

5 (a) State what is meant by an *electric field*.

.....
..... [1]

(b) The electric field between an earthed metal plate and two charged metal spheres is illustrated in Fig. 5.1.

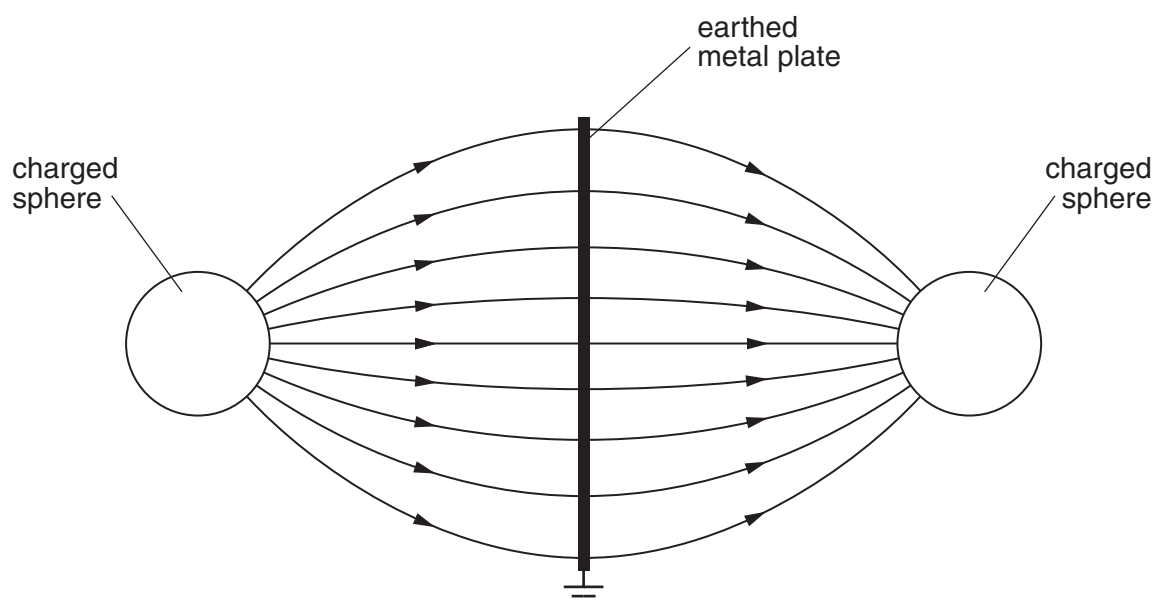


Fig. 5.1

(i) On Fig. 5.1, label each sphere with (+) or (–) to show its charge. [1]

(ii) On Fig. 5.1, mark a region where the magnitude of the electric field is

1. constant (label this region C), [1]

2. decreasing (label this region D). [1]

- (c) A molecule has its centre P of positive charge situated a distance of $2.8 \times 10^{-10} \text{ m}$ from its centre N of negative charge, as illustrated in Fig. 5.2.

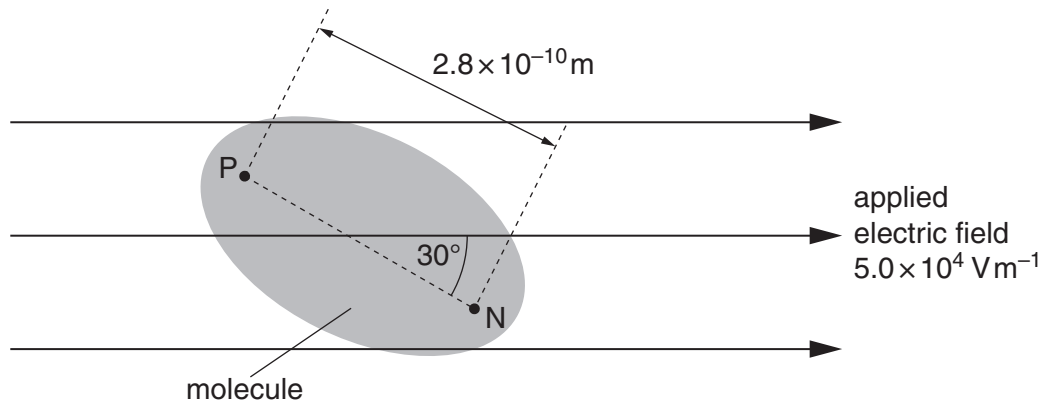


Fig. 5.2

The molecule is situated in a uniform electric field of field strength $5.0 \times 10^4 \text{ V m}^{-1}$. The axis NP of the molecule is at an angle of 30° to this uniform applied electric field. The magnitude of the charge at P and at N is $1.6 \times 10^{-19} \text{ C}$.

- (i) On Fig. 5.2, draw an arrow at P and an arrow at N to show the directions of the forces due to the applied electric field at each of these points. [1]
- (ii) Calculate the torque on the molecule produced by the forces in (i).

torque = N m [2]