



The first hurdle has been cleared

Yesterday morning the moment of truth had finally come: the practical exam. Somewhat tense, the students got up early to be transported to the laboratories of the Faculties of Chemistry and Pharmacy. For five hours, the contestants had to display their practical skills to their best advantage. Three interesting and challenging assignments had been set for this purpose. In the adjacent interview, you can read more about the background and content of these experiments.

At a quarter to three (!), the first students came out of the laboratories. They were visibly tired and sometimes you could not get a word out of them. After consumption of some rolls and beverages, they slowly came to their senses again and began to compare notes. The reactions were mixed: some had finished well before the appointed time, others had kept on working until the last minute. The general opinion was that they had had to work hard but that the assignments had not been too difficult. Although the work was now done for the students, the



scientific committee had their work still cut out for them: in the coming days, they will have to check and assess all melting points, TLC plates and weights...

Interview with Prof. B. Zwanenburg, chair of the scientific committee



'When formulating the assignments for the practical exam, the scientific committee kept its eye on the theme of "Towards the greening of Chemistry." This theme is highly relevant nowadays, particularly within industry. Chemical companies are increasingly paying attention to the selectivity of reaction steps, the responsible use of solvents, and the costs and benefits of chemical process steps. The theme formed the inspiration for the three experiments selected for the exam. In one of these, the students were asked to synthesize a substance used as a basic substance for therapeutic drugs. The starting substance was the amino acid phenylalanine.

Ordinary water was prescribed as the reaction medium, instead of an environmentally unfriendly solvent. This was not only appropriate to the theme, but also increased the safety of the experiment.

Staying within the domain of health care, the next assignment involved the analysis of iron pills to determine their quality as a drug. This required the use of spectrophotometry, one of the most up-to-date chemical analysis techniques. One of the latest developments within the "greening of Chemistry" is the use of stereoselective natural enzymes. By starting from a racemate, this technique enables the production of an almost pure stereoisomer as final product. The students had to study the effects of such an enzyme. An example from bulk chemistry is the production of aspartame, which DSM produces with similar enzymes.'

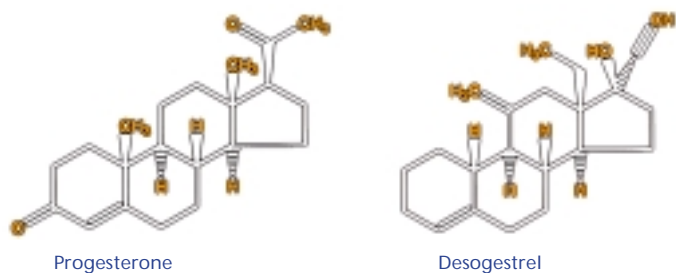
Trip to Amsterdam

Day two of the Olympiad competition. Who will find the correct solutions and be awarded the prizes on Saturday? The competition will be fierce and tight. But while the students will join in the fray — good luck, youthful contestants! — the mentors will have the day to themselves. A trip to the Dutch capital Amsterdam is in store for them, a trip that the students will only make on Friday.

Amsterdam is a city that does not lend itself well to a summing-up. The city is simply too diverse for that: more than 700,000 inhabitants, 400,000 bicycles, 10,000 shops, 165 canals, 1300 bridges, 2500 houseboats, 40 museums, 7000 historical buildings from the sixteenth, seventeenth, and eighteenth centuries, 40 concerts and shows each day, 1400 pubs

The pill with more impact than an atom bomb

It was not Einstein's relativity theory, nor the atom bomb, nor the power of computers or the birth of the Internet that had the biggest impact on life in the previous century, two hundred prominent historians conclude in a retrospective. Instead, they regard the introduction of the contraceptive pill in 1960 as the most influential event. Although the pill was never used as a matter of course in its early days (as it still isn't today), the consequences of its introduction were enormous. The "anti-baby pill" finally separated sex from reproduction, and this led to a drastic reduction of the birth rate in many countries. The pill became one of the symbols of the social changes occurring in western countries in the 1960s. Today, around 100 million women take the pill every day.



What exactly is it, this pill, and how was it developed? One of the first steps was taken in 1901, when it was demonstrated that menstruation is regulated by hormones. In 1936, American scientists showed that the progesterone hormone can inhibit ovulation. It is this substance which the "father" of the pill, American Gregory Pincus used in the first trials with 60 female volunteers. In the same year, Pincus carried out the first large-scale trial with 6,000 participants in Puerto Rico and Haiti — and it was a success. American pharmaceutical company Searle began to market the first contraceptive pill — Enovid — in 1960.

Organon

Dutch company Organon (a subsidiary of Akzo Nobel) has always been in the forefront of the pill's development. The company has many years of experience with hormones. As early as the 1930s, it marketed fertility hormones for women. In the 1950s, the Organon laboratories discovered a substance that strongly resembles progesterone, a 3-deoxo-steroid. Two years after Searle, Organon therefore introduced its own pill, Lyndiol, which contains Lynestrenol, the 3-deoxo-variant of norethisteron, the main component of the Searle pill.

Second generation

The first pill generation was followed by a second. This pill contained less progestatives, which reduced the number of androgynous (masculinizing) side effects. Searle researchers succeeded in this by introducing substituents on several positions in the steroid molecule: 11-beta-methyl-19-norsteroid.

To find an answer to the introduction of this improved pill, chemist Albert Joannes van den Broek of the Organon organic chemistry laboratory began a search for a variant of the 3-deoxo-steroid with similar properties. For this purpose, he introduced an oxygen atom at position 11 of the steroid molecule. He then tried to convert the 11-oxo group into a beta-methyl group. To accomplish this, Van den Broek reasoned, a so-called Grignard reaction with methyl magnesium bromide or methyl lithium seemed the most likely candidate. This would result in an 11-hydroxy-11-methyl system, with the 11-hydroxyl group still to be removed. However, this proved difficult because the orientation of the 11 methyl group was difficult to control, and the reaction often resulted in a mixture containing 11-alfa-methyl — a substance which, although pharmacologically inactive, is difficult to remove. Because of this problem, Van den Broek opted for a different approach. He used Wittig reagent (triphenyl-methylenephosphorane) to convert the 11-oxo group to the 11-methylene group. Then, he reduced the methyl group catalytically with stereoselective hydrogen to the 11-beta methyl group. Van den Broek had the hormonal properties of various 11-beta methyl steroids tested. He also sent the lab some 11-methylene intermediates to be tested, among them desogestrel. To everyone's surprise, the latter product proved to be the substance Van den Broek had been looking for. It became the basis for Marvelon, a pill that is now used all over the world.

The "male pill"

When it was introduced, many women saw the pill as an instrument liberating them from the "plight of pregnancy." The women's rights movement received an enormous boost. However, not all users of the pill were happy with it. By the end of the 1960s, complaints were heard about the "hormone corselet" women had to squeeze into and about possible health risks. Some feminists complained about the unequal division of pleasure and pain between men and women: she takes the pill and hopes to stay healthy, he doesn't take anything and is not worried at all. So far, men seem little inclined to take a variety of the pill.

Nevertheless, the World Health Organization doggedly continues to develop a male pill. Perhaps it will be a female chemist who will discover it, who knows? In the meantime, the pill will remain a daily ingestion for women in many parts of the world.



Tomorrow's program

Wednesday 10 July 2002

MENTORS / SCIENTIFIC OBSERVERS

07:00 Early breakfast at hotel
08.00-22.00 Excursion to Amsterdam
and surroundings

STUDENTS

07:00 Early breakfast at hotel
08:00 Departure for Groningen University
09.00-14.00 Theoretical Examination
15:00 Departure for Zuidbroek
18:00 Dinner at hotel
19.30-01.00 Evening out in Groningen

GUESTS

07:00 Early breakfast at hotel
08.00-22.00 Excursion to Amsterdam
and surroundings



After the practical exam, the students could relax by singing, dancing and drumming together.

“Why did you make the practical examination best/worst?”

- *“Was very good”*
– Yuri (Brasil)
- *“Well... life isn't always fair... and certainly, practical exam is part of life!!”*
– Patrick (Canada)
- *“Traditionally bad”* – Greece
- *“During the practice there were the calmest minutes during these few days, so I used them for resting... And it was too late then...”*
– Paulius (Lithuania)
- *“The UV spectrometer fooled me – I thought it was the weighing balance”*
– Martin (Ireland)
- *“No comment”* – @%\$U_&Y (difficult to copy these Arabian characters)
- *“Vacuum filtration devices should have been more”*
- *“Yes, definitely!”*
– Slim/Estonia



>> Trip to Amsterdam

and bars, and 750 restaurants. The itinerary for today contained nothing but highlights. The trip by boat through the famous canals is not to be missed. It will probably offer the most intense experience of the rich past of this city. Another highlight will be the Rijksmuseum with its internationally renowned art collection, including hundreds of paintings from the hey-day of the city during the Dutch “Golden Age” (some 300 to 400 years ago). The collection contains many works by Rembrandt — among them, of course, the famous “Night Watch” — and Vermeer. Try to evade the hustle and bustle that always accompanies this kind of trips for a few minutes and



Rembrandt: “Night Watch”

take this time to let some of the paintings of these grandmasters really get to you. You will be rewarded. A completely different experience will be the visit to Nemo, a science and technology center in the heart of Amsterdam. In this ultramodern architectural masterpiece by famous Italian architect Renzo

Piano, the visitors can conduct chemistry and physics experiments themselves. Always nice, of course, for you to critically examine the chemistry experiments on offer. And, if the overcrowded program lets you, try to experience a whiff of ordinary life in Amsterdam. No doubt, you will be struck by the extraordinary mix of people. On the way back, there will be dinner at a typically Dutch restaurant in Volendam. The journey back leads through the “polders”, land that used to be the seabed of the former Zuider Zee; if there is still time, the Batavia will be visited, a replica of a 17th-century VOC merchantman.

Have fun!

Touring the Friesian lakes



After all the excitement and effort put into the translation of the practical exams, the mentors were given ample opportunity to relax during the "Lake tour Friesland" on Monday, a six-hour boat trip around some of the lakes of Friesland. Before the trip, they were treated to a lecture about the many aspects of water management in Friesland. On the way, the boat made a quick stop at Grouw, the picturesque tourist town with its cozy, traditional shopping alleys. By the end of the day, everyone had more or less replenished the energy spent on Sunday and regained their breath for the next challenge: the translation of the theoretical exams.

Accident observer

MONDAY 8 JULY: Although the Martinikerk was packed with students, mentors, and guests last Saturday, we were unfortunately not able to welcome Mr Kingsley Imade from Nigeria in our midst. Because of a car accident in Nigeria, he could not attend the opening ceremony of the 34th International Chemistry Olympiad in Groningen. Mr Kingsley Imade was to visit Groningen in his capacity as observer because Nigeria is considering Olympiad participation next year. We wish him all the best.

Did you know that...

- Several guides are lending a hand as part of an internship. And, rumor has it, this is the best internship they have ever had!
- A Polish lab assistant helping the students attended the same secondary school as one of the Polish contestants.
- The Australians claim that they saw New Zealanders "jumping halfway over sheep."
- Herman Broek (IChO coordinator): "We'll probably create a new problem for any solution we may find."

What's on today's menu?

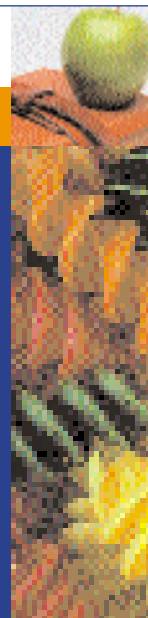
Tuesday 10 July 2002

Dinner Zuidbroek

Indonesian buffet with:

- Ayam Bali (chicken Bali)
- Babi Ketjap (Pork in black sauce)
- Fried yellow rice
- Rendang (Spicy coconut beef)
- Beans "Sambal Goreng" (spicy and stir fried)
- Sayur Lodeh (Curried stew)
- Chicken Madras
- Salads with dressings

Many thanks to the Zuidbroek chef!



Mallinckrodt Baker



Ministry of Economic Affairs



The miracles of science™



Milieu en Water
Cultuur en Waterschappen



34th International
CHEMISTRY OLYMPIAD
Groningen | The Netherlands | 5-14 July 2002



Nijenborgh 4
9747 AG Groningen
telephone +31 50 363 46 15
fax +31 50 363 45 00
e-mail icho34@chem.rug.nl
www.chem.rug.nl/icho34

COLOPHON
Editorial staff Jan Apotheker, Erik Couzijn, Wouter Couzijn, Kitty van Gruijthuijsen, Eduard Hirschfeld, Ok Hoelscher, Edzard Krol, Karin de Vries
Translation Paul Hulsman University of Groningen Language Centre
Graphic design G2K designers, Groningen/Amsterdam
Layout Edzard Krol