

Exercises

Section 2.1 The Structure of Matter

- 2.1 How many electrons would together comprise a total mass of 1 kg?
- 2.2 The mass of a proton is approximately 1837 times greater than that of an electron. If the mass of a neutron is the same as that of a proton, approximately how many atoms are in a 1-kg mass of copper?
- 2.3 The element silicon has 14 protons and 14 neutrons in the nucleus of each atom. Find the number of electrons in each of the electron shells of a neutral atom.
- 2.4 The element germanium has 32 protons and 40 neutrons in the nucleus of each atom. Find the number of electrons in each of the electron shells of a neutral atom.

Section 2.3 Electric Current

- 2.5 What is the total charge, in coulombs, of 3.2×10^{15} copper atoms, each of which has lost one valence electron?
- 2.6 What is the total charge, in coulombs, of a 1-kg mass of electrons?
- 2.7 What is the current in a conductor if 4.804 C of charge passes through it in 15 ms?
- 2.8 What is the current in a conductor if 3.141×10^{15} electrons pass through it in 0.25 s?
- 2.9 How many coulombs of charge pass through a conductor in 50 ms if the current in the conductor is 2.3 A?
- 2.10 How many electrons pass through a conductor in 1 min if the current in the conductor is 200 μ A?
- 2.11 For how long must the current in a conductor equal 125 mA in order that 50 C of charge passes through it?

- 2.12 For how long must the current in a conductor equal 1 A in order that 6.242×10^{18} electrons pass through it?

Section 2.4 Electromotive Force (Voltage)

- 2.13 A certain battery has a rating of 150 A-h. For how long can it supply a current of 200 mA?
- 2.14 How much current can a battery with a rating of 80 A-h supply continuously for 150 min?

Section 2.5 Resistance

- 2.15 The resistance of a certain conductor is directly proportional to its length. If a 50-m length of the conductor has resistance 25 Ω , what is the resistance of a 75-m length?
- 2.16 The resistance of a cylinder made of a certain material is inversely proportional to the square of its diameter. If a cylinder having diameter 60 mm has resistance 1.5 k Ω , what is its resistance if the diameter is reduced to 30 mm?
- 2.17 Convert
- (a) 57.532 Ω to kilohms
 - (b) 57.532 Ω to megohms
 - (c) 0.04 k Ω to ohms
 - (d) 1250 k Ω to megohms
 - (e) 8.4×10^{-4} M Ω to kilohms
 - (f) $1.835 \times 10^5 \Omega$ to kilohms
- 2.18 Convert
- (a) 1.075 k Ω to ohms
 - (b) 94.617 Ω to kilohms
 - (c) 94.617 Ω to megohms
 - (d) 0.0032 M Ω to kilohms
 - (e) 24.83×10^3 k Ω to megohms
 - (f) 99.01×10^{-4} M Ω to kilohms

(a) $Q = I \times t$
 $= 2.3 \times 50 = 115$