

# 1 Chapter Test

## Chemistry and You

### Multiple Choice

On the line at the left, write the letter of the answer that best completes each sentence.

- B 1. A tentative answer to a scientific question is called a
  - a. theory.
  - b. conclusion.
  - c. law.
  - d. hypothesis.
- D 2. Experimentation involves the testing of
  - a. laws.
  - b. variables.
  - c. classification.
  - d. conversions.
3. The most important rule in lab safety is to
  - a. wear gloves.
  - b. know your equipment.
  - c. follow instructions.
  - d. clean up when you're finished.
4. An example of an SI base unit is a
  - a. kilogram.
  - b. force.
  - c. pressure.
  - d. power.
5. An example of a derived quantity is
  - a. area.
  - b. mass.
  - c. length.
  - d. time.
6. Measurements are always uncertain because
  - a. instruments aren't precise.
  - b. measurements involve some estimation.
  - c. people don't know how to use instruments.
  - d. both a and b
7. A measurement that is very close to the standard accepted <sup>\*</sup>value is said to be
  - a. analogous.
  - b. precise.
  - c. accurate.
  - d. uncertain.
- D 8. Zeros are always considered significant digits when they
  - a. function as place keepers.
  - b. occur between two nonzero numbers.
  - c. precede a decimal point.
  - d. both a and b

# 1 Chapter Test (continued)

9. The unit of measure for density is  
a. g/s.  
b. g/C°.  
c. g/cm³.  
d. g/Kg.
10. How many significant digits are in the measurement 0.005 030 g?  
a. 3  
b. 4  
c. 5  
d. 7
11. The technique of dimension analysis is used to  
a. convert a very large number into an easier-to-use form.  
b. determine the independent variable on a graph.  
c. convert units of measurement.  
d. develop a testable hypothesis.

## True or False

If the statement is true, write "true." If it is false, change the underlined word or words to make the statement true.

- hair & clothes 12. The safety symbol showing a flame should remind you to secure all loose equipment.
- T 13. The meter is the SI base unit for measuring length.
- milli- 14. The metric prefix centi- means one thousandth, or 0.001.
- precise 15. A sensitive measuring instrument will give consistent results under the same conditions.

## Problems

Express each of the following in scientific notation.

16. 0.000 000 015 cm  
 $1.5 \times 10^{-8}$
17. 1,360,000,000 g  
 $1.36 \times 10^9$

Perform the following calculations, then round off each answer to the proper number of significant digits.

18.  $6.15 \text{ m} \times 3.026 \text{ m} \times 0.018 \text{ m}$   
2 sig. figs.  
 $0.33 \text{ m}^3$
19.  $\frac{1.6305 \text{ g}}{2.0 \text{ m}^3}$   
2 sig. figs.  
 $0.82 \text{ g/m}^3$

# 1 Chapter Test (continued)

20. Identify how many significant digits are in each of the following measurements and write your answer on the line.

6 a. 187.032 g

3 c.  $1.30 \times 10^{-12}$  kg

3 b. 0.0601 m<sup>3</sup>

2 d. 620 L

Solve each of the following problems as directed. Show all your work.

21. Convert 160.57 g into each of the following units. Use scientific notation where convenient.

a. 0.16057 kg

$$\frac{160.57 \text{ g}}{1000 \text{ g}} = 0.16057 \text{ kg}$$

b.  $1.6057 \times 10^8$   $\mu\text{g}$

$$\frac{160.57 \text{ g}}{1 \times 10^{-6} \text{ g}} = 1.6057 \times 10^8 \mu\text{g}$$

$$\frac{160.57 \text{ g}}{1000 \text{ mg}} = 160.57 \text{ mg}$$

c. 160.570 mg

$$\frac{160.57 \text{ g}}{1 \text{ g}} = 160.570 \text{ mg}$$

22. The density of iron is 7.86 g/cm<sup>3</sup>. You are given an unknown metal that has a volume of 30.1 cm<sup>3</sup>. What would the mass of the sample be if the metal is iron?

$$d = \frac{m}{V}$$

$$7.86 = \frac{m}{30.1}$$

$$7.86 \times 30.1 = m = 236.586$$

$$m = 237 \text{ g}$$

23. Calculate the number of feet in a 5-km race, given the following unit equalities: 1 in = 2.54 cm; 12 in = 1 ft.

$$\frac{5 \text{ km}}{1 \text{ km}} \times \frac{1000 \text{ m}}{1000 \text{ m}} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ in}} = \frac{5000}{30.4}$$

$$= 16.447 \text{ feet}$$

## Essays

Write your answers to the following questions on a separate sheet of paper.

24. Explain how you would use the scientific method to determine whether or not dogs can see color. Be sure to include each of the steps of the scientific method as discussed in the chapter.
25. Could you generate a natural law from the results you would obtain in question 24? Explain.

No. Laws come after many supported theories.

Laws = big ideas / patterns

## 3 Chapter Test

### Atomic Structure

#### Multiple Choice

On the line at the left, write the letter of the answer that best completes each statement.

- c 1. An atom is
  - a. a tiny, indivisible particle.
  - b. the smallest piece of matter.
  - c. the smallest particle of an element that retains the chemical identity of that element.
  - d. an artificially assembled unit that contains protons and electrons.
- b 2. Dalton's atomic theory did NOT include the postulate that
  - a. matter is made of small particles called atoms.
  - b. atoms contain electrons, protons, and neutrons.
  - c. atoms are neither created nor destroyed in chemical reactions.
  - d. compounds always contain the same relative numbers and kinds of atoms.
- c 3. The electrical charges in an atom are located
  - a. only in the nucleus.
  - b. on protons and neutrons.
  - c. on protons and electrons.
  - d. on protons, electrons, and neutrons.
- d 4. J. J. Thomson concluded that a cathode ray contains negatively charged particles by studying how
  - a. the cathode ray produced a green spot on the fluorescent screen.
  - b. a magnetic field deflected the ray's path.
  - c. the ray was deflected by electrically charged plates.
  - d. both b and c.
- b 5. Which of the following is a true statement about radiation?
  - a. Alpha radiation consists of particles with a 4+ charge.
  - b. Beta radiation consists of high-speed electrons.
  - c. Gamma radiation would be deflected toward positive plates.
  - d. All forms of radiation can penetrate a lead plate.
- c 6. Rutherford's alpha scattering experiment indicated that
  - a. the nucleus of an atom occupies most of an atom's volume.
  - b. positive charges are dispersed throughout the atom.
  - c. positive charges are concentrated in a very small core at the atom's center.
  - d. protons and neutrons are located in the nucleus.

### 3 Chapter Test (continued)

- a 7. Scientists have determined that electrons  
 a. move in the space around the nucleus.  
 b. have a mass equal to the mass of protons.  
 c. orbit the nucleus in a well-defined path.  
 d. are electrically neutral.
- b 8. Atoms of each element contain a unique number of  
 a. neutrons in their nuclei.  
 b. protons in their nuclei. *atomic #*  
 c. electrons in their nuclei.  
 d. all of the above
- c 9. Two isotopes of the same element may have different  
 a. mass numbers and atomic numbers.  
 b. numbers of protons and numbers of neutrons.  
 c. mass numbers and numbers of neutrons.  
 d. chemical properties.
- d 10. An atom may be radioactive if the nucleus contains  
 a. more than 83 protons.  
 b. too few neutrons.  
 c. too many neutrons.  
 d. all of the above

### True or False

If the statement is true, write "true." If it is false, change the underlined word or words to make the statement true. Write your answer on the line provided.

- Farraday 11. John Dalton suggested that the structure of the atom was somehow related to electricity.
- Static electricity 12. A cathode ray comes from electrical charges that are not in motion.
- T 13. From his oil drop experiment, Millikan calculated that the mass of an electron is very small in relation to the mass of a proton.
- neutrons 14. Atoms of nitrogen-14 and nitrogen-15 differ from each other only in the number of electrons they possess.
- T 15. Beta radiation is represented by the symbol  ${}^0_{-1}e^{-}$ .

### 3 Chapter Test (continued)

#### Problems

Use a periodic table to complete the following chart.

|     | Chemical Symbol         | Number of protons | Number of electrons | Number of neutrons | Atom or ion? |
|-----|-------------------------|-------------------|---------------------|--------------------|--------------|
| 16. | $^{131}_{53}\text{I}^-$ | 53                | 54                  | $131 - 53 = 78$    | ion          |
| 17. | Br                      | 35                | 36                  | 45                 | ion          |
| 18. | Na                      | 11                | 11                  | 12                 | atom         |
| 19. | Cs                      | 23                | 55                  | 78                 | atom         |

Write the nuclear reaction for each of the following radioactive decays.

20. alpha decay of  $^{230}_{90}\text{Th}$   $\rightarrow$   $^4_2\alpha$  +  $^{226}_{88}\text{Ra}$
21. beta decay of  $^{14}_6\text{C}$   $\rightarrow$   $^0_{-1}\beta$  +  $^{14}_7\text{N}$

#### Short Answer

Answer each of the following questions in the space provided.

22. Why do chemical properties change in atoms that undergo radioactive decay?

$\neq$  proton change  $\rightarrow$  new element

23. Draw both Thomson's and Rutherford's models of a lithium atom.



- 23.5 Nuclei need neutrons to overcome the repelling force of the pos. charged protons.

#### Essays

Write your answers to each of the following questions on a separate sheet of paper.

24. Is most of the volume of an atom empty space? Explain.   
small nucleus e center  
small e<sup>-</sup>s in e<sup>-</sup> cloud
25. Describe the impact that scientific discoveries about the structure of the atom have had on your life.   
 - plastics

#### 26. Fission + Fusion Reactions