

Question number	Answer	Notes	Marks
9 (a) (i)	number of protons = 1; number of neutrons = 2;		2
(ii)	any three of the following <b>comparisons:</b> MP1. beta particle is negatively charged <u>and</u> alpha is positively charged; MP2. beta particle has lower/less mass ORA; MP3. beta particle has 1 charge but alpha has 2 charges; MP4. beta particle is an electron but alpha is $2p + 2n$ /eq; MP5. beta is less ionising; MP6. beta has higher speed; MP7. beta particles have larger range; MP8. beta has higher penetrating ability;	ignore descriptions of applications of types of radiation  allow 'beta is lighter' ORA  allow beta can pass through paper but alpha will be stopped	3
(iii)	any sensible suggestion; e.g. <ul style="list-style-type: none"> <li>alpha is 4 nucleons, tritium has (only) 3 / eq</li> <li>tritium has only 1p, 2p are in alpha</li> <li>tritium has not got enough mass / mass number too low</li> <li>tritium has not got enough nucleons</li> <li>tritium has not got enough p / atomic number too low</li> <li>tritium has not got enough p+n</li> </ul>	ignore tritium is too small	1
(b)	any two from: MP1. energy explanation; e.g. beta particles have given up all their KE on impact MP2. absorption explanation; e.g. beta particles have hit (and been absorbed by) phosphor MP3. penetration explanation; e.g. beta cannot penetrate (thick) glass / tube MP4. range explanation; e.g. signs are further away than the range of beta	ignore: <ul style="list-style-type: none"> <li>beta particles have low ionisation /OWTTE</li> <li>no gas can escape</li> </ul>	2