

**CHEM 1311**  
**Homework**  
**Matter & Measurement**

1. (0.38) Carry out the following conversions:
  - (a)  $5\text{pm} = \underline{\hspace{1cm}} \text{cm} = \underline{\hspace{1cm}} \text{nm}$
  - (b)  $8.5 \text{ cm}^3 = \underline{\hspace{1cm}} \text{m}^3 \underline{\hspace{1cm}} \text{nm}^3$
  - (c)  $65.2 \text{ mg} = \underline{\hspace{1cm}} \text{g} = \underline{\hspace{1cm}} \text{pg}$
  
2. (0.39) Which is larger, and by approximately how much?
  - (a) A liter or a quart
  - (b) A mile or a kilometer
  - (c) A gram or an ounce
  - (d) A centimeter or an inch
  
3. (0.40) How many significant figures are in each of the following measurements?
  - (a) 35.0445 g
  - (b) 59.0001 cm
  - (c) 0.03003 kg
  - (d) 0.00450 m
  - (e) 67,000 m<sup>2</sup>
  - (t)  $3.8200 \times 10^3 \text{ L}$
  
4. (0.41) How many significant figures are in each of the following measurements?
  - (a) \$130.95
  - (b) 2000.003 g
  - (c) 5 ft 3 in.
  - (d) 510 J
  - (e)  $5.10 \times 10^2 \text{ J}$
  - (f) 10 students
  
5. (0.42) The Vehicle Assembly Building at the John F. Kennedy Space Center in Cape Canaveral, Florida, is the largest building in the world, with a volume of 3,666,500 m<sup>3</sup>. Express this volume in scientific notation.
  
6. (0.43) The diameter of the Earth at the equator is 7926.381 mi. Round this quantity to four significant figures; to two significant figures. Express the answers in scientific notation.
  
7. (0.44) Express the following measurements in scientific notation:
  - (a) 453.32 mg
  - (b) 0.000042 L
  - (c) 667,000 g
  
8. (0.45) Convert the following measurements from scientific notation to standard notation:
  - (a)  $3.221 \times 10^{-3} \text{ mm}$
  - (b)  $8.940 \times 10^5 \text{ m}$
  - (c)  $1.35082 \times 10^{-12} \text{ m}^3$
  - (d)  $6.4100 \times 10^2 \text{ km}$
  
9. (0.46) Round the following quantities to the number of significant figures indicated in parentheses:
  - (a) 35,670.06 m (4, 6)
  - (b) 68.507 g (2, 3)
  - (c)  $4.995 \times 10^3 \text{ cm}$  (3)
  - (d)  $2.30985 \times 10^{-4} \text{ kg}$  (5)
  
10. (0.47) Round the following quantities to the number of significant figures indicated in parentheses:
  - (a) 7.0001 kg (4)
  - (b) 1.605 km (3)
  - (c)  $13.2151 \text{ g/cm}^3$  (3)
  - (d) 2,300,000.1 (7)

11. (0.48) Express the results of the following calculations with the correct significant figures:
- (a)  $4.884 \times 2.05$                       (b)  $94.61 \div 3.7$   
(c)  $3.7 \div 94.61$                       (d)  $5502.3 + 24 + 0.01$   
(e)  $86.3 + 1.42 - 0.09$               (t)  $5.7 \times 2.31$
12. (0.49) Express the results of the following calculations with the correct number of significant figures:
- (a)  $\frac{3.41-0.23}{5.233} \times 0.205$               (b)  $\frac{5.556 \times 2.3}{4.223-0.08}$
13. (0.52) The normal body temperature of a goat is  $39.9^\circ\text{C}$ , and that of an Australian spiny anteater is  $22.2^\circ\text{C}$ . Express these temperatures in degrees Fahrenheit.
14. (0.53) Of the 90 or so naturally occurring elements, only four are liquid near room temperature: mercury (melting point =  $-38.87^\circ\text{C}$ ), bromine (melting point =  $-7.2^\circ\text{C}$ ), cesium (melting point =  $28.40^\circ\text{C}$ ), and gallium (melting point =  $29.78^\circ\text{C}$ ). Convert these melting points to degrees Fahrenheit.
15. (0.54) Tungsten, the element used to make filaments in light bulbs, has a melting point of  $6192^\circ\text{F}$ . Convert this temperature to degrees Celsius and to kelvin.
16. (0.55) Suppose that your oven is calibrated in degrees Fahrenheit but a recipe calls for you to bake at  $175^\circ\text{C}$ . What oven setting should you use?
17. (0.58) The density of silver is  $10.5\text{ g/cm}^3$ . What is the mass (in kilograms) of a cube of silver that measures  $0.62\text{ m}$  on each side?
18. (0.59) A vessel contains  $4.67\text{ L}$  of bromine, whose density is  $3.10\text{ g/cm}^3$ . What is the mass of the bromine in the vessel in kilograms?
19. (0.60) Aspirin has a density of  $1.40\text{ g/cm}^3$ . What is the volume in cubic centimeters of an aspirin tablet weighing  $250\text{ mg}$ ? Of a tablet weighing  $500\text{ lb}$ ?
20. (0.61) Gaseous hydrogen has a density of  $0.0899\text{ g/L}$  at  $0^\circ\text{C}$ , and gaseous chlorine has a density of  $3.214\text{ g/L}$  at the same temperature. How many liters of each would you need if you wanted  $1.0078\text{ g}$  of hydrogen and  $35.45\text{ g}$  of chlorine?
21. (0.62) What is the density of lead in  $\text{g/cm}^3$  if a rectangular bar measuring  $0.50\text{ cm}$  in height,  $1.55\text{ cm}$  in width, and  $25.00\text{ cm}$  in length having a mass of  $220.9\text{ g}$ ?
22. (0.63) What is the density of lithium metal in  $\text{g/cm}^3$  if a cylindrical wire with a diameter of  $2.40\text{ mm}$  and a length of  $15.0\text{ cm}$  has a mass of  $0.3624\text{ g}$ ?

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23. Carry out the following conversions:

(a)  $612 \text{ g} = \underline{\hspace{1cm}} \text{ mg}$

(b)  $781 \text{ mL} = \underline{\hspace{1cm}} \text{ L}$

(c)  $8.160 \text{ m} = \underline{\hspace{1cm}} \text{ cm}$

24. Providing an aspirin tablet contains 325 mg of aspirin, determine how many grams of aspirin the tablet contains.

25. A soccer field is 120. m. Given that one meter is 1.094 yd, determine the field's length in feet.