Radioactivity: background theory

1. Select the correct answer for the missing word(s) using the drop-down choices provided.

Our understanding of atomic structure has improved over time. Thousands of years ago, atoms were imagined as the _____ possible lumps of matter that were the same all the way through. In 1897, Thomson suggested a model known as the plum pudding (chocolate chip cookie) model, in which _____ charged particles were embedded in a _____ charged material. This model was refined in 1911 by a team that was led by Rutherford, who suggested atoms contained mostly _____ with a central _____ nucleus surrounded by electrons. In the model that we use today, the electrons are arranged in _____ and small amounts of _____ are absorbed or released when electrons move between energy levels in these shells.

2. Use your cursor to draw lines that connect the correct properties to the particles listed below.

Mass (amu)	Sub-atomic particle	Charge
1	Electron	0
1	Neutron	-1
nearly zero	Proton	+1

3. Complete the table below to give the numbers of each sub-atomic particle for these isotopes.

Isotope	$^{241}_{95}\text{Am}$	$^{238}_{92}\text{U}$	$^{226}_{88}\text{Ra}$	$^{14}_{6}\text{C}$	$^{222}_{86}\text{Rn}$	$^{133}_{54}\text{Xe}$
Number of protons						
Number of neutrons						

4. In the boxes provided below, write three precautions for handling radioactive sources safely.

5. This question concerns the radioactive decay of fermium-252 ($^{252}_{100}\text{Fm}$).

(a) Fermium-252 has a half-life of 25 hours.
At the start of an experiment there is 100 g of fermium-252.
What mass of fermium-252 will remain after 100 hours?

mass = _____ g

(b) Fermium-252 undergoes alpha decay to form an isotope of californium.
Insert the correct values for the product's atomic number and atomic mass.

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