



University Kasdi Merbah Ouargla  
Faculty of Mathematics & Matter Sciences

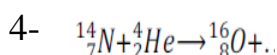
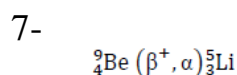
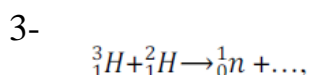
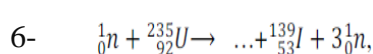
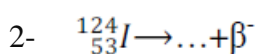
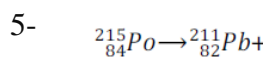
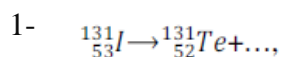


Department of Chemistry

Year: 2023\2024 Course: Chemistry 1 Level: First year

TD N3: Radioactivity

**Exercise 1:** Complete the following nuclear reactions. For each equation, indicate the type of reaction in question:



**Exercise 2:**

- 1) A radioactive nucleus has a half-life of 1 s.
  - a. Calculate its radioactive decay constant  $\lambda$ .
  - b. At a given time, a sample of this radioactive substance has an activity of  $11.1 \cdot 10^7$  disintegrations per second. Calculate the average number of radioactive nuclei present in the sample at that time.
- 2) During the Chernobyl disaster, cesium 134 and cesium 137 were released into the atmosphere.
  - a. Cesium 137 is  $\beta^{-}$  radioactive. Write the disintegration balance equation, specifying the products formed.
  - b. The half-life of cesium 134 is  $T = 2$  years. Deduce the radioactive constant  $\lambda$ . How long will it take for 99% of the released cesium 134 to have disappeared?

**Exercise 3:**

By natural radioactivity, radium is transformed into inert gas and radon. A desintegration of 35.38% of radium occurs every 1000 years.

- a) Determine the radioactive constant of this transformation and the period  $T$ .
  - b) What is the mass of radium whose activity is 1Ci?
2. What is the activity, expressed in curies, of a radioactive source consisting of 500 mg of Strontium ( ${}^{90}\text{Sr}$ ) if its period is 28 years.
    - a) What happens to this activity one year later.