

Konferencija o sigurnosti vodika

OD PROIZVODNJE DO PUNIONICE

prof.emer.dr.sc. Frano Barbir

Hotel International
03.04.2025. Zagreb, Hrvatska

ORGANIZATORI:



POKROVITELJ:



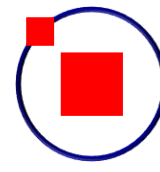
REPUBLIKA HRVATSKA
Ministarstvo
gospodarstva

ZLATNI SPONZOR:



SPONZOR:



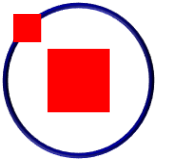


Is hydrogen dangerous?

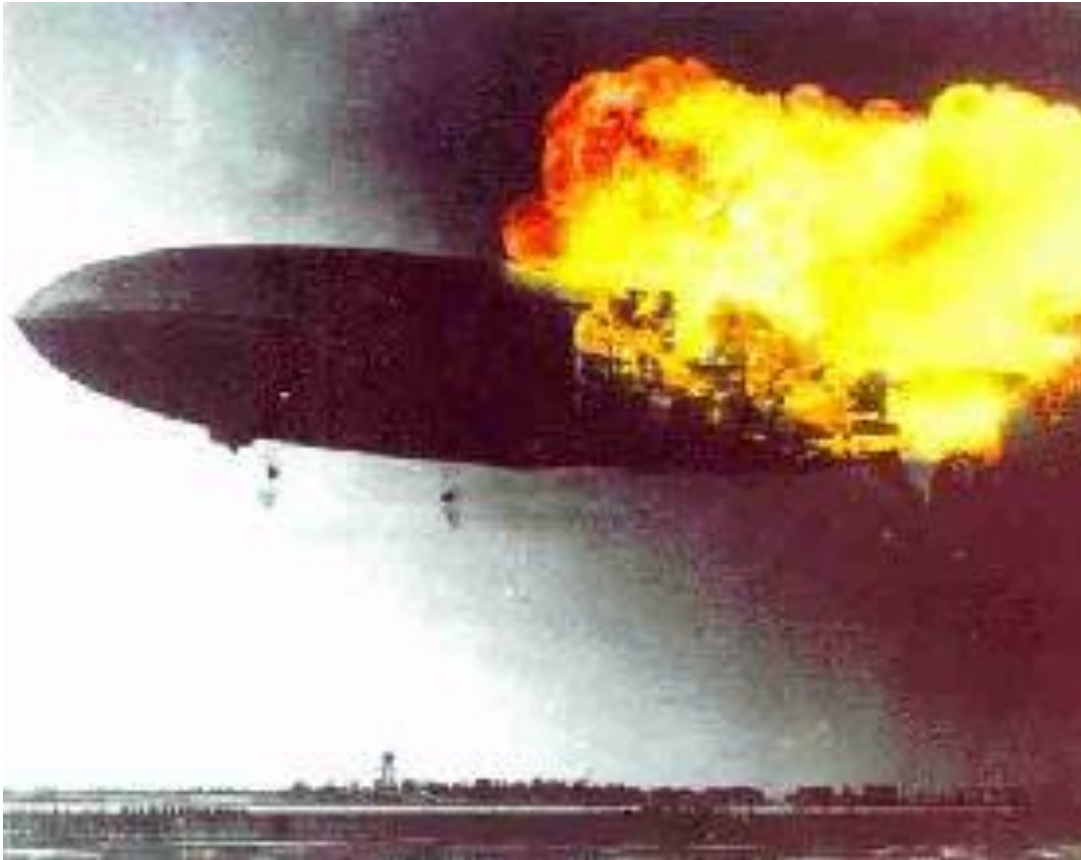


Yes!

Hydrogen is extremely dangerous?

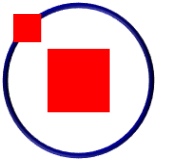


Real danger of perception?

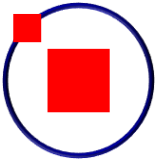


Hindenburg disaster (1937)
Is actually an example of how hydrogen is not as dangerous!
In this accident 13 passengers and 22 crew members died!
But 26 passengers and 39 crew members survived!

Myths about hydrogen – hydrogen bomb

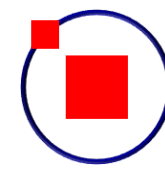


TERMINATOR 3



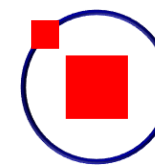
Terminator (Schwarzenegger): When ruptured the fuel cells become unstable!





Hydrogen explosion on refuelling station in Sandvika, Bærum, near Oslo 12 July, 2019





Hydrogen safety characteristics

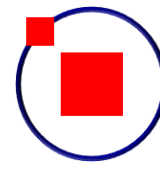
- leak probability 
- volume of fuel released in leak 
- energy of fuel released in leak 
- diffusivity and buoyancy 
- lower flammability limit in air  
- minimum ignition energy 
- ignition energy at LFL 
- flame velocity 
- lower detonability fuel/air ratio 
- explosive energy per energy stored 
- flame visibility 
- flame emissivity 
- flame fumes toxicity 
- fuel toxicity 

Legend

-  higher than other fuels
-  ~same as other fuels
-  lower than other fuels

Risk color codes

-  potentially dangerous
-  safe
-  same as other fuels or irrelevant

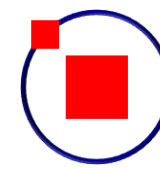


Is hydrogen dangerous?

Yes!

Is hydrogen more dangerous than other fuels?

No!



Conclusions and recommendations

- hydrogen is at least as safe as other fuels
- special considerations in:
 - design
 - construction
 - operation
 - maintenance
- more research and demonstration
- codes and standards needed
- public awareness and education



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Program

- | | |
|--|---|
| <p>10.00 Krešimir Katranček, Martina Zupan Urek, Ministarstvo gospodarstva:
Predstavljanje Pravilnika o punionicama vodika i mogućnosti financiranja punionica u Hrvatskoj</p> <p>10.20 Dario Dragojević, Ministarstvo unutarnjih poslova: Prostori ugroženi eksplozivnom atmosferom</p> <p>10.40 Dr. Stuart Hawksworth, Međunarodna udruga za sigurnost vodika (HySafe), UK: Napredak u području sigurnosti vodika – iskustvo Ujedinjenog Kraljevstva</p> <p>11.00 Tomáš Beseda, Messer Slovnaft, Slovačka: Unapređenje primjene vodika u prometu u Slovačkoj</p> | <p>12.00 Dr. Bodo Gross, Saarländische Wasserstoffagentur GmbH, Njemačka:
Iskustvo u izgradnji punionice vodika</p> <p>12.20 Dr. Virág Mészáros, HUMDA Lab Nonprofit Ltd, Mađarska: Rješenja za punionice vodika-iskustvo Mađarske</p> <p>12.40 Izv. Prof. Blagoy Burdin, IEES, Bugarska: Prva punionica vodika u Bugarskoj – naučene lekcije</p> <p>13.00 Nikola Matijašević, EIHP: Korištenje vodika u prometu na hrvatskim autocestama</p> |
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