4. In Figure 26.4, batter B supplies $12\,V$. (a) Find the charge on each capacitor first when only switch S_1 is closed and (b) later when switch S_2 is also closed. Take $C_1 = 1.0\,\mu F$, $C_2 = 2.0\,\mu F$, $C_3 = 3.0\,\mu F$ and $C_4 = 4.0\,\mu F$.

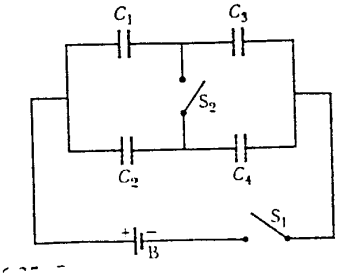

FIG. 26.4

5. A certain substance has a dielectric constant of 2.8 and a dielectric strength of $18\,MV/m$. If it is used as the dielectric material in aparallel-plate capacitor, what minimum area should the plates of the capacitor have to obtain a capacitance of $7.0 \times 10^{-2}\,\mu F$ and to ensure that the capacitor will be able to withstand a potential difference of $4.0\,kV$?

Chapter 27

1. Near Earth, the densiy of protons in the solar wind is $8.70\,cm^{-3}$ and their speed is $470\,km/s$. (a) Find the current density of these protons. (b) If Earth's magnetic field did not deflect them, the protons would strike the planet. What total current would Earth then receive?

2. A wire with a resistance of $6.0\,\Omega$ is drawn out through a die so that its new length is three times its original length. Find the resistance of the longer wire, assuming that the resistivity and density of the material are unchanged.

3. A common flashlight bulb is rated at $0.30\,A$ and $2.9\,V$ (the values of the current and voltage under operating conditions). If the resistance of the bulb filament at room temperature ($20°C$) is $1.1\,\Omega$, what is the temperature of the filament when the bulb is on? The filment is made of tungsten.

4. A cylindrical resistor of radius $5.0\,mm$ and length $2.0\,cm$ is made of material that has a resistivity of $3.5 \times 10^{-5}\,\Omega m$. What are (a) the current density and (b) the potential difference when the energy dissipation rate in the resistor is $1.0\,W$?

5. A $100\,W$ lightbulb is plugged into a standard $120\,V$ outlet. (a) How much does it cost per month to leave the light turned on continuously? Assume electricla energy costs $6c/kW.h$. (b) What is the resistance of the bulb? (c) What is the current in the bulb? (d) Is the resistance different when the bulb is turned off?

Chapter 28

1. A wire of esistance $5.0\,\Omega$ is connected o a battery whose emf E is $2.0\,V$ and whose internal resisance is $1.0\,\Omega$. In 2.0 min, (a) How much energy is transferred from chemical to electrical form? (b) How much energy appears in the wire as thermal energy? (c) Account for the fifference between (a) and (b).

2. In Figure 28.2, if the potential at point P is $100\,V$, what is the potential at point Q?

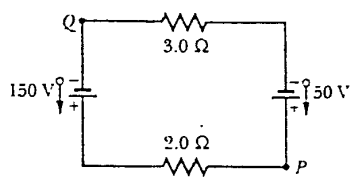

FIG. 28.2