

**Marks**  
**7**

- A cyclotron facility can produce beams of neutrons or protons. Theoretically,  $^{188}_{75}\text{Re}$  can be produced by irradiation of  $^{186}_{74}\text{W}$  with either particle followed by radioactive decay of the intermediate nuclide. Give the relevant equations to describe both sequences of reactions.

neutron bombardment

proton bombardment

In practice, only the sequence using neutron bombardment is used. Give one possible reason why proton bombardment is not used.

Rhenium-188 is used for the relief of cancer-induced bone pain and has a half life of 16.7 hours. What mass of  $^{188}_{75}\text{Re}$  needs to be produced to allow shipment 24 hours later of a solution with a specific activity of 500 mCi?

Answer: