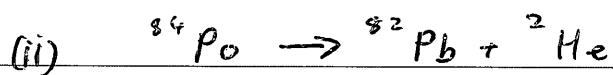


(a) (i) The Wilson cloud Chamber is able to determine whether it is an alpha or beta decay. This can be proven by passing the particle through the device and developing a reading from the density of the cloud and its radio isotopes that it produces.



$$218.00897 \rightarrow 218.99981 + 4.0026$$

$$218.00897 \rightarrow 218.00241$$

Energy released = 0.00656 J of energy released.

(b) (i) ~~$v = f\lambda$~~ $E = hf$

$c = f\lambda$

$c = \frac{E\lambda}{h}$

$$\frac{E (1.675 \times 10^{-27}) \lambda (0.2 \times 10^{-9})}{6.626 \times 10^{-34}}$$

$$= 0.0005055 c$$

$$v = \frac{3 \times 10^8}{0.0005055}$$

$$= 5.934 \times 10^{11} \text{ m s}^{-1}$$

(ii) This beam of neutrons is useful in the determination of the structure of a material as it has a low wavelength but also a high velocity. A low wavelength allows the beam of neutrons to pass past and ~~around~~ ^{through} the object, this allows the structure to be determined directly. A high velocity helps to penetrate the object which in turn develops the known structure and microstructure of the material.

(c) The spectroscope played a very important role in the development of the model of an atom. The spectroscope allowed Bohr to see what each atom was made of and how it can be changed/manipulated for certain objects. The spectroscope developed the understanding of electrons, protons, neutrons, barons, leptons and Neutrinos. Bohr found the Neutron as another part that was involved in an atom. The Neutron was a smaller version of a neutron which developed the understanding of model of the model of an atom. This development could only be have been found using the spectroscope, which has given scientist a greater understanding and perception of how the atom is made up and its structural benefits.

If you require more space to answer parts (a), (b) and (c) of the question, you may ask for an extra writing booklet.

If you have used an extra writing booklet for parts (a), (b) and (c) of the question, tick here.

(d) (i) Davisson and Germer stated that electrons fired at a crystal of nickel would either pass through or be reflected back towards the electron gun. The results for this experiment showed that $\frac{1}{2}$ electron can be broken down into multiples or multiples of the original causing the structure of an atom to be reconsidered

(ii) Davisson and Germer experiment of electron ~~be~~ fired into the crystal of nickel showed ~~that~~ the Rutherford and Bohr the increased structure that the an electron has and it has multiple different forms. This developed how Bohr perceived an atom to be and this new development showed that his new found perception of the Nucleoni. The significance of Davisson and Germer experiment is incredible as it ~~show~~ shows how the model of an atom could be changed and perceived creating new found ways from the standard model of an atom to be justified and perceived.

(e) Particles and Forces knowledge has advanced dramatically increasing the knowledge of the Atomic nucleus.

1. Particles can be broken up into smaller parts allowing the atoms to be less affected. The addition of new particles such as the neutrino, electrons, protons, and Neutrons develops the understanding of how the structure can affect and increase the development of an individuals understanding. (Bohr's experiment)

2. Large forces placed upon an atom when impacted show how it can be broken up into more pieces and developed further into new perceptions of the Atomic nucleus. This relates to Davission and Germer experiment of firing a electron into a crystal of nickel.

3. Electrons can move around the Atoms nucleus to develop a new structure. This development of the particle changes the understanding of how a nucleus behaves when it is impacted by other forces and developments.

All Three of these advances have increased society's understanding of how the atomic nucleus can be manipulated and developed in order for it to remain and develop upon its impacts of the atomic nucleus.