

The Global Chemistry Experiment

“Water: A Chemical Solution”

water.chemistry2011.org

Report, June 2011

July 15th, 2011

*IUPAC and UNESCO have developed a set of activities to entice students around the world to learn about how chemistry contributes to one of the most important resources in their daily lives, **water**. This global experiment, “**Water: A Chemical Solution**”, explores the chemistry of water and the role of water in society and the environment.*

The Global Chemistry Experiment is a cornerstone activity of the IYC which consists of four component activities. Each can be carried out by children of all ages in schools around the world. The activities are adaptable to the skills and interests of students of various ages and use equipment that is widely available. The activities provide students with an appreciation of chemical investigation and data collection and validation. The results submitted by the students are available in a website, water.chemistry2011.org, as an interactive global data map - demonstrating the value of international cooperation in science (Figure 1). The activities have been carefully selected in order to ensure they are suitable for implementation in schools across the world; they have been tested to ensure workability, especially in developing countries.

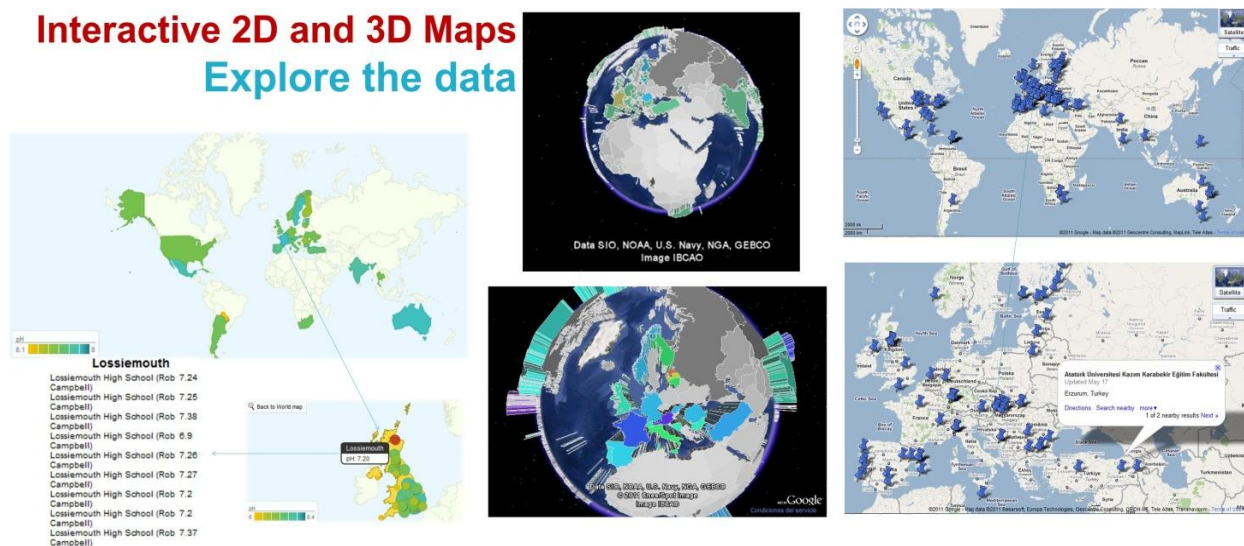
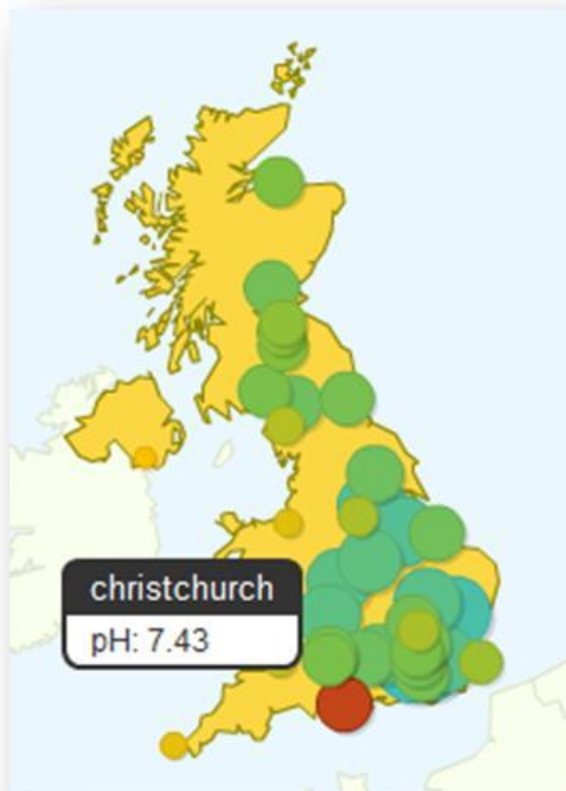


Figure 1. Interactive 2D map showing the pH values as an average for each country (top left) and the values measured by each school (bottom left). The 3D map (center) and the map of all the schools involved in the Global Experiment (right) are also available at water.chemistry2011.org

pH of the water in the UK



Data from Chirst Church

School + Teacher	ph
highcliffe (hunt hunt)	7.6
Highcliffe (Hunt Hunt)	7.6
Highcliffe (Hunt Hunt)	7.1
Highcliffe (hunt hunt)	7.5
highcliffe (hunt hunt)	7.3
highcliffe (hunt hunt)	6.8
highcliffe (hunt hunt)	7.4
Highcliffe School (CULLEN CULLEN)	7.3
Highcliffe (Berkeley Berkeley)	7.4
Highcliffe School (Waring Waring)	7.6
Highcliffe School (Waring Waring)	7.4
Highcliffe School (Waring Waring)	7.7
highcliffe (hunt hunt)	7.5
highcliffe (hunt hunt)	7.5
Highcliffe (Stone Stone)	7.46
Highcliffe (Stone Stone)	7.38
Highcliffe (Stone Stone)	7.54
Highcliffe (Stone Stone)	7.73

pH of the water



Temperature of the water





Some Figures

The Global Experiment was launched on March 22nd, the World Water Day. As by the end of June, only in three months after its launch, the Global Experiment has:

- Over 500 schools registered with 10,000+ students from over 40 countries from the 5 continents
- water.chemistry2011.org, done and maintained with European Schoolnet, is available in 5 languages: English, French, Spanish Chinese, and Russian, including state-of-the-art interactive tools, 2D and 3D map showing the data, and pictures, videos and news on the Global Experiment
- The four activities of the Global Experiment are currently available in 9 languages: English, French, Spanish, Russian, Hebrew, Portuguese, Arabic, Catalan and Chinese
- The Twitter account of the Global Experiment has 370 followers
- 500 people follow the Global Experiment in Facebook
- 4 videos have been made to promote the Global Experiment
- 5 Schoolpacks containing 10 Global Water Kits and a School Resource Kit have been sent to 30 countries for free to favour the participation of low-income communities
- The Global Experiment has been extensively featured in TV and Radio shows, news articles, and blogs, including BBC's "The One Show" on 21/06/2011 and the BBC Radio show "Science in Action" on 23/06/2011.

These data are only the tip of the iceberg as many students that performed the Global Experiment did not submit their data using the website. For example, on June 22nd, hundreds of schools and thousands of students took part in Global Experiment in UK during the national launch of this activity in Britain.

The Global Experiment of the International Year of Chemistry has already been described as the "biggest ever global chemistry experiment" by several media and chemical societies like the Royal Society of Chemistry.

Truly 2.0 Experience: Creating the Global Experiment Virtual Community

One of the main objectives of the Global Experiment is to allow educators and students from all around the World to interact, share experiences, news and pictures, and interact using social media. The website water.chemistry2011.org includes several state-of-the-art tools to share content, interact, and coordinate activities. Special attention has been paid to the use of social media to promote, coordinate and engage the youth in the Global Experiment. The most popular social sites like Twitter (with 370 followers and following 1800 people) and Facebook (with 500 members) (see Figure 3) have been extremely useful and fully integrated in the website with the tool shown in Figure 2. Also several videos have been especially done for the Global Experiment, posted in YOUTUBE and integrated in the website (Figure 4). The teachers and the students have the possibility to share their pictures with the rest of the community through the website. A few examples are all around the World are shown in Figure 5. All the schools taking part in the Global Experiment receive a Certificate of Participation (Figure 6) as a token of their contribution and to promote the submission of data in our website.

Figure 2. Box included in the home page of water.chemistry2011.org that integrates the main social media in the Global Experiment

Figure 3. The official Twitter (left) and Facebook (right) sites of the Global Experiment. Hundreds of followers interact using these social media allowing a more interactive participation of students and educations in the Global Experiment.



Figure 4. Videos made to promote the Global Experiment posted at water.chemistry2011.org



Figure 5. Some of the pictures received from all around the World of students performing the Global Experiment and available at water.chemistry2011.org



Figure 6. Certificate of participation that all the schools taking part in the Global Experiment receive as token of their contribution.

The Big Splash: The Launch of the Global Experiment on the World Water Day, March 22nd

Following over a year of dedicated efforts of the planning and implementation teams, the project launched successfully on the UN World Water Day, March 20 - 22, in Cape Town, South Africa. Hundreds of 15-18 year old students from Cape Town townships carried out experiments to test water quality, measure salinity and acidity, and learn how water is filtered and distilled. During the “Big Splash”, which coincided with the South African National Water Week, students were exposed to different activities that emphasized the importance of water in their city. Rovani Sigamoney, the IYC Focal Point at UNESCO, recently reported in *Chemistry International* that “the participating pupils enthusiastically found the pH of a sample of water from Intaka Island (a wetland in Cape Town) and then filtered and purified the water under the supervision of Erica Steenberg from RADMASTE Centre, University of Witswatersrand, and three volunteers”. Rovani said: “This was the first chemistry experiment that most of the pupils had ever carried out and their excitement at completing the exercise and obtaining the results was delightful to witness. Their total engagement in the experiment was evident in the many questions that they asked”.



Figure 7. One of the kits distributed during the Big Splash of the Global Experiment and some of the students from Cape Town, South Africa performing the activities on March 22nd, during the official launch of the Global Experiment on the World Water Day.

Making Headlines: “Schoolchildren to test local water in world's largest-ever chemistry experiment”

Dozens of articles, TV and Radio shows and blog entries have been published in the last months on theGlobal Experiment.

RSC president, Professor David Phillips, said: "This remarkable initiative will demonstrate the enjoyment gained from practical experimentation". "We believe the results will also provide a picture of global pH that will be very informative". "So the work by students all over our country, and in others where the experiment will be taking place on the same day, is of genuine national and international use."

The Global Experiment has been extensively featured in TV and Radio shows, news articles, and blogs, including BBC’s magazine programme “The One Show” on 21/06/2011, the BBC Radio show “Science in Action” on 23/06/2011.

From the BBC interview in [Science in Action](#):

"Water Acid Maps. One of the findings from the IPSO report showed that a rising carbon dioxide level in the atmosphere is leading to increased acidity of the oceans, as it dissolves in water. Currently there is no global record of how acidic the water around the world actually is – more data is desperately needed. So in what is being billed as the world's largest chemistry experiment is aiming to provide. Schools around the world are being asked to measure their local body of water, and plot the results on a global map. Pupils in London have been honing their skills, as Science in Action's Ania Lichtarowicz found out."



These are some of the quotes from the media coverage on the Global Experiment:

“Water, Water Everywhere: “Water: A Chemical Solution” is a set of four simple experiments designed to entice students around the world to learn about how chemistry contributes to one of the most important resources in their daily lives” Chemical and Engineering News (21/02/2011)

Mr Barwell, Member of the British Parliament said: “I am really looking forward to welcoming young people from my constituency to the House of Commons and joining them in taking part in the world’s largest chemistry experiment. It is so important for children of all ages to take part in hands-on science lessons and I am hugely grateful to the Royal Society of Chemistry for organising the event.” Many UK schools participate in this, the world’s biggest-ever chemistry experiment, which will be the largest single collection of data on water quality ever undertaken at one time and will be achieved by hundreds of thousands of youngsters around the globe becoming scientists for a day”, the RSC reported (28/06/2011)

“A Global Experiment is planned as a signature/flagship IYC-2011 activity initiated by IUPAC/UNESCO that will involve children and teachers from around the world. These young people will measure simple properties of water and log their data so that there can be a global visualization of the results. The purpose is to provide wider engagement by young people and schools throughout the world in visible hands-on chemistry activities that they share and analyze together”. The Washington Post (02/03/2011).

Science teacher Stefan Radajewski said: “It’s fantastic that our students are taking part in this global experiment about a resource that most of us take for granted”. Hertfordshire Mercury (30/06/2011)

“Schoolchildren to test local water in world's largest-ever chemistry experiment” RSC Press Release (17/06/2011)

“Children all around the world will have the opportunity to upload the results of their investigations to an official website, making this initiative a Global Chemistry Experiment, and eventually, the biggest chemistry experiment ever”. UNESCO News

“School students around the world are invited to explore one of Earth’s most critical resources. The results of their investigations will contribute to a Global Experiment, which will possibly become the biggest chemistry experiment ever”, ChemistryViews (08/02/2011)

“Schoolchildren take part in world's largest-ever chemistry experiment” Bedfordshire News (22/06/2011)

BBC
NEWS EDUCATION & FAMILY

Home **UK** Africa Asia-Pac Europe Latin America Mid-East South Asia US & Canada Business Health Sci/Environment
England Northern Ireland Scotland Wales UK Politics **Education** Magazine

22 June 2011 Last updated at 12:48 GMT f t e b

Pupils test world water in mass chemistry experiment

Children from hundreds of schools in Britain are taking part in what organisers say may be the biggest ever global chemistry experiment.

Students from around the world are testing the acidity of water from their local rivers and lakes.

The International Union of Pure and Applied Chemistry will collate the data into a map of global water quality.



Schools around the world are collecting and submitting results

ESTES
EDUCATOR

LARGEST CHEMISTRY EXPERIMENT EVER!

2011 is the International Year of Chemistry (IYC)



Water is the most abundant substance on the Earth's surface. It covers most of the Earth's surface. It is a precious resource. Ninety-seven percent of the water on Earth is sea water. Only three percent is fresh water. To help students from all over the globe understand that water is a precious resource, the Dow Chemical Company is supporting The Global Water Experiment.

Launched on World Water Day, The Global Water Experiment encourages students to test the water where they live and interact with it. The results will be showcased on an interactive global data map that will be available in 2011. Learn more about the International Year of Chemistry.

RSC NEWS

www.rsc.org

International Year of CHEMISTRY 2011



The Global Experiment

UK SCHOOLS GET INVOLVED IN THE WORLD'S BIGGEST CHEMISTRY EXPERIMENT, TESTING THE ACIDITY OF LOCAL WATER SUPPLIES

RSC Advancing the Chemical Sciences

AWARD WINNERS 2011 p8

ORGANIC DIVISION ROUNDUP p14

Figure 8. One of the examples of the media coverage on the Global Experiment. Article published on the BBC on 22/06/2011 describing the participation of hundreds of schools in Britain in the “biggest ever global chemistry experiment” and a press release from the RSC also describing the Global Experiment as the “world’s largest-ever chemistry experiment” (17/06/2011)

A Truly Global Community

Great efforts have been made to make the Global Experiment a truly global activity. The website has been made available in five languages: English, French, Spanish, Chinese and Russian, but this is not enough. All the activities can be downloaded in nine languages so far including English, French, Spanish, Russian, Chinese, Portuguese, Hebrew, Arabic, and Catalan. UNESCO has graciously made these translations available and others have been translated by volunteers.

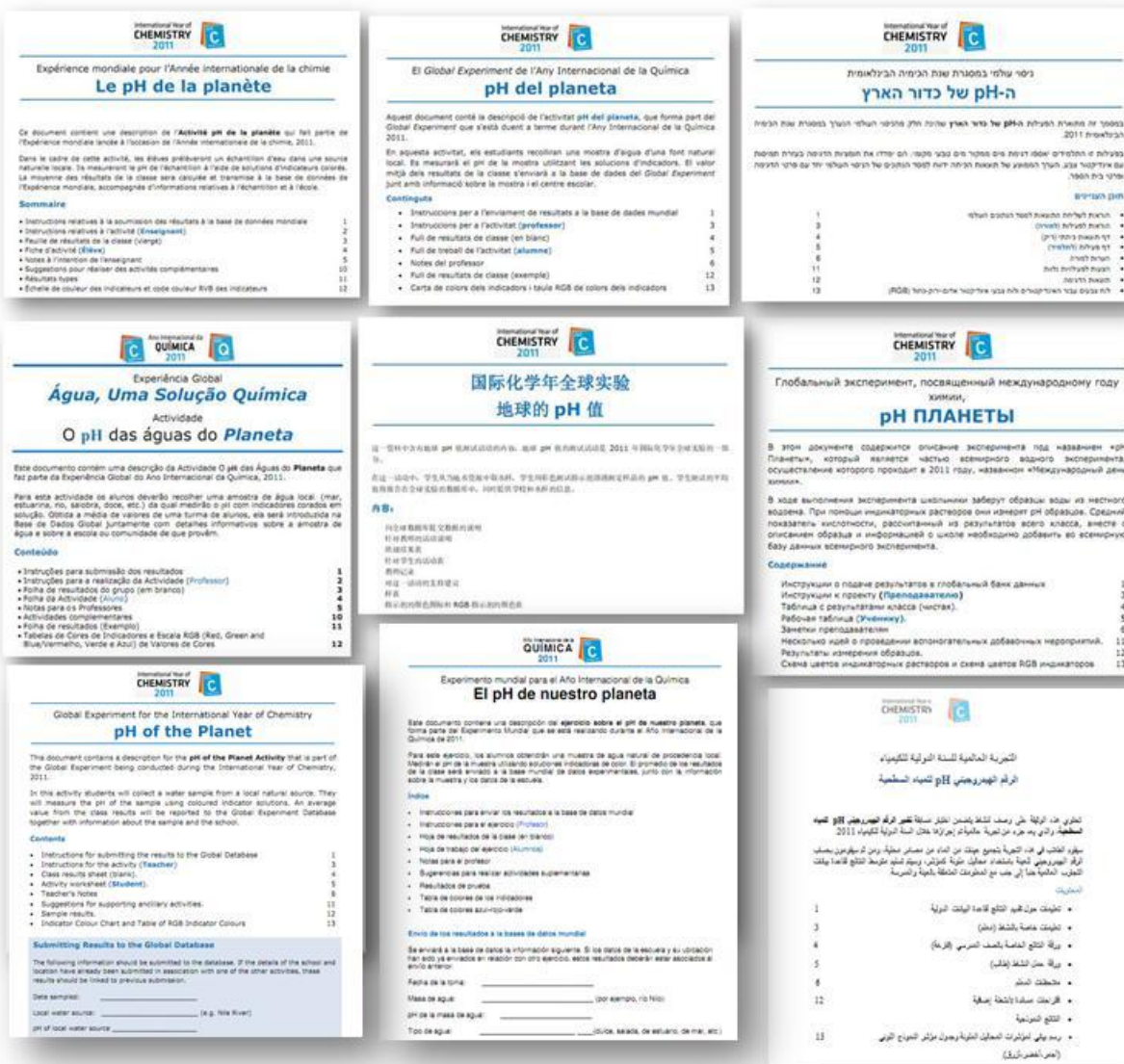


Figure 9. The first activity of the Global Experiment, entitled “pH of the Planet”, is currently available in 9 languages: English, French, Spanish, Russian, Chinese, Portuguese, Hebrew, Arabic, Catalan and Chinese



But not everybody has access to a computer, much less to Internet, so the activities are also available as hard copies from the UNESCO regional offices that also coordinate the submission of the data collected by students that have no access to Internet. Thank to these efforts the Global Experiment, in only three months, has collected data from schools from over 40 countries from the five continents.

Making the Global Experiment Available to Every School on the Planet

From the very beginning it was clear that if the Global Experiment aims to be truly global it must be made available to every school, even to those without the most basic materials. Adapted experimental protocols have been developed for these kits to ensure consistency with the Global Water experiment.

Five Schoolpacks containing 10 Global Water Kits (GWK) and a School Resource Kit have been sent to 30 countries for free to favour the participation of low-income communities . Since one GWK can be used by four to six learners at the same time, a School Pack caters for a class of 40 to 60 students. Very small quantities and volumes of chemicals are used, so the teacher can use the same School Pack several times with different classes and different grades. This means that even if a school receives only one School Pack, they will be able to participate in the Global Experiment with many students.

A list of the 30 countries that received free kits to perform the Global Experiment in a true effort to make the Global Experiment available to every body:

Senegal, Mali, Tajikistan, Ghana, The Gambia, West bank, Gaza, Nauru, Burkina Faso, Indonesia, Jordan, Sri Lanka, Saint Lucia, Haiti, Maldives, Grenada, Syria, Lebanon, Bhutan, Democratic Republic of Congo, Madagascar, Armenia, Tanzania, Morocco, Namibia, Oman, Pakistan, Ethiopia, Nigeria, Kenya, Botswana, Malaysia.

There is also the possibility to purchase the kits, although the activities of the Global Water Experiment are designed to be undertaken with equipment and materials commonly available in a school laboratory. However if preferred, a kit especially designed for carrying out the activities in the Global Water Experiment can be purchased from the Radmaste Centre at the University of Witwatersrand in South Africa:<http://www.radmaste.org.za/>. The kit is supplied as a school resource with the common equipment and materials to perform the experiments and ten individual sets of equipment for student use (which can also be ordered individually).

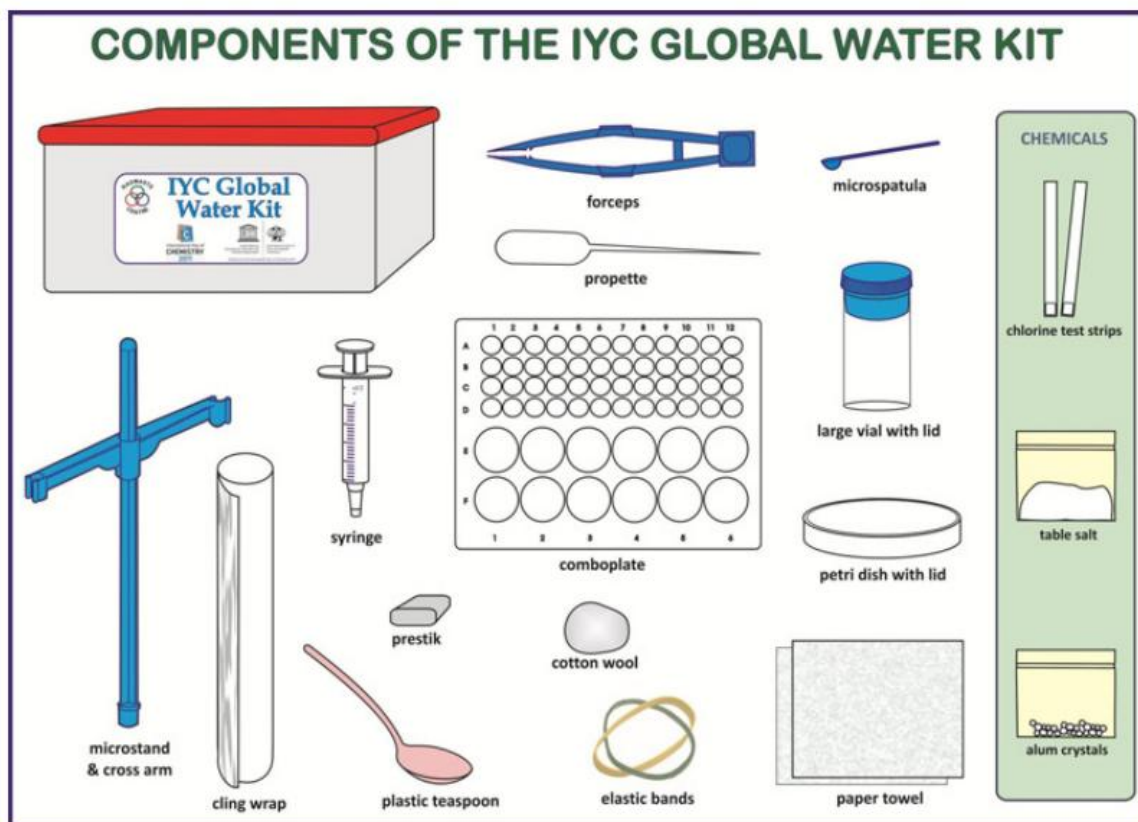
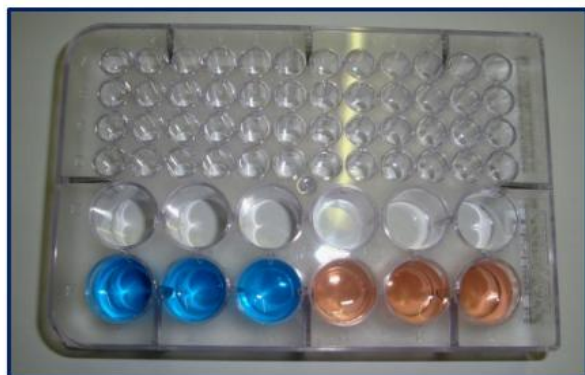


Figure 10. Components of the Global Experiment Kit designed and distributed by Radmaste Centre at the University of Witwatersrand in South Africa



This sea water sample from Durban (South Africa) shows a pH of about 7.8 with bromothymol blue (three wells on the left). It has been tested further with *m*-Cresol purple in the wells on the right, where it shows a pH value of between 7.8 and 8.0.

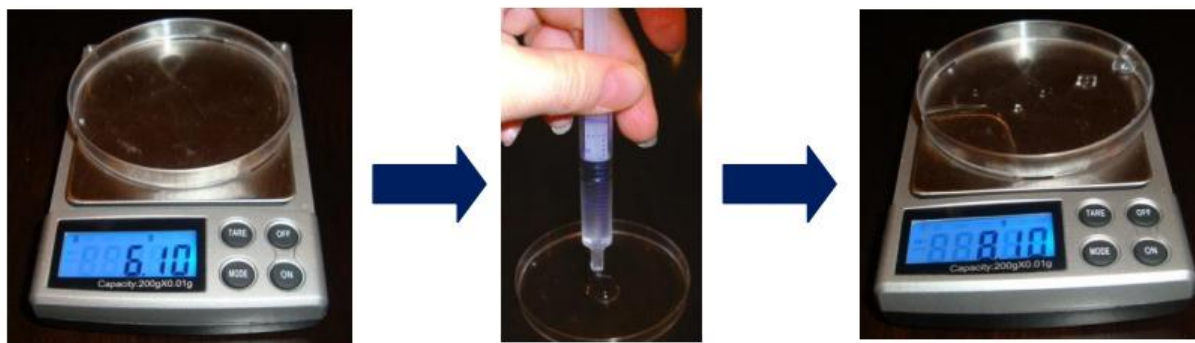
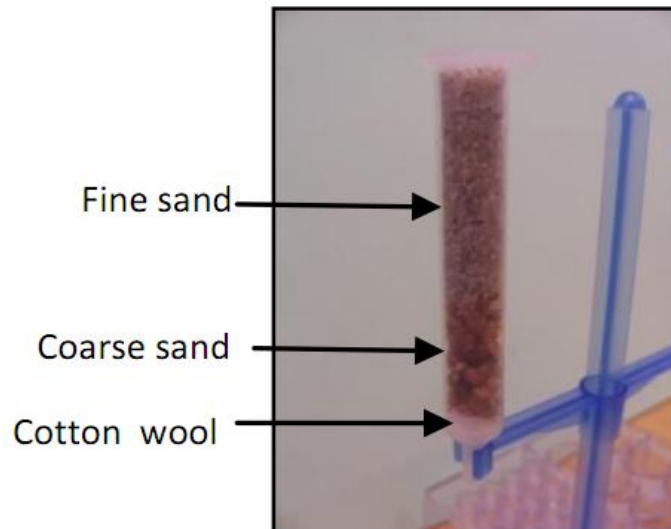


Figure 11. Pictures of some of the components of the Global Experiment Kit.

The Global Experiment Task Group: Building a Global Partnership

I can not emphasize strongly enough the significance of the global partnership that has come forward to implement this global IYC unifying activity. We would not have a global experiment without the efforts of a large number of incredibly dedicated volunteers. In addition to the partnership with UNESCO and the involvement of IUPAC CCE members, members of three IUPAC Divisions, and three IYC management committee members, the experiment has benefitted from the very strong participation of chemical industry who are represented by BASF, CEFIC (which served as secretariat of the group in the planning stages), the American Chemistry Council, and the International Water Association. The task group and partnerships for the Global Experiment include contributors from fields, sectors, and regions far and wide, demonstrating the wide interest and global reach of the project:

- Franco Bisegna, Claudine Drossart, and Madeleine Laffont, CEFIC
- Mark Cesa, INEOS, USA and IUPAC Organic and Biomolecular Chemistry Division, and IUPAC Committee on Chemistry and Industry (COCI)
- Robert Bowles and Richard Porter, RSC
- Erica Steenberg, University of the Witwatersrand, Johannesburg CCE
- Filomena Camões, University of Lisbon and IUPAC Analytical Chemistry Division
- Johanna Coleman and Jacqueline Haider, BASF
- Javier Garcia-Martinez, University of Alicante, IUPAC Inorganic Chemistry Division and CCE
- Julia Hasler, Magalie Lebreton, and Rovani Sigamoney, UNESCO
- Colin Humphris, IUPAC Bureau and IYC Management Committee
- Masahiro Kamata, Tokyo Gakugei University
- Frances Lucraft, International Water Association
- Mary Ostrowski and Ben Zingman, American Chemistry Council
- Cristiane Reiners, Universität zu Köln and CCE
- Lida Schoen, CCE and the Young Ambassadors for Chemistry program
- Tony Wright, The University of Queensland, Australia and CCE

Contracted Partners:

- RADMASTE Centre, South Africa
- European SchoolNet, Brussels



For more information: Javier Garcia Martinez; phone: +34 628-327439; e-mail: j.garcia@ua.es