

From textbook: 5,9,15,17,23,25,27,29,31,37,39,43,45,47,49,51,53,55,57,59,61,63,65,67,69,71,73,75,77 and 79

- Complete the following sentence. A *scientific law* is:
  - a tentative explanation for a set of observations that can be tested by further experimentation.
  - a statement describing a relationship between phenomena that is always the same under the same conditions.
  - a unifying principle that explains a body of facts and relations.
  - a model used to visualize the invisible.
- Which one of these is an example of a *physical* property?
  - dynamite explodes
  - meat rots if it is not refrigerated
  - honey tastes sweet
  - ice floats on top of liquid water
  - a silver platter tarnishes
- Which one of these represents a *chemical* change?
  - lard when heated changes to liquid
  - water disappears from a beaker in a few days at room temperature
  - sugar dissolving in water
  - milk turns sour in a few days at room temperature
  - water boils below 100°C on a mountain
- The diameter of an atom is approximately  $1 \times 10^{-8}$  cm. What is this diameter when expressed in nanometers?
  - $1 \times 10^{-19}$  nm
  - $1 \times 10^{-15}$  nm
  - $1 \times 10^1$  nm
  - $1 \times 10^{-10}$  nm
  - $1 \times 10^{-1}$  nm
- A particular flask has a mass of 17.4916 g when empty. When filled with ordinary water at 20.0°C (density = 0.9982 g/mL), the mass of the flask is now 43.9616 g. The density of so-called "heavy water" at 20.0°C is 1.1053 g/mL. What will the mass of the flask be when filled with heavy water at 20.0°C?
- An object sinks when placed in water if the mass of the object is greater than the mass of the water that the object displaces. Which of these objects will *not* sink when dropped into a bucket of water? (Given: density of water = 1.00 g/cm<sup>3</sup>)
  - a cube of aluminum (density = 2.702 g/cm<sup>3</sup>)
  - a diamond (density = 3.51 g/cm<sup>3</sup>)
  - a chunk of dry ice (density = 1.56 g/cm<sup>3</sup>)
  - a chunk of sodium (density = 0.91 g/cm<sup>3</sup>)
  - a sphere of magnesium (density = 1.74 g/cm<sup>3</sup>)
- The city of Los Angeles is now approximately 2400 miles south of Anchorage, Alaska. It is moving slowly northward as the San Andreas fault slides along. If Los Angeles is to arrive near Anchorage, Alaska, in 76 million years, at what average rate will it have to move in mm per month?
- Radio waves travel at the speed of light, which is  $3.00 \times 10^8$  m/s. How many kilometers will radio messages to outer space travel in exactly one year?

9. An aluminum can weighs 15.8 g. *The Wall Street Journal* lists the price for aluminum at \$.528 per pound. How much is this can worth? (1 lb = 454 g)
10. A. Classify a penny as a *pure substance* or a *mixture*.  
B. Classify snow as a *pure substance* or a *mixture*.
11. All of the following are atoms except:
- A. Cl                      B. N                      C. O<sub>2</sub>                      D. Na                      E. S
12. Which of the following would be classified as a mixture?
- A. seawater                      B. boiling water                      C. ice  
D. sugar                      E. baking soda
13. Which of the following is a pure substance?
- A. salt                      B. bourbon whiskey                      C. tea  
D. wine                      E. brass
14. A homogeneous mixture can be described as:
- A. one prepared by shaking flour with water.  
B. a substance like a rock.  
C. one which is a patchwork of aggregates of different substances.  
D. one in which the composition of the mixture is the same throughout the sample.  
E. a solution like milk.
15. All of the following are heterogeneous mixtures except:
- A. vodka.                      B. milk.                      C. a rock.  
D. sour cream.                      E. a precipitate in water.
16. Which of the following is an alloy?
- A. A homogeneous mixture of two different metallic elements.  
B. Solid copper mixed with molten copper.  
C. A metallic coating of one metal on another different metal.  
D. A homogeneous mixture of two different nonmetals.  
E. A metallic element.
17. Which of the following is a chemical property of methane (natural gas)?
- A. Methane melts at 89 K.  
B. Methane-air mixtures burn.  
C. Liquid methane is a poor conductor of electricity.  
D. Solid methane has a density of 0.415 g/mL.  
E. Methane is a colorless, odorless gas at room temperature.

18. Which of the following is a chemical property of zinc?
- A. Zinc conducts electricity.
  - B. The density of zinc is 7.14 g/mL.
  - C. Zinc dissolves in hydrochloric acid with the evolution of hydrogen gas.
  - D. Zinc is bluish-white in color.
  - E. Zinc melts at 1180 K.
19. An example of a chemical change is:
- A. the melting of ice to form water.
  - B. the boiling of water to form steam.
  - C. the formation of frost when moist air passes over a cold surface.
  - D. the burning of hydrogen in air to form water.
  - E. the evaporation of water on a hot day.
20. An example of a physical property is:
- A. the reaction of rubidium with water to form rubidium hydroxide.
  - B. the reaction of cesium with oxygen to form cesium superoxide.
  - C. the burning of sulfur to form sulfur dioxide.
  - D. the energy content of liquid sodium.
  - E. the density of boron.
21. What is the prefix corresponding to the factor  $10^{-3}$  ?
22. What is the prefix corresponding to the factor  $10^{-2}$  ?
23. A bottle of cola purchased in Europe gave the volume as 50 cL. What is the volume in mL?
24. The atmosphere of the earth extends about 60 miles. If 1 km = 0.6214 mi, what distance does this correspond to in km?
25. Which of the following is longest?
- A. 2.0 nm
  - B. 200 pm
  - C.  $2.0 \times 10^{-4}$  m
  - D.  $2.0 \times 10^{-9}$  dm
  - E.  $2.0 \times 10^{-10}$  cm
26. All of the following are intensive properties of a substance except:
- A. mass.
  - B. melting point.
  - C. density.
  - D. pressure.
  - E. temperature.

27. A 5-g sample of lead is bluish-white in color and is very soft and malleable. It has a melting point of 600 K and a boiling point of 1893 K. At 20°C its density is 11.35 g/cm<sup>3</sup>. Which property of lead is an extensive property?
- A. The color of lead.
  - B. The mass of lead.
  - C. The density of lead.
  - D. The melting and boiling points of lead.
  - E. The soft, malleable qualities of lead.
28. All of the following are intensive properties of a substance except:
- A. internal energy.
  - B. temperature.
  - C. density.
  - D. solubility.
  - E. color.
29. A gold coin with a mass of 96.5 g is placed in exactly 100 mL of water in a graduated cylinder. If 5.0 mL of water are displaced from the cylinder, what is the density of the coin with the correct number of significant figures?
30. A gold brick measures 5.00 × 10.0 × 20.0 cm. If the density of gold is 19.3 g/cm<sup>3</sup>, what is the mass of the brick in pounds? (1 lb = 454 g)
31. Exactly 1 m<sup>3</sup> is equal to how many Liters?
32. An automobile from Germany had a gasoline consumption rating of 20 km/L. What is the American rating for this car in mi/gal? (1.6 km = 1 mi and 1 gal = 3.785 L)
33. A fast chemistry professor runs a 10 km race at the rate of exactly 6 min/mi. If 1 mi = 1.61 km, how long does it take her to run the race?
34. Which of the measured numbers below has the greatest number of significant figures?
- A. 0.3100
  - B. 0.00310
  - C. 310.
  - D. 3.1 × 10<sup>-4</sup>
  - E. 0.000310
35. How many zeros are significant in the measured number 0.001050 miles?
36. What answer should be reported if 0.57 cm is subtracted from 10.003 cm?
37. When the calculation
- $$4.60 \times 9.315 - 1.0 \times 10^{-2}$$

is carried out, what is the number of significant figures in the answer?

38. When the calculation

$$(32.8070 + 1.0200) * 0.000201$$

is carried out, what is the number of significant figures in the answer?

39. How many significant figures are there in the measured number 0.0020340?

40. If a piece of wood has a mass of 1.78 g and a volume of 1.2 cm<sup>3</sup>, the density, reported to the correct number of significant figures, is:

**Answers:**

1. B

4. E

7. 4.2 mm/mo

10. Snow = pure Penny = mixture

13. A

16. A

19. D

22. centi.

25. C

28. A

31. 1000 L

34. A

37. 3

40. 1.5 g/mL

2. D

5. 46.8016 g

8.  $9.46 \times 10^{12}$  km

11. C

14. D

17. B

20. E

23. 500 mL

26. A

29. 19 g/mL

32. 47 mi/gal

35. 2

38. 3

3. D

6. D

9. \$ 0.0184

12. A

15. A

18. C

21. milli.

24. 97 km

27. B

30. 42.6 lb

33. 37.3 min

36. 9.43 cm

39. 5