AnsweronQuestion #68230-Physics / Electric Circuits

An electric dipole is placed in a uniform electric field of magnitude $5x10^{4}N/C$ with its dipole moment $4x10^{-9}Cm$ parallel to the field. Find the work done in turning the dipole till its dipole moment points in the direction opposite to the electric field.

Solution

Work done = change of the potential energy. The potential energy of the dipole in uniform electric field is given by

$$W_p = -(\mathbf{E} \cdot \mathbf{d}) = -Ed\cos\varphi.$$

Thus

$$W = W_{p_2} - W_{p_1} = -Ed(\cos 180^\circ - \cos 0^\circ) =$$
$$= 2Ed = 2 \times 5 \times 10^4 \times 4 \times 10^{-9} = 40 \times 10^{-5} \text{ J} = 0.4 \text{ mJ}.$$

Answer: 0.4 mJ.

Answer provided by https://www.AssignmentExpert.com