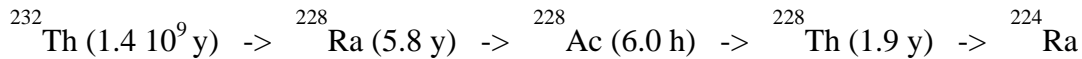


## Compulsory task 2 in FYSKJM4710

Natural appearance of Thorium (Th) consist almost entirely of the isotope  $^{232}\text{Th}$ , with half life of  $14 \cdot 10^9$  y. When it decays we get:



- Denote the disintegration types which take place in the four transitions.
- The disintegration speed (activity) of the two thorium isotopes in a Th content mineral or an old thorium salt will be equal. Explain why.
- Calculate the disintegration speed of  $^{232}\text{Th}$  in 1.0 kg thorium-oxide ( $\text{ThO}_2$ )
- 1.0 kg new generated  $\text{ThO}_2$  stand 2.0 years in a locker before it is disclosed by Universitas. Calculate the disintegration speed of  $^{228}\text{Ra}$  and  $^{228}\text{Ac}$  in the salt at the time of disclosure.
- The series of disintegrations which an original  $^{232}\text{Th}$  atom ends as a stable lead isotope. Which? Explain your answer. (Lead has four 4 stabile isotopes: 204, 206, 207 and 208).
- Account for why  $^{222}\text{Rn}$  is a radiation hygienic problem (the largest in Norway) and many houses high levels of this Radon nucleus in the indoor air
- The nucleus  $^{99}\text{Tc}$  (half life 213 000 y) has in object to interest in politics and media because of the emission of this from Sellafield. In 1995 Sellafield emitted 190 TBq of the radioactive nucleus ( $1 \text{ TBq} = 10^{12} \text{ Bq}$ ). Which amount of masse with  $^{99}\text{Tc}$  corresponds to this amount of activity?