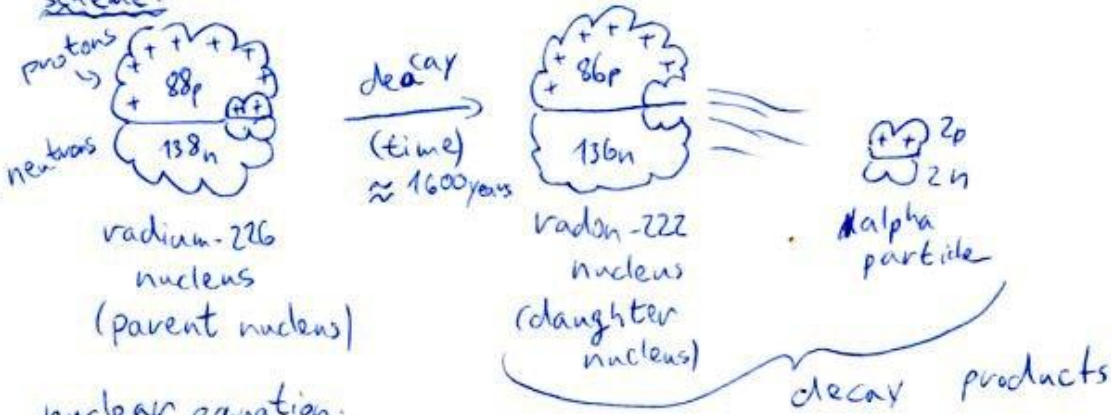


# 6) The decay process

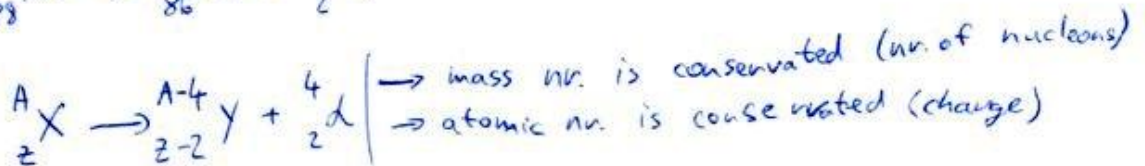
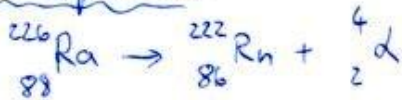
- 3 spontaneous decays:  $\alpha, \beta, \gamma$

## Alpha decay

scheme:

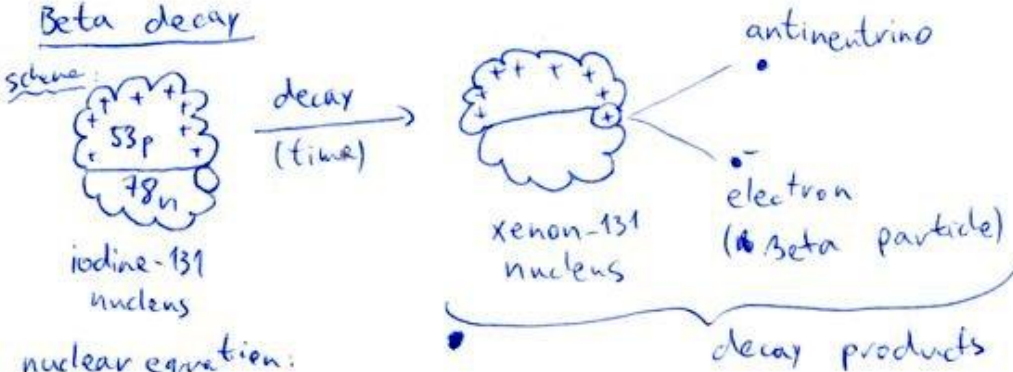


nuclear equation:



## Beta decay

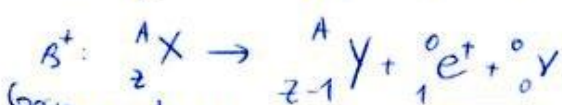
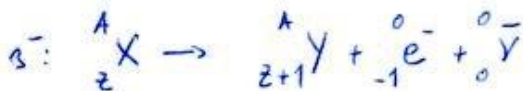
scheme:



nuclear equation:

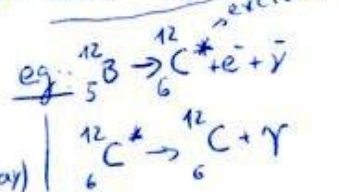


↳ beta minus ( $\beta^-$ ) decay. There is also less common  $\beta^+$  decay.



( $e^+$ ... positron,  $\nu$ ... neutrino)

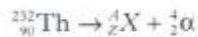
## Gamma decay



## Dacays - examples

Q

- 1 The following equation represents the radioactive decay of thorium-232.  $A$ ,  $Z$ , and  $X$  are unknown.



- What type of radiation is being emitted?
- What are the values of  $A$  and  $Z$ ?
- Use the table on page 264 to decide what new element is formed by the decay process.
- Rewrite the above equation, replacing  $A$ ,  $Z$ , and  $X$  with the numbers and symbols you have found.
- What are the decay products?

- 2 When radioactive sodium-24 decays, magnesium-24 is formed. The following equation represents the decay process, but the equation is incomplete:

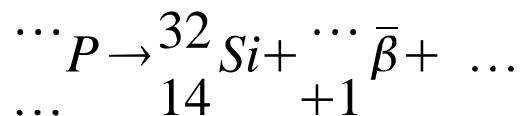


Assuming that only one charged particle is emitted:

- What is the mass number of this particle?
- What is the relative charge of this particle?
- What type of particle is it?

### Example 3.

Complete following decay equation:



### Example 4.

Atom of lead-209 decays with one beta minus decay and after with one alpha decay. Write the name, mass and proton number of this reaction product atom!

48 <b>Cd</b> Cadmium 112.411	49 <b>In</b> Indium 114.818	50 <b>Sn</b> Tin 118.710	51 <b>Sb</b> Antimony 121.760	52 <b>Te</b> Tellurium 127.60	53 <b>I</b> Iodine 126.90447	54 <b>Xe</b> Xenon 131.293	K L M N O
80 <b>Hg</b> Mercury 200.59	81 <b>Tl</b> Thallium 204.3833	82 <b>Pb</b> Lead 207.2	83 <b>Bi</b> Bismuth 208.98040	84 <b>Po</b> Polonium (208.9824)	85 <b>At</b> Astatine (209.9871)	86 <b>Rn</b> Radon (222.0176)	K L M N O P
112 <b>Uub</b> Ununbium (285)	113 <b>Uut</b> Ununtrium (284)	114 <b>Uuq</b> Ununquadium (289)	115 <b>Uup</b> Ununpentium (288)	116 <b>Uuh</b> Ununhexium (292)	117 <b>Uus</b> Ununseptium	118 <b>Uuo</b> Ununoctium (294)	K L M N O P Q