015.

-Marcin Dolecki is the author of 80 biographies of Polish chemists in this book – about 7% of the whole text, Roman Mierzecki wrote 4 biographies of Polish chemists.

Wroclaw, Institute for the History of Science

-Establishing museums focused on the history of science where the knowledge of the history of chemistry is being popularized.

Lublin

-The Conference of Polish Chemical Society in Lublin in 2011 year devoted to Maria Curie-Skłodowska.

-Comprehensive University Lectures devoted to the history of chemistry.

-The program of Polish Radio of Lublin: *Godzina muzyki i myśli* (1998 year) – devoted to the history of chemistry.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

PORTUGAL

1- Country. Portugal

2- Details of the researcher/professor filling this form (Name, position, department, email).

The information related to this country has been edited thanks to the information kindly provided by:

-Ana Carneiro, Associate professor, Department of Applied Social Sciences, amoc@fct.unl.pt

-Sérgio Rodrigues, Assistant professor, Department of Chemistry, Universidade de Coimbra, spjrodrigues@ci.uc.pt

-Isabel Malaquias, Associate professor, Department of Physics, Universidade de Aveiro, imalaquias@ua.pt

3- Which centres or departments offer courses in the history of chemistry?

Lisbon:

A few topics on the history of chemistry are included in Only in the PhD programme on history of science and technology.

Coimbra:

The MSc in Teaching Chemistry and Physics of University of Coimbra have a unit of “História das Ideias em Química” (3 ECTS, compulsory, very few students, 2013 and 2014 none).

The PhD in Teaching Sciences has a unit “Epistemologia e História das Ciências” (6 ECTS, optional, approximately 1 ECTS of history of chemistry, since 2013, Sérgio Rodrigues).

Aveiro:

Optional course for chemistry students, physics students, and as a free unit titled “História das Ciências e do Pensamento Científico” (6 ECTS unit) at the University of Aveiro with few topics in history of chemistry (until now there have been students, although reformulation of degrees can promote its decline) (Prof. Isabel Malaquias).

Aveiro+Coimbra:

The PhD in History of Science and Scientific Education (coordinated since 2012 by the Universities of Aveiro and Coimbra has a few modules dealing with topics of history of chemistry and popularization (Prof: João Oliveira, Paulo Claro, Ivone Delgadillo, Sérgio Rodrigues). The course “Epistemologia e História das Ciências” has also been chosen as free option.

4- General information on professors, students, teaching materials, etc.

-History of chemistry is not taught as an independent course.

-The status of the course is: The History of Science seminar is compulsory for students of the PhD programme on history of science and technology. Only two topics on the history of chemistry are included in this seminar.

-The level of history of chemistry students is: PhD.

-The main audiences for the history of chemistry lessons depends on the academic year. Usually students were secondary education teachers, but with the level of unemployment in the educational system, these have been dramatically reduced and lately there were not enough students to open the programme.

-Teaching materials (Lisbon): In the above described circumstances, I usually resort to a chapter of a book or an article from a journal, both selected from the available international bibliography.

-Teaching materials (Aveiro): selected articles and books; methods: presentations with significant discussion with students; similar audience: science teachers, science communicators, some students from abroad (mainly Brazil). PhD students are in some cases science teachers, science communicators. Visits and work on the scientific collections are included.

-5 List other forms of teaching and popularization with strong history of chemistry contents.

-Occasionally, there are collaborations to organise exhibitions and international meetings as well as publications associated with the history of chemistry with the Museum of Science of the University of Lisbon.

- Some guided tours to the 19th century laboratory of chemistry and chemistry collections of this Museum has been organised to students and teachers from secondary schools and also from the Faculty of Sciences and Technology of the New University of Lisbon.

-In 2011, Sérgio Rodrigues and Filipa Oliveira, with the support from SPQ, Museu da Ciência da Universidade de Coimbra and Museu da Ciência de Lisboa, re-enact a partial and actualized version (3 sessions, one hour each) of the lessons from Faraday's "Chemical History of a Candle" that was presented in Museu da Ciência da Universidade de Coimbra and Museu da Ciência de Lisboa. A short version (1 hour) was brought to Universidade do Porto, Festa d Avante (by invitation of SPQ) and two secondary schools (through the programme "O Mundo na Escola", http://www.mundonaescola.pt/?page_id=5397)

Coimbra:

-Sérgio Rodrigues write chemistry popularization texts in two blogs, occasionally with high history of chemistry contents: "De Rerum Natura" (<http://dererummundi.blogspot.pt/search/label/química>) and "Percursos Químicos" (<http://percursosquimicos.blogspot.pt/>).

-Occasionally organized popularization of chemistry trails "Passeios Químicos" by Sérgio Rodrigues and Ciência Viva and Museu da Ciência da Universidade de Coimbra also include history of chemistry references.

Aveiro:

Fábrica Ciência Viva de Aveiro frequently has some activities promoting chemistry and aspects of history of chemistry in Café de Ciência (Amorim da Costa, A. M. Nunes dos Santos, Paulo Claro, Ivone Delgadillo...), performances (theatre play "Questão de Ar" by I. Malaquias and M. Condesso). In collaboration with the SPQ History Group, a Journey on "O legado científico de dois luso-brasileiros setencistas - Nos 250 anos do nascimento de Vicente Coelho Seabra e José Bonifácio de Andrada e Silva" (Amorim da Costa, Martim Portugal Ferreira, 2014). <http://www.spq.pt/agenda/event/198>

- 6 List other institutions where there is a presence of history of chemistry like museum, university collections, interest groups...

-Both Museu da Ciência da Universidade de Coimbra and Museu da Ciência de Lisboa have restaured labs (Laboratorios Chímicos) and class rooms (Amphiteatros) with original equipment and furniture tracing back to their origins (18th and 19th century).

In University of Oporto, the "Laboratorio Chímico" created at the beginning of the XX century is not yet restored, but a chemistry collection is available in this university museum. https://sigarra.up.pt/up/en/web_base.gera_pagina?p_pagina=museus-da-universidade

Lisbon:

-The Museum of the University of Lisbon and its vast collection, including his historic laboratory. <http://www.museus.ulisboa.pt/>

Coimbra:

-The building of the 18th century laboratory of chemistry which has been musealized, but does not focus specifically on chemistry. <http://www.museudaciencia.org/>

-The permanent exhibition of "Laboratorio Chímico", now Museu da Ciência da Universidade de Coimbra, has a large focus on chemistry based on the large collection of the museum. This collection is not completely catalogued (<http://museudaciencia.inwebonline.net/>). It has pieces identified as old as the 18th century and traces back to the memory of the foundation of the Portuguese University in Coimbra in 1290. Sérgio Rodrigues was appointed as scientific curator of the chemistry collection in 2014.

-7 What are the local, regional and national associations on history of chemistry & science?

Only the Portuguese Society of Chemistry has a history group. <http://www.spq.pt/>

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

Since 2014, all materials from “Revista de Chimica Pura e Applicada” (1905-1956), “Revista Portuguesa de Química” (1958-1997), and “Química, Boletim da Sociedade Portuguesa de Química” (since 1977) are available online. A total of more than 4600 articles is included. http://www.spq.pt/publicacoes_spq

The journal of the Portuguese Society of Chemistry includes (and calls actively for) an article on history of chemistry, but it is not a specialized journal on the history of chemistry.

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

The SPQ History Group uses the mailing list of all its adherents (although not being a very interactive one) and publicizes in the SPQ webpage space news whenever necessary.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

I think as an independent discipline, history of chemistry is disappearing, especially in teaching as the history of most particular scientific fields. The problem is complex and among other reasons has to do with political options, which transcend the national scene.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

-The work published on the history of quantum chemistry by Ana Simões/Kostas Gavroglu in the European and American contexts. Kostas Gavroglu, Ana Simões, *Neither Physics nor Chemistry- a History of Quantum Chemistry*, MIT Press, 2012.

-Commemorations of the 101th anniversary of University of Lisbon, 2012.

-Ana Simões, Ana Maria Eiró, Miguel Ramos (coord.), *Novas Memórias de Professores Cientistas*, Universidade de Lisboa, 2012. Ana Simões (coord.), *Memórias de Professores Cientistas*, Universidade de Lisboa, 2001, 2010.

-Congresso Luso-Brasileiro de História das Ciências, Coimbra, 2011 (<http://www.uc.pt/congressos/clbhc/>). Its book of abstracts (http://www.uc.pt/congressos/clbhc/actas_congresso/) had a significant number of presentations related with the history of chemistry.

-Isabel Malaquias (2015), *Echoes from the Reception of the Periodic Classification in Portugal*. In: Masanori Kaji, Helge Kragh, Gábor Palló (eds.), *Early Responses to the Periodic System*, OUP, 240-261.

Other editions related with the history of chemistry:

-Sebastião Formosinho, Hugh Burrows (Eds.), *Fernando Pinto Coelho, o Mestre e o Professor no centenário do seu nascimento*, Imprensa da Universidade de Coimbra, 2013.

-Jorge Calado, *Haja Luz! Uma História da Química Através de Tudo*, 2011, (2012, 2nd edition), IST Press.

-Michael Faraday, *História Química de uma Vela* (Maria Isabel Prata and Sérgio Rodrigues, translation and notes), Imprensa da Universidade de Coimbra, Coimbra 2011.

-Antoine Lavoisier, *Tratado Elementar de Química* (Emídio Queiroz Lopes, translation and notes, revised by the

SPQ group of History of Chemistry), SPQ, 2011.

-Sebastião Formosinho, Hugh Burrows (Eds.) *Sementes de Ciência: livro de homenagem António Marinho Amorim da Costa*, Imprensa da Universidade de Coimbra, 2011.

-Raquel Gonçalves, *Marie Sklodwska Curie – Imagem de outra Face*, Colibri, 2011.

-Raquel Gonçalves, *Dorothy Crowfoot Hodgkin*, Colibri, 2010.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

RUSSIA

1- Country. Russia

2- Details of the researcher/professor filling this form.

The information related to this country has been edited thanks to the information kindly provided by:
Dr. Elena Zaitseva(Baum), Chemical Faculty, Moscow State University (senior research scientist at the Moscow State University, lecturer in History of Chemistry), baumzai@mail.ru

3- Which centres or departments offer courses in the history of chemistry?

- 1) Moscow University at the Chemical Faculty- two courses: “Introduction to history and methodology of chemistry. History of chemical faculty” (72 hours on a semester, lecturers: Zefirova Ol’ga N., Bogatova T.V., the heads of faculty chairs); “History and methodology of chemistry” (72 hours on a semester, lecturers: Bogatova Tatjana V., Zaitseva(Baum) Elena A.). New: in the last course a lecture on the subject “Female chemists” is included. Lectures. Exam works. About 50% of students write special essays. Some of them prepare a graduation work (diploma) on the history of chemistry.
- 2) Saint Petersburg University- course for bachelor students (0,5 ECTS) and course for master students (1,0 ECTS).
- 3) Kazan’ University at the Chemical Faculty “History and methodology of chemistry” (72 hours on a semester, lecturer –Budnikov German K.). Lectures. Seminars (3). Exam work. Two excursions to the Museum of Kazan’ chemical school. Kazan’ University at the Pedagogical Faculty – course- “An Introduction to history and methodology of chemistry” for the bachelor programme (72 hours on a semester, lecturer- Mel’nikova G.F.).
- 4) University of Chemical Technology of Russia (Moscow) in connection with the establishment of pedagogical department in 1995 (prepares chemistry teachers) there was developed an original curriculum (two-semester course on “History and methodology of chemistry”, 72 hours on a semester, lecturer- Mustafin D.I.).
- 5) Moscow State University of Fine Chemical Technology (MITHT) – course “History and methodology of chemistry” for: a) master students specializing in “chemical technology and biotechnology” (77-94 hours on a semester) and b) master students specializing in “inorganic chemistry” (112 hours on a semester). New – a lecture is included on the subject “Female chemists”.
- 6) Voronezh University at the Chemical Faculty- course “History and methodology of chemistry” (36 hours on a semester) for the bachelor programme, course “History and methodology of material science” for MCs programme. Lecturer: Samoylov Alexander M.
- 7) Southern Federal University at the Chemical Faculty (Rostov-on-Don) –a) course “History and methodology of chemistry” for the bachelor programme (lecturer- Levchenkov S.I.), b) specialized courses: “History of origin and development of electrochemistry” (50 hours on a semester), “History and methodology of organic chemistry” (20 hours –lectures, 8 hours -seminars on a semester), “History and methodology of organic synthesis” (20 hours –lectures, 8 hours -seminars on a semester).
- 8) Tver’ University at the Chemical-Technological Faculty- course “History and methodology of chemistry” for MCs programme (lecturer- Levina A.S).
- 9) North –Caucasus Federal University (NCFU) at the Institute of Education and Social Sciences (Stavropol)– course “History and methodology of chemistry” for the bachelor programme (lecturer- Shibaeva Ludmila Mikhailovna).
- 10) Saint Petersburg State Technological University (Technical University)- course “History and methodology of chemistry, chemical technology and biotechnology for master students specializing in “chemical technology and biotechnology”
- 11) Tomsk University at the Chemical Faculty - course “History and methodology of chemistry” for the bachelor programme.
- 12) Russian Christian Humanitarian Academy (SPb)- course “History of Alchemy” for master students specializing in religious studies (22 hours –lectures, lecturer- Rodichenkov Yuri).

3- General information on professors, students, teaching materials, etc.

- History of science professors are trained as chemists, historians of sciences, philosophers, and biologists.
- History of chemistry is taught as an independent course.
- The status of the course is: compulsory.
- The level of history of chemistry students is: There are all variants.
- The main audiences for the history of chemistry lessons are: chemists, prospective teachers, historians, philosopher, economists...etc.
- Mostly are used the textbooks in Russian. Namely: two textbooks of N.A.Figurovskij (History of chemistry, 1979; " Sketch of the general history of chemistry. From the ancient times till the beginning of XIX century", 1969), textbook "History of chemistry", 1989 (authors- Solov'ev Ju.I., Trifonov D.N., Shamin A.N.), Mittova Ja., Samoylov A.M. "The history of Chemistry from Ancient Times till the End of XX Century". In two volumes. Vol.1 -2009-416P., Vol.2 -2012-624P.(www.id-intellect.ru). [Levchenkov S.I.](http://www.physchem.chimfak.rsu.ru/Source/History) "History of Chemistry Short Essay" (www.physchem.chimfak.rsu.ru/Source/History). The book "Female chemists : Biographies, Contribution into Science, Recognition" (Moscow, Janus-K, 2013) is used in the lecturers at the Chemical Faculty of Moscow University (<http://wsc.hypotheses.org/158>) and at the Historical faculty of Saint Petersburg University. **New** – about history of alchemy, particularly in Russia, –Khalturin Ju.L.,Kuchurin V.V., Rodichenkov Yu.F. «The heavenly science»: The European alchemy and Russian Rosicrucians in XVII-XIX Centuries».2015 (<http://intelbook.org/2015-03-18-nebesnaya-nauka/>)

-5 List other forms of teaching and popularization with strong history of chemistry contents.

- Lecturers of Kazan' University use in teaching process expositions of the Museum of Kazan' chemical school
- Sector of chemical and biological sciences at the Institute of History of Science and Technology Russian Academy of Sciences (Moscow)(IJET as abbreviated in Russian)
- Close contacts and collaboration with the Association for the Study of Esotericism and Mysticism (ASEM) (<http://aiem-asem.org/>). Common publications (f.e. in the book "The Phenomenon of Alchemy in the History of Science, Philosophy,Culture". Smolensk: Print-Ezpress, 2013)

- 6 List other institutions where there is a presence of history of chemistry.

- Innovative practices of cooperation between museums in preserve the heritage of chemistry and making accessible it's sources for students of some Moscow higher educational establishments. First and foremost I would like to mention the innovative practices of two leading universities - Moscow State Academy of Oil and Gas n.a. Ivan M.Gubkin (MSAOG) and Moscow State University of Railway Engineering (MIIT, as abbreviated in Russian). MSAOG: at the Faculty of Chemical Technology and Ecology, the Academy has 2 museums (Museum of the Scientific Basis of the Production and Use of Lubricants named after Nikolai I.Chernozhukov (since 2003) and Petroleum Museum (since 2003, head Olga B. Chernova)). Educational and Methodological Museum Center for the History of MIIT (head Anna K. Nikolaenko) was established in 1999 on the basis of the Museum of MIIT. The center also includes some historical halls, in particular, the laboratory - chemical one n.a. Ivan A. Kablukov.

- Museum of History of the Russian Chemical-Technological University n.a. Dmitrii I.Mendeleev (abovementioned University of Chemical Technology of Russia, Moscow) created by the decision of administration of this higher educational establishment in 1978 and opened in 1981. It contains sections devoted to contribution of university scientists and teachers to chemistry science and chemistry manufacturing.

- Museum of Kazan' chemical school D.Mendeleev Museum & Archives (SPb).

- Interest groups: History of Chemistry sector (Chemical Faculty, Moscow State University), abovementioned sector of chemical and biological sciences at the Institute of History of Science and Technology Russian Academy of Sciences (Moscow).

-7 What are the local, regional and national associations on history of chemistry & science?

- No.

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

-Journal “Studies in the History of Science and Technology” (published by the Institute of History of Science and Technology Russian Academy of Sciences (Moscow)).

Historians of sciences also publish them in the magazines which are issued by separate universities (for example, «The Bulletin of the Moscow State University. Ser.2.», «The Bulletin of Tomsk State University», etc.).

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

- Mailing list of the Russian chemical society.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

There is no gain of young researchers in the field of the history of chemistry. This area of a science is scarcely financed by the state; simultaneously there are no special private funds for these purposes too. We haven't special Russian-language magazines in this field.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

- History of Chemistry sector (Chemical Faculty, Moscow State University) have organized first International conference “Women- chemists” (Moscow University, 2011). Then we decided to combine most interesting reports (some of them in the extended version) into a separate issue “Female chemists: Biographies, Contribution into Science, Recognition” (Moscow, Janus-K, 2013) (<http://wsc.hypotheses.org/158>).

-From 2012 International conferences on the History of Alchemy are organised every year in Russia.

-Within the limits of annual conference IIET (Institute of History of Science and Technology Russian Academy of Sciences (Moscow)) the section of history of chemical and biological sciences works.

- At annual student's conference of the Moscow university (Lomonosov conference) works always section of history of chemistry. Young Russian researchers and students present their papers.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

SERBIA

1- Country. Serbia
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Vesna Milanovic, PhD student, teaching assistant at Faculty of Chemistry, University of Belgrade, fields of interests: history of chemistry and chemistry education, vesnamilanovic@chem.bg.ac.rs
3- Which centres or departments offer courses in the history of chemistry? -Subject: <i>history of chemistry</i> , Faculty of chemistry in Belgrade. This course is compulsory for future chemistry teachers in the seventh semester. Other groups at Faculty of Chemistry in Belgrade do not have this course. This course has value of 2 ECTS credits. The students (future chemistry teachers) have two hours per week, totally 30 hours for whole semester. After new accreditation it will be 4 ECTS credits and 3 hours per week. The history of chemistry course includes lectures, working in groups, making timelines, the seminar works of the students, visits to the Museum of Chemistry.
4- General information on professors, students, teaching materials, etc. -History of chemistry professors are trained as a chemist, with interest in chemistry education and history of chemistry. (Univ. of Belgrado). -History of chemistry is taught as an independent course. (Univ. of Belgrado). -The status of the course is: compulsory for future chemistry teachers. (Univ. of Belgrado) -The level of history of chemistry students is: Graduate (BSc). (Univ. of Belgrado). -The main audiences for the history of chemistry lessons are: chemists, prospective teachers, historians, philosopher, economists...etc. (Univ. of Belgrado). -Teaching materials are recommended on the webpage of faculty including: <ul style="list-style-type: none">- Drago Grdenic (2001), <i>The tale of chemistry</i>, Zagreb: New Liber and school's book- Marija Jankovic (1999), <i>The history of chemistry</i>, Sarajevo: Students' printing press University of Sarajevo- Ivan Gutman, Meliha Zejnilagic-Hajric, Ines Nuic (2010), <i>Chosen chapters from the history of chemistry</i>, Kragujevac: Faculty of natural sciences in Kragujevac
-5List other forms of teaching and popularization with strong history of chemistry contents. Museum of Chemistry at Faculty of Chemistry in Belgrade, in which the heritage of the Serbian chemists is saved. It promotes student visits, from primary and secondary schools. The group visits are guided by senior students of the Faculty of Chemistry. In November 2013, it organised a exhibition called "The laboratory of great men, the heritage of Serbian chemistry". The exhibition was lasted one month and was visited by 6000 visitors.
- 6 List other institutions where there is a presence of history of chemistry. No more information about other institutions.
-7 What are the local, regional and national associations on history of chemistry & science? Unknown.
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

- *Journal of the Serbian Chemical Society*, has a new section for the history of chemistry.
<http://www.shd.org.rs/JSCS/>
- *Chemical review* edited by the Serbian Chemical Society. Every year, the cover page of this journal is dedicated to one famous person from national history of chemistry.

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country?

All information about activities in this area we obtain from the office of the Serbian Chemical Society, or from the site of society.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

The main problem is that researchers in chemistry do not pay attention to the history of chemistry and do not consider researches in history in chemistry like equally. They think that work in this area has a smaller value than their work. Other problem is connected with unavailability of primary sources.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

- Involvement as delegate with the Working Party on the History of Chemistry.
- Promotion of the awareness of young people about impact of the history of chemistry contents to the deeper understanding of chemistry, important for the academic consideration of the discipline.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

SPAIN

1- Country. Spain
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: -Jose Ramon Bertomeu-Sanchez, Senior lecturer. Department of History of Science and Documentation, University of Valencia, bertomeu@uv.es -Agustí Nieto-Galán, Senior Lecturer in History of Science at the Universitat Autònoma de Barcelona, agusti.nieto@uab.cat
3- Which centres or departments offer courses in the history of chemistry? For each course, include the following specific information. <u>Valencia</u> Subject: “History of chemistry”, 4,5 ECTS, Lectures+Seminar+Discussion groups. <u>Barcelona</u> Subject: “History of chemistry”, offered by the Centre d’Història de la Ciència (CEHIC), one semester, 6 ECTS, undergraduate course: 4th year.
4- General information on professors, students, teaching materials. <u>Valencia</u> -History of chemistry professor is trained as historian. -History of chemistry is taught as an independent course (Faculty of Chemistry) and included in many other courses on history of sciences (Master degree). It is also taught in a brief course for secondary school teachers. -The status of the course is: optional. -The level of history of chemistry students is: Graduate. -The main audiences for the history of chemistry lessons are: chemists, prospective teachers, (master degree on secondary school teachers), varied (master degree on history of science). -Teaching materials: - Fara, P. (2009), <i>Breve historia de la ciencia</i> , Barcelona, Ariel. - Brock, W.H. (1998), <i>Historia de la química</i> , Madrid, Alianza Editorial, 619 p. - Bensaude-Vincent, B.; Stengers, I. (1997), <i>Historia de la química</i> , Madrid, Addison-Wesley, -Bertomeu Sánchez, J.R.; García Belmar, A. (2006), <i>La revolución química: entre la historia y la memoria</i> , Valencia, PUV. - García Belmar, A.; Bertomeu Sánchez, J.R. (1999), <i>Nombrar la materia: Una introducción histórica a la terminología química</i> , Barcelona, El Serbal, 245 p -Edgerton, D. (2007), <i>Innovación y tradición. Historia de la tecnología moderna</i> , Barcelona, Crítica, 320 p. Some recommended textbooks for the history of science postgraduate students of Valencia and Barcelona are: -Fara, P. (2009), <i>Science A Four Thousand Year History</i> (Spanish edition, 2009). - Bowler, P. J., Morus, I. R., (2005), <i>Making Modern Science: A Historical Survey</i> (Spanish edition, Panorama general de la ciencia moderna, 2007). -Other local textbooks: -Lopez Ocon, L, 2003, <i>Breve Historia de la ciencia española</i> . <u>Barcelona</u> -History of Science lecturer, with research interests in history of chemistry.

-History of chemistry taught as an independent course

-Status of the course: optional.

-Level of the students: Undergraduate

-Main audiences: chemistry undergraduates

-Syllabus:

Tema 1: Els orígens, Tema 2: L'herència alquímica, Tema 3: Química i revolució científica, Tema 4: Química i Il·lustració, Tema 5: La revolució química (I), Tema 6: La revolució química (II), Tema 7: Àtoms i molècules, Tema 8: La química orgànica, Tema 9: La identitat de la química, Tema 10: La irrupció de la física

Tema 11: El nou àtom químic, Tema 12: La química i la vida, Tema 13: La imatge pública de la química (I)

Tema 14: La imatge pública de la química (II).

-Teaching materials:

Detailed reading of:

Brock, W H., *Historia de la química*. Madrid. Alianza Editorial 1998 (*The Fontana History of Chemistry*. Fontana Press. London 1992)

-Bensaude-Vincent, B; Stengers, I, *Historia de la química*. Addison-Wesley. Madrid 1997 (*Histoire de la Chimie*. La Découverte. Paris 1993).

More specific text:

Ihde, A. J., *The Development of Modern Chemistry*. Harper Row. New York 1966.

General readings:

-García Belmar, A.; Bertomeu Sánchez, J.R.,

Nombrar la materia: Una introducción histórica a la terminología química. Barcelona. El Serbal 1999.

-Knight, D, *Ideas in Chemistry. A History of the Science*. Athlone Press. London 1992.

-Levere, T. H., *Transforming Matter. A History of Chemistry from Alchemy to the Buckyball*. Johns Hopkins University Press. Baltimore 2001.

-Partington, J. R., *Historia de la Química*. Espasa Calpe. Madrid, 1945.

-Partington, J. R., *A History of Chemistry*. Macmillan. London, 1961-70.

More readings:

-Abraham, L, *A Dictionary of Alchemical Imagery*. Cambridge University Press. Cambridge 2001.

-Aftalion, F, *A History of Chemical Industry*. University of Penn Press. Philadelphia 1991.

-Bensaude-Vincent, B, "Lavoisier una revolución científica" en SERRES, M. (ed.) *Historia de las Ciencias*. Cátedra. Madrid 1991. pp. 411-436.

-Bensaude-Vincent, B, "Mendeleiev: historia de un descubrimiento", en SERRES, M. (ed.) *Historia de las Ciencias*. Cátedra. Madrid 1991. pp. 503-525.

-Carson, R. L., *Primavera silenciosa*. Drakontos. Crítica. Barcelona 2001.

-Debus, A. G. (1978) *Hombre y naturaleza en el Renacimiento*. Fondo de Cultura Económica. México 1985.

-Debus, A. G., *Chemistry, alchemy and the new philosophy, 1550-1700*. London 1987.

-Eliade, M, *Herreros y Alquimistas*. Alianza. Madrid 1986.

-Fru-ton, J, *Molecules and Life: Historical Essays on the Interplay of Chemistry and Biology*. Wiley Interscience. New York 1972.

-Furter, W. (ed.) *History of Chemical Engineering*. American Chemical Society. Washington 1987.

-Geison, G. L., *The Private Science of Louis Pasteur*. Princeton University Press. Princeton 1995.

-Guyton de Morveau, L.; Lavoisier, A. L; Berthollet, C; Fourcroy, A.F, *Método de la nueva nomenclatura química*. Fundación Ciencias de la Salud. Madrid, 1994 (edició en facsímil).

-Haber, L. F., *The Poisonous Cloud: Chemical Warfare in the First World War*. Clarendon Press. Oxford 1986.

-Holmes, F. L., *Eighteenth-Century Chemistry as an Investigative Enterprise*. University of California Press. Berkeley 1989.

-Holmes, F. L.; Levere, T. H. (eds.) *Instruments and Experimentation in the History of Chemistry*. The MIT Press. Cambridge Mass. 2000.

-Holmyard, E.J., *Alchemy*. Dover Publications. New York 1990. (1a edició 1957).

-Izquierdo, M. et al. (eds.) *A.L. Lavoisier i els orígens de la química moderna 200 anys després*. Barcelona, 1994.

Institut d'Estudis Catalans. Barcelona 1996.

-James, L. K. (ed.) *Nobel Laureates in Chemistry, 1901-1992*. CHF. Washington 1993

-Kohler, R. E., *From Medical Chemistry to Biochemistry*. Cambridge University Press. Cambridge 1982.

-Laidler, K.J., *The World of Physical Chemistry*. Oxford University Press. Oxford 1993.

-Lavoiser, A. L, *Tractat elemental de química*. (traducció catalana de Mireia Artís; introducció històrica i notes d'Agustí Nieto-Galan). Clàssics de la ciència en català. Institut d'Estudis Catalans. Barcelona 2003.

-Lavoiser, A. L. *Tratado elemental de química*. Alfaguara. Madrid 1982. (Trad. de Ramón Gago).

-Mauskopf, S. H. (ed.) *Chemical Sciences in the Modern World*. University of Pennsylvania Press. Philadelphia 1993.

-Multhaupt, R. P. *The Origins of Chemistry*. Oldbourne. London 1966.

-Nye, Mary Jo, *Before Big Science. The Pursuit of Modern Chemistry and Physics, 1800-1940*. Harvard University Press. Cambridge, MA. 1996.

-Sánchez Ron, J. M, *El poder de la ciencia*. Alianza. Madrid 1992.

-Taylor, F. S., *La alquimia y los alquimistas*. Barcelona. A.H.R. 1994.

-5 List other forms of teaching and popularization with strong history of chemistry contents.

Spring school Society for the History of Science, Mahon (every two years), <http://blogs.iec.cat/schct/activitats-2/escola-de-primavera/8th-european-spring-school/>

Master degree on History of Science and Communication (every year – three universities involved: Valencia, Alicante and Elche). <http://www.uv.es/uvweb/master-history-science-scientific-communication/en/master-s-degree-history-science-scientific-communication-1285881510296.html>

Master degree on History of Science: Science, History and Society (every year – three universities involved: Univ. Autònoma de Barcelona, and Univ. de Barcelona).

<http://www.cehic.es/master.php?sitelang=en&seccio=&idtipopersonal=>

Once a year the University of La Rioja organises a summer school on history of chemistry (2014, 5th edition) http://fundacion.unirioja.es/formacion_cursos/view/231.

Webpage on history of chemistry: <http://www.juanjuliobonet.cat/index.htm>

Exhibition on history of chemistry, Valencia: <http://www.ihmc.uv-csic.es/quimica/>

Exhibition on history of chemistry, Barcelona: <http://www.bib.uab.cat/ciencias/expo/quimica/>

- 6 List other institutions where there is a presence of history of chemistry.

Museum for History of Medicine and Science (Valencia) -permanent and temporary exhibitions.

<http://www.uv.es/uvweb/institut-universitari-historia-medicina-ciencia-lopez-pinero/en/divulgacio/exposicions-permanents/ciencia-societat-1285896763236.html>

-7 What are the local, regional and national associations on history of chemistry & science?

Several groups existed but they are mostly for chemist-historians or amateurs:

-Sociedad Española de Historia de las Ciencias y de las Técnicas (SEHCYT), <https://sites.google.com/site/sehcyt2012/>

-Societat Catalana d'Història de la Ciència i de la Tècnica (SCHCYT), <http://schct.iec.cat/>

-Sociedad de Docentes Universitarios de Historia de la Farmacia de España, (SDUHFE), <http://pendientedemigracion.ucm.es/info/sduhfe/>

- Sociedad Española de Historia de la Alquimia, <http://www.revistaazogue.com/callforpapers.htm>

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

The journals on History of Science included papers on history of chemistry. The most important is Dynamis. There are other publications such as Asclepio or Llull. The journal of the Royal Society of Chemistry includes a section on history of chemistry but papers are written usually by chemist-historians or amateurs. Some popular journals on science popularization include papers on history of chemistry.

Journals with scientific impact (WOS/JCR):

Dynamis <http://www.revistadynamis.es/>

Revista Theoria <http://www.ehu.es/ojs/index.php/THEORIA>

Revista de Historia Industrial <http://www.ub.edu/rhi/es/contactar.html>

Revista Historia Agraria <http://www.historiaagraria.com/>

Other relevant journals:

Actes Societat Catalana Historia Ciència, <http://revistes.iec.cat/index.php/AHCT/index>

Asclepio, <http://asclepio.revistas.csic.es/index.php/asclepio>

Llull, <https://sites.google.com/site/sehcyt2012/journal-llull>

Revista Azogue, <http://www.revistaazogue.com/callforpapers.htm>

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country? (the list must not necessarily be specific to the history of chemistry, as long as it does serve for dissemination of history of chemistry events or discussions)

-Conecta is the best one: run by E. Perdiguero quique@umh.es

-Centre d'Història de la Ciència (CEHIC) of the UAB, <https://listes.uab.es:4443/mailman/listinfo/hct-l>

-Instituto de Historia de la Medicina y de la Ciencia López Piñero of the UV

<http://www.uv.es/uvweb/institut-universitari-historia-medicina-ciencia-lopez-pinero/es/divulgacio/activitats-divulgatives-1285896559982.html>

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

-Absence of institutional setting. Courses are mostly taught by non-professional historians and retired chemists.

-Lack of professionalization. History of chemistry is absent in many Chemistry Faculties in the whole Spain.

Professional chemists often produce bad history of chemistry and they consider it a simple hobby in their careers.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

-A large number of publications in international journals. Participation in international meetings. Involvement as review editors for relevant history of chemistry journals. New studies on history of chemistry in Spain.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

-It is important to have information for each course. And in this form is difficult to clarify this point. Most of the history of chemistry is taught in courses on general history of science and it is difficult to include this information in this survey. Courses for prospective teachers are also very important to be considered here.

SWEDEN

1- Country. Sweden
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Hjalmar Fors, PhD, Docent. hjalmar.fors@idehist.uu.se , assistant professor dept. of history of science and ideas, Uppsala University, lecturer/reader dept. of literature, history of ideas and religion, Gothenburg University.
3- Which centres or departments offer courses in the history of chemistry? 4- General information on professors, students, teaching materials, etc. At present only a one-time, one-term course on the history of the elements, at Senioruniversitetet, Uppsala (beginning autumn 2015), involving Anders Lundgren, Hjalmar Fors and Hanna Vikström. This is an evening course organized for the benefit of senior citizens, and hence it gives no credits.
-5 List other forms of teaching and popularization with strong history of chemistry contents. The main stakeholder is Svenska Kemistsamfundet, the Swedish Chemical Society, and in particular its committee for the history of chemistry. The committee consists of a rather small group of chemists, teachers, and historians of chemistry who have regular meetings (about two to four times a year). Regular activities include managing historical information on the society's webpages, giving lectures when requested to do so, and writing essays for journals such as Kemivärlden/Kemisk tidskrift. An important recent activity has been the organization of the 9 th international conference on the history of chemistry in Uppsala in 2013. It was organized by a group led by Hjalmar Fors (chair) and Anders Lundgren (vice chair), but ultimately it was a cooperation between the dept. of history of science and ideas, Uppsala and the Swedish Chemical Society, initiated through this committee. There are few researchers in Sweden concerned specifically with the history of chemistry connected to the dept. for the history of science and ideas, Uppsala. There is Anders Lundgren, a well-known historian of chemistry, who, although recently retired is very much active as a researcher and public lecturer. There is Hjalmar Fors who has worked on the subject for many years, although these last years mostly on the history of alchemy and pharmacy, and the period before c. 1730. There is Nils-Otto Ahnfelt, a pharmaceutical chemist turned historian of science, who is now attached to the dept. for history of science and ideas, and I can also mention Jenny Beckman, who although primarily a historian of biology, is doing work on J. J. Berzelius at the present. There are also Olof Ljungström and Daniel Normark, at Enheten för medicinens historia och kulturarv, (Unit for medical history and heritage) at Karolinska institutet, both work, although not exclusively, on issues related to 20 th century chemistry. Among chemists writing history of chemistry Jan Trofast stands out: he has published a great number of monographs and collections of edited letters. Some PhD theses have been written on the subject, although none recently, and there are also a few PhD students active in the general area of history of chemistry, in particular Hanna Vikström at the Royal Institute of Technology, Stockholm.
- 6 List other institutions where there is a presence of history of chemistry. Department for history of science and ideas, Uppsala university, whence exists a small group of researchers interested in the history of chemistry (see above).

Centrum för Vetenskapshistoria vid Kungliga Vetenskapsakademien. (The center for history of science at the Swedish Royal Academy of Sciences). Some research on the history of chemistry is going on and the archives of the academy contains documents, manuscripts and letters of a great number of internationally renowned chemists active from the 18th century to the present. Sadly, the Berzelius museum of the Academy is now closed.

<http://www.center.kva.se/en/>

Enheten för medicinens historia och kulturarv, Unit for medical history and heritage, at Karolinska institutet, Stockholm. Some research on the history of chemistry is going on and the Hagströmer Library, at which the unit is localized, contains extensive collections of books concerned with the history of alchemy, chemistry and pharmacy.

<https://internwebben.ki.se/en/unit-medical-history-and-heritage>

-7 What are the local, regional and national associations on history of chemistry & science?

Svenska Nationalkommittén för teknik- och vetenskapshistoria vid Kungl. Vetenskapsakademien Swedish National Committee for History of Technology and Science, at the Swedish Royal Academy of Sciences, and Member of the International Council for Science ICSU. <https://www.kva.se/en/contact/NationalICSU-kommitteer/History-of-Science/>

Svenska Kemistsamfundet, (the Swedish Chemical Society, see above) <http://www.chemsoc.se/>

Lärdomshistoriska Samfundet (Swedish Society for the history of science and ideas) <http://www.idehist.uu.se/research/Swedish+History+of+Science+and+Ideas+Society/?languageId=1>

Berzeliussällskapet (The Berzelius Society) <http://www.chemsoc.se/berzelius-sallskapet.aspx>

- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country?

Lychnos: Årsbok för idé- och lärdomshistoria <http://www.vethist.idehist.uu.se/lychnos/?lang=eng>

-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country? (the list must not necessarily be specific to the history of chemistry, as long as it does serve for dissemination of history of chemistry events or discussions)

Unknown.

-10 Which are the most important challenges/problems to the history of chemistry in your local context?

There is no research community to speak of, and the institutional base is much too weak. There is, e.g., no chaired professor who professes a specialization in the history of chemistry or adjacent areas such as history of mining, metallurgy, pharmacy, or even biology. This is a big problem, as it also means that it is difficult to organize courses, and to recruit and train students and PhD-students.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

The organization of the 9th international conference on the history of chemistry in Uppsala in 2013, and the simultaneous hosting in Uppsala of the Sites of Chemistry in the 20th Century Conference (organized by John Perkins, Oxford in cooperation with Hjalmar Fors and Olof Ljungström, and held just before the 9ICHC).

There is also the recent publication by University of Chicago Press of the first monograph ever on the key environment for alchemy/chemistry in Sweden before 1750, Bergskollegium (The Swedish Bureau of Mines):

Hjalmar Fors, *The Limits of Matter: Chemistry, Mining and Enlightenment* (Chicago, 2015).

Recently, Hjalmar Fors also initiated a research- and teaching cooperation on the history of chemistry and the history of medicine, between the dept. for history of science and ideas, Uppsala, and CESIMA in Sao Paulo, Brazil. It is well-funded by the STINT-foundation and its Brazilian counterpart CAPES. As CESIMA is very strong in the history of chemistry, and Uppsala in the history of medicine, we have high hopes for a very interesting collaboration that might be very beneficial for the study of history of chemistry in Sweden.

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

UNITED KINGDOM

1- Country. United Kingdom
2- Details of the researcher/professor filling this form. The information related to this country has been edited thanks to the information kindly provided by: Dr Anna Simmons, Hon. Research Associate, Department of Science and Technology Studies, UCL a.simmons@ucl.ac.uk ; Also Membership Secretary of SHAC and RSCHG Newsletter Editor. I am also grateful to Dr Peter J T Morris, Peter.Morris@sciencemuseum.ac.uk
3- Which centres or departments offer courses in the history of chemistry? 4- General information on professors, students, teaching materials, etc. The main centres for history of chemistry research and teaching remain Durham (Matthew Eddy), Cambridge (Hasok Chang) and UCL (Frank James and Simon Werrett), but this is predominantly at a post-graduate level, although a handful of students at Oxford University complete a year's historical research and write a thesis as part of the final year of their M.Chem. degree. In comparison to 2007, the other important thing to note is that there are more PhD students studying history of chemistry and alchemy. Out of SHAC's current 15 student members in the UK, nine are broadly studying history of chemistry(at UCL, Durham, York, Cambridge, Leeds and Oxford Brookes) and six history of alchemy (at UCL, Cambridge, Exeter, Kent and Bristol)
-5 List other forms of teaching and popularization with strong history of chemistry contents.
- 6 List other institutions where there is a presence of history of chemistry.
-7 What are the local, regional and national associations on history of chemistry & science? Society for the History of Alchemy and Chemistry http://www.ambix.org/ Royal Society of Chemistry Historical Group and for history of science http://www.rsc.org/Membership/Networking/InterestGroups/Historical/ British Society for the History of Science http://www.bshs.org.uk/
- 8 What are the most relevant journals, newsletters or periodical publications on history of chemistry & science in your country? <i>Ambix</i> (journal) and Chemical Intelligence (newsletter) published by SHAC; http://www.ambix.org/publications/ambix/ , http://www.ambix.org/publications/chemical-intelligence/ Royal Society of Chemistry Historical Group Newsletter http://www.rsc.org/Membership/Networking/InterestGroups/Historical/Newsletters.asp
-9 What are the most employed distribution lists (electronic mailing list) for the discipline in your country? CHEM-HIST; Mersenne.
-10 Which are the most important challenges/problems to the history of chemistry in your local context? Access to jobs and funding for early career post-doctorates.

-11 Which are the most recent achievements/progresses in the history of chemistry in your local context?

ADHOC (the association for the Discussion of History of Chemistry) – this discussion group has met regularly at UCL and Cambridge and includes a wide range of participants

Sites of Chemistry, 1600-2000, Series of Conferences co-organised by John Perkins (Oxford Brookes) and Antonio Garcia Belmar (University of Alicante): first conference in Oxford, 2011, then Valencia, 2012 and Uppsala (2013).

Situating Chemistry, 1760-1840, Network and Database – an international network primarily funded by the Netherlands Organisation for Scientific Research, John Perkins (Oxford Brookes) and Lissa Roberts (University of Twente), co-organisers. See www.situatingchemistry.org

SHAC Award Scheme and SHAC Graduate Network – international in scope see www.ambix.org/grants/shac-award and www.ambix.org/projects/the-graduate-network

-12 Other comments, suggestions and amendments about the survey will be greatly appreciated

Having read the previous report from 2007, I don't think the situation in the UK regarding teaching has changed that much, with the exception of the number of PhD Students.