

Answer on Question #51524, Physics, Electromagnetism

Two large horizontal metal plate are separated by 4mm. the lower plate is at a potential of -6v. what potential should be applied to the upper plate to create electric field strength of 400V/m upwards in the space between the plates?

- a) +22V
- b) +10V
- c) -10V
- d) -22v

Answer:

Since the electric field is the negative of the gradient of the potential and the E-field is constant inside a capacitor, the magnitude of the Electric field has a very simple relation to the voltage between the plates and their separation  $d$ .

$$E = \frac{U}{d} = \frac{\varphi_1 - \varphi_2}{d}$$

$$(\varphi_1 - \varphi_2) = E \cdot d$$

$$(\varphi_1 - \varphi_2) = 400 \frac{V}{m} \cdot 0.004 m = 1.6 V$$

$$-6 V - \varphi_2 = 1.6 V$$

$$-\varphi_2 = 7.6 V$$

$$\varphi_2 = -7.6 V$$