SESSION 1: IMPROVING QUALITY of LIFE

PANEL 1.2: Nuclear technologies in industry, material sciences and beyond

Tor Bjørnstad is Special Adviser at the Institute for Energy Technology at Kjeller, Norway and Professor Emeritus in Nuclear Chemistry and Nuclear Physics at the University of Oslo; he has more than 40 years of experience in basic and applied radiochemistry, nuclear chemistry and nuclear physics at various universities and research institutions, including CERN in Geneva.
They help us understand processes – we call them tracers

Tor Bjørnstad
Institute for Energy Technology (IFE)
Kjeller, Norway
Radioactive tracers decay

Remaining number of nuclei

\[ N_0 \]

\[ N_0/2 \]

\[ N_0/4 \]

\[ N_0/8 \]

\[ N_0/16 \]

\[ N_0/32 \]

100 %

50 %

25 %

12.5 %

6.25 %

3.12 %

Time

\[ 1 \times T_{1/2} \]

\[ 2 \times T_{1/2} \]

\[ 3 \times T_{1/2} \]

\[ 4 \times T_{1/2} \]

\[ 5 \times T_{1/2} \]
Singing detectives
1. Chemical process systems

- Feed chemicals = Reactants
- Chemical reaction chamber
- Heat treatment
- Final reaction product

Graphs showing time vs. some value.
2a. Water expels oil
2b. Reservoir description

- Preferential flow directions
- Horizontal and vertical communication between wells
- Permeability strata
- Sweep volumes
- Large-scale heterogeneities

Statified reservoir
3a. Waves erode coastlines
3b. Coastal management: Wave-induced Sediment transport
3c. Coastal management: Tracing of sediment transport

Radiotracer injection
4. Monitoring air pollution
Final message:

Tracer technology is an indispensable tool in many branches including chemical process technology, mining, civil engineering, environmental examinations and in basic sciences!