

- 1 Nucleus P undergoes a series of nuclear reactions to form nucleus Q. It is found that Q has the same nucleon number as P, but a larger mass.

Which statement is true?

- A P is less stable than Q.
- B P requires more energy than Q to be separated into its individual nucleons.
- C The binding energy of P is smaller than the binding energy of Q.
- D There has been a net release of energy through the series of nuclear reactions.

- 2 Which combination of successive emissions produces a final nucleus with the same proton number as the starting nucleus?

- A  $\alpha \alpha \beta$
- B  $\alpha \beta \beta$
- C  $\alpha \beta \gamma$
- D  $\beta \gamma \beta$

- 3 The symbol  $^{130}_{52}\text{Te}$  represents a nuclide of tellurium that undergoes a double beta decay to become a nuclide of xenon (Xe).

What is the symbol of this xenon nuclide?

- A  $^{128}_{54}\text{Xe}$       B  $^{129}_{54}\text{Xe}$       C  $^{130}_{53}\text{Xe}$       D  $^{130}_{54}\text{Xe}$

- 4 Radon-222 ( $^{222}_{86}\text{Ra}$ ) is a radioactive gas that decays randomly with a decay constant of  $7.55 \times 10^{-3} \text{ hour}^{-1}$ .

The activity of radon gas in a sample of  $4.80 \times 10^{-3} \text{ m}^3$  of air taken from a building is 0.600 Bq.

Find the number of radon atoms in  $1.00 \text{ m}^3$  of the air.

- A 125
- B  $1.66 \times 10^4$
- C  $2.86 \times 10^5$
- D  $5.96 \times 10^7$

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The grid shows a number of nuclides arranged according to the number of protons (x-axis) and the number of neutrons (y-axis) in each.

A nucleus of the nuclide  ${}^8_3\text{Li}$  decays by emitting a  $\beta^-$  particle.

What is the resulting nuclide?

	6		<b>C</b>			
	5			${}^8_3\text{Li}$	<b>A</b>	
	4			${}^7_3\text{Li}$	<b>B</b>	
number of neutrons	3	<b>D</b>		${}^6_3\text{Li}$		
	2		${}^4_2\text{He}$			
	1	${}^2_1\text{H}$	${}^3_2\text{He}$			
	0	${}^1_1\text{H}$				
		1	2	3	4	5
		number of protons				

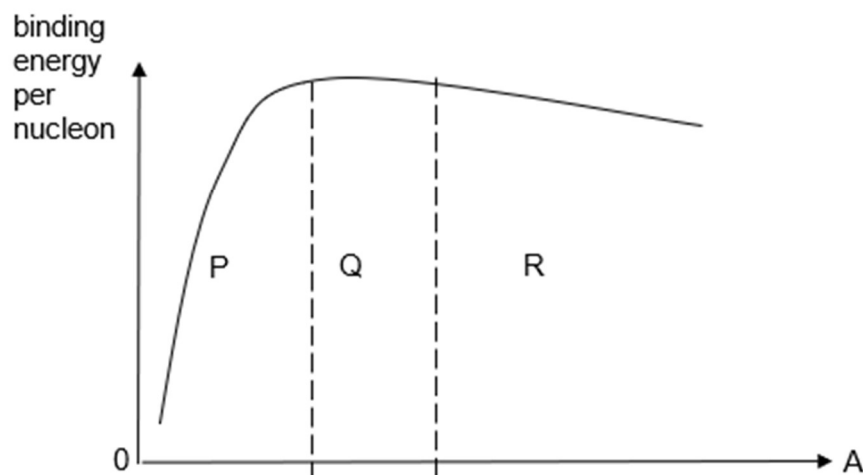
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The deviation of  $\alpha$ -particles by thin metal foils through angles that range from  $0^\circ$  to  $180^\circ$  can be explained by

- A** scattering from free electrons.
- B** scattering from bound electrons.
- C** scattering from small but heavy regions of positive charge.
- D** diffraction from the crystal lattice

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The graph shows how the binding energy per nucleon of a nucleus varies with nucleon number  $A$ .

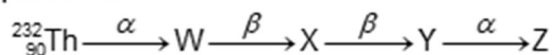


Which one of the following statements is **not** true?

- A Nuclei in region Q are more stable than nuclei in region R.
- B Nuclear fusion reactions bring nuclei in region P closer to region Q.
- C Energy is released in nuclear fission reactions from nuclei in region P.
- D The binding energy per nucleon increases most significantly at lower nucleon numbers.

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The following represents a sequence of radioactive decays involving two  $\alpha$ -particles and two  $\beta$ -particles.



What is the nuclide Z?

- A  ${}_{88}^{224}\text{Ra}$       B  ${}_{88}^{228}\text{Ra}$       C  ${}_{89}^{228}\text{Ac}$       D  ${}_{90}^{228}\text{Th}$

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Two samples of radioactive nuclides X and Y are prepared. Y has twice the initial activity and twice the half-life of X.

What is the ratio of the activity of X to Y after 6 half-lives of X?

- A  $\frac{1}{2}$       B  $\frac{1}{4}$       C  $\frac{1}{8}$       D  $\frac{1}{16}$

## H2 Physics Revision

Topic : Nuclear Physics

Multiple Choice Questions

Name: \_\_\_\_\_

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