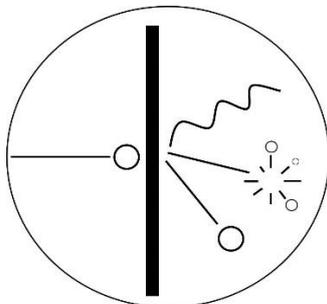


INTDS NEWSLETTER

International Nuclear Target Development Society



November 2021
Volume 47



iThemba LABS, South Africa

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1 Editorial

Dear Members of the INTDS!

Many thanks to Ntombizonke Kheswa for her contribution about the target laboratory of iThemba LABS in South Africa for our series **Target Laboratories of the World** and for the wonderful photo of iThemba LABS on the title page.

In this edition, we report on the virtual Membership Meeting in March to inform all of you that could not participate in the online event! Please feel free to contact the Board on any question arising!

We are very happy to visit PSI in Switzerland in autumn 2022; you all should have gotten the First Announcement for the conference <https://indico.psi.ch/event/7834/>.

Unfortunately, we again had no technical contribution but we want to start a new rubric **INTDS worldwide resonance**, which we hope to fill with your help every now and then. Here we want to collect notes or articles connected to the society. Please send us information together with the correct quote for the coming issues!

Please help us, keeping the Newsletter interesting and informative and send contributions, ideas, advertisements, or whatever you want to share with the INTDS members to INTDS-Newsletter@gsi.de. So please, give yourself a jolt and share some of your tips and tricks with other target makers!

Bettina Lommel and Birgit Kindler

2 Obituary Joseph Heagney

Joe Heagney (1937-2021)

The International Target Development Community lost a dear friend in Joe Heagney who passed away January 28, 2021 leaving behind his wife Joanne (both long time members of the INTDS).



Joe received a B.S. in Physics in 1955 from the University of Wyoming and was accepted into the PhD program in Physics at the University of Washington in Seattle at the Nuclear Physics Laboratory. After earning a M.Sc. in Physics in 1968, Joe was offered a staff position at the Nuclear Physics Laboratory as a Senior Scientist doing machine physics. In 1968, he and Joanne started Micromatter Co. for manufacturing and selling thin carbon foils to start and later broadening their range including target foils and XRF calibration standards. In 2008 Micromatter Co. was sold to AAPS in Vancouver, B.C., Canada After the sale of Micromatter in 2008, Joe and Joanne received permission to use the business name Microfoils Co. for selling vacuum shipping containers Joe designed and manufactured and the remainder of the isotopically enriched foils from the inventory of Frank Karasek.

In his work in the field of accelerator target development, and x-ray fluorescence calibration standards you could not really separate Joe and Joanne. They were always a team! Most of us should be very familiar with their compilation paper on reduction techniques given at the Los Alamos Conference in 1977 (*their concise table of results hang on the wall in our*

laboratory!) We (ANL Target Laboratory) employ the VAC-3 target transport canisters engineered by Joe to the point of their being back-ordered on many occasions. (*We certainly kept Joe busy manufacturing them!*) Moreover, we specifically requested the electrically focused electron gun designed by Joe to be included in the state-of-the-art deposition tool we had recently procured from Angstrom Engineering.

In 2002, Joe was elected to serve as INTDS President but had to step down (*at that time*) due to health reasons. His contributions to the art of target making and the INTDS will certainly be missed!

Respectfully submitted,

John P. Greene

March 2021



Joe and his wife Joanne at the INTDS conference in 1988 in Darmstadt, Germany and John Greene on the right.

3 Target Laboratories of the World “Target Laboratory of iThemba LABS”

iThemba LABS, Somerset West, South Africa

by Ntombizonke Kheswa

iThemba Laboratory for Accelerator-Based Sciences (iThemba LABS) is the largest multidisciplinary national research facility in South Africa and the largest accelerator facility in the southern hemisphere¹. The Laboratory for Accelerator-based Sciences is actually a collection of three laboratories, namely;

- The Separated Sectors Cyclotron Laboratory that provides ion beams for basic nuclear physics research, radioisotope production, radiobiology research related to particle therapy (Figure 1)
- The Tandatron Laboratory offering Ion-Beam Analysis techniques such as PIXE, ERDA and RBS for application in Materials Research, Material Engineering and Nano-science
- The Tandem and Accelerator Mass Spectrometer Laboratory offering another and complementary tool for Ion-beam Analysis technique and Accelerator Mass Spectrometry as a multidisciplinary research tool.



Figure 2: Separated Sector Cyclotron (SSC)

The establishment of the target laboratory at iThemba LABS in 2005, was to supply and manufacture target materials required by scientists and postgraduate students conducting research in nuclear physics at the facility.

¹ Azaiez, *et al.* (2020), iThemba LABS, Nuclear Physics News, 30:4, 5-11

Various target materials have been produced since then, starting from pressed Li targets to rare-earth metals such as Nd, Sm and Gd, all produced using thermal reductions. Figure 2 shows a Li-target covered with a Havar foil for protection.

Depositions for thermal reductions and for any other materials is conducted using two vacuum evaporators equipped with electron and resistive heating sources.



Figure 2: Li-target covered with Havar foil inside the experimental target chamber.

The laboratory also performs characterization on targets mainly for thickness measurement using alpha source equipment, which was built in-house. Other thin films like deuterated polystyrene, encapsulated powder targets like sulphur are among those manufactured at the target laboratory of iThemba LABS.

As the time progresses, the target laboratory also supplied target materials to other research departments, for example, materials research experiments. Recently, synthesis of organometallic complexes with enriched metal were manufactured for production of metallic beams.

The glove box in figure 3 is used for providing inert atmosphere during making of moisture and air sensitive targets and handling of organometallic complexes.



Figure 3: Glove box for providing inert atmosphere during manufacturing of air and moisture-sensitive targets. .

4 INTDS Membership Meeting

INTDS Membership Meeting 2021 Thursday March 25th, 2021

Agenda

1. Introduction
2. Minutes of the 2019 virtual Board Meeting (Birgit Kindler)
3. Board elections (Bettina Lommel)
4. Membership and financial report status (Dannie Steski)
5. Report on INTDS newsletters (Birgit Kindler / Bettina Lommel)
6. INTDS Conferences:
 - i. Proceeding MSU
<https://www.epj-conferences.org/articles/epjconf/abs/2020/05/contents/contents.html>
 - ii. 2022 Edition (Dorothea Schumann)
 - iii. Next conference
7. INTDS web site: library, (Anna Stolarz)
8. Karasek fund (John Greene) and update on INTDS by-laws reviewing (John Greene)
9. Awards
10. Miscellaneous

Brief notes to the meeting

The agenda and most of the reports were published ahead of the Zoom meeting in the INTDS newsletter #46 on 12th of March. Here, only questions and additional information given during or after the meeting are summarized!

About 30 members (including board members) participated in the meeting.

1. Introduction

Our new president Christelle Stodel opened the meeting and welcomed the participants.

2. Minutes of the 2020 VBM (Birgit Kindler)

Board of Directors

Elections:

Ntombizonke Kheswa	New Vice President
Matthew Gott	Assistant Treasurer
Birgit Kindler	Recording Secretary

Inaugurations:

Christelle Stodel	President
Klaus Eberhardt	Past President
John Greene	End of Term

- Creation of an assistant position to the INTDS Webmaster and Database Manager was discussed and in principle approved.
- A decision on the issue was postponed, further discussion on details necessary.

INTDS Membership

- Since the INTDS 2020 conference had to be postponed to 2022, the Board approved the motion to prolong all memberships for 2 years without additional fees.
- The Board discussed the proposition to separate the membership fees from the conference fees and how the membership fee can be paid independent of the participation in a conference => Issue for modification of the by-laws (Agenda item 8) and the host guidelines

Corporate membership for the INTDS

- The Board agreed on a commercial membership with a higher membership fee
- No company advertisements should be allowed directly on the INTDS website but corporate members could place a link
- Details have to be discussed and the point has to be added

to the modified by-laws.

INTDS communication in Social Media

- The Board agreed that a stable „classic“ website is most important and has to be filled with life by the whole membership
- Presence in social media is an issue for the visibility of the INTDS and to attract younger people to the society but not priority 1.
- Not in competition to the website but complementary

INTDS by-laws: Modification / correction

- John Greene volunteered to prepare a draft for the revised by-laws
- Before, he will work on reinstating the non-profit status of the INTDS and move the registration of the company from California to Illinois.
- The revised version of the by-laws will be finalized in 2021 and will be submitted to the formal voting in the membership meeting in 2022

3. Board Elections 2020 (Bettina Lommel)

Nomination committee: Hironori Kuboki, Bettina Lommel (chair) and Dannie Steski

- 4 positions expired in 2020.
- Suggested from the nomination committee were 8 candidates.
- A 9th candidate was suggested from an INTDS member by mail.
- According to the by-laws the information about the election and the presentation of the candidates was not in time.
- There was a complaint about this delay from one INTDS member.
- Nevertheless two thirds of the directors voted in favour of proceeding as proposed because of the special situation, as it is foreseen in the by-laws.
- 3 candidates were elected directly, the 4th position was decided in a run off.

Elected as new officers are:

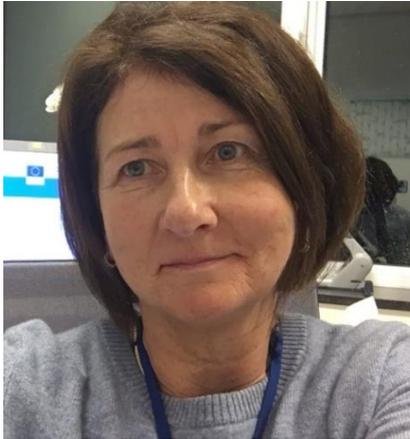
Matthew Gott
(Argonne National Lab)



Ntombizonke Kheswa
(iThemba LABS)



Goedele Sibbens
(EC-JRC-Geel)



Masahiro Yoshimoto
(J-PARC)



3. Board Elections 2020 (Bettina)

Executive board of the INTDS:

- President: Christelle Stodel (2020 – 2024) (GANIL, Caen, France)
- Vice-President: Ntombizonke Y. Kheswa (2020 – 2024) (iThemba LABS, South Africa)
- Past-President: Klaus Eberhardt (2020 – 2024) (Johannes Gutenberg University, Mainz, Germany)

Board of directors:

- Matthew Gott (2020 -2024) Argonne National Laboratory, USA
- Hironori Kuboki (2018 -2022) RIKEN, Saitama, Japan
- Bettina Lommel (2018 -2022) GSI, Darmstadt, Germany
- Goedele Sibbens(2020 -2024) EC-JRC,Geel, Belgium
- Dannie Steski(2018 – 2022) Brookhaven National Laboratory, USA
- Masahiro Yoshimoto (2020 - 2024) J-PARC, Tokai, Japan

Appointed officers:

- Corresponding Secretary/Treasurer Dannie Steski (BNL, USA) (since2018)
- Treasurer assistant Mathew Gott (ANL, USA) (since 2020)
- Recording Secretary Birgit Kindler (GSI, Germany) (since2010)
- Newsletter editor Birgit Kindler & Bettina Lommel (GSI, Germany) (since 2019)
- Bibliography data base manager Anna Stolarz (HIL UW, Poland) (since 2000)
- Webmaster Anna Stolarz, (HIL UW, Poland) (since2008)

Membership Meeting, March 25th 2021 - Zoom



INTDS International Nuclear Targets Development Society

In 2022 the following positions on the board will expire:

Hironori Kuboki, Bettina Lommel, Dannie Steski and Christelle Stodel
(only as board member)

Nomination Committee for the Board Election 2022:

Matthew Gott, Goedele Sibbens (chair) and Masahiro Yoshimoto

There were no questions or comments to the reports given in item 1 – 3 of the agenda.

4. Membership and financial report status (Dannie Steski)

The reports were already published in the previous NL.

Dannie Steski added that the INTDS accounts and funds will be moved to Chase Manhattan Bank soon so that it can be accessed also by Matthew Gott, our new assistant treasurer. This was already approved by the Board.

5. Report on INTDS Newsletter (Bettina Lommel & Birgit Kindler)

The report was already published in the previous NL.

Update: Newsletter #45 sent 18th of December 2020 and #46 on 12th of March 2021.

6. INTDS conference - 2018 (Frédérique Pellemoine, FNAL)

29th International Conference of the International Nuclear Target Development Society (INTDS2018)

Participation

50 participants from 13 countries:

Belgium (2), Canada (4), China (3), Finland (1), France (2), Germany (3), Japan (5), Poland (1), Romania (1), South Africa (1), Switzerland (4), UK (1), USA (22)

Contributions

45 scientific talks in seven different sessions

- beam charge strippers (foil, liquid, gas, plasma), target characterization, thin films and foils preparation techniques,
- isotopically enriched and radioactive targets,
- targets for high intensity beams,
- cryogenic and polarized targets,
- targets for special application (medical, industrial, controlled fusion).

Proceedings

22 publications available on the EPJ web of conferences:

<https://www.epj-conferences.org/articles/epjconf/abs/2020/05/contents/contents.html>

INTDS conference - 2022 (Dorothea Schumann) & 2024 (Kristian Myrhe & Mike Zach)

INTDS 2022:

INTDS 2020 was postponed to 25.-30. September 2022 at Paul-Scherrer Institute Villigen, Switzerland. The new First Announcement was sent in August. All information can be found at the conference website:

<https://indico.psi.ch/event/7834/>

INTDS 2024: The next conference will be hosted by Oak Ridge National Laboratory. Kristian Myrhe and Mike Zach are looking forward to welcoming the community of target makers in Oak Ridge, Tennessee, US.

7. INTDS Website (Anna Stolarz)

The report was already published in the previous Newsletter.

8. Karasek fund & update on INTDS by-laws reviewing (John Greene)

The Frank Karasek Memorial Scholarship Fund was established by the International Nuclear Target Development Society (INTDS) in 1996 in recognition of Frank's enormous contributions to the production of thin metal foils by the method of rolling. This fund is designated for the support of researchers from other laboratories engaged in target foil rolling for nuclear physics research. Frank's prodigious work is well known throughout the world [1, 2]. The large rolling mills he used at Argonne National Laboratory (ANL) are still in use in the Material Science Division.

[1] Frank J. Karasek, Proc. Of the Seminar on the Preparation and Standardisation of Isotopic Targets and Foils, Harwell, England, AERE-R 5097 (1965) p.111

[2] F. J. Karasek, Nucl. Instr. and Meth. 102 (1972) 457-458

Discussion:

Formal rules about who is eligible should be established and should also go in the by-laws.

+ processes regarding the Karasek Fund (donations to the INTDS as well as to the Karasek Fund should be possible. For example, a part of a future corporate membership could go to the fund or money from commercial advertisement. In the moment, there are no rules for replenishing the fund. There is not much money available but the request for money from the fund was not high in recent years either.)

Task:

- Prepare a new version of the by-laws
- Update of the rules of eligibility of candidates for KF, donation, commercial advertisement ...

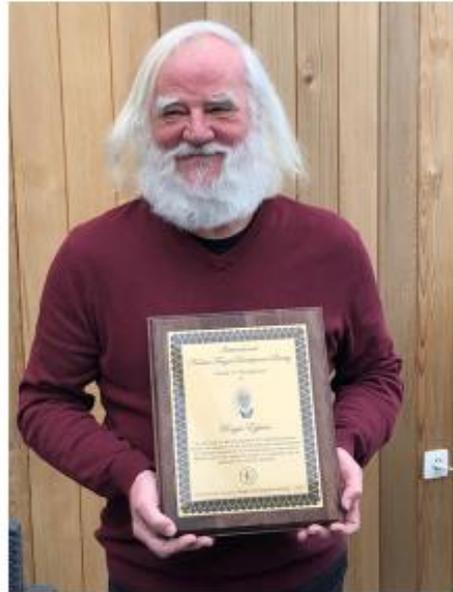
9. Awards



Roger Eykens Lab...

preparation of stable and radioactive targets as well as research on polyimide foils as backing material:

- the development of a hydrofluorination process for uranium to be able to prepare thin uranium layers by vacuum deposition
- the two campaigns in the preparation and characterisation of LIF and B reference deposits for the measurement of the neutron life time
- the improvement of the quality of polyimide foils towards strength and electrical conductivity, important as these foils are used as substrates for actinide deposits



Membership Meeting, March 25th 2021 - Zoom



INTDS International Nuclear Targets Development Society



John Stoner Arizona Carbon Foil Co., Inc

- pioneered efforts for optical, acoustic (and nuclear) foil thickness and areal density measurements
- Structural properties of carbon foils
- Large area foils and floating techniques
- Polyimide polycarbonate, polypropylene foils (even diamond foils!)



Membership Meeting, March 25th 2021 - Zoom



INTDS International Nuclear Targets Development Society



John Greene
Argonne National Laboratory

- Reduction techniques of rare-earth compounds to metallic form
- Rolling technique of various materials
- Polymer targets production
- Your willingness in skills transfer by offering training to emerging target makers
- Your endless effort in promoting the existence of the target society to the science community worldwide
- Serving the INTDS board for many years as a director, Vice President and President of the society
- INTDS newsletter editor



Membership Meeting, March 25th 2021 - Zoom



INTDS

International
Nuclear Targets Development Society

Thanks for your attention

Looking forward to seeing you in 2022
@ Villigen, Switzerland !!!!

Take care

5 INTDS worldwide resonance

5.1 iThemba LABS to the election of Ntombizonke Kheswa to the Vice President of the INTDS²:



When the WORLD calls, WE respond!

March 11, 2021

The International Nuclear Target Development Society is a not-for-profit educational organization that encourages the sharing and publishing of techniques, provides mentoring to people that are new to target and sample preparation, and hosts conferences. The Board of Directors, that governs the Society, consists of SEVEN members from geographically different locations.

Ntombizonke Kheswa, a target engineer in the target laboratory of InIT-department, has been elected as the Vice-President of the International Nuclear Target Development Society (INTDS) for a 4-year term, which started in January 2021. Ntombi has been producing various targets for use by both internal and external users for many years. This accolade is not only a recognition of her contribution to the art of targetry at iThemba LABS, but also for her contribution to the Society since she joined in 2006. Congratulations to our colleague and we wish her all the best in her new position!

5.2 The EU SCIENCE HUB to the INTDS award for Roger Eykens³

INTDS – award of recognition for outstanding achievements in development of target preparation techniques

MAY 18 2021 Roger Eykens, from JRC Geel, recently received from the Board of Directors of the International Nuclear Targets Development Society (**INTDS**) the INTDS 2020 Award of recognition for outstanding achievements in the development of target preparation techniques and for service to the Society.

Roger has been working in the JRC-Geel Target Preparation laboratories for 35 years and prepared and characterized nuclear samples, called “targets” for nuclear data measurements at the JRC’s and international accelerator sites. The quality of these targets has a strong impact on the results of the experiments and so on the neutron-



Roger Eykens preparing 235UF4 deposits by physical vapour deposition
©EU, 2021

² <https://tlabs.ac.za/when-the-world-calls-we-respond/>

³ <https://ec.europa.eu/jrc/en/science-update/intds-award-recognition-outstanding-achievements-development-target-preparation-techniques>

induced reaction data, which are important for studies in fundamental physics, astrophysics, reactor safety, waste transmutation, nuclear medicine, material science, industry, and nuclear safeguards.

One of his main achievements was the development of a hydrofluorination process for uranium for the preparation of thin uranium layers by evaporative deposition in which the material to be deposited is heated to a high vapour pressure by electrically resistive heating.



Fig 1. Left: Roger Eykens receiving the INTDS2020 Award, Right: $^{235}\text{UF}_4$ layer with an areal density of $67 \mu\text{gcm}^2$ prepared by physical vapour deposition on a polyimide foil with an areal density of $27 \mu\text{gcm}^2$ coated with a $50 \mu\text{gcm}^2$ gold layer

©EU, 2021

Roger Eykens also took part in the two campaigns related to the preparation and characterization of LiF and B reference deposits for the measurement of the neutron life time. The sharp-edge deposits were prepared by physical vapour deposition and very well characterized for radius, profile and amount of isotope of interest.

The expertise of Roger was key to the JRC-Geel site in preserving the skills in the field as one of the very few sites world-wide that still has unique facilities and know-how in the preparation of thin film actinide deposits for nuclear data measurements.

The JRC published in several articles the achievements of Roger Eykens, please find below an incomplete excerpt:

R. Eykens, J. Pauwels, J. Van Audenhove, The hydrofluorination of uranium and plutonium, Nucl. Instr. and Meth. A236 (1985) 497

H. Mast, R. Eykens, J. Pauwels, C. Wagemans, ²⁴³Am targets for nuclear fission experiments: Requirements and realisation, Nucl. Instr. and Meth. A282 (1989) 107

J. Pauwels, R. Eykens, A. Lamberty, J. Van Gestel, H. Tagziria, R. D. Scott, J. Byrne, P. G. Dawber, D. M. Gilliam, The preparation and characterization of ⁶LiF and ¹⁰B reference deposits for the measurement of neutron lifetime, Nucl. Instr. and Meth. A303 (1991) 133

R. Eykens, A. Goetz, A. Lamberty, J. Van Gestel, J. Pauwels, Preparation and characterization of ³⁵Cl and ³⁶Cl samples for (n, p) cross section measurements, Nucl. Instr. and Meth. A303 (1991) 152

R. Eykens, P. Maier-Komor, J. Van Gestel, J. Pauwels, New aspects of thin polyimide foils, Nucl. Instr. and Meth. A362 (1995) 175

G. Sibbens, A. Moens, R. Eykens, Preparation and sublimation of uranium tetrafluoride for the production of thin ²³⁵UF₄ targets, J Radioanal Nucl Chem (2015) 305:723-726

6 Advertising



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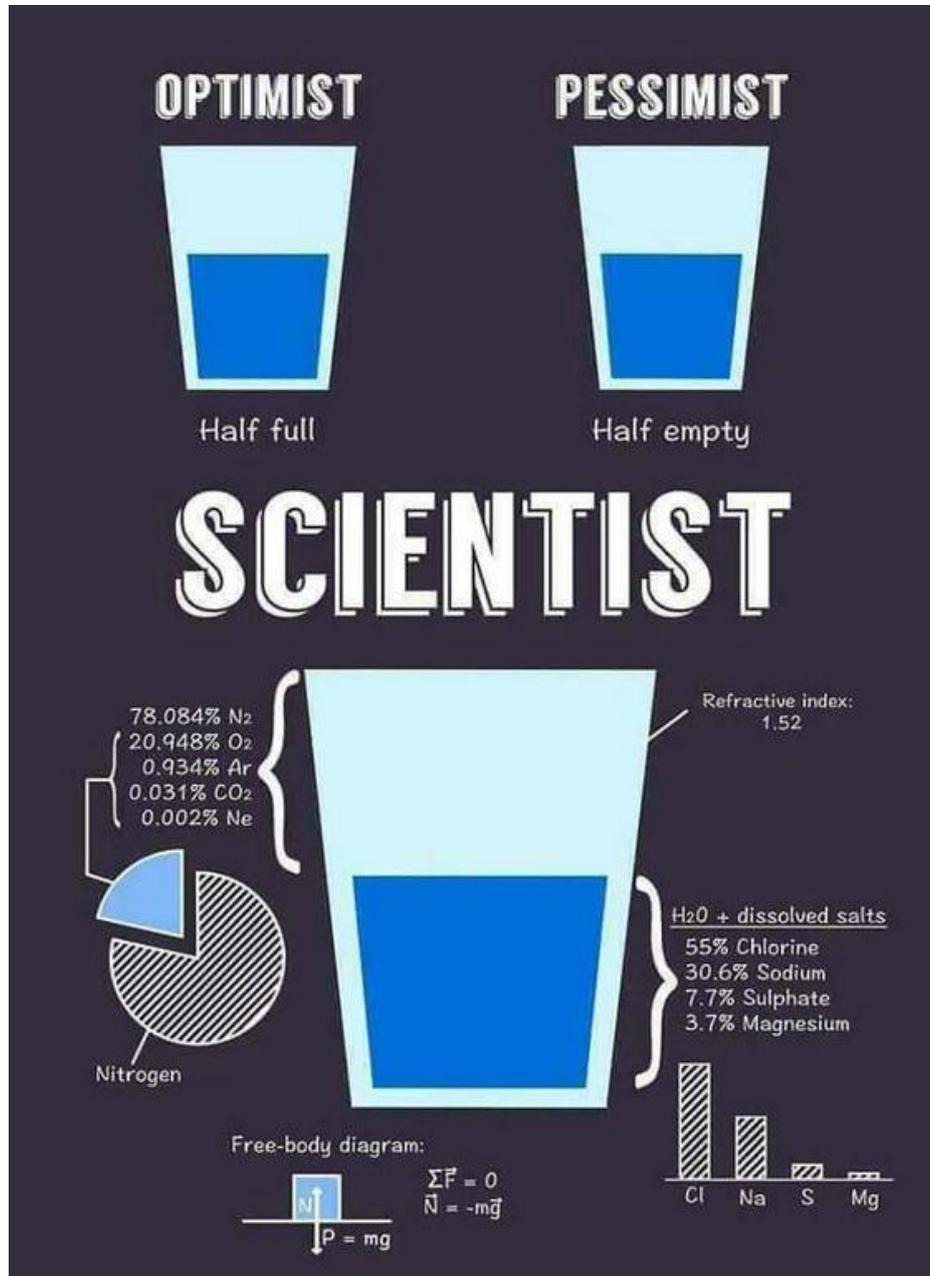
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7 Laughs for Target Makers



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Source: www.cplabsafety.com or CP Lab Safety

For further information on the INTDS, please refer to our website on www.intds.org.