

## Today's programme

Students		Mentors and Scientific Observers		Guests	
06:15-07:00	Breakfast	07:00-08:45	Breakfast	07:00-08:45	Breakfast
07:00	Departure for ELTE University	09:00-13:00	Budapest sightseeing	09:00-13:00	Budapest sightseeing with the Mentors
08:30-14:00	Practical Exam	13:00-14:00	Lunch at the hotel	13:00-15:00	Lunch in the city
14:00-15:00	Lunch	14:00-18:00	Consultation with the Authors	15:00-16:00	Visit to the Houses of Parliament
16:00-18:30	Visit to the Houses of Parliament and the Museum of Ethnography	18:00-19:00	Dinner	16:00-18:00	Free time
19:00	Departure for Gödöllő	20:00-	2nd Jury Meeting	18:00-19:00	Dinner at the hotel
20:00-21:00	Dinner				

## Molecule of the day

Noble gases such as argon have a complete electron octet, and thus full s and p subshells, which is responsible for their remarkably low reactivity. Nowadays, however, it is widely known that the heavier noble gases have stable compounds (for instance XeF<sub>6</sub>). In 2000, Finnish scientists managed to synthesize and characterize the first argon compound (HArF) by impinging UV light onto frozen argon containing a small amount of hydrogen fluoride. The molecule is extremely unstable and decomposes above -233 °C.

(Nature, 2000, 406, 874)

(Darvas Mária)



## Useful expressions

Round bottom flask

Your safety glasses are cool

Hold this for a moment

It's hot

It's extremely flammable

Can I use your tweezers?

The vacuum is not sufficient

The substance didn't precipitate ☹

Try scratching with a glass rod

The [ground glass] joint got stuck

The burette is dripping

The fuse in the spectrophotometer blew

Gömblobbik

Király a védőszemüveged

Fogd meg egy percere

Ez forró

Nagyon gyúlékony

Használhatom a csipeszed?

Nem elég jó a vákuum

Nem vált ki az anyag ☹

Próbáld üvegbottal vakargatni

Beragadt a csiszolat

Csöpög a buretta

Kiégett a spektrofotométer biztosítéka

## Curiosity of the day

To produce intensive blue light is a real challenge. In fireworks usually CuCl is used to produce blue stars, but they are never very bright. Even bigger challenge was to produce an efficient solid state device emitting blue light without burning up in seconds. It has been solved in Japan in the nineties: gallium-nitride deposited on sapphire has been the right solution. Nowadays this is the basis of the blue LED-s and blue laser-diodes.

(Stirling András)

## The motto of the day

A tidy laboratory means a lazy chemist.

(J. J. Berzelius)

## Weather

It seems to be cold, windy and rainy today. Lab coats will not be too hot for today, but umbrellas for the trip in the afternoon!

## Colophon

### Catalyzer

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**Editorial team:** Darvas Mária, Jagasics Éva, Magyarfalvi Gábor,  
Stirling András, Túri László, Vass Márton,  
Jon Baker

**Layout:** Csordás Zoltán, Pál Attila

**Photographer:** Gillicze Bálint

**Press:** Prime Rate Ltd. Budapest

### Secretariat of the IChO

<http://www.icho.hu>

Pázmány Péter sétány 1/A, Budapest H-1117, Hungary

Telephone: +36 1 372 2910, Fax: +36 1 372 29 31

(during the olympiad: +36 20 779 5210)

E-mail: [info@icho.hu](mailto:info@icho.hu)

Budapest

Ministry of Education and Culture

Eötvös Loránd University

Faculty of Science

Institute of Chemistry

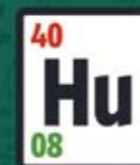
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40th International  
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# Catalyzer

Issue No. 5 – Tuesday 15 July 2008

## Budapest – as it was and as it is

After the practical exam you will see another bit of Budapest, so let's see some facts about the city and what places are worth visiting:

The territory of Budapest has always been inhabited, but it became Hungarian only in 896 when the seven Hungarian tribes, led by Árpád, conquered the Carpathian Basin. The first dynasty of Hungary, the Arpadian House, had for at time its seat in Old Buda. After the Mongolian attack (13<sup>th</sup> century) the country was reconstructed, thanks to King Béla IV who also ordered the building of Buda Castle on Castle Hill. The 14<sup>th</sup> century was the start of a prosperous period for the three towns (Old Buda, Buda and Pest) which reached its peak in the reign of King Corvinus Mátyás, when Buda became the centre of culture and arts in Europe. Defeat in the Battle of Mohács (1526) began 150 years of Ottoman occupation, a period of decay.

Buda was liberated by the United Christian Army, and new settlers arrived from German territories thus beginning the period with the Habsburgs. The Hungarian War of Independence in 1848-49 was quashed and was followed with a terrible revenge by the Habsburgs. Only after the Compromise (1867) was life brought back to normal. The former independently developing three towns, Old Buda, Buda and Pest were united under the name Budapest in 1873.

The 1000<sup>th</sup> anniversary of the Hungarian Conquest was celebrated nationwide in 1896, and countless buildings and memorials were inaugurated for the occasion. The most important is Heroes' square, our national pantheon. It is enclosed by two huge museums built in the neo-classical style: the Museum of Fine Arts and the Exhibition Hall. Behind the square there is City Park and the Castle of Vajdahunyad.

In front of the square is the start of Andrassy Avenue, which has

been declared a World heritage site by UNESCO. The Continent's first underground was built under this avenue. The Opera House, the "jewellery box" of Budapest, was also built on Andrassy Avenue. It is a very richly decorated neo-renaissance building. Close to end of the avenue is Budapest's main Roman Catholic Church, St. Stephen's Basilica. (It was named after our first king.) Pope John Paul II visited here, in 1991.

The most stunning stop of any exploration tour, however, may be the Houses of Parliament, the most expensive building in Hungary, which we'll visit today. The ground was broken on the quay in 1885, and the building took 17 years to complete with an average of 1000 workers labouring at any one time. It cost 37 million gold crowns for which amount a town of 20 000 inhabitants could have been built. 40 kilos of 23 carat gold were used for the interior decoration. Whenever possible Hungarian materials and Hungarian techniques were used and Hungarian master craftsmen employed. The northern and southern wings of the building each serves one house of the legislature. They are connected by an enormous dome hall, which was once the site of unified sessions, today the Holy Crown is on display here. The dome itself is 96 metres high, also as a memento of the Conquest.

(Moór Anna)





## The practical exam – strategies and preparation

Yesterday we spent a nice but very rainy and cold day at Lake Balaton or as we Hungarians proudly call it 'the Hungarian Sea', but the good times are over and today participants will have to face their first challenge, the Practical Exam. I asked some of the teams how they feel about it and here are their answers.

### Russia

*Q: Today is the day of the practical exam, and I am really curious about your feelings. Are you nervous?*

*A: No, not at all, come what may come, we are absolutely calm.*

*A(Russian guide): They were already studying this morning when I went there to wake them up ...*

*Q: Do you have any laboratory classes in your school?*

*A: Are you kidding? No.*

*Q: How did you prepare then for the contest?*

*A: We had a three-week-long preparatory course in Moscow during which we were taught to carry out some experiments.*

*Q: Do you have any laboratory classes in your school?*

*A: Yes, we have a two-hour-long laboratory class every week but it is different for the different schools, for example the other members of the team have shorter class.*

*Q: Apart from these classes, did you have any preparatory course for the practical exam?*

*A: Yes, we had an intensive course which lasted for one week.*

*Q: Do you have any funny story that happened in the lab with you or your friends?*

*A: I remember once our teacher touched a hot-plate and then he told us he could not feel anything with his hand.*

### Vietnam



*Q: Today is the day of the practical exam, and I am really curious about your feelings. Are you nervous?*

*A: We are a little nervous, yes. It is very exciting to be here.*

*Q: Do you have any laboratory classes in your school?*

*A: Yes we have one in a week.*

*Q: What do you do in these classes? What kind of experiments do you carry out?*

*A: We do analytical chemistry mainly. We titrate a lot and also we do some qualitative analysis, color reactions and so on.*

*Q: Do you have any funny story that happened in the lab with you or your friends?*

*A: Well actually, every time we enter the laboratory something is broken ☺.*

### Singapore



*Q: Today is the day of the practical exam, and I am really curious about your feelings. Are you nervous?*

*A: We are very much excited and nervous. We would like to get over it as quickly as possible.*



## The practical exam of the first Olympiad

As a result of long and exhausting research and investigation the organizers managed to dig the problems of the practical exam from the very first Olympiad from the archives. So look back in history, here they come

### Problem 1

There are ten test tubes in the rack at your disposal (1 – 10) and each test tube contains one of aqueous solutions of the following salts:  $\text{Na}_2\text{SO}_4$ ,  $\text{AgNO}_3$ ,  $\text{KI}$ ,  $\text{Ba}(\text{OH})_2$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{Ag}_2\text{SO}_4$ ,  $\text{Pb}(\text{NO}_3)_2$ ,  $\text{NaOH}$ ,  $\text{NH}_4\text{I}$ ,  $\text{KCl}$ .

For identification of the particular test tubes you can use mutual reactions of the solutions in the test tubes only.

Determine in which order the solutions of the salts in your rack are and write chemical equations of the reactions you used for identification of the salts.

### Problem 2

Each of the six test tubes (A – F) in the rack contains one of the following substances: benzoic acid, salicylic acid, citric acid, tartaric acid, oxalic acid and glucose.

Determine the order in which the substances in the test tubes are placed in your rack and give chemical reactions you used for identification of the substances.

For identification of the substances the following aqueous solutions are at your disposal:  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{NaOH}$ ,  $\text{NH}_4\text{OH}$ ,  $\text{CuSO}_4$ ,  $\text{KMnO}_4$ ,  $\text{FeCl}_3$ ,  $\text{KCl}$ , and distilled water.

*Thanks to Anton Sirota for providing the texts of the problems.*

## Did you know...

that cows and other ruminants produce almost 20% of the World's annual methane emission due to their digestive processes? I am sure you did and you also know that methane is a very important greenhouse gas. However, you might not be aware of some indirect consequences of the dairy production of Hungarian cows. The most notable of them is our national phenomenon, Túró Rudi. This is a delicious chocolate bar stuffed with quark, extremely popular in Hungary, that can be easily recognised by its red-dotted wrapping. Every day more than half a million Túró Rudis are sold and eaten. As both chocolate and quark are great favourites of Hungarian people, their combination is irresistible. But what is quark exactly? Quark is produced from milk using lactic acid bacteria. Their diligent work acidifies the milk and when the pH is lower than 4.6, casein (essential protein of milk) precipitates. This precipitate is in fact quark. After some filtering and drying it is ready for consumption. We use it for both sweet and salt dishes. Quark is mainly produced in Central and Eastern Europe so it is no surprise if you've never heard of it. So go and get a Túró Rudi. Or more... as we usually do.

## ...and that...

the ball point pen we use almost every day was patented only 70 years ago by a Hungarian editor, Biró László, who was fed up with the continuous struggle with his fountain pens (filling them up, cleaning the leaked ink, etc...). Inspired by the fact that the ink used in printing newspapers dries very quickly, he created a new type of pen with the help of his chemist brother. For this pen he needed a new mechanism to deliver the ink. Together they constructed the ball-point pen – the mechanism is the same as in roll-on deodorants. The viscous ink from the ink cartridge is picked up by the little ball and delivered onto the paper as the pen moves along. Today this ball is made of brass, steel or tungsten carbide. The inventor's name has been preserved in several languages (English and Spanish among them) as „biro“. Ball-point pens utilize gravity, so you cannot write with them upside down. How about writing in outer space with them?

*(Stirling András)*