Volume 57
Edition 1

ACiD

Science Meets Sports

The Molecular Truth Behind Performance

Amsterdams Chemisch Dispuut

Hidden Chemical Dangers of Climbing
How to: Flunkyball
The Biochemistry of Creatine
Doping and Sports

Colophon

Editorial office
Nada Benlhaj
Fay Heemskerk
Linde de Vries
Donny Ferreira
Connor van Tricht
Joost Parlevliet
David Alvarez Rodriguez

Contact
Amsterdams Chemisch Dispuut (Room A0.09)
Postbus 94214
1090 GE Amsterdam
Phone: 020 – 525 7861
Mail: blad@acdweb.nl
Website: www.acdweb.nl

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From the Editor

Dear reader,

A new academic year means a new edition of ACiD. Since September, we have a new committee who will make an effort to provide you with the best articles, with a good balance of informative and entertaining.

Since the theme of this edition is sports, we will have multiple articles talking about the chemistry behind sports. If you are not really interested in sports, we have many other pieces, such as an article about the element mercury, a delicious recipe or a puzzle page. Since the ACD has a new board, every board member will introduce themselves. If you would like to know more about the research that is going on at our universities, we have articles about that. This and more can be found in this periodical, so I hope there is something for everyone.

I hope you enjoy reading this edition of ACiD!

On behalf of our entire editing team,

Nada Benlhaj

Content

From the Old and the New Chair

From the Old Chair

Dear reader,

Although our board year ended two months ago, the blad committee asked me to look back on the past year. On the 25th of September, we officially handed over the reins as Marek, Elianne, and I passed the baton to the 80th board of ACD. They've already made a great start, and we wish them all the best for the year ahead.

I also want to briefly highlight some of the memorable moments from our year. Perhaps the most special event was our excursion to Edinburgh. I really enjoyed visiting the chemical companies; it was a truly special experience. We ended our year with FLUX, the annual festival at Science Park. The weather was amazing, and we had a lot of fun.

Besides these larger events, the committees also worked hard to organize a variety of other activities, such as our weekly borrels, excursions, arts and crafts sessions, sports activities, and lectures. We had a lot of fun together with all of you. Thank you for an amazing year! I am looking forward to an amazing lustrum year!

Kind regards from your old chair,

Nora

From the New Chair

Dear reader,

This year it is up to me, as the new chair, to inform you all about all the happenings this year. The year opened with introducing our first-years to our committees with the Committee Fair, introducing our members to them with the annual Meet-the-Freshman-borrel and introducing the freshmen to their peers at the FirstYearWeekend.

In October it was time for cosiness with our Gezellie activity, where we made shrinky dinks. Then it was time for education as we had an informative excursion to Brineworks, and we expanded our beer knowledge at the annual KabouterBorrel with the NSA. On Halloween we went to the scariest place in Amsterdam, the W&N building, to play hide and seek. After barely escaping the building, we had some drinks with the research groups of the VU.

This year is our 16th lustrum year, and we celebrated 80 years of ACD's existence with cake and a lustrum gala. I'm incredibly honoured to be the chair this year and am so excited for what's to come.

I may not have introduced myself yet, but rest assured that I will do that with my board later on in the periodical.

Your new chair,

Lisa

Het Wel en Wee van de OC

Nada Benlhaj

Dear reader,

This is the first ACiD of the academic year and that means another piece about the OC. For the new students, let me first explain what the OC is. The Opleidingscommissie (Programme Committee), or OC, fights for the interests of the students of certain programmes. In my case, the bachelor and master chemistry. The OC consists of four student members and four lecturers, and a secretary. Since the beginning of this year we have a new secretary, Elianne Lekkerkerker who we are delighted to have joined. We also have a new chair, Anouk Rijs, who is a lecturer at the VU and a new bachelor student member, Inge de Koning. This means that now we consist of lecturers Anouk Rijs (chair), Tati Fernández Ibáñez (lecturers vice chair), Hong Zhang and Arno Föster. The student members are for the master Carlijn pool (student vice chair) and Emiel van Putten, and for the bachelor Nada Benlhaj and Inge de Koning.

For those who do not know what exactly the OC does, let me explain. The programme committee tries to better the experience of the students of the bachelor and master chemistry in their respective programme and tries to improve the quality of the programmes. They do this through various pathways. One method is that at the end of every course, an evaluation is sent to everyone who followed it. Here you can fill in what you enjoyed about the course or which improvements you would like to see. We read every evaluation that is sent, so do not hesitate to fill these in. If people do not fill in these evaluations, we do not know what is happening, so we would appreciate it if you would always answer them. Positive feedback is also feedback, so don't think you need to only answer if you have negative feedback.
Another way we try to protect the rights and interests of the students is through the influence we have on the Teaching and Examination Regulations, TER for short. There is one for all the bachelors and masters, and there is one specific for each programme. We can give advice on some points and we can vote on whether or not we agree with some points. If you would like to know more about what is in these, you can find them on the UvA site for your specific programme.

At last I would like to say that starting from February, we are looking for a new student master member. If you are interested in being active behind the scenes of the programmes and you are still doing your masters for at least two years, this vacancy may be for you! More information about this will appear on the canvas pages of the bachelor and (pre-) master.

I hope to have informed you about what is happening with the OC and I will see you in the next edition of ACiD.

Best regards,

Nada Benlhaj

OC mail: ocs-science@uva.nl
OC page: student.uva.nl/sck/content/az/opleidingscommissie/opleidingscommissie

MOF Thin Films for Energy Conversion

Gabrielli Almeida

Metal–organic frameworks (MOFs) came into the spotlight this October when the 2025 Nobel Prize in Chemistry was awarded to Susumu Kitagawa, Richard Robson and Omar M. Yaghi for their pioneering work on these materials. This recognition highlights the growing impact of MOFs in modern chemistry and materials science. First developed in the 1990s, MOFs are crystalline networks of metal species linked by organic molecules, forming highly porous and tunable structures. Their modular design is like the chemist's LEGO® and enables tailored functionalities, making them useful in gas storage, separation, sensing and catalysis.

Researchers around the world have now developed thousands of MOF architectures, though most have only been explored on a small/laboratory scale. To move toward technological implementation, both academia and industry are investing in scalable production and new processing strategies for device integration.

One promising route is to process MOFs as thin films rather than the common powders. Thin-film fabrication enables the controlled assembly of multicomponent frameworks, where different metal nodes or organic linkers are combined to tune charge transfer, light absorption and band gap. It also allows control over crystal orientation during growth, creating continuous pathways for charge transport. These films can be deposited on functional substrates such as silicon and conductive oxides, making them attractive for solar-energy and photo-electrocatalytic applications.

Dr. Gabrielli Almeida, PostDoc at the Van 't Hoff Institute for Molecular Sciences (HIMS) at UvA and the Advanced Research Center for Nanolithography (ARCNL), has developed a new computer-controlled microfluidic flow cell system for for layer-by-layer assembly of MOF thin films (Fig. 1A). This approach yields reproducible multicomponent films with continuous charge-transport pathways (Fig. 1B). Their structure and properties are monitored using X-ray diffraction, in situ visible and infrared spectroscopy, and conductivity measurements, linking synthesis conditions to performance.

The project funded by the Universities' MMD Technology Hub is a joint collaboration between the research groups of Dr. Sonja Pullen and Dr. Bettina Baumgartner (both at HIMS) and Dr. Emilia Olsson (ARCNL and ITFA). By integrating synthesis, characterization and modelling, we aim to build a closed-loop platform where MOF thin films can be designed with predictable performance - one layer at a time!

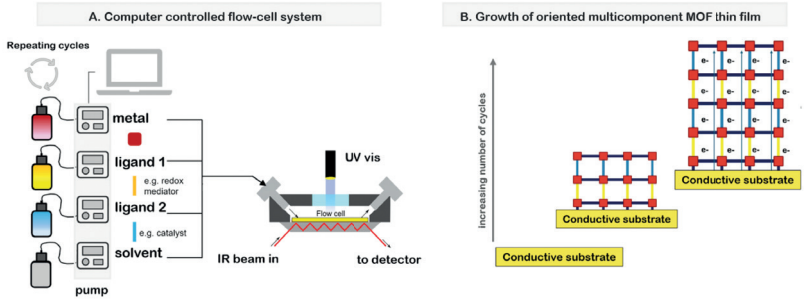


Figure 1: Layer-by-layer synthesis of multicomponent MOF thin films.

Meet the Board

Chair – Lisa Schweinsbergen

Hi, I'm Lisa, chair of the 80th board of the ACD. I'm 20 years old and in the third year of my bachelor's degree. I'm currently doing the Education minor alongside my board year, and I'm very passionate about ballroom dancing, so if you ever see me dancing for no reason, this is why. I also enjoy having drinks with friends, and the ACD is a great place for that. I live in a beautiful little farming village in North Holland called Berkhout. Within the ACD, I am known for doing what a chairperson does. Namely, chairing meetings... At least, I think so :)

Secretary – Connor van Tricht

Hi! My name is Connor, I am a third-year bachelor student and the secretary of the 80th board of the ACD. I was born and raised in this beautiful city, and I currently still live in my childhood home with my parents and three cats, where I spend most of my time playing videogames, geeking out over scent, and watching football and Formula 1.

As the secretary you might have seen my name pop up already as I maintain the mailing contact with our members through the 'om-de-weekmail' (biweekly mail). I am also responsible for taking minutes during the board meetings and the ALVs, for managing the board email by labelling messages and answering general emails, and for maintaining the member database. Lastly, I am part of the LEC, IT committee, Lustrum committee, Acquisition committee and I help with writing the ACiD!

Treasurer – Koen Andrea

Hello, I'm Koen, the Treasurer of the 80th Board of the ACD. I'm currently in my third year of the Chemistry bachelor's program, where I'm following the Education minor.
Originally, I'm from Bennekom, but I now live in Amsterdam-Noord. In my spare time, I love spending time with friends and playing games. I'm also a big football fan, and you can often find me on the pitch refereeing a match.
As Treasurer, I'm the finance guy of the ACD, meaning I'm responsible for everything related to money. Additionally, I'm part of the ABC, BEC, and Gezellie committees.
I'm always happy to chat, so if you see me around, don't hesitate to come say hi!

Commissioner of Education – Carlijn Smit

Hey, I'm Carlijn, the Commissioner of Education of the 80th board of the ACD, and I'm a third-year student of the bachelor Chemistry. Some more things to know about me are that I am from Haarlem, but I now live in Amsterdam, and I work at the reception of a hostel. When I'm not at Science Park or at work, I enjoy cooking, spending time with friends, and doing all sorts of outdoorsy stuff. At the ACD, my favorite thing has always been organizing fun activities in the many committees that I have been a part of. This year, I am part of the Party-, IT- and Lustrum committee, and also help out the first-year students in the EJC. Aside from that, as the Commissioner of Education, you can always come to me if you have notes, complaints or ideas that you would like the bachelor or master coordinators to know about. Lastly, don't forget to bring me your exams for the ACD website.

Commissioner of External Affairs – Lars de Bie

Hello! My name is Lars, I'm 21 years old, and I was born and raised in a small town in Brabant called Boekel. Almost two years ago, I moved away from there, and I'm now living in Duivendrecht. In February, I started my master's in Chemistry, following the Analytical Sciences track, after completing my pre-master. In my free time, I enjoy spending time with friends, watching Formula 1, and occasionally riding my dirt bike. One of my yearly highlights is going skiing with family and friends. As Commissioner of External Affairs, I'm responsible for the acquisition (partnerships) of the ACD, the foreign excursion (BEC), the lectures and excursions (LEC), and the AllYearsWeekend (AJW).

Commissioner of Internal Affairs – Emma Zonneveld

Hii, I'm Emma, your lovely commissioner of internal affairs. I hail from a tiny little coastal town infamous for the industry located next to it, but I love it all the same anyway. In my free time I enjoy a good movie or book with a cat on my lap (preferably).
At the ACD I'm ultimately responsible for the borrels and other recreational activities we organise. So you can also come to me for some good vibes, to pitch an idea for an activity, or to complain about our assortment of drinks.

From left tot right: Lisa, Koen, Carlijn, Connor, Lars, Emma



















Doping and Sports

David Alvarez Rodriguez

Nothing is more gratifying and prestigious than winning an olympic medal in sports. With the Winter Olympics approaching, the issue of fair play arises as the prestigious tournament has seen numerous scandals in the past during both summer and winter editions. Cheating can occur in all kinds of forms, ranging from using a motor powered bicycle during cycling, which has been coined mechanical doping, to less blatant transgressions such as the use of banned performance enhancing drugs (doping). During the Olympic Games, all athletes must adhere to the list of banned substances designed by the World Anti-Doping Agency (WADA). It is important to note that not all athletes are tested for doping during the games and that selection is at random, although athlete samples are stored and targeted testing takes place when there is suspicion based on individual performance, or as part of a broad investigation. A well renowned example of this is the investigation and subsequent ban of Russian athletes following the 2014 Winter Olympics. In this piece, I will tell you more about the chemistry behind (non-mechanical!) doping and the challenges faced for the detection of performance enhancing drugs.

One of the most well known and widely applied doping agents in sports is erythropoietin (epo), famously used by Lance Armstrong during his triumphs in the Tour de France and the Olympic Games. Epo is a hormone that is naturally present in the body and stimulates the production of red blood cells, which transport oxygen through the body and towards tissues. As you may recall, oxygen plays an important role in the electron transport chain of the citric acid cycle, leading to the production of the energy rich molecule adenosine triphosphate (ATP). However, when the intake of oxygen is no longer sufficient to keep up with muscular activity, the pathway of anaerobic glycolysis is followed instead. This process generates much less ATP, but also takes less time. One of the products formed is lactic acid, and the resulting acidification is believed to cause muscle fatigue and eventual muscle cramp during high intensity exercise by various mechanisms. However, hormones, including epo, are typically regulated by a negative feedback loop, limiting the concentration levels of red blood cells. Therefore, increasing the concentration of epo through doping provides an inherent advantage in terms of athletic performance.[1,2]

For this reason, screening for epo takes place during sporting events. The most common form of epo doping is through recombinant human epo (rHuEpo). This is a class of compounds that has a near identical structure to human epo while maintaining the same biological function. Large biomolecules, such as hormones are impossible to synthesize by organic chemistry approaches because they have a distinct shape (folding) that plays a key role in maintaining their function and biological activity. Instead, they are produced in cell culture, in which mammalian cells are used to closely resemble human ones. After a protein is formed, small alterations can occur, which are known as post

translational modifications (PTMs). One type of PTM is glycosylation: the addition of glycans (sugar molecules). As shown in Figure 1, the pattern at which this occurs differs between species, and as a result, the produced epo is distinguishable from human epo.[2,3]

Since the 2000s-2010s, there have been multiple methods for screening for epo in the samples of athletes, a major one of them being gel electrophoresis. The well established method of sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) was commonly used, but this technique struggled to detect different kinds of rHuEpo. An alternative to this method is Sarcosyl-PAGE, which is more well suited in detecting glycoforms. Sarcosyl is a milder type of anionic detergent compared to SDS; still providing analyte molecules with a negative charge, but not drastically disrupting their shape. The principle behind gel electrophoresis is that charged molecules move in the presence of an electric field, and that small molecules travel faster through the gel than larger compounds due to experiencing less friction. The separation is therefore based on the charge of the molecule and the shape of the molecule when dissolved. In gel electrophoresis, analyte bands are observed after the test is complete, with small compounds making it further through the gel. A reference compound, a negative control sample (containing human epo, but not rHuEpo) and a positive control sample (deliberately containing some type of rHuEpo) is used for band pattern comparison with the athletes samples. Since rHuEpo is heavier than endogenous epo, the appearance of an additional band in the athlete's sample above the human epo band and close to the rHuEpo band observed in the positive control sample, is a clear sign of the presence of rHuEpo in the athlete's sample, and will thus result in a positive doping test.[4]

Knowing this, I hope you are well assured when watching the Olympic Games and have an idea of the applications of analytical chemistry that come with it.

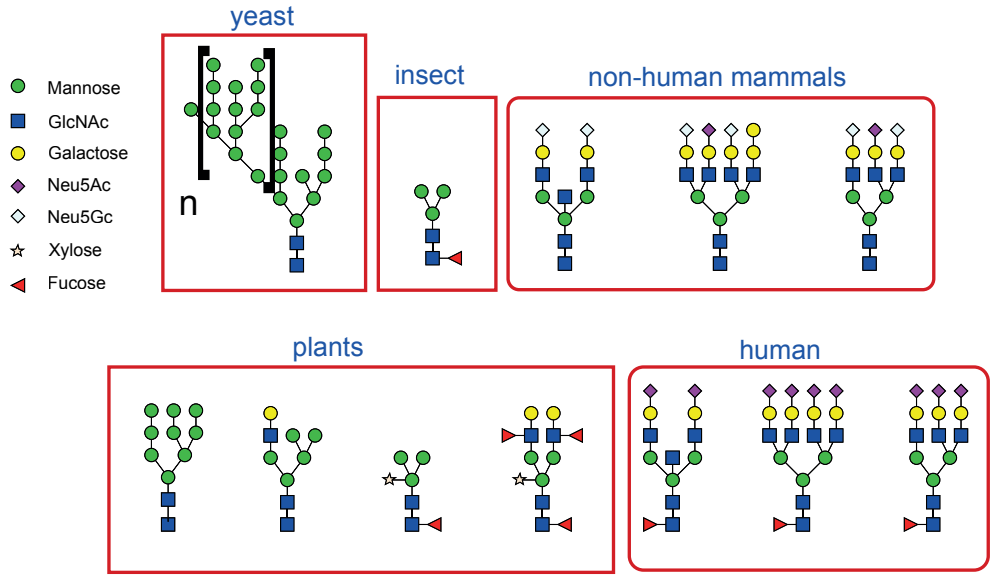


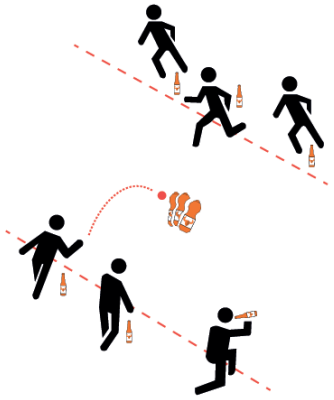
Figure 1: Different glycan modification patterns are observed between species, making rHuEpo used in doping distinguishable from endogenous Epo.[5]

How to: Flunkyball

Donny Ferreira

In this amazing edition, we've already mentioned a few sports, but we haven't yet talked about the most important one: Flunkyball!

University students have always had a strong desire for a game that combines friendly competition with a social atmosphere, where both athletic skill and good company are celebrated and that's how Flunkyball was born!



What do you need?

- A soccer ball (or anything throwable)
- A large plastic bottle filled with water
- Bottles of beer
- A big group of people

How to play

⚽ Setup:
Split into two teams and place the bottle filled with water in the center of the field. Choose one person as the referee, they don't play on either team. Each team stands at least 8 meters away from the bottle, making sure both sides are equally distant. Every player places an open beer bottle on the ground in front of them.

⚽ Gameplay:
Teams take turns throwing the ball overhand at the bottle in the center.
If your team knocks over the bottle, your team must start drinking your beers as fast as possible! Meanwhile, the opposing team runs into the field to:

a. Retrieve the ball
b. Set the bottle back upright in its original spot
c. Run back behind their line

As soon as they are back, they shout "STOP!". When "STOP!" is called, the drinking team must immediately stop drinking.

⚽ Winning the game:
When a player finishes their beer, they call the referee over and hold their empty bottle upside down above their head for 5 seconds to prove it's empty.
The first team whose members have all finished their beers wins the game!

Penalty Rules

Hit beer:
If an opponent hits your beer with the ball and beer spills out, you must finish an extra beer. (Tip: you may defend your beer with one leg!)

Stepping over the line:
You may not step in front of the “beer line.”
If you do, you must finish an extra beer.

Not empty enough:
If three or more drops come out when you show your empty bottle, you must finish a new beer.

Spilled beer:
If any beer spills from your bottle during the game, you must finish an extra beer.

Referee’s discretion:
The referee may add extra rules or penalties including extra beers based on these guidelines.

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Hidden Chemical Dangers of Climbing

Flint de Rover

Climbing has been a rising star in top sports recently, but what are the hidden dangers of this newly popular sport?

Rock climbing is an outdoor climbing sport that has gained raging popularity recently. Indoor climbing, such as bouldering and top climbing have also been rising in popularity. In recent years all forms of climbing have gained more attention, and the number of climbers is growing by the day. However, most climbers are completely unaware of the hidden dangers of climbing.

Almost every climber uses chalk for more grip when they're climbing, or comes in contact with chalk by climbing popular routes that already have chalk on them. Originally, chalk was only used for gymnastics until John Gill introduced climbing chalk to bouldering in 1954. Now it's the most natural thing for a climber to have. Climbing chalk consists of magnesium carbonate (MgCO3). This is an anhydrous salt and therefore dries sweat, which mostly consists of water. The drying of sweat stimulates a stronger grip.

However, there is more to this powder than it seems. A recent study, 'The distribution of climbing chalk on climbed boulders and its impact on rock-dwelling fern and moss species,' shows the harmful effects of chalk on the germination and survival of four species of rock-dwelling ferns and mosses in an experimental setup in a climate chamber. Magnesium carbonate has a pH of around 10.5, and magnesium has a vital role as a macronutrient. Considering the pH dependency of plant nutrient uptake, chalk can be expected to negatively impact plant growth. Climbing chalk can therefore be considered an environmental hazard. But chalk is not the only danger in climbing. There's another danger that is even more common than chalk: climbing shoes. That's right, the shoes that everyone uses for climbing release toxic rubber particles from the soles. The rubber that gives friction and grip on holds, releases particles into the air and onto the hold with every climb. Researchers from the University of Vienna found that the concentrations of particulate matter in the air of climbing gyms exceeded World Health Organization guidelines by around 20 times. The found chemicals can cause headaches, dizziness, irritation in the respiratory system, and skin irritation. Some are even carcinogenic, such as benzothiazole. But overall, there is little research on the long-term health consequences, and there are currently no legal regulations regulating the use of such chemicals in climbing shoes.

So what can we do? Using chalk more consciously is very important, as some climbers are prone to overusing chalk. An alternative for chalk powder is liquid chalk, which seems to be a more environmentally friendly option, as it doesn't release dust clouds and therefore fewer particles. As for the climbing shoes, climbing gyms can make sure their gyms are well ventilated and the routes are changed regularly, but of course the main problem lies with the manufacturers. Unfortunately, it doesn't seem like the manufacturers will change their ways anytime soon.

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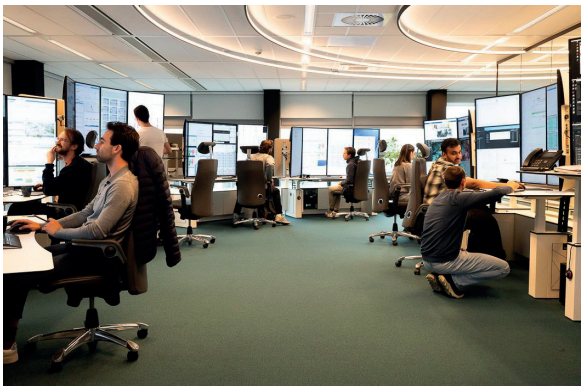

We're a team. We learn from each other.

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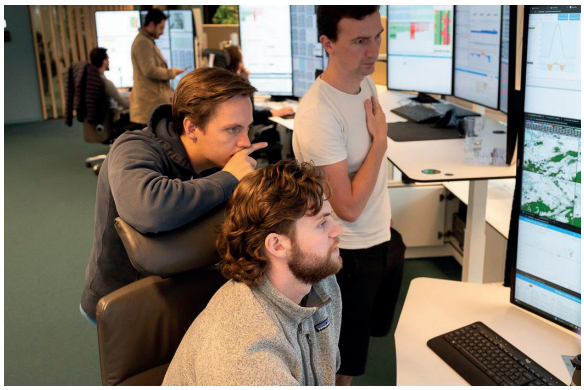

Work hard, play hard!

At Northpool, we work hard. We trade 24/7. Everything we do is teamwork. To keep the right spirit, we do a lot of fun things together. Organized by Northpool, or a spontaneous get together after a shift or workday and a lunchbreak in the city center of Leiden.
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Northpool B.V.
Dellaertweg 5C
2316 WZ Leiden
The Netherlands

Casunziei: Beet Ravioli by Donny Ferreira

This coming winter, the Olympic Winter Games Milano Cortina 2026 will take place, the perfect excuse to explore the rich culinary traditions of the region! We've chosen a specialty from Cortina d'Ampezzo: Casunziei. These beet-filled ravioli bring a taste of the Dolomites straight to your plate.

Ingredients (for 4 people):

- 250 g boiled potatoes
- 450 g raw red beets
- 310 g type "00" flour
- 3 large eggs
- 110 g butter
- poppy seeds
- parmigiano reggiano
- salt, pepper, and nutmeg

Instructions:

1. Filling:

Cook the red beets in just enough water to cover them.
When a fork slides in easily, drain, peel, and crush them.
Let the crushed beets drain on a rack for at least 1 hour (or overnight) to remove excess water.
Add the boiled, crushed potatoes. Let cool completely.
Season with salt, pepper and nutmeg. If needed, mix in 1 tablespoon of cornstarch or breadcrumbs to thicken.(It should be a thick paste)

2. Dough:

Make dough with flour and eggs, (if needed add a little warm water). Knead until smooth, let the dough rest for 30 minutes, then roll out thin.
Cut circles with an 8 cm diameter
Place a spoonful of filling in the center of each circle.
Fold in half and press the edges with a fork to seal, releasing any air pockets

3. Cooking & Serving:

Bring a large pot of salted water to a boil.
Melt the butter in a pan with poppy seeds, then remove from heat before it browns.
Cook the casunziei in boiling water until they float.
Lift them out with a slotted spoon and toss gently in the butter and poppy seeds.
Serve with parmigiano reggiano & enjoy!

Hydrophilic Interaction Chromatography HRMS with Acrylamide Monolithic Columns: A Novel Approach for Intact Antibody Glycoform Characterization

Annika van der Zon

Monoclonal antibodies (mAbs) are highly specific therapeutic proteins designed to recognize and bind to a single target antigen. They have become one of the most successful classes of biopharmaceuticals, widely used in the treatment of autoimmune diseases (e.g., rheumatoid arthritis) and various cancers. Their ability to target disease-related molecules with high precision makes them powerful tools in clinical drug development.

Structurally, mAbs are large glycoproteins of approximately 148 kDa, composed of two heavy and two light chains. Like many other proteins expressed in mammalian cells, mAbs undergo several post-translational modifications (PTMs), such as glycosylation and charge variants. These PTMs can significantly influence an antibody's biological activity, stability, pharmacokinetics, and safety. Therefore, understanding and accurately characterizing these modifications is essential for ensuring consistent therapeutic performance. Among the various PTMs, glycosylation is particularly important. Each mAb typically carries N-linked glycans (monosaccharides) attached to the Fc region of the heavy chains. These glycans affect the antibody's structural conformation and interactions with immune receptors, ultimately influencing mechanisms such as antibody-dependent cellular cytotoxicity and complement activation. Even small differences in glycosylation can alter therapeutic efficacy or immunogenicity, making detailed glycan characterization a critical aspect of quality control.

To investigate glycosylation, analytical strategies can be applied at different protein levels: released glycan, glycopeptide, subunit, or intact protein level. While the released glycan, peptide, and subunit levels analyses provide detailed structural information on individual glycans, intact level analysis offers unique advantages. It allows the study of complete glycoform distributions, combinations of all glycan variants on the intact antibody, without the need for sample preparation that may introduce artifacts.

In this study, we focused on characterizing intact mAb glycoforms using hydrophilic interaction chromatography coupled with mass spectrometry (HILIC-MS) [1]. HILIC separates glycoforms based on their hydrophilicity, allowing minor differences in glycan composition to be resolved. We employed in-house prepared acrylamide monolithic HILIC columns with small dimensions (200 µm × 15 cm). These columns enable operation at low flow rates (1 µL/min), minimizing sample dilution and enhancing detection sensitivity, crucial for identifying low-abundance glycoforms. We optimized various parameters of the synthesis of the stationary phase, chromatographic performance, and identified the glycoforms based on the mass.

For the first time, we demonstrate a detailed separation of intact mAb glycoforms using

HILIC-MS (Figure 1). Remarkably, this separation is driven solely by minor differences in glycosylation, such as a single galactose residue (~162 Da), representing only about 0.1% of the total molecular weight of the antibody (148 kDa). Despite this small mass difference, the HILIC approach successfully resolved distinct glycoforms, including previously undetected low-abundance species such as single Fc-glycan variants.

Compared to conventional reversed-phase liquid chromatography (RPLC), commonly used in biopharmaceutical analysis, our HILIC-MS method provides a more comprehensive glycoform profiling than RPLC-MS and enables the characterization of low-abundance species at high sensitivity and reduced sample amount (100 ng).

This work establishes HILIC-MS as a promising analytical platform for intact mAb glycoform characterization. Its ability to resolve fine glycan heterogeneity with minimal sample requirements makes it particularly suitable for future applications in clinical and biomarker studies, such as analyzing immunoglobulin G (IgG) glycosylation in limited-volume human serum samples.

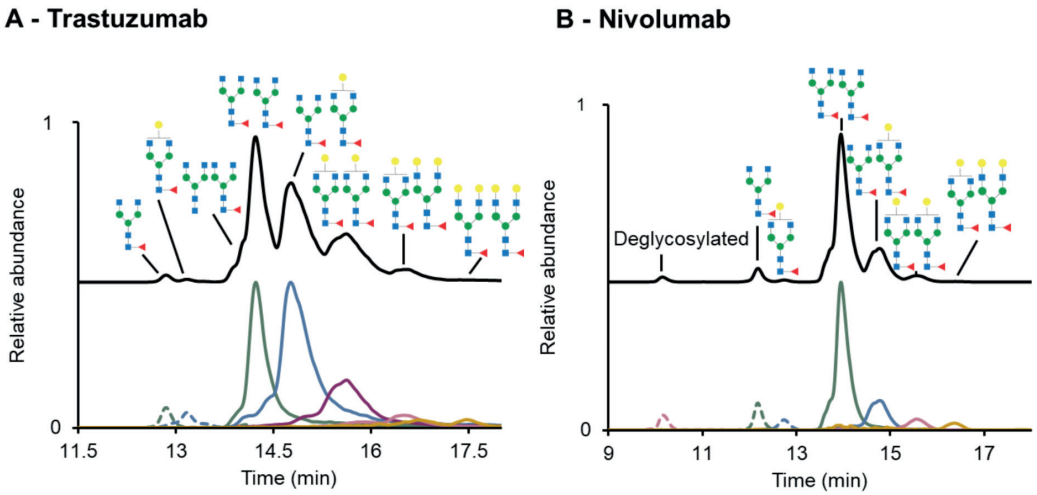


Figure 1: Intact glycoform separation of (A) trastuzumab and (B) nivolumab obtained using acrylamide monolithic HILIC-MS. The corresponding glycoform structures are shown, and the extracted ion chromatograms (EICs) illustrate the separation of individual glycoforms. Adapted from Ref[1].

Do you want to know more? Check our paper recently published in the journal Analytical Chemistry!
Van der Zon AAM, Hana LN, Husein H, Holmark T, Zhai Z, Gargano AFG. Hydrophilic Interaction Chromatography HRMS with Acrylamide Monolithic Columns: A Novel Approach for Intact Antibody Glycoform Characterization. Anal Chem 2025;97:13569–76. https://doi.org/10.1021/acs.analchem.5c02033.

The Periodical Element: Mercury by Connor van Tricht

The ACD has turned 80 a few weeks ago, which gives us the chance to talk about the 80th element, mercury. The symbol for mercury, Hg, is an abbreviation of the Roman word 'hydrargyrum', which is derived from the Ancient Greek word ὑδράργυρος, which is a compound word meaningwater-silver, from ὕδωρ (water) and ἄργυρος (silver). This name, just like its English name 'quicksilver', refers to its liquid and shiny form under standard conditions, a property unique among metals.

While mercury is notorious within the chemical community for its toxicity, especially in the form of organomercury compounds such as dimethylmercury, known for the fatal incident involving Professor Karen Wetterhahn, it has a rich history of use. Well-known uses of mercury include thermometers and dental amalgam, an alloy of mercury with other metals such as silver, copper, and tin, used to fill tooth cavities. Mercury has also been used in telescope mirrors, electrochemistry, and even as gaseous mercury in fluorescent lamps. But over the years, the use of mercury is slowly being phased out.

The Biochemistry of Creatine
A Popular Sports Supplement

Joost Parlevliet

Muscle tissue requires a lot of energy to fuel the proteins that enable contraction. The molecule that powers the muscles is called adenosine triphosphate (ATP). By losing one of the phosphate groups, energy is released and ATP is converted into adenosine diphosphate (ADP). However, muscles do not store a large enough amount of ATP to contract for more than a couple of seconds. Therefore, there are three main pathways to restore ATP levels inside the muscle:

1. Phosphorylation of ADP by creatine phosphate, also known as the phosphocreatine system.

2. Phosphorylation of ADP by glycolysis.

3. Oxidative phosphorylation of ADP inside the mitochondria.

Phosphorylation by means of creatine phosphate is a very rapid process, but the storage of creatine phosphate is limited. After approximately ten seconds, the creatine phosphate storage is completely depleted and the other two pathways must deliver energy. In this article, the first pathway is explained in more detail.

Creatine

Creatine is an organic compound found primarily in tissues with a high energy demand, mainly skeletal muscle tissue. Hence, the name is derived from the Greek word for meat κρέας (kreas). Ever since the 1990's creatine has been a popular supplement for athletes to increase muscle strength, especially for high-intensity exercises. The structures of creatine itself and the 'active' variant of creatine, creatine phosphate or phosphocreatine, are shown in the Figure.

The phosphocreatine system

The phosphorylated form phosphocreatine is used to resupply the body's energy storage. In the brain and muscles, ATP is used to deliver energy, releasing one phosphate group to become ADP. Phosphocreatine is used to replenish the ATP storage by giving up its phosphate group to ADP. This reaction is catalysed by the enzyme creatine kinase (CK). This single enzymatic reaction ensures that ATP levels can be rapidly restored.

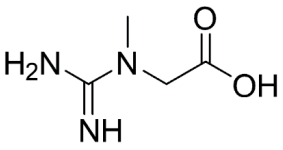
Creatine as a dietary supplement

Creatine is used in many forms as a dietary supplement by athletes. Research has shown that creatine supplementation in combination with resistance training leads to small increases in muscle hypertrophy, more in younger individuals than older individuals. It also shows that creatine monohydrate supplementation has no significant influence on endurance performance in a trained population. This is explained by the fact that the body naturally relies more on other means of ATP production for longer intervals of activity, such as running.

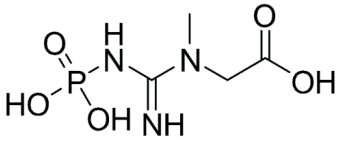
Elimination of creatine

Creatine is broken down inside the body into creatinine. This waste product is eliminated primarily by the kidneys, specifically in the glomerulus and tubules of the kidney. Because elimination takes place almost exclusively

inside the kidney, creatinine is also used as a diagnostic marker to test the function of the kidneys. Based on the creatinine concentration in the blood plasma and different variables such as sex, height and weight, an estimation of the filtration rate of the kidneys can be calculated.



creatine



phosphocreatine

Meet the Freshmen

Jorrit

Hi, my name is Jorrit and this is my first year of the bachelor chemistry. I'm 18 years old. I was born in Amsterdam and have been living here my whole life. Chemistry has been my favourite subject since I was in high school as I like to learn how different molecules behave in reactions and why they behave that way. Although I knew what I wanted to study, because of exam stress I didn't have time to do research for what I wanted to do, so I took a gap year. I also looked at the bachelor chemistry in Utrecht and the bachelor life science and technology in TU delft, however because of interest and travel time, I didn't end up going there. What I like most about the study currently is the explanation of how different reactions work and getting to know more advanced things than what I learned in high school (Like orbitals). Things I like to do besides chemistry are games (board games and video games), I also read and I like to do DND and Warhammer.

Linde

Hi, I'm Linde and this year I started a bachelor's degree in chemistry at the University of Amsterdam/VU University Amsterdam. I actually spent a long time deliberating over my choice of study and only made my decision quite late. I was also considering the Music Teacher training programme at the conservatory, to which I had already been admitted. In the end, I decided to study chemistry first, as I enjoyed the subject in high school. I think it would be great to continue with biochemistry and, for example, develop medicines later on, or combine music and chemistry in some way. Music is one of my hobbies. I mainly play the cello now, but I also played the piano for a long time before that. I have also often sung in bands. I am not currently playing in any bands, but I have just been accepted into the VU orchestra, where I now rehearse every Wednesday evening and I have just started a string quartet with a few others! I hope to be able to combine chemistry with music in some way in the future, and I am curious to see what else I will learn in this programme!

Rafaël

Hello, I'm Rafaël. This year I started with the bachelor Chemistry here at the UvA and VU. I have always known that I wanted to study chemistry all the way since the start of high school. And so far, the study has not disappointed me once. Even when I was just a little kid, I have always loved to help other people and partly due to that reason I now plan on becoming a teacher in the near future! Just one day before the official start of the study, my family and I got ourselves a kitten. She is the most adorable little creature that I've seen, and she already has a big personality. Her favourite past times are currently; chewing on everything she sees, climbing on anything where she can and sinking her little claws into and sleeping on your lap. This has unfortunately come at the cost of multiple destroyed electric cables, holes in clothes and my plant. Besides playing with the kitten, I spend most of my time hanging out with friends, by either playing board games or video games. I am really looking forward to the rest of this year and what else the study has to offer!

Malena

Hello! I'm Malena and I'm in my first year of the chemistry bachelor at UvA/VU. I was hesitant for a while on what to study, because chemistry and art history were my favourite subjects in school and they both seemed like fields I would find myself diving into. But at a study market for school I ended up on an introduction of this bachelor and they introduced the master program for painting restoration, which felt perfect for me to combine both of my interests in chemistry and art. Since then I've been certain the chemistry bachelor was the right choice for me, because I was excited for the program and it would allow me to enter into fields that intrigue me, like restoration and forensics. I'm most looking forward to the practical aspects of the program, and especially being able to eventually partake in a lab study at the university. I'm also excited for subjects surrounding analytics and biochemistry, as it will allow me to navigate which of these fields is best suited for me. Even though I chose chemistry, I will always love everything surrounding art and culture the most, and I therefore spend most of my free time drawing or going to museums and the cinema :-)

Celebrating 80 Years of ACD

Connor van Tricht

On the 7th of November 2025 the ACD turned 80, which is reason for a big party! From the 7th of November until October of 2026 the lustrum committee will organise all kinds of educational, active and social activities for members both new and old with “space” being the main theme. But first, let’s look all the way back to 80 years ago.

In the first academic year after the Second World War came to an end, the applications for the chemistry programme in Amsterdam poured in, but the study did not have an association yet. In response, the Natuur Philosophische Faculteitsvereniging (Natural Philosophy Faculty Association) organised a founding meeting to breathe life into the as-yet-unnamed study association for chemistry students in Amsterdam. Not long after, the association was given its name, Amsterdams Chemisch Dispuut at the general meeting chaired by the first board consisting of F. Haak (chair), B. Jibben, C. Kuipers, J. Links and B. Mulder.

In its early years, the study association mainly organised excursions and lectures. It was not until the 1960s that the first foreign excursions were organised: first to Germany and later to Switzerland, Sweden and Scotland. With the advent of foreign excursions, more and more committees for other activities appeared. As more social activities were organised, the Roetertoeter, our own bar on Roeterseiland, was established to organise borrels.

To better inform members, the first ACD periodical was printed in 1968, 23 years after the study association was founded. The brand-new BLAD mainly contained practical timetables, reports of faculty meetings, and other announcements from the board, members and non-members. Throughout the years BLAD went through a couple of name changes from BLAD to ACD Handelsblad to ACD Blad and finally to our beloved ACiD. Throughout the years the content of the periodical has changed from the more practical content of the early years to the more popular-science articles we have now.

In 2010, the ACD moved from Roeterseiland to Science Park, together with the chemistry programme, which also marked the end of the Roetertoeter. At first, we didn't really have a place to socialise at Science Park, so we mainly went to the Hok or to the city centre. Fortunately, in 2015, the Brainwave and its foundation were established, where we still hold our weekly borrels to this day.

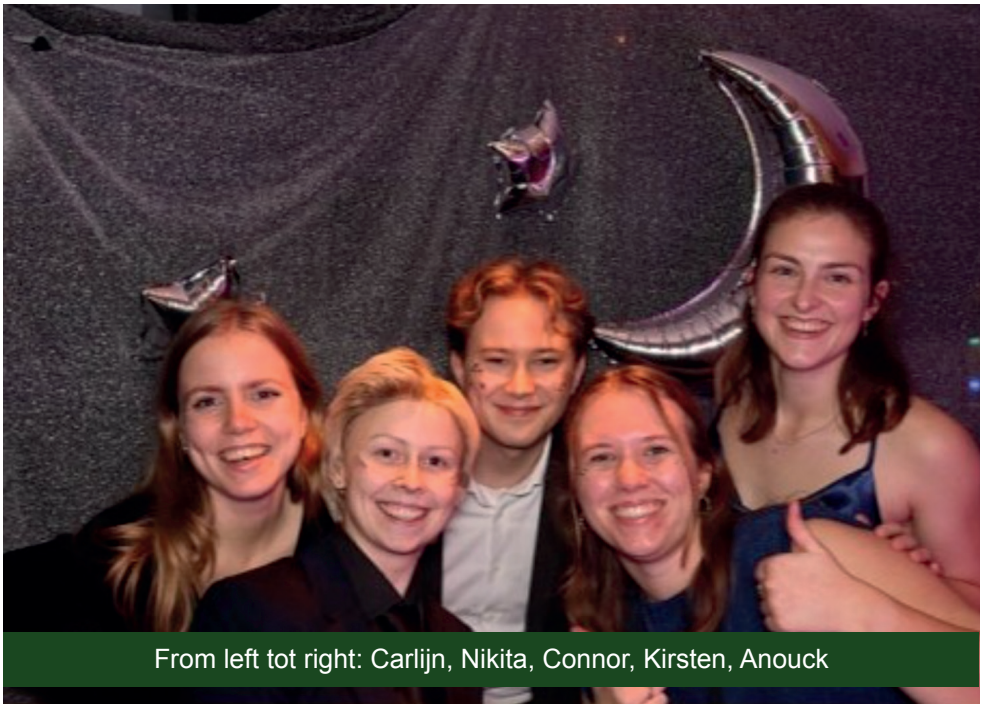
Now we are back in the year 2025, 80 years after our founding. On the 7th of November, the date of our dies, the lustrum year was opened with a lustrum gala where (former) ACD members danced the night away in an extraterrestrial Amstelzaal. The night can be relived through the photos taken at the photobooth and with the camera in the photo book found on our website! Before the gala, the boards from the past five years also got together and caught up while enjoying a delicious three-course meal at Café Wildschut.

On the 12th of January 2026 a lustrum symposium will be held at Science Park with different speakers from the field of astro-

chemistry and related areas. It is shaping up to be an informative afternoon, save the date already! In January we will also go ice skating with ACD, so prepare your skates!

In the fourth period (February/March) we will get a tour through the star dome accompanied by a lecture. In the fifth period (April/May) we will organise both a reunion activity for alumni and an activity for all (previous) members, after which we will end the academic year with a sports activity in June. The lustrum year will conclude with a final activity in the first period of academic year 2026–2027 (September/October) in the run-up to our 81st dies.

We hope to see you all at one of the activities!



From left tot right: Carlijn, Nikita, Connor, Kirsten, Anouck

The history of the ACD was adapted from an article from the Almanac 1945-2020 written by Daan Jellema, former member of the Almanac Committee.

O	A	P	Q	T	T	Y	J	B	S	M
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Z	I	O	A	Y	V	A	T	V	U	L
Q	N	M	R	E	T	N	I	W	R	U
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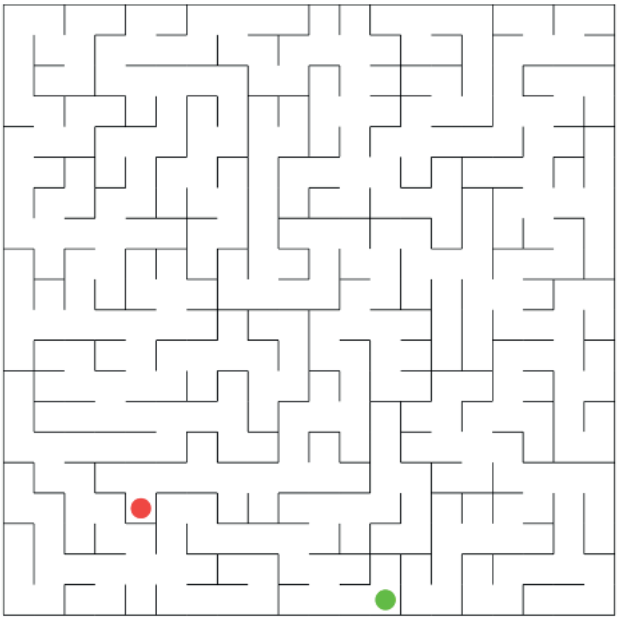
OLYMPICS
ADRENALINE
BOULDERING
MAGNESIUM
CREATINE
MERCURY
RAVIOLI
PROTEIN
DOPING
ENERGY
WINTER
SPORT

The goal of this puzzle is to connect the green dot to the red dot!



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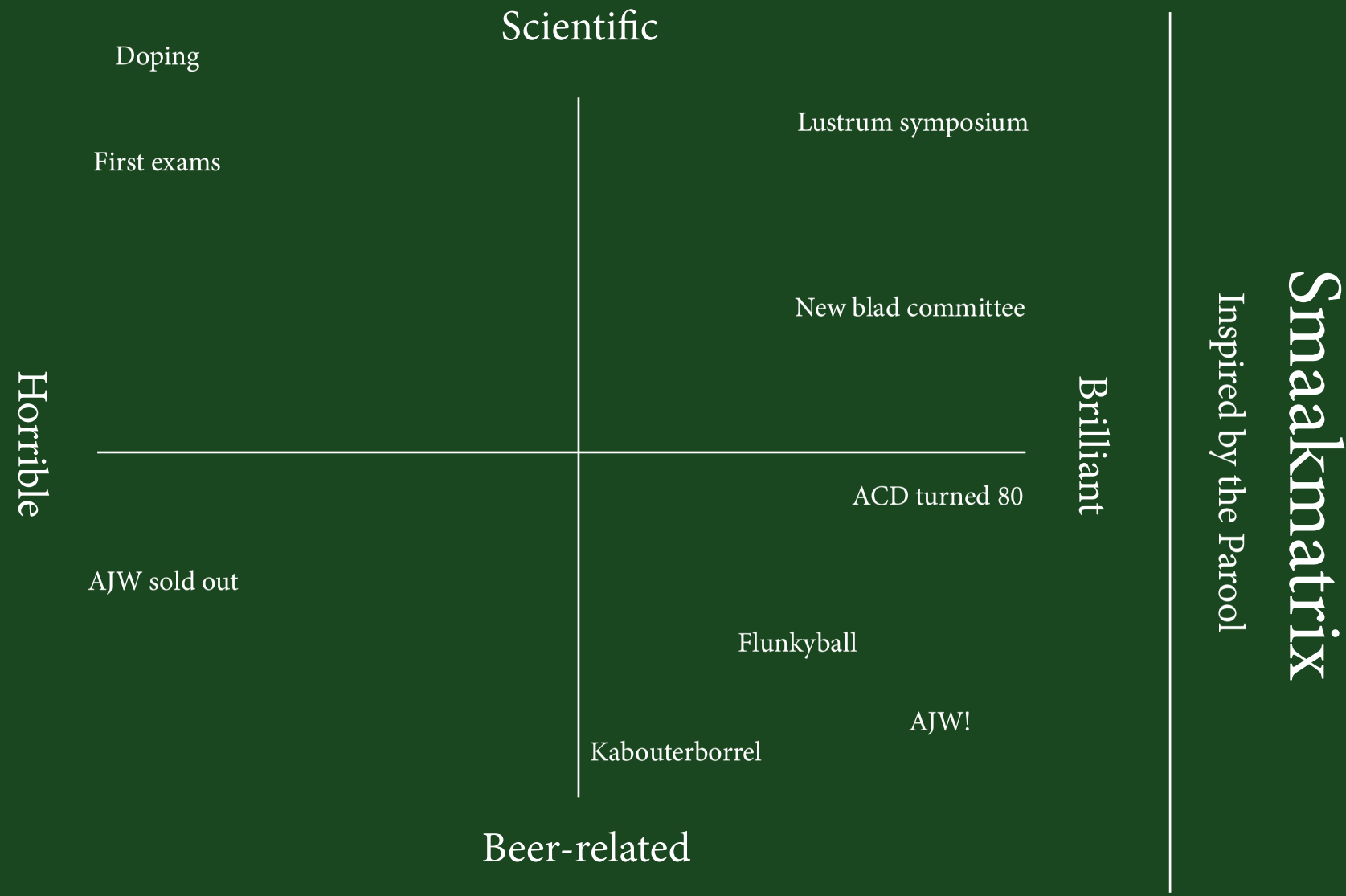
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