

- 5 (a) Define *electric potential* at a point.

.....  
 .....  
 .....

[2]

- (b) An isolated metal sphere is charged to a potential  $V$ . The charge on the sphere is  $q$ . The charge on the sphere may be considered to act as a point charge at the centre of the sphere.

The variation with potential  $V$  of the charge  $q$  on the sphere is shown in Fig. 5.1.

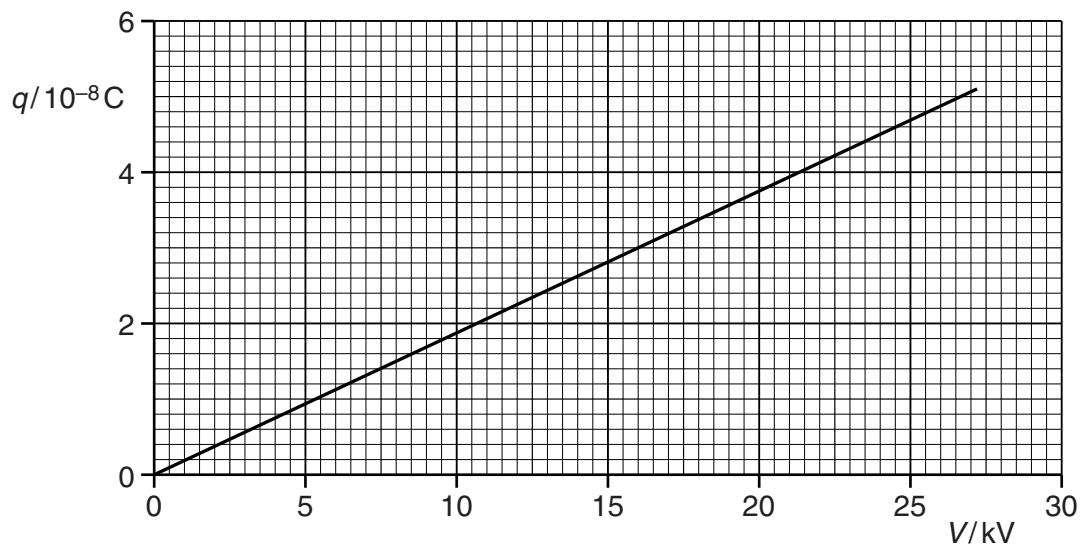


Fig. 5.1

Use Fig. 5.1 to determine

- (i) the radius of the sphere,

radius = ..... m [2]

- (ii) the energy required to increase the potential of the sphere from zero to 24 kV.

energy = ..... J [3]

- (c) The sphere in (b) discharges by causing sparks when the electric field strength at the surface of the sphere is greater than  $2.0 \times 10^6 \text{ V m}^{-1}$ .

Use your answer in (b)(i) to calculate the maximum potential to which the sphere can be charged.

potential = ..... V [3]