

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

(a) Name the constituent of an atom which

(i) has zero charge,

(1)

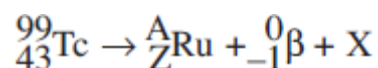
(ii) has the largest specific charge,

(1)

(iii) when removed leaves a different isotope of the element.

(1)

(b) The equation

represents the decay of technetium-99 by the emission of a β^- particle.

(i) Identify the particle X.

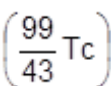
(1)

(ii) Determine the values of A and Z.

A = _____

Z = _____

(2)

 (iii) Calculate the specific charge of the technetium-99 $\left({}_{43}^{99}\text{Tc}\right)$ nucleus. State an appropriate unit for your answer.


nucleus. State an

appropriate unit for your answer.

specific charge = _____ unit _____

(4)

(Total 10 marks)

Q2.

Under certain circumstances it is possible for a photon to be converted into an electron and a positron.

- (a) State what this process is called.

(1)

- (b) A photon must have a minimum energy in order to create an electron and a positron.

Calculate the minimum energy of the photon in joules. Give your answer to an appropriate number of significant figures.

minimum energy = _____ J

(3)

- (c) A photon of slightly higher energy than that calculated in part (b) is converted into an electron and a positron.

State what happens to the excess energy.

(1)

- (d) Describe what is likely to happen to the positron shortly after its creation.

(2)

(Total 7 marks)