***Chemistry***

**1: Essential Ideas**

**1.6: Mathematical Treatment of Measurement Results**

57. Write conversion factors (as ratios) for the number of:

(a) yards in 1 meter

(b) liters in 1 liquid quart

(c) pounds in 1 kilogram

Solution

(a) ; (b) ; (c) 

59. The label on a soft drink bottle gives the volume in two units: 2.0 L and 67.6 fl oz. Use this information to derive a conversion factor between the English and metric units. How many significant figures can you justify in your conversion factor?

Solution

Divide the total number of liters by the total number of fluid ounces.



Only two significant figures are justified.

61. Soccer is played with a round ball having a circumference between 27 and 28 in. and a weight between 14 and 16 oz. What are these specifications in units of centimeters and grams?

Solution

68–71 cm; 400–450 g

63. How many milliliters of a soft drink are contained in a 12.0-oz can?

Solution

355 mL

65. The diameter of a red blood cell is about 3 × 10–4 in. What is its diameter in centimeters?

Solution

8 × 10–4 cm

67. Is a 197-lb weight lifter light enough to compete in a class limited to those weighing 90 kg or less?

Solution

yes; weight = 89.4 kg

69. Many medical laboratory tests are run using 5.0 μL blood serum. What is this volume in milliliters?

Solution

5.0 × 10–3 mL

71. Use scientific (exponential) notation to express the following quantities in terms of the SI base units in Table1.3:

(a) 0.13 g

(b) 232 Gg

(c) 5.23 pm

(d) 86.3 mg

(e) 37.6 cm

(f) 54 μm

(g) 1 Ts

(h) 27 ps

(i) 0.15 mK

Solution

(a) 1.3 × 10–4 kg; (b) 2.32 × 108 kg; (c) 5.23 × 10–12 m; (d) 8.63 × 10–5 kg; (e) 3.76 × 10–1 m; (f) 5.4 × 10–5 m; (g) 1 × 1012 s; (h) 2. 7 × 10–11 s; (i) l.5 × 10–4 K

73. Gasoline is sold by the liter in many countries. How many liters are required to fill a 12.0-gal gas tank?

Solution

45.4 L

75. A long ton is defined as exactly 2240 lb. What is this mass in kilograms?

Solution



77. Make the conversion indicated in each of the following:

(a) the length of a soccer field, 120 m (three significant figures), to feet

(b) the height of Mt. Kilimanjaro, at 19,565 ft the highest mountain in Africa, to kilometers

(c) the area of an 8.5 × 11-inch sheet of paper in cm2

(d) the displacement volume of an automobile engine, 161 in.3, to liters

(e) the estimated mass of the atmosphere, 5.6 × 1015 tons, to kilograms

(f) the mass of a bushel of rye, 32.0 lb, to kilograms

(g) the mass of a 5.00-grain aspirin tablet to milligrams (1 grain = 0.00229 oz)

Solution

(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

(g) 



79. A chemist’s 50-Trillion Angstrom Run (see Exercise 21) would be an archeologist’s 10,900 cubit run. How long is one cubit in meters and in feet? ()

Solution





81. As an instructor is preparing for an experiment, he requires 225 g phosphoric acid. The only container readily available is a 150-mL Erlenmeyer flask. Is it large enough to contain the acid, whose density is 1.83 g/mL?

Solution

Yes, the acid's volume is 123 mL.

83. A chemistry student is 159 cm tall and weighs 45.8 kg. What is her height in inches and weight in pounds?

Solution

62.6 in (about 5 ft 3 in.) and 101 lb

85. Solve these problems about lumber dimensions.

(a) To describe to a European how houses are constructed in the US, the dimensions of “two-by-four” lumber must be converted into metric units. The thickness × width × length dimensions are 1.50 in. × 3.50 in. × 8.00 ft in the US. What are the dimensions in cm × cm × m?

(b) This lumber can be used as vertical studs, which are typically placed 16.0 in. apart. What is that distance in centimeters?

Solution

(a) 3.81 cm × 8.89 cm × 2.44 m; (b) 40.6 cm

87. Calculate the density of aluminum if 27.6 cm3 has a mass of 74.6 g.

Solution

2.70 g/cm3

89. Calculate these masses.

(a) What is the mass of 6.00 cm3 of mercury, density = 13.5939 g/cm3?

(b) What is the mass of 25.0 mL octane, density = 0.702 g/cm3?

Solution

(a) 81.6 g; (b) 17.6 g

91. Calculate these volumes.

(a) What is the volume of 25 g iodine, density = 4.93 g/cm3?

(b) What is the volume of 3.28 g gaseous hydrogen, density = 0.089 g/L?

Solution

(a) 5.1 mL; (b) 37 L

93. Convert the boiling temperature of gold, 2966 °C, into degrees Fahrenheit and kelvin.

Solution

5371 °F, 3239 K

95. Convert the temperature of the coldest area in a freezer, –10 °F, to degrees Celsius and kelvin.

Solution

–23 °C, 250 K

97. Convert the boiling temperature of liquid ammonia, –28.1 °F, into degrees Celsius and kelvin.

Solution

–33.4 °C, 239.8 K

99. The weather in Europe was unusually warm during the summer of 1995. The TV news reported temperatures as high as 45 °C. What was the temperature on the Fahrenheit scale?

Solution

113 °F

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