<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(a)</td>
<td>(\beta)-source and detector suitably arranged deflecting plates suitably arranged additional detail e.g. slit or collimator, vacuum chamber, circuit connected to deflecting plates</td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td>at least 3 readings at right angles beyond &amp; perp. to the plates one near +ve, one near –ve and one in centre</td>
</tr>
<tr>
<td></td>
<td>(c)</td>
<td>highest reading near +ve plate</td>
</tr>
<tr>
<td></td>
<td>(d)</td>
<td>electrons negatively charged, attracted to +ve</td>
</tr>
</tbody>
</table>

| 2 | (a) | correct equation i.e. Ra gives Rn + alpha particle or He all numbers correct on Rn and He | 1 1 2 |
|   | (b) | (i) radiation from surroundings/background radiation | 1 |
|   |   | (ii) 532 to 552 counts/min | 1 |
|   |   | (iii) 5/6 cm | 1 |
|   |   | (iv) beyond 5/6 cm no alpha, only background radiation | 1 4 (6) |
(a) (i) source, detector
named absorber/air and labels
(ii) take detector reading with no source (background)
detector reading with source, detector and air only
detector reading with appropriate named absorber
(including distance in air)
(iii) same reading with absorber(including air) as background
so all alpha absorbed by cardboard/paper/air, others would get through

(b) curved path stated or drawn
path at right angles to magnetic field
into paper

4 (a) top line correct, need 24 and 0
bottom line correct, need 12 and –1 (accept β or e for electron
(b) particles take curved path (accept from diagram)
move between the poles at right angles to lines of force
move out of paper
(c) (i) use detector to pick up radiation (from isotope at points on/in body etc.)
high count where circulation good or v.v. explained
(ii) alpha particles all absorbed, none detected
beta particles may be largely absorbed, not penetrative enough
gamma rays reach detector/leave body any two
c. suitable curve completed by 20 days' radioactivity left, after 1 day about 85% left.

d. at least two points worked out.

b. half-life 4 days.

A1

A1

A2

A1

A2

A1

A2