

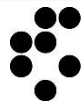


# Tritium in water - introduction

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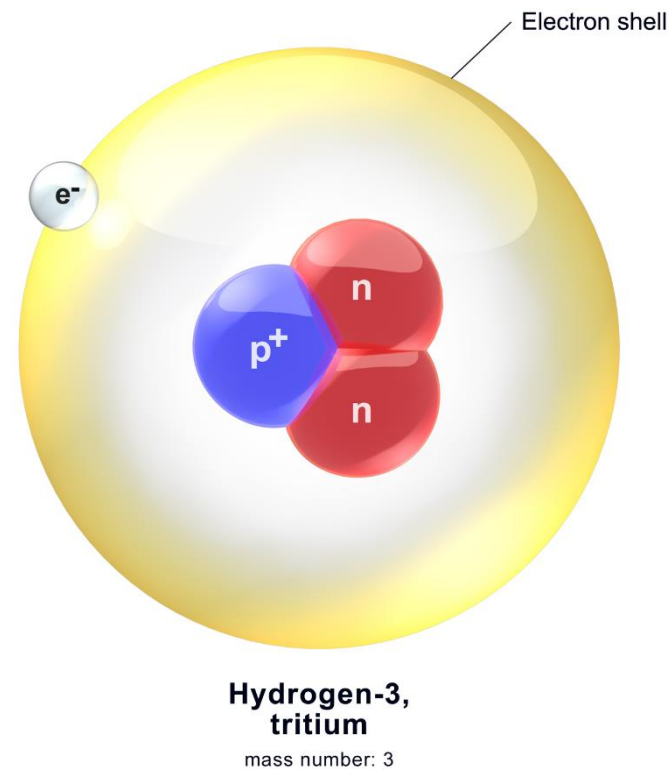
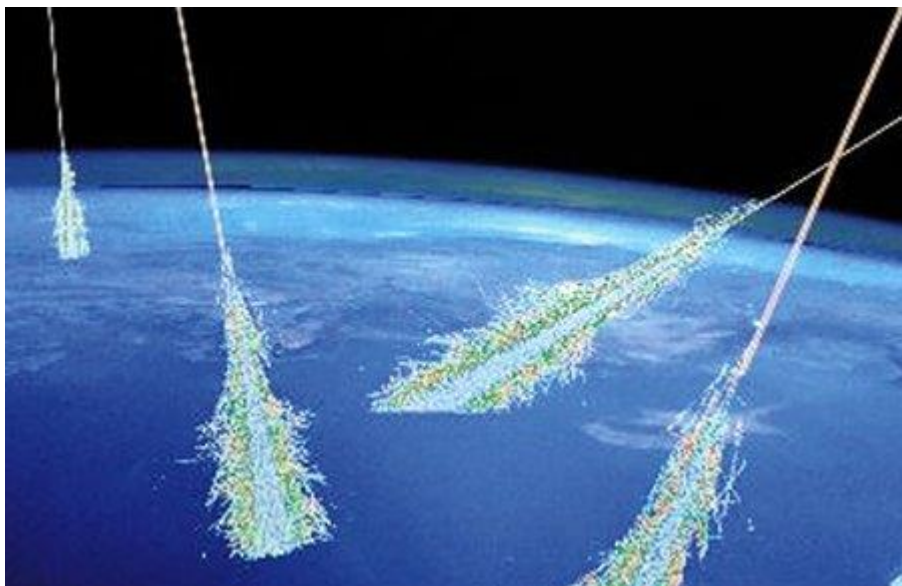


This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Euratom research and training programme 2014-2018 under grant agreement No 754 972



# Tritium - occurrence

- Cosmogenic radionuclide



- Annual natural production:  $7.2E+16$  Bq/year

# Tritium - occurrence

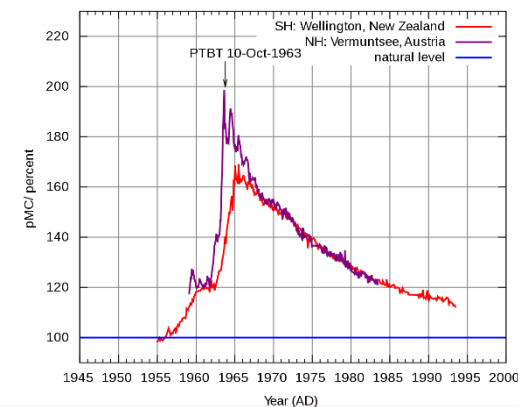
- Production by antropogenic activities:  
Nuclear bomb testing      Routine operation of NPP



## Accidental releases



- Annual anthropogenic releases:  $5E+16$  Bq/year



# Tritium - use

- Night illumination

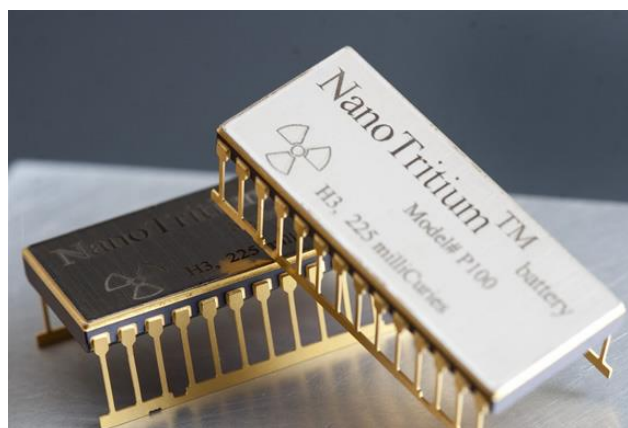
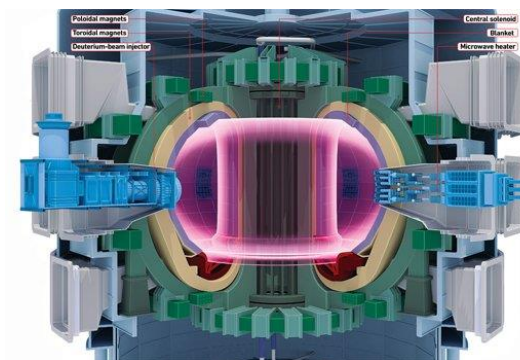


- Nuclear weapons



# Tritium - use

- Fuel for future fusion reactors
- Radiolabelling
- Electrical power source in betavoltaic device





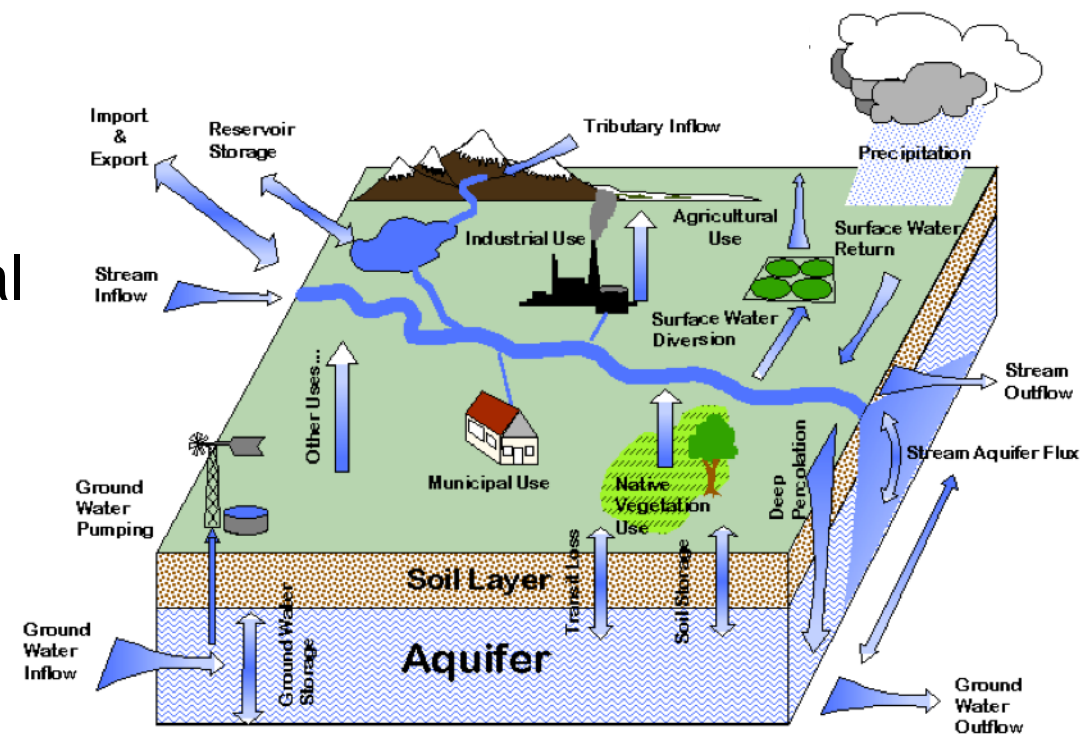
# Forms of tritium and health effects

- Low energy beta emitter – dangerous if inhaled or ingested
- Can cause DNA damage if substituted into DNA molecule
- Forms of tritium:
  - HTO – incorporated into water molecule
  - HT – incorporated into hydrogen gas molecule
  - OBT – incorporated into organic molecule

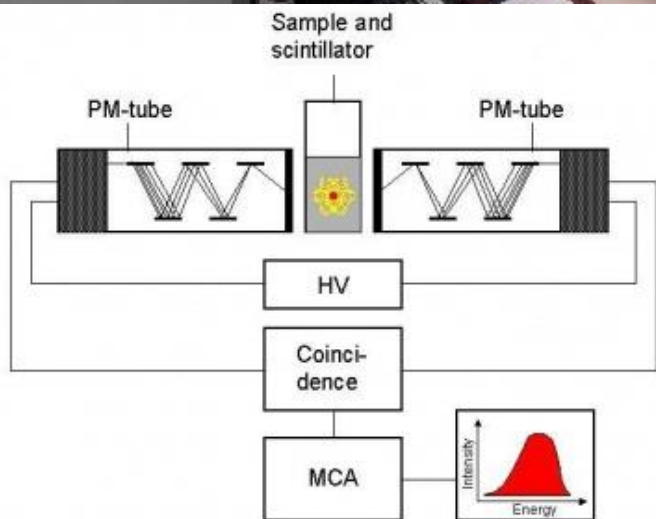
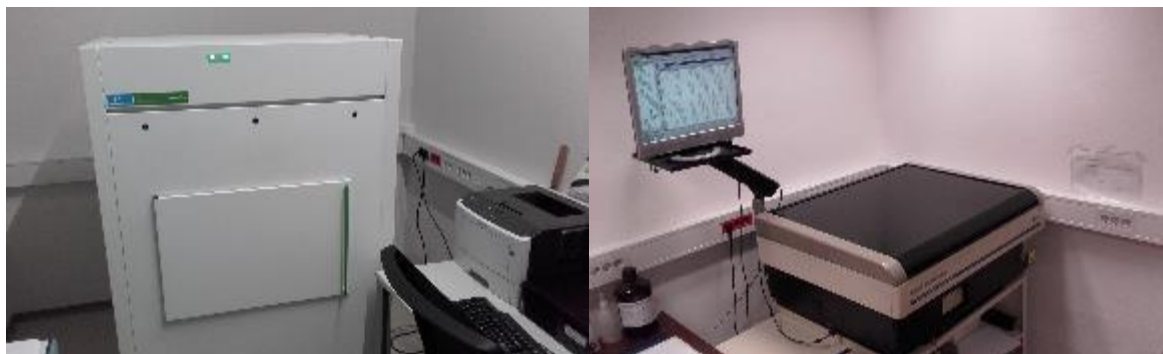


# Tritium – powerful tracer

- Assessing age of groundwaters
- Assessing residence times of continental hydrologic systems
- Oceanic transient tracer



# Tritium measurements

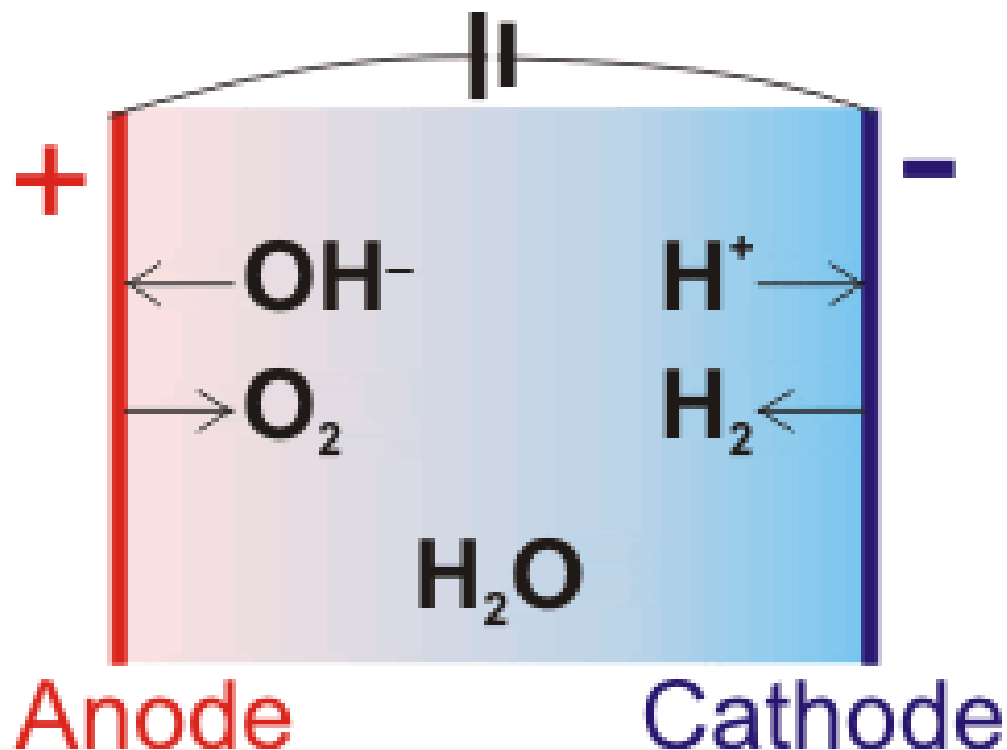


- Liquid scintillation counter
- Internal proportional counter for counting tritium gas
- Measurement of decay product helium by mass spectrometry

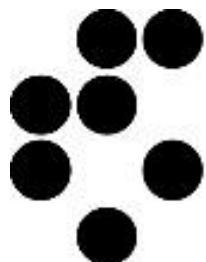


# Tritium electrolytic enrichment

- For low activity tritium measurements in water
- Tritium is heavier than hydrogen and is enriched in remaining water during electrolysis



# meet cinch



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