Mark – scheme for RADIOACTIVITY quiz:

1. **Delta.**
2. **True**
3. **Gamma**
4. **Alpha particles**
5. **Beta decay** *(Radioactive decay that emits energetic electrons is called beta decay. Beta decay comes in two varieties. β- decay involves normal, negatively-charged electrons , while β+ decay involves positively-charged electrons or positrons. The energetic electrons or positrons are called beta particles in this context.)*
6. **Alpha decay**

Q2: Complete the following nuclear equations (the question marks)

a. ${}^{42}_{19}\mathrm{K} \rightarrow {}^{0}_{-1}\mathrm{e}^{-} + ?$

b. ${}^{239}_{94}\mathrm{Pu} \rightarrow {}^{4}_{2}\mathrm{He}^{2+} + ?$

c. ${}^{9}_{4}\mathrm{Be} \rightarrow {}^{9}_{4}\mathrm{Be} + ?$

d. ${}^{235}_{92}\mathrm{U} \rightarrow ? + {}^{231}_{90}\mathrm{Th}$

e. ${}^{6}_{3}\mathrm{Li} \rightarrow {}^{4}_{2}\mathrm{He}^{2+} + ?$

f. $? \rightarrow {}^{142}_{56}\mathrm{Ba} + {}^{91}_{36}\mathrm{Kr} + 3\ {}^{1}_{0}\mathrm{n}$

Pre-lesson activity:

- What is the atomic mass?
- Why we do not use the absolute atomic mass?
- How the relative atomic mass was calculated?
- What is the value of *amu*?
- Why the atomic masses in the periodic table are not necessarily whole numbers?

Theme of the lesson

Atomic mass

Learning objectives

- ✔ Calculate relative atomic, molecular and formula masses.
- ✔ Explain why the atomic masses in the periodic table are not necessarily whole numbers.
- ✔ Calculate relative isotopic ratios from molar mass.

Success criteria

Student achieves if

- ✔ He/she will be able to calculate relative atomic, molecular and formula masses
- ✔ He/she can explain why the atomic masses in the periodic table are not necessarily whole numbers
- ✔ He/she will be able to calculate relative isotopic ratios from molar mass

The relative atomic mass is calculated using the equation:

$$\boldsymbol{A_r} = \frac{(\%\ of\ Isotope\ 1 \times mass\ of\ Isotope\ 1) + (\%\ of\ Isotope\ n \times mass\ of\ Isotope\ n)}{100}$$

So in the case of chlorine:

$$A_r = \frac{(25\%\ o \times 37) + (75\%\ o \times 35)}{100} = 35.5$$

Task 1. Calculate the relative atomic mass of oxygen if its absolute atomic mass is equal to 26.67×10^{-27}kg

Task 2. What is the absolute atomic mass of sulfur atom?

Task 3. Calculate the average relative atomic mass for next isotopes of given elements:

- 69.2% $^{63}_{29}$Cu and 30.8% $^{65}_{29}$Cu
- 50% of $^{79}_{35}$Br and 50% of $^{81}_{35}$Br

Task 4. It is possible to do the reverse of a relative atomic mass calculation if you know the A_r which isotopes are present. (It involves a little bit of arithmetical algebra.) The A_r of boron is 10.81 and consists of only two isotopes,boron-10 and boron-11. Calculate the % composition of isotopes MS