

Brown-Holme Test Bank

Chapter 1

True-False Questions

1. T or F Chemistry is the study of matter and the changes it undergoes.

Answer: True

2. T or F Nanoengineering involves the use of very tiny screws and rivets to hold the nanodevice together.

Answer: False

3. T or F Technological advances open new areas of resources

Answer: True

4. T or F The Scientific Method involves creating a series of empirical data until the solution to a question is found.

Answer: False

5. T or F All molecules are combinations of two or more elements

Answer: False

6. T or F Accuracy of a data set is related to how well the average value of the data set matches the known value

Answer: True

7. T or F All molecular motion ceases at 0 Kelvin

Answer: True

8. T or F Zeros to the right of the decimal and before the first non-zero number are always significant.

Answer: False

9. T or F -40 degrees is the point at which the Fahrenheit and Celsius scales intersect

Answer: True

10. T or F Units are of no value to engineers, and therefore, can be ignored in a calculation.

Answer: False

Multiple Choice

11. A substance is said to be matter if it

- a. has volume and occupies space
- b. has mass and occupies space
- c. has shape and mass
- d. has shape and volume

Answer: B

12. The ratio of mass to volume is the property referred to as

- a. density
- b. volume
- c. weight
- d. molar enthalpy

Answer: A

13. Compared to metals with lower malleabilities, a highly malleable metal is always

- a. higher in melting point
- b. higher in luster
- c. more chemical reactive
- d. easier to form and shape with tools

Answer: D

14. At the macroscopic level, a gas

- a. is hard and does not change shape
- b. adapts to the shape of the container and possesses fixed volume
- c. expands to occupy the entire volume of its container
- d. is odorless

Answer: C

15. The combustion of propane represents a

- a. physical property
- b. chemical property

Answer: B

16. Which of the following are examples of molecules:

- a. H_2O
- b. H_2
- c. S_8
- d. all of the above

Answer: D

17. Unidirectional errors in a measurement are indicative of

- a. systemic error
- b. gross error
- c. random error
- d. indeterminate error

Answer: A

18. Consider a rifle target in which a closely grouped (< 2 cm diameter) set of shots are located 15 cm away from the “bull’s-eye”. This illustrates

- a. good accuracy and poor precision
- b. good accuracy and good precision
- c. poor accuracy and good precision
- d. poor accuracy and poor precision

Answer: C

19. A cylinder of 5.0 cm height has a radius of 2.00 cm. The volume of the cylinder is

- a. 10 cm^2
- b. 63 cm^3
- c. 63
- d. 62.8 cm^3

Answer: B

20. An apple weighing 326.2 grams is bitten. After the bite, the apple weighs 278.3 grams. What mass, in SI units, was removed from the apple as a result of this bite?

- a. 47.9 grams
- b. 47.90 grams
- c. .0479 kg
- d. 0.0479 kg

Answer: D

21. An earth-mover's engine coolant "tests" to $-23\text{ }^{\circ}\text{F}$. What is the corresponding temperature on the Celsius scale?

- a. $-31\text{ }^{\circ}\text{C}$
- b. $-1.2\text{ }^{\circ}\text{C}$
- c. $-99\text{ }^{\circ}\text{C}$
- d. $-1.25\text{ }^{\circ}\text{C}$

Answer: A

22. Very shortly after starting a V6 automobile engine, water is observed dripping from the tailpipe of the car. Given that water is a product of hydrocarbon combustion, we can deduce that the combustion events requires which of the following substances:

- a. N_2
- b. O_2
- c. Ar
- d. CO_2

Answer: B

23. Given that 1 calorie = 4.184 joules and 1 gram of fat contains 9 kcal, how much energy is released when 1 pound of body fat is burned in metabolism?

- a. $2 \times 10^7\text{ J}$
- b. $2.1 \times 10^{-1}\text{ J}$
- c. $8 \times 10^4\text{ J}$
- d. $1.71 \times 10^4\text{ kJ}$

Answer: A

24. A new metal alloy has been developed to replace the material used in a particular gear cog. If the new alloy cog displaces 11.68 mL of water and has a mass of 30.952 grams, the alloy has a density of

- a. 11.68 g/cm^3
- b. 0.3774 g/cm^3
- c. 35.16 g/cm^3
- d. 2.650 g/cm^3

Answer: D

25. The correct number of significant figures in the value 54.820 is

- a. three
- b. four
- c. five
- d. six

Answer: C

26. The correct number of significant figures in the value 0.02030 is

- a. three
- b. four
- c. five
- d. six

Answer: B

27. The correct number of significant figures in the value 9.102×10^3 is

- a. four
- b. five
- c. six
- d. seven

Answer: A

28. A new 3.5 inch Czerney-Turner monochromator grating has 650 grooves/mm. The total number of grooves is

- a. 5.8×10^2 grooves
- b. 9.0×10^3 grooves
- c. 5.8×10^4 grooves
- d. 2.3×10^4 grooves

Answer: C

29. After two years a study demonstrates that the most efficient lubricant temperature for a particular roller bearing in an assembly line is 81.7 F°. What temperature does this correspond to in Kelvin?

- a. 300.8 K
- b. 363 K
- c. 304 K
- d. 362.6 K

Answer: A

30. The human brain contains approximately 50 ppm iron on a wet-weight basis (fresh tissue). How much iron is present in 400 mg of fresh human brain tissue?

- a. 20 µg
- b. 20 mg
- c. 20 g
- d. 2.0×10^{-3} mg

Answer: A

31. One-fifth (20.0%) of the volume of a compromised underground fuel tank has seeped into the surrounding soil and groundwater. If the storage tank was originally filled to its a 10,522 gallon capacity and the average density of the spilled fuel is 0.78 g/cm³, what mass of fuel has leaked into the surrounding environment?

- a. 6.20×10^6 kg
- b. 1.02×10^4 kg
- c. 7.1×10^4 kg
- d. 6.2×10^3 kg

Answer: D

32. If there are 2.25 treads per in^2 of tire surface, how many treads are on the tire surface if the tire has a diameter of 25 inches and width of 14.3 in?

- a. 1590 treads
- b. 4950 treads
- c. 3510 treads
- d. 2500 treads

Answer: D

33. A small urban street repair requires 215 “yards” ($1 \text{ yard} = 1 \text{ yd}^3$) of concrete. Assuming a uniform density of 3.2 g/cm^3 for the required concrete mix, what mass of concrete, in kg, is needed for this project?

- a. $5.1 \times 10^3 \text{ kg}$
- b. $6.6 \times 10^4 \text{ kg}$
- c. $5.3 \times 10^5 \text{ kg}$
- d. $7.4 \times 10^8 \text{ kg}$

Answer: C

34. In the storied history of the Appalachian mountain railroads, the Ballad of Old 97 tells of “Pete’s” demise trying to put his train into Spencer, VA on time. If Pete’s train was carrying 750 tons of Walker coal, how many kg of coal were on board?

- a. $3.3 \times 10^6 \text{ kg}$
- b. $6.8 \times 10^5 \text{ kg}$
- c. $5.4 \times 10^6 \text{ kg}$
- d. $8.1 \times 10^5 \text{ kg}$

Answer: B

35. A 22.0 cm long glass tube, sealed at one end, is filled with ethanol. The mass of ethanol needed to fill the tube is 24.14 g. The inner diameter of the tube is 13.3 mm. Calculate the density of ethanol.

- a. 0.812 g/mL
- b. 0.772 g/mL
- c. 0.856 g/mL
- d. 0.790 g/mL

Answer: D

Fill in the Blank

36. Variables measured while the substance being observed retains its identity are referred to as _____ properties.

Answer: physical

37. The changes a substance undergoes in a reaction with a different substance is known as a _____ property.

Answer: chemical

38. In an analysis of raw ore, an iron concentration of $5.23 \pm 0.01\%$ infers that the method used to test for iron has a _____ degree of precision.

Answer: high

39. Errors that are not unidirectional and attributed in part to the discontinuous nature of matter and energy are _____ errors.

Answers: random, indeterminate

40. The _____ _____ refers to the amount of force required to produce a specified deformation of the material being tested.

Answer: yield strength