

Q30.

a) i) Nucleon are particles ^{that} form nucleus, they are protons and neutron.

ii) Protons has positive charge, whereas neutron is neutral.

b) i) ~~$\frac{1}{\lambda} = R_H \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$~~

$$\Delta E = 2.04 \times 10^{-18} - 1.94 \times 10^{-18}$$

$$= 0.10 \times 10^{-18} \text{ J}$$

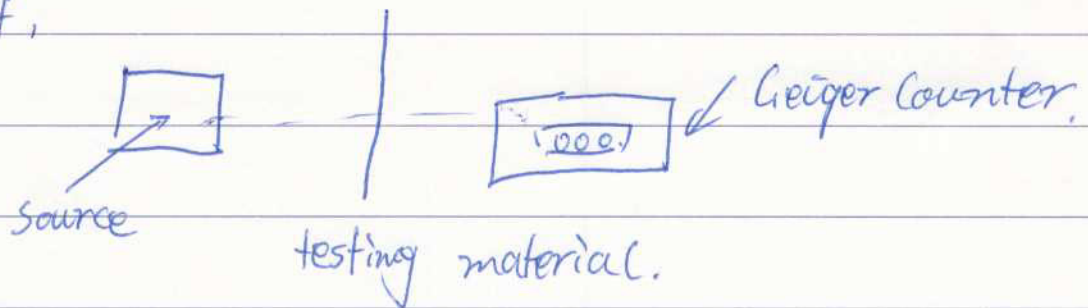
ii):

	⋮	
$n=6$	=====	$E = 2.04 \times 10^{-18}$
$n=5$	=====	$E = 1.94 \times 10^{-18}$
$n=4$	=====	
$n=3$	=====	$E = 1.63 \times 10^{-18}$
$n=2$	=====	

$n=1$. ————— $E=0$

The gap between layers decrease as the quantum number increases, the energy of the states increases as the quantum number increases

c). A radiation source is placed in front of a testing material, and place a ~~ge~~ Geiger Counter behind it,



The testing material can be a piece of sheet, a aluminium sheet, and lead sheets with different thickness.

The reading on the Counter is to be compared with the reading without and material between it for the same length of time. The result can determine if certain material can block certain radiation or decrease its speed.

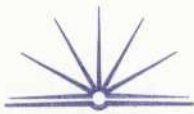
d). The Manhattan Project is a project of development of atomic bombs during World War II, it brings significant effect for society. After it has been developed, the first time it was used ~~in~~ in war is at the end of World War II, in Japan. That created a lot of damage, and also shortened the time that would be used to defeat Japan and its allies. Since the nuclear bomb is the most powerful weapon in human history, this fact leads that the countries have nuclear weapons have much more say than those countries do not ~~that~~ have it. By using the same principle, it also brings benefit to our society, such as nuclear stations. However, undoubtedly, it places human race into extreme ~~at~~ risk.

e) Chadwick did an experiment, he sends a beam of alpha particles through beryllium sheet ~~not~~ which has paraffin wax behind it, he discovered that there was a proton ~~is~~ knocked out by ~~the~~ a particle emitted from beryllium, which is chargeless, by the law of conservation of momentum, he states this particle has similar mass ~~was~~ as proton. It is named neutron. It is an enormous step in nuclear ~~to~~ science, it has ~~pro~~ shown that there is another particle in nuclei apart from protons. Fermi is the first person discovers nuclear fission by hit heavy elements ~~at~~ with neutrons. The element breaks up into ~~5~~ 2 approximately equal portion.

Chadwick's discovery of neutron is important, understandings of some other discoveries are all influenced by it.

For example, beta minus decay, ${}^0_1n \rightarrow {}^1_1p + {}^0_{-1}e$, and beta plus decay, ${}^1_1p \rightarrow {}^0_1n + {}^0_{+1}e$. ~~the~~ The discovery of neutron resulted in a greater understanding of the atom. (continued).

in both case, neutron is involved



As nuclear fission is successfully performed, it suggests that particles can be divided into sub-particles by colliding it with neutrons or some other particles. It is also discovered that when nuclear fission takes place, large amount of energy is released.