



An integrated Congress for Chemical Engineers and Biotechnologists,
Students and all members of the Business Community in the Process Industries



It is with great pleasure that we invite you to what will be the most comprehensive Chemical and Biochemical Engineering Congress in the history of the European Federation of Chemical Engineering (EFCE). Its programme will cover the widest range of subjects relevant to process technology, such as process intensification, renewable feed stocks, sustainable value chains, product design and biotechnology. Plenary lectures by renowned speakers will provide overviews of different aspects of the Congress theme:

**SHAPING A SUSTAINABLE FUTURE:
A PARTNERSHIP OF ACADEMIA, INDUSTRY
AND SOCIETY.**

High-quality presentations in 18 parallel sessions each day will provide results of the latest research and development and industrial applications. Several special events will be

organized for students, such as poster competitions and a design competition.

Lunches, dinners and evening programmes will provide opportunities for socializing and networking. Delegates will learn about the latest practical developments at a large industrial exhibition which will also be part of the Congress.

We look forward to welcoming you in The Hague in April 2013 and invite you to submit your abstracts before 15 November 2012 in order to secure a platform for your latest work!

Prof. Jan Harmsen,
Congress Co-Chairman

Prof. Guilherme Matos Ferreira
Chairman for ECAB2

THE PROGRAMME

Sunday evening (21 April): Opening ceremony

Monday through Wednesday:

Morning sessions will be devoted to Plenary and Keynote Lectures

During the lunches various meetings will be held by special groups. A 'career event' will be organized where those who are looking for a job will be put in contact with prospective employers

18 parallel sessions will be held each afternoon

Thursday has been reserved for Workshops, Excursions, and Company visits

For details see our websites www.ecce2013.eu of www.ecab.eu

KEY DATES

Opening of Abstract Submission

Deadline Abstract Submission

Information about abstract allocation

Opening of Registration

Deadline for entries for Student Competition

Deadline for reduced registration fee

1 June 2012

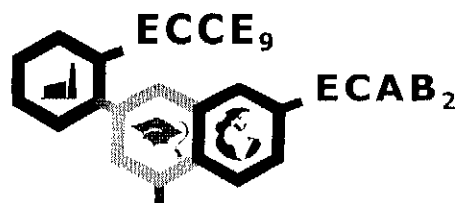
15 November 2012

15 January 2013

1 October 2012

31 December 2012

31 January 2013



The following conferences will be an integral part of the congress:

- **EPIC2013**, the European Process Intensification Conference
- **NPS12**, the annual congress of ISPT, the Institute for Sustainable Process Technology, jointly with NPT

TOPICS

Contributions will be grouped into the following 14 categories, each of which will be supervised by two members of the scientific committee:

- Society
- Energy
- Biomedical Engineering
- Food & Agrochemicals
- Product Engineering & Novel Materials
- Biotechnology
- Bioreactor Engineering
- Analytical Technologies
- Separations & Downstream Processing
- Renewable Energy & Feedstock
- Processes for Bulk & Fine Chemicals
- Modelling & Simulation
- Fundamentals
- Process Intensification (EPIC)

DESIGN COMPETITION FOR STUDENTS

Graduate students in teams of two are invited to take part in the Huntsman Design Contest. Winning teams can look forward to prizes of 3000, 2000, and 1000 euros and a waiver of registration fees. For details see our websites www.ecce2013.eu or www.ecab.eu.

POSTER COMPETITION

A poster competition will be organized by several Working Parties of the EFCE

ORGANIZING COMMITTEE:

Jan Harmsen (Co-Chairman)
Harry Van den Akker (Co-Chairman)
Guilherme Ferreira (Co-chairman)
Paul Bussmann (Treasurer)
Fred van Hessen (Secretary)
Gerrit Westhoff (Secretary)
Wridzer Bakker (EFCE, ISPT)

Nieck Benes (Scientific Committee)
Maaïke Kroon (design contests)
Marcel Ottens (ECAB)
Eveline Hermans (Student events)

VENUE

World Forum, The Hague, The Netherlands, www.worldforum.nl

CONGRESS ORGANIZERS

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INNOVATION IN PROCESS TECHNOLOGY

The Institute for Sustainable Process Technology (ISPT) together with the Association of Dutch Process Technologists (NPT) will organize contributions from industry, business and government. A platform will also be provided for young entrepreneurs to express their vision on innovation.

CAREER EVENT

An informal setting will be available where prospective employers and employees who are attending the Congress can meet in private and discuss a possible match in a relaxed atmosphere.

TECHNICAL EXHIBITION

More than 80 spaces varying in size from 6 m² to 12 m² have been created where companies can show that engineering problems do not need to wait for a possible future solution, but can be solved today. Nine spaces have already been reserved for our sponsors.

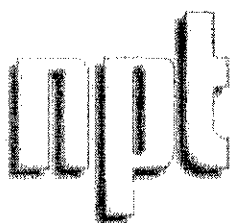
SPONSORSHIP

Various attractive sponsorship possibilities will make your company known as a key player in the process and biotechnology sector. They offer the opportunity for brand exposure and networking with possible new clients.

Details about sponsorship and the technical exhibition can be found on the websites.

SOCIAL PROGRAMME

The Congress dinner will be held in a special venue in The Hague. There will be organized tours to sites and company visits in the The Hague area as well as a boat trip in the port of Rotterdam (the largest in the world). Information on how to subscribe will be published on the website.



www.ecce2013.eu



www.ecab2013.eu



SEPARATION OF HUMAN IMMUNOGLOBULIN G SUBCLASSES USING MONOLITHIC COLUMN

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Background

Human immunoglobulin G (hIgG), constitutes an important therapeutic antibody for a number of diseases. ⁽¹⁾ There is an increasing demand for highly purified hIgG and its subclasses since wide range of potential application in immunodiagnostics and immunotherapy was found. ⁽²⁾ hIgG consists of four subclasses (IgG1, IgG2, IgG3, and IgG4) that show differences in some of their physicochemical characteristics and biological properties. ⁽³⁾

Protein A affinity chromatography is a common method for antibody purification due to its well-characterized structure and high affinity to IgG. ⁽¹⁾ To our knowledge, until now **monolithic** Protein A column has not been used for the separation of hIgG subclasses. Monolithic columns have attracted significant attention for the purification of large biomolecules due to its flow independent binding capacity that enables rapid separations at high flow rates. ⁽⁴⁾

Aims

The present study aims to separate hIgG into its subclasses using monolithic stationary phase.

Methods

CIM[®] r-Protein A monolithic column (1mL) was equilibrated with 0.1 M phosphate buffer pH 7.5 (buffer A) at a flow rate of 1 mL/min. hIgG (purity > 95%) was applied to the column. IgG3 eluted upon loading due to its low affinity. A stepwise pH gradient was made using buffer A and 0.1 M citrate buffer pH 3.0 (buffer B) to elute bound subclasses. ⁽⁵⁾ Two fractions eluted at pH 4.2 (50% buffer B) and pH 3.8 (60% buffer B) were indentified as IgG2 and IgG1-IgG4 by chromatograms of pure subclasses.

Accordingly, step gradient was evaluated for the separation of IgG2 by using buffer C (50A:50B (v/v), pH 4.2). Column was equilibrated with buffer A and hIgG was loaded. After elution of IgG3, gradient to 100% buffer C eluted IgG2. Washing with 0.1 M citric acid pH 2.2 desorbed remaining subclasses. Pure IgG2 and IgG1 (purity > 95 %) were also subjected to same experiments and it was confirmed that, step gradient only

desorbed IgG2 from hIgG (mixture of all subclasses). Experiments were performed with a Gilson chromatography system by monitoring absorbance at 280nm at ~23 °C.

Results

Since IgG3 has very low affinity to Protein A, it was recovered in the flow-through fraction soon after sample injection. IgG2 was successfully obtained by step gradient using an elution buffer at pH 4.2. IgG1 and IgG4 were eluted simultaneously which would be investigated further in detail.

Conclusions

We succeeded in partial separation of hIgG subclasses with step-wise pH gradient elution on monolithic Protein A column. Furthermore, we achieved separation of IgG2 in a single and rapid way with step gradient.

References

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2. M.H. Hasnoi, M. Debbia, S. Cochet, J. P. Cartron, P. Lambin, and O. Bertrand, *J Chromatogr A*, 766, 49-60, (1997).
3. R. G. Hamilton, *Clin. Chem.*, 33/10, 1707-1725, (1987).
4. A. Podgornik, M. Barut, A. Strancar, D. Josić, and T. Koloini, *Anal. Chem.* 72, 5693 – 5699 (2000).
5. I.V. Nikolayenko, O.Yu. Galkin, N.I. Grabchenko, and M.Ya. Spivak, *Ukrainica Bioorganica Acta*, 2, 3-11 (2005).