



Potential of Silesian-Lesser Poland Hydrogen Valley Association based on a Komag Research Institute Experience



Bartosz POLNIK
R&D Director

LAUREAT KONKURSU



TERAZ POLSKA

www.komag.eu



Hydrogen valleys in Poland

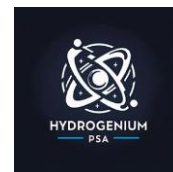


	Bursztynowa Dolina Wodorowa
	Pomorska Dolina Wodorowa
	Zachodniopomorska Dolina Wodorowa
	Wielkopolska Dolina Wodorowa
	Dolnośląska Dolina Wodorowa
	Śląsko-Małopolska Dolina Wodorowa
	Podkarpacka Dolina Wodorowa
	Mazowiecka Dolina Wodorowa
	Centralna Dolina Wodorowa
	Podlaska Dolina Wodorowa
	Lubelski Kłaster Wodorowy
	Uznamsko-Wolińska Dolina Wodorowa
	Świętokrzyska Dolina Wodorowa

Founding Members – 18 individuals Supporting Members – 26 entities



URZĄD MARSZAŁKOWSKI
WOJEWÓDZTWA MAŁOPOLSKIEGO



Akademia
Górnośląska
im. Wojciecha Korfańskiego w Katowicach



Uniwersytet
Ekonomiczny
w Katowicach



PROGRES Sp. z o.o.
EKO INNOWACJE



Politechnika
Śląska



UNIWERSYTET ŚLĄSKI
W KATOWICACH



KLASTRY ENERGII



Politechnika Krakowska
im. Tadeusza Kościuszki



Akademia WSB



AGH
AKADEMIA GÓRNICZO-HUTNICZA
IM. STANISŁAWA STĄSZICA
W KRAKOWIE

The association is formed by representatives of the private sector, local government units, and scientific and research institutions.

Territory and region potential



- Universities, research institutes, research laboratories
- Technical and infrastructural facilities
- The largest and most important motorway junctions
- Specialized staff of all levels with high technical culture
- Various investment places
- The highest connectivity of regions in Poland
- Three international airports (Katowice-Pyrzowice, Kraków-Balice, Ostrava)
- Direct neighborhood with the Czech Republic and the Slovak Republic



27 516 km² – the combined area of both provinces

10% of the country's area

8 million people

the highest population density per square kilometer in the country

Silesian Voivodeship: average of 366 people per km²

Lesser Poland Voivodeship: average of 225 people per km²

Entire country: average of 123 people per km²



Number of registered entities according to Statistics Poland data as of 30 June 2026.

<https://dashboard-region.stat.gov.pl/>

651,670 in the Silesian Voivodeship

694,966 in the Małopolska Province



Since May 2021, we have been developing and managing a dedicated hydrogen portal, available at <https://h2poland.eu>.

This portal serves as a multi-platform communication tool aimed at both domestic and international stakeholders, playing a pivotal role in raising awareness about the hydrogen economy.

It functions as a central, nationwide knowledge hub regarding the development of the hydrogen economy, incorporating the results of work carried out under the national hydrogen partnership. In practice, it is a key tool for building public awareness across the entire hydrogen value chain—from production, storage, and transport to end-use applications.

Its creation directly fulfills commitments made under the sectoral agreement for the development of the hydrogen economy. The platform enables the digital aggregation, organization, and presentation of major initiatives, projects, and achievements related to hydrogen technologies, while also providing up-to-date industry statistics and data. It caters to a wide audience—including representatives from business, government, academia, and industry organizations, as well as individuals seeking to deepen their knowledge of hydrogen. Featuring the latest scientific and popular-science publications, it serves as a comprehensive source of information on the national hydrogen ecosystem.



Małopolska Centre for Innovative Hydrogen Storage and Transport Technologies

A regional initiative established by a resolution of the Regional Assembly (Sejmik) in 2024.

Goal: integrating business, science and administration in the field of hydrogen technologies, and developing solutions for hydrogen storage and transport.

Kraków Technology Park – coordinator of the hydrogen technology roadmap

KPT runs regional smart-labs and consultations, and is developing a Business Technology Roadmap (BTR) for hydrogen in Małopolska.

Silesian University of Technology, AGH University of Krakow, Cracow University of Technology, Jagiellonian University, Polish Academy of Sciences

Strong scientific base in electrolysis, materials, hydrogen storage and fuel cells, as well as a strong research centre: laboratories of hydrogen technologies, power engineering, automation and computer science.

Centre for Renewable Energy and Hydrogen Technologies in Rybnik

A project of the Silesian University of Technology (PLN 27 million), covering research on the production, storage and applications of hydrogen.



The City of Rybnik is today one of the most active cities in Poland in the field of **hydrogen** – it is simultaneously pursuing infrastructure, educational and industrial activities.

- **Hydrogen buses** — the city was one of the first in Poland to introduce regular public transport based on hydrogen-powered buses.
- **Hydrogen refuelling station** — a municipal station is in operation, used for public and private transport.
- **ROW 2.0 – Rybnik Hydrogen District** — a strategic project to transform the region from coal to hydrogen, carried out jointly with the Silesian University of Technology. It covers production, education, research and industry.

Rybnik not only uses hydrogen in transport, but is building a complete ecosystem: production, infrastructure, education, laboratories, international cooperation and participation in shaping legislation.

The Upper Silesian-Zagłębie Metropolis (GZM) runs the most advanced programme in Poland for deploying hydrogen-based public transport. Its activities are concrete, funded and already being implemented operationally.

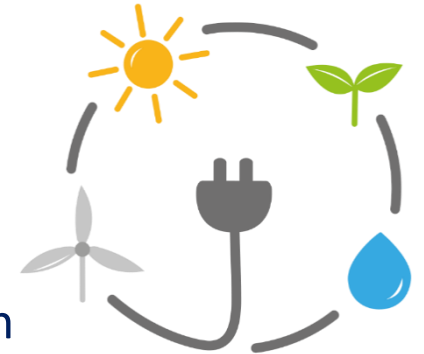
- **The “Hydrogen GZM” programme** – the Metropolis’s flagship project, a comprehensive programme for deploying hydrogen technologies in public transport, including the purchase and deployment of hydrogen buses, construction of refuelling infrastructure, testing of technologies in real-world conditions, and preparing the region for a full transition to zero-emission transport.



Mission: Creation and implementation of innovative solutions for industry

It is realized by:

- ❖ Active participation in building the economy based on knowledge and innovations.
- ❖ Creation of bridge between science and industry.
- ❖ Maintaining strong position in the European Research Area and strengthening position in the Global Research Area.
- ❖ Development of new research areas.
- ❖ Transfer of technologies.
- ❖ Active participation in projects of scientific-and-industrial clusters.



DIRECTIONS OF ACTIONS OF KOMAG falling under the Strategy

- ❖ Just transition
- ❖ E-MOBILITIES
- ❖ Internet of Things
- ❖ Silesian Energy Storage System
- ❖ Industry 4.0 and 5.0
- ❖ Energy Mix – stabilization of the energy system
- ❖ Security of ICT systems
- ❖ Revitalization and recultivation of post-industrial areas
- ❖ Biodiversity



147 EMPLOYEES

3 Professors • 5 Habilitated Doctors (Post Doc.) • 39 PhD's

ONGOING PhD PROGRAMS

- **8 Industrial PhD**
Conducted within the joint inter-university Doctoral School.
- **4 External PhD Programs**
Advanced individual research pathways carried out by institute staff.

EVALUATED SCIENTIFIC DISCIPLINES

KOMAG conducts scientific activity across 3 primary disciplines, achieving top-tier national evaluation ratings:

Automation, Electronics, Electrical Engineering & Space Technologies

Rating: CATEGORY A (Highest prestigious evaluation rating in Poland)

Mechanical Engineering

Rating: CATEGORY A (Top-tier scientific rating for design & robotics)

Environmental Engineering, Mining & Energy

Rating: CATEGORY A (Excellence in eco-mining & clean energy research)



DIVISIONS AND LABORATORIES

R&D

Division of Powered Roof Support

Division of Machinery and Equipment

Division of Preparation Systems

Division of Mechatronic Systems

Division of Industrial Infrastructure

Division of Modeling Methods and Ergonomics

LABORATORIES

Laboratory of Tests

Laboratory of Applied Tests

Laboratory of Material Engineering and Environment

CERTIFICATION

Division of Attestation Tests Certifying Body



High-pressure alkaline electrolyzer producing hydrogen at a pressure of 200 bar - Work motivation

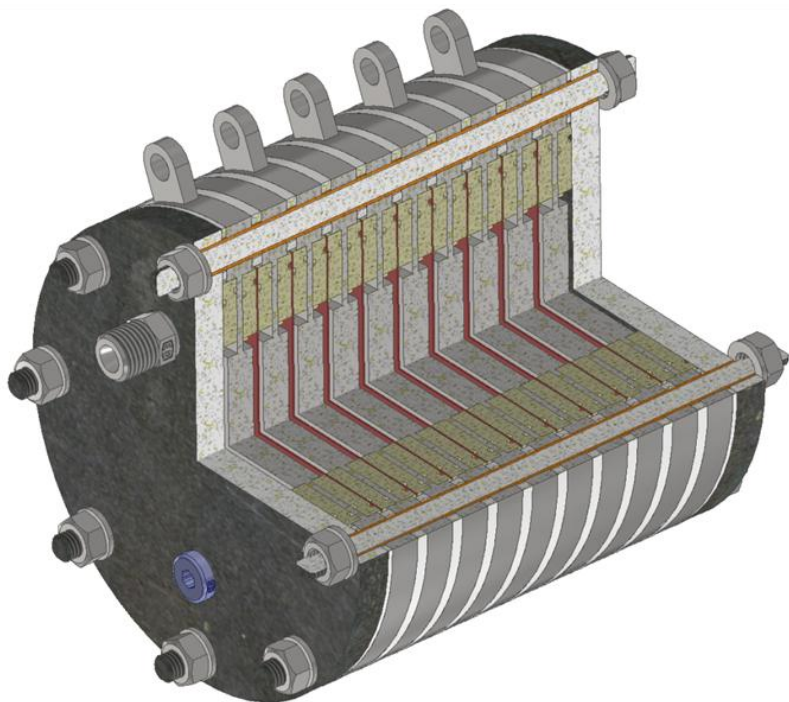


- The goal is to reduce the costs of hydrogen production in the 350 bar and 700 bar standards, also in the future in 1000/1100 bar systems
- In hydrogen storage/production systems, the gas is compressed to high pressures to increase the ratio of stored energy to storage volume
- Typically, compression systems consist of 2-4 compression stages
- In addition to the investment costs in hydrogen compressors, their cooling and proper maintenance and service are necessary
- The electrolyzer produces hydrogen at high pressure - 200 bar - this allows the elimination of 2 stages of compression
- Compression in the electrolyzer ensures lower electricity consumption for the compression process in compressors - the net efficiency of the hydrogen production system is higher
- By eliminating 2 compression stages, the system's reliability increases thanks to fewer moving parts, fittings, power electronics and compressor automation.
- In mass production, the price of this electrolyzer with peripheral systems is comparable to current market atmospheric solutions or up to 30 bar
- There is no similar solution on the market

**A solution protected
by IP rights in the
patent office**

Electrolyzer model based design and development

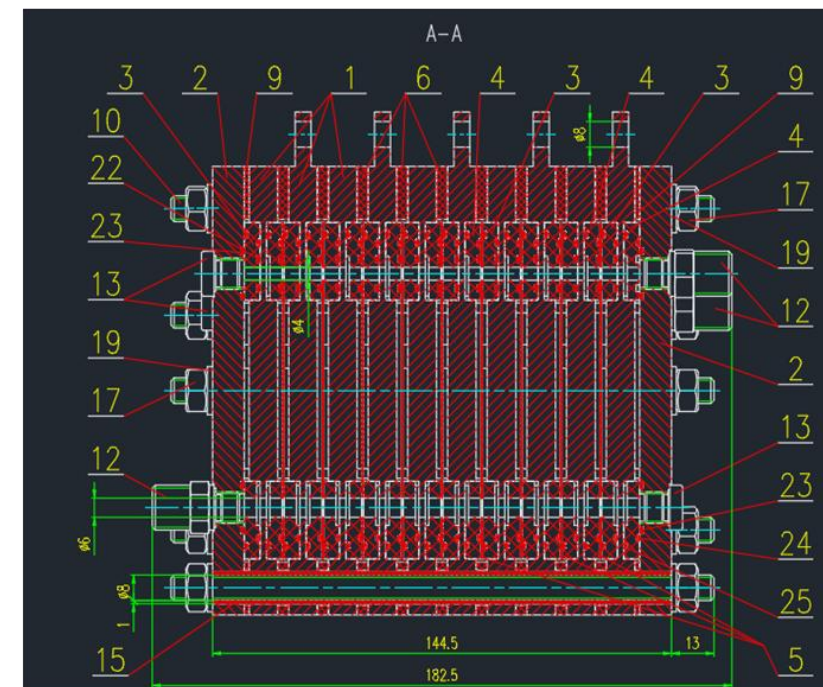
3D Model



Computer Analyzes

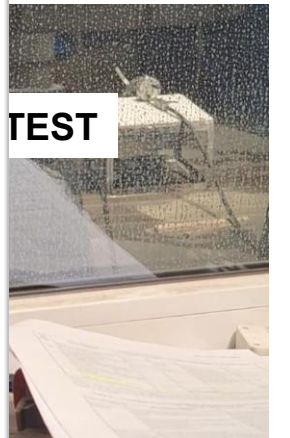
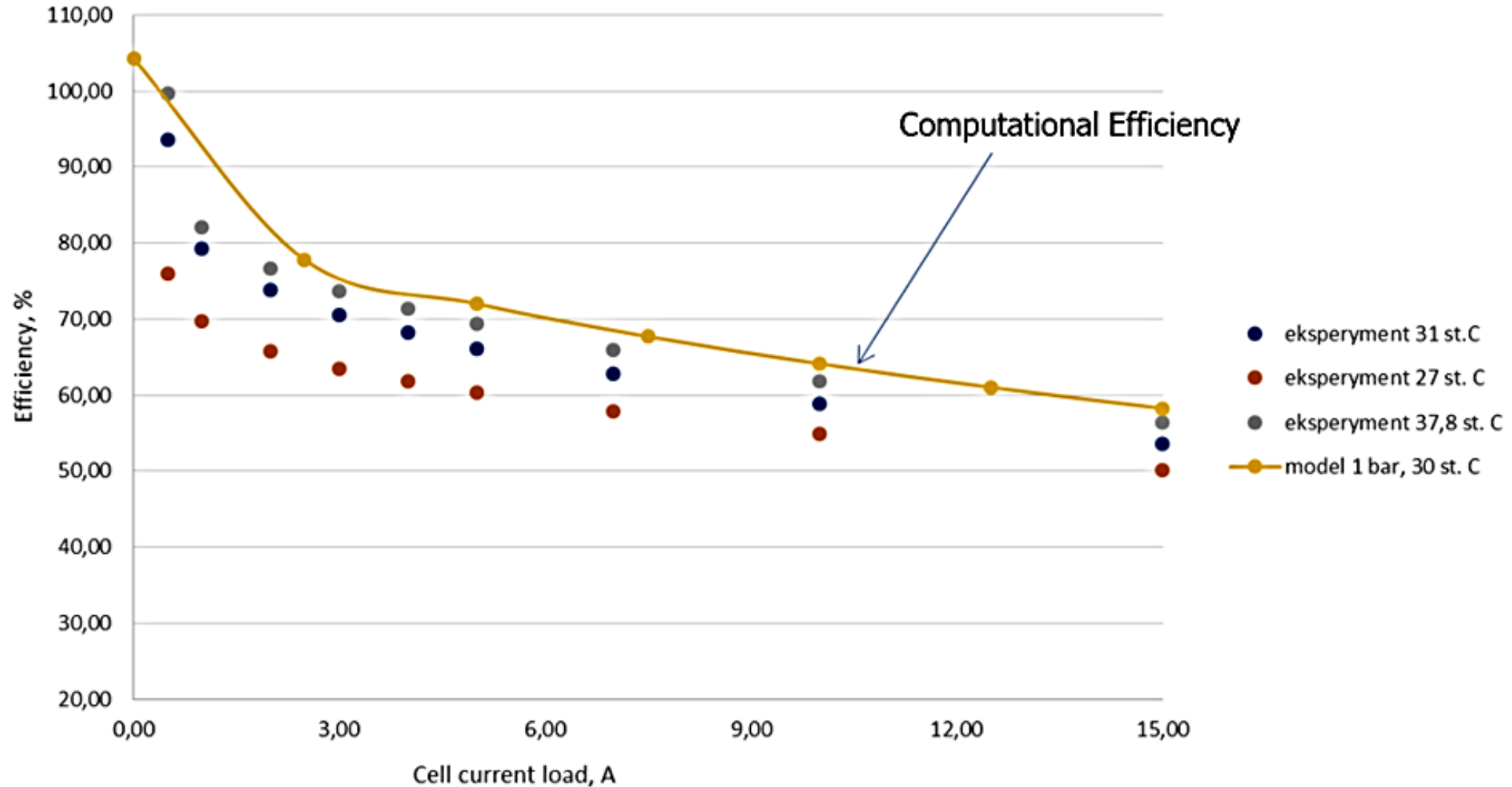


Technical Documentation

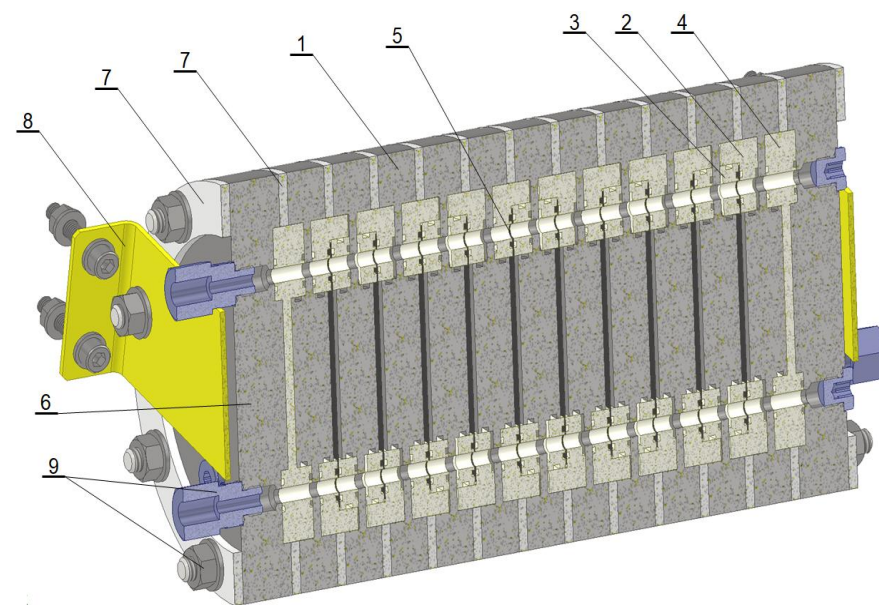
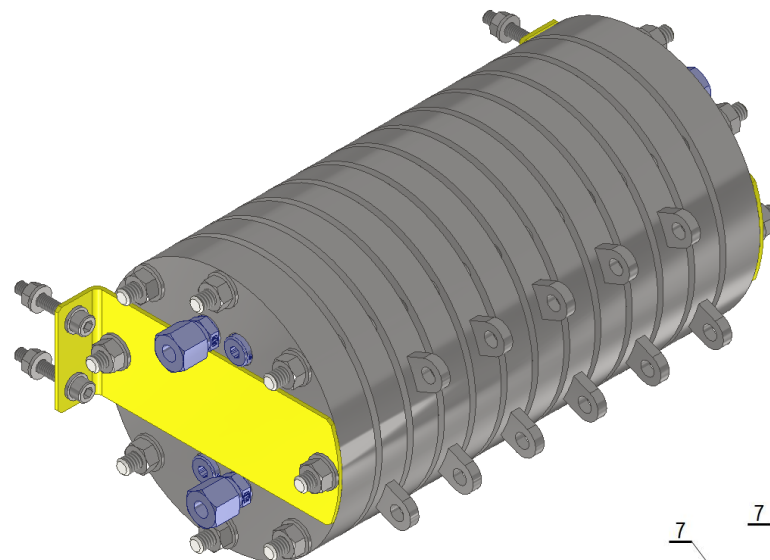
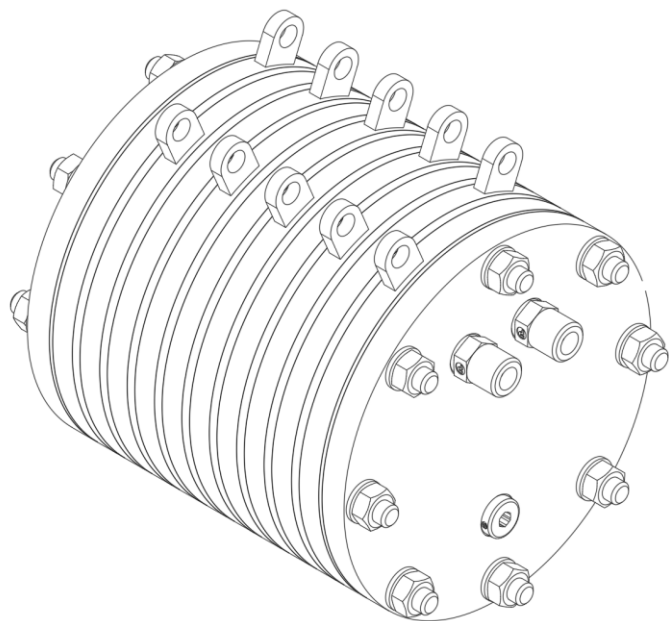


Electrolyzer development and stand tests

HHV Efficiency

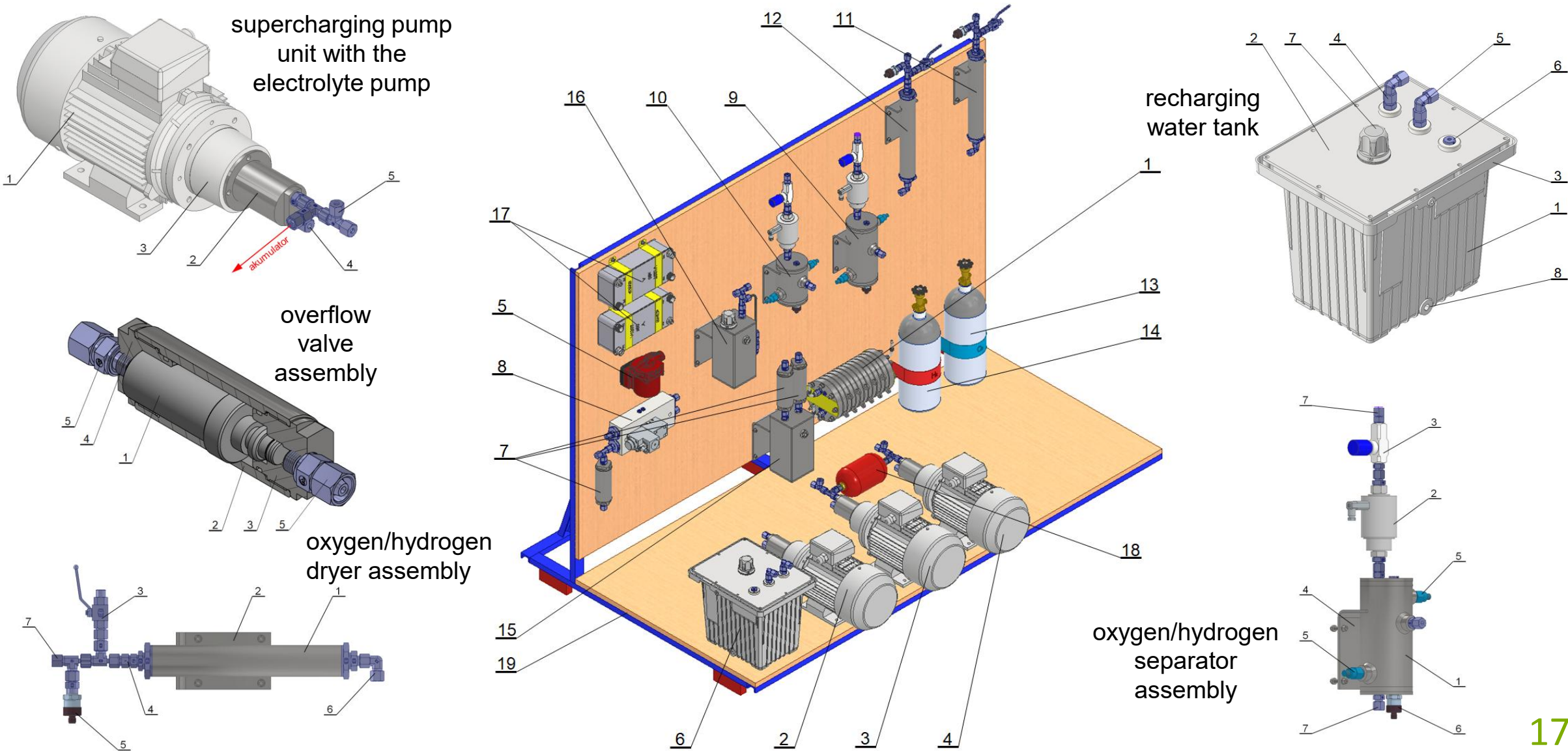


Electrolyzer – final/future version



Mobile educational station for SAFE profession training

HYDROGEN ELECTROLYSIS TECHNIQUE



SUMMARY OF PROJECT

- **Acquired knowledge and experience in the construction and construction of alkaline electrolyzers.**
- **Advantages of the proposed solutions:**
 - **high compression pressures,**
 - **separate electrolytic chambers**
- **There is a need to invest in research infrastructure to verify the assumptions of solutions for the Polish industry**
- **Great potential for research and implementation projects - the so-called green hydrogen**
- **The educational station is mobile and safe. Perfect for teaching in schools, universities and BCUs. The station is delivered with a set of training materials and training for teachers**
- **POLISH PRODUCT**

HYDROGEN INHALATOR STAND

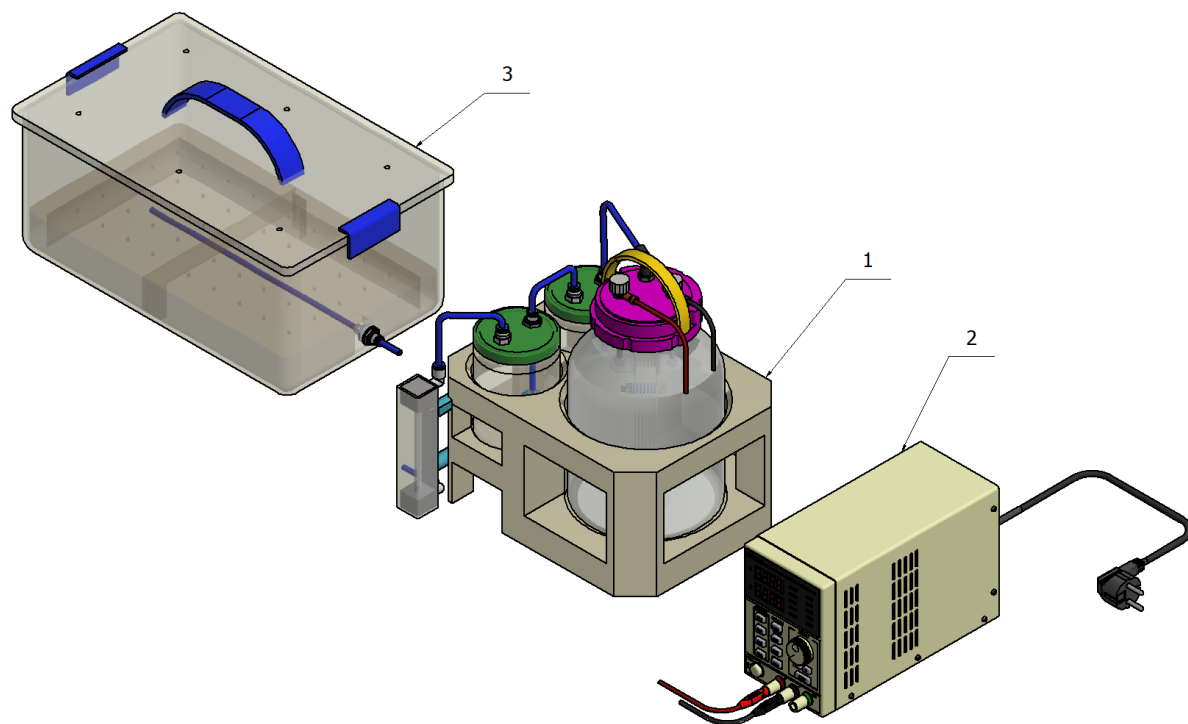


Fig. 1 3D model of the test stand for laboratory studies of HHO gas inhalation:
1-HHO generator assembly,
2-laboratory power supply, 3-test container

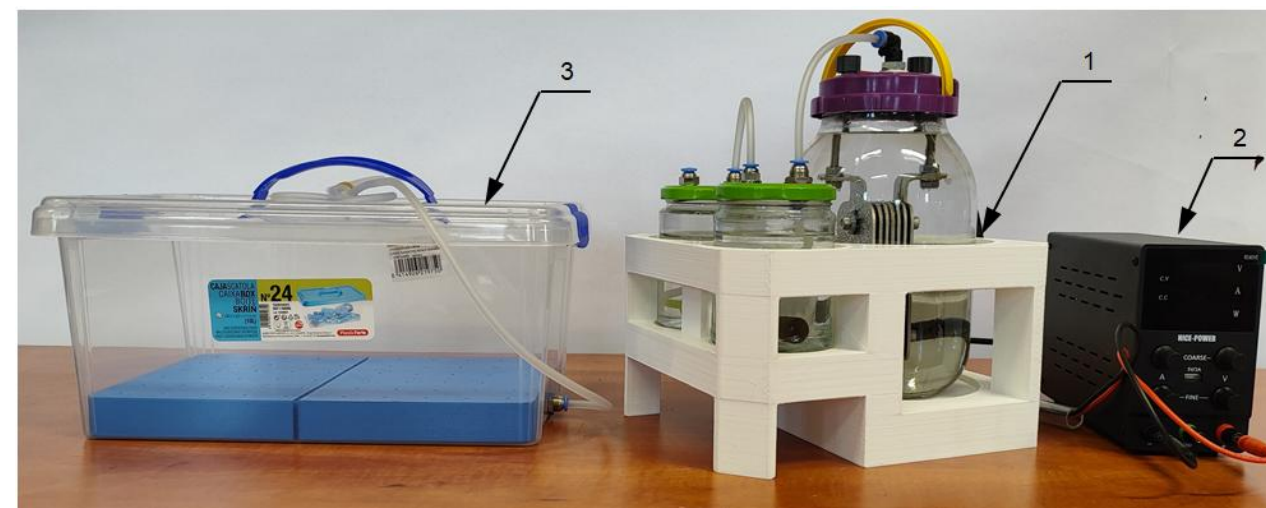


Fig. 2 Test stand for laboratory studies of HHO gas inhalation:
1-HHO generator assembly, 2-laboratory power supply,
3-test container

HYDROGEN INHALATOR STAND

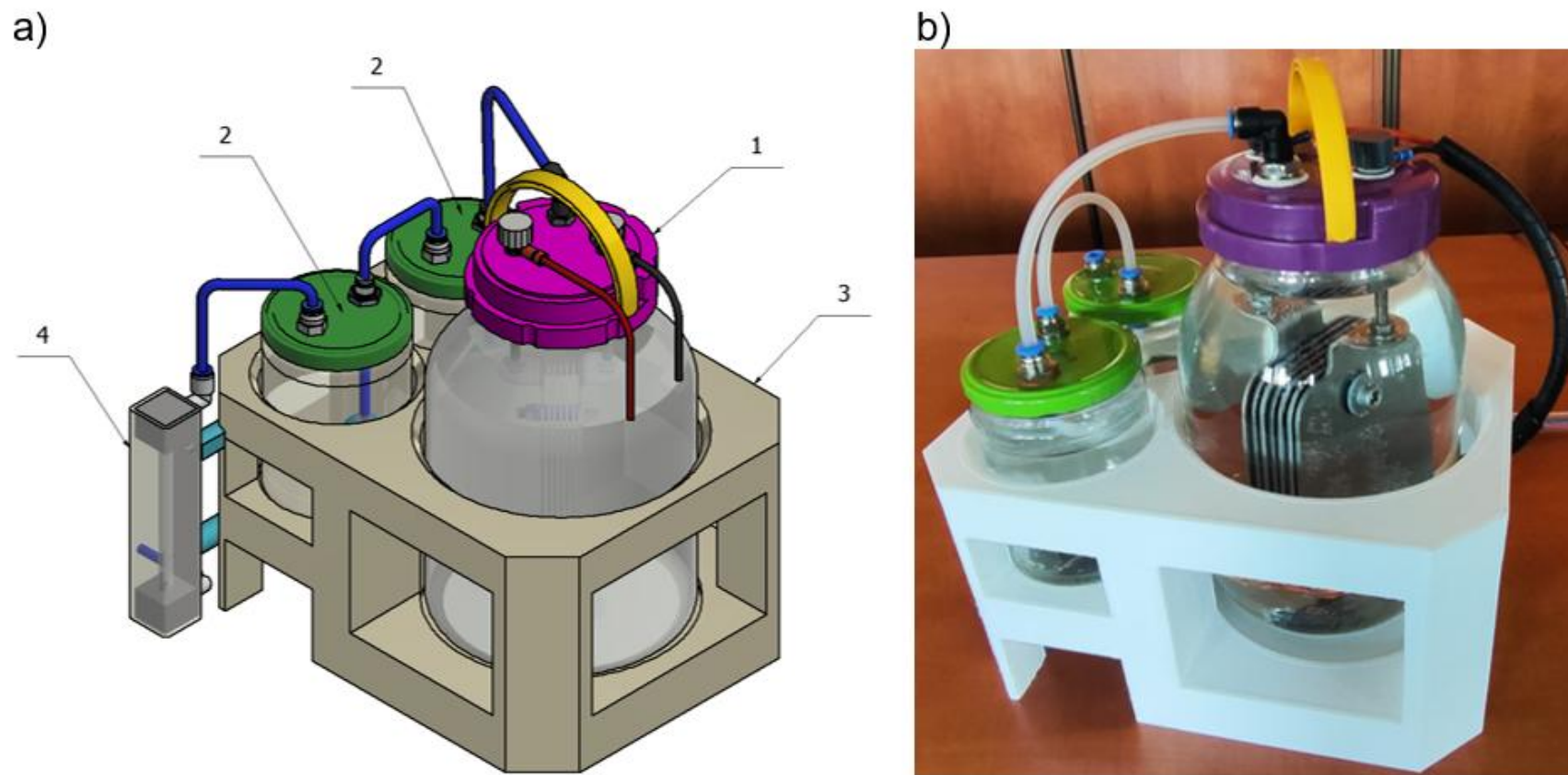


Fig. 3 HHO generator assembly: a) 3D model, b) physical unit:
1-HHO generator, 2-bubbler, 3-holder, 4-rotameter

HYDROGEN INHALATOR STAND

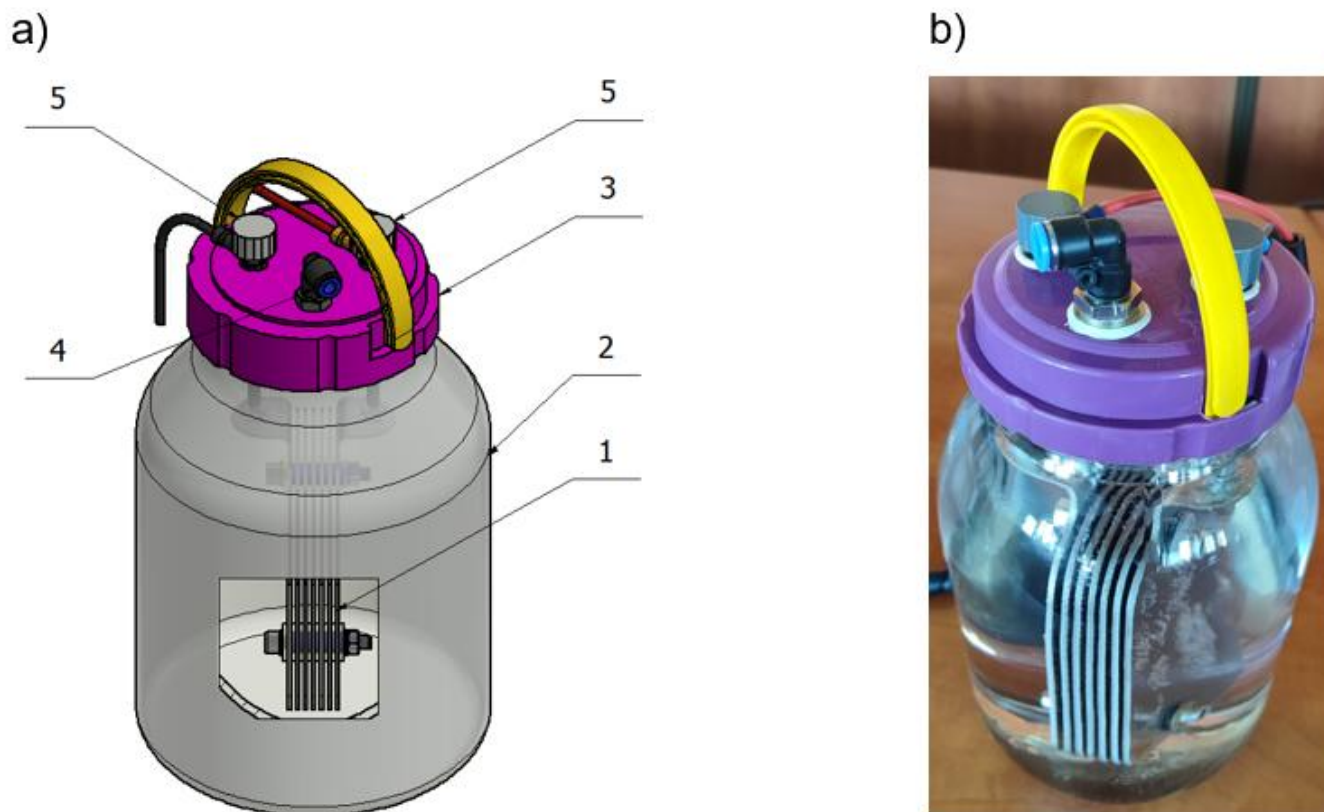


Fig. 4 HHO generator: a) 3D model – 1-electrode assembly, 2-housing, 3-cover, 4-pneumatic connector, 5-capped power leads,
b) physical unit
(model item numbers correspond to the actual components)

HYDROGEN INHALATOR STAND

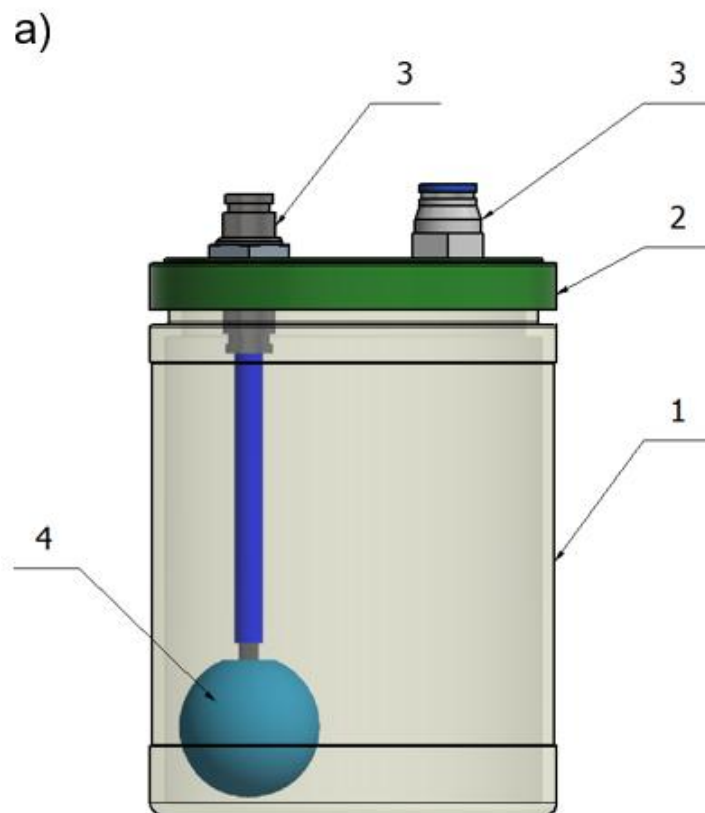


Fig. 5 Bubbler: a) 3D model – 1-glass jar, 2-screw cap, 3- pneumatic connector, 4-air stone, b) physical unit (model item numbers correspond to the actual components)

HYDROGEN INHALATOR STAND



Fig. 7 Laboratory power supply:

- maximum output voltage 30 V,
- maximum output currentt 10 A,
 - supply 230 V / 50 Hz

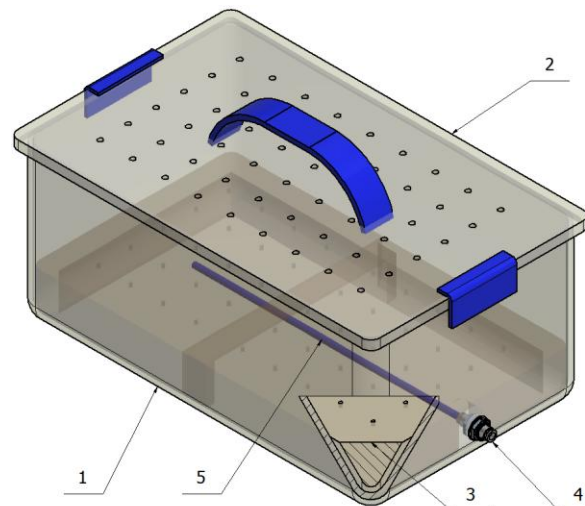


Fig. 8 Model of the fully equipped container:
1-container, 2-lid, 3-floor, 4-pneumatic connector,
5-silicone pneumatic tube



Fig. 9 Plastic Forte 10 dm³
transparent storage container

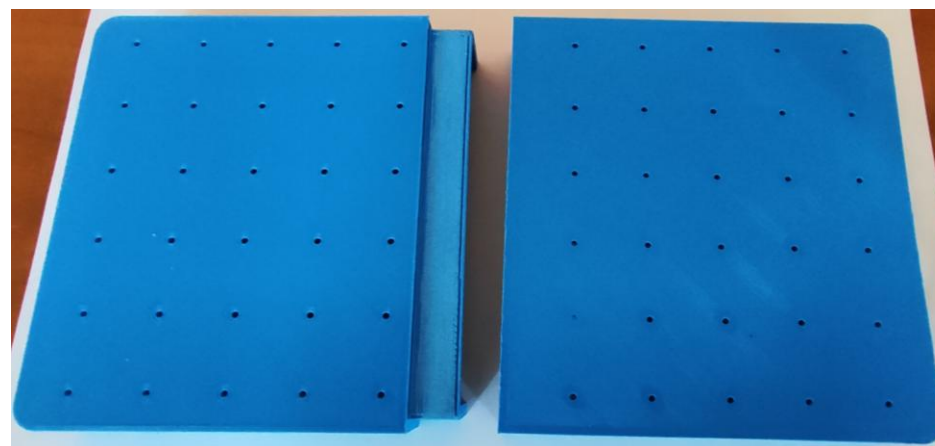


Fig. 10 Container floor

HYDROGEN INHALATOR STAND



Fig. 13 Test stand at the NIO laboratory

CONFERENCES

KOMAG organizes periodically the following scientific-and-technical conferences:



KOMEKO – Scientific-and-Technical Conference: Innovative and Environmentally Friendly Techniques and Technologies of Minerals' Processing. Safety – Quality – Effectiveness.



KOMTECH – International Scientific-and-Technical Conference: Innovative Techniques and Technologies for the Mining Industry. Safety – Effectiveness – Reliability.





THANK YOU FOR YOUR ATTENTION
We invite you to cooperation

Bartosz Polnik
e-mail: bpolnik@komag.eu
tel. 32 23 74 629

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