

Test Bank for Interactive General Organic and Biological Chemistry 1st Macmillan Learning

IGOB Chapter 01: Science and Measurement

1. A student is conducting an experiment to determine the effect of pH on enzyme activity. The student predicts that enzyme activity will be highest at a neutral pH and decrease at both acidic and basic pH levels. Which step of the scientific method is the student performing when they make this prediction?

- a. Hypothesis
- b. Experimentation
- c. Observation
- d. Analysis

ANSWER: a

2. A researcher is studying the effect of temperature on the solubility of a salt in water. They first measure the solubility at 25 °C, then at 35 °C, and finally at 45 °C. Which step of the scientific method does this represent?

- a. Experimentation
- b. Analysis
- c. Conclusion
- d. Hypothesis

ANSWER: a

3. Convert the following number from standard notation to scientific notation:

2350 g

ANSWER: 2.35×10^3 g

4. Convert the following number from standard notation to scientific notation:

0.00941 mL

ANSWER: 9.41×10^{-3} mL

5. Convert the following number from scientific notation to standard notation:

7.42×10^7 m

ANSWER: 74,200,000 m

6. Convert the following number from scientific notation to standard notation:

1.35×10^{-4} g

ANSWER: 0.000135 g

7. Evaluate $\frac{0.5794}{2.60 \times 10^{-3}}$ using a calculator.

ANSWER: 223

8. During an experiment, a chemist notes several observations. Which of the following is a qualitative observation?

- a. The solution turned from blue to green.
- b. The solution's temperature increased by 10 degrees Celsius.

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- c. The mass of the reactant was 5 grams.
- d. The pH of the solution was measured to be 7.4.

ANSWER: a

9. During an experiment, a chemist records several observations. Which of the following is a quantitative observation?

- a. The volume of the gas produced was 2.5 liters.
- b. The mixture turned cloudy.
- c. The substance dissolved completely.
- d. The liquid emitted a strong odor.

ANSWER: a

10. When making a measurement with a ruler, what is the correct procedure to ensure the most accurate reading?

- a. Estimate to one digit beyond the smallest division markings.
- b. Always round to the nearest whole number.
- c. Record only the digits that correspond to the smallest division markings.
- d. Always have three significant figures in the measurement.

ANSWER: a

11. When properly reading the volume of liquid in a syringe, which of the following practices should be followed?

- a. Read the volume at the top of the barrel seal.
- b. Read the volume in the middle of the barrel seal.
- c. Estimate the volume to the nearest whole number.
- d. Record the largest volume marking, ignoring the position of the barrel seal.

ANSWER: a

12. Which of the following statements is false?

- a. Any zeros to the left of all nonzero digits are significant.
- b. Any zeros between significant digits are significant.
- c. Any zeros to the right of all nonzero digits in a number with decimal-place digits are significant.
- d. All the digits in the coefficient of a number in scientific notation are significant.

ANSWER: a

13. Which of the following numbers has exactly three significant digits?

- a. 903
- b. 0.030
- c. 70.00
- d. 4000

ANSWER: a

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14. How many significant digits are in the number 0.00340?

- a. Three
- b. Four
- c. Two
- d. Five

ANSWER: a

15. How many significant digits are in 0.0026510 g?

ANSWER: 5

16. How many significant digits are in 55,200 km?

ANSWER: 3

17. Calculate the following sum and round the answer to the proper number of digits: 24.50 g + 2.784 g + 5.9 g

- a. 33.2 g
- b. 33.184 g
- c. 33.18 g
- d. 33 g

ANSWER: a

18. Calculate the following and round answer to the proper precision:

$$489.51 \text{ cm} - 49.561 \text{ cm} + 25.7 \text{ cm}$$

ANSWER: 465.6 cm

19. Perform the following calculation and select the answer with the correct number of significant digits:

$$5.2478 \text{ cm} \times 5.89 \text{ cm}$$

- a. 30.9 cm²
- b. 30.909542 cm²
- c. 31 cm²
- d. 30.910 cm²

ANSWER: a

20. Perform the following calculation and report the answer to the correct number of significant digits (including correct units).

$$\frac{5.89 \text{ g}}{7.6 \text{ cm}^3}$$

ANSWER: 0.78 $\frac{\text{g}}{\text{cm}^3}$

21. Which of the following are not considered to be exact numbers?

- a. measured quantities

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- b. defined quantities
- c. integers within formulas
- d. counted numbers

ANSWER: a

22. Paracetamol (acetaminophen) is a widely used over-the-counter pain reliever and a fever reducer. It is commonly sold as tablets, each containing 500 mg of the drug (assume two significant digits). If a person takes three tablets in a 12-hour period, what is the total mass of paracetamol consumed by the person in that period?

- a. 1.0 g
- b. 1.5 g
- c. 2.0 g
- d. 2.5 g

ANSWER: b

23. Ibuprofen is a common nonsteroidal anti-inflammatory drug (NSAID) used to reduce pain and inflammation. The label on a bottle of ibuprofen tablets says "do not exceed 6 tablets in 24 hours". If each tablet contains 200 mg of the drug (assume two significant digits), calculate the maximum daily dosage.

ANSWER: 1200 mg

24. Determine the result of the following calculation to the proper number of significant digits.

$$\frac{(35.67 \text{ g} - 14.61 \text{ g})}{44.27 \text{ mL}}$$

- a. 0.4757 g/mL
- b. 0.48 g/mL
- c. 35.34 g/mL
- d. 35 g/mL

ANSWER: a

25. Determine the result of the following calculation to the proper number of significant digits.

$$(45.64 \text{ mL})(0.396 \text{ g/mL}) + 156.89 \text{ g}$$

ANSWER: 175.0 g

26. Which of the following *incorrectly* matches an SI unit with the physical quantity that it measures?

- a. gram (g), volume
- b. kelvin (K), temperature
- c. second (s), time
- d. meter (m), length

ANSWER: a

27. Which of the following correctly matches an SI prefix with its corresponding value?

- a. kilo- (k), 10^2

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b. mega- (M), 10^6

c. centi- (c), 10^{-1}

d. milli- (m), 10^3

ANSWER: b

28. Which unit is larger: mg or μg ?

ANSWER: mg

29. Rank the following SI prefixes in order from smallest to largest value: micro- (μ), kilo- (k), milli- (m), and centi- (c).

ANSWER: micro- (μ), milli- (m), centi- (c), kilo- (k)

30. Determine which of the following values is given in English units.

a. 3.5 lb

b. 5.4 km

c. 2.0 L

d. 271.2 K

ANSWER: a

31. A liquid vitamin supplement for children is sold in a concentration of 100 mg/2.5 mL. If a child needs a dose containing 80 mg of the vitamin, how many milliliters (mL) of the supplement should be given?

a. 1.0 mL

b. 1.5 mL

c. 2.0 mL

d. 2.5 mL

ANSWER: c

32. An antacid solution is sold in a concentration of 300 mg/5.0 mL. If an adult requires a 15 mL dose of the antacid, how many milligrams (mg) of the active ingredient does this dose contain?

ANSWER: 900 mg

33. The recommended daily allowance for vitamin D is 600 IU. Given that 1 IU of vitamin D is equivalent to 0.025 μg , express this recommended daily allowance in micrograms (μg). Assume that the given values contain two significant digits.

a. 15 μg

b. 20 μg

c. 25 μg

d. 30 μg

ANSWER: a

34. The recommended daily allowance for vitamin E is 15 mg. Given that 1 mg of vitamin E is equivalent to

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0.67 IU, express this recommended daily allowance in IU. Assume that the given values contain two significant digits.

ANSWER: 22 IU

35. A cough syrup contains 20.0% active ingredient by mass. If the entire contents of a bottle of cough syrup has a mass of 150.0 g, how many grams of the active ingredient are in the bottle?

- a. 25.0 g
- b. 30.0 g
- c. 35.0 g
- d. 40.0 g

ANSWER: b

36. A sports drink contains 12.0% glucose by mass. If the contents of a bottle of the sports drink has a mass of 500.0 g, how many grams of glucose are in the bottle?

ANSWER: 60.0 g

37. A hospital patient is prescribed 450.0 mL of a glucose solution to be delivered by intravenous (IV) drip. The drip rate of the IV is 6.0 mL/min. Determine the number of seconds that it will take for the patient to receive the prescribed 450.0 mL.

- a. 4500 s
- b. 5000 s
- c. 5400 s
- d. 6000 s

ANSWER: a

38. A hospital patient is prescribed 275 mL of a nutrient solution to be delivered by intravenous (IV) drip. The drip rate of the IV is 5.0 mL/min. Determine the number of seconds that it will take for the patient to receive the prescribed 275 mL.

ANSWER: 3300 s

39. A patient's blood sugar level measures 180 mg/dL. What is this blood sugar level in grams per liter (g/L)?

- a. 0.18 g/L
- b. 1.8 g/L
- c. 18 g/L
- d. 180 g/L

ANSWER: b

40. A patient's blood urea nitrogen (BUN) level measures 25 mg/dL. What is this BUN level in grams per liter (g/L)?

ANSWER: 0.25 g/L

41. A patient's blood calcium level is 9.5 mg/dL. Determine their blood calcium measurement in grams per milliliter (g/mL).

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- a. 0.000095 g/mL
- b. 0.00095 g/mL
- c. 0.0095 g/mL
- d. 0.095 g/mL

ANSWER: a

42. A patient's blood triglyceride level is 150 mg/dL. Determine their blood triglyceride measurement in grams per milliliter (g/mL).

ANSWER: 0.0015 g/mL

43. The maximum recommended single dose of ibuprofen for adults is 10.0 mg/kg of body weight every six hours. Calculate the maximum single dose in milligrams for an adult that weighs 135 lbs. There are 2.2046 lb per kilogram.

ANSWER: 612 mg

44. A sample of a liquid has a mass of 250.0 g and a volume of 200.0 mL. What is the density of the liquid in grams per milliliter?

- a. 0.800 g/mL
- b. 1.250 g/mL
- c. 1.500 g/mL
- d. 2.000 g/mL

ANSWER: b

45. What is specific gravity?

- a. a measure of density relative to water
- b. a measure of concentration relative to blood
- c. a measure of mass relative to glucose
- d. a measure of volume relative to urine

ANSWER: a

46. The density of lead is 11.3 g/mL. Calculate the mass of a block of lead that can displace a volume of 27.0 mL of water when submerged.

ANSWER: 305 g

47. Calculate the density of a rectangular metal block that is 15.00 cm long, 5.00 cm wide, and 2.00 cm thick, and has a mass of 450 g.

ANSWER: 3.0 g/cm³

48. A liquid sample has a mass of 256 g and a density of 0.7025 g/mL. Determine the volume of this sample.

ANSWER: 364 mL

49. A rubber ball has a density of 0.92 g/mL. In which of the following liquids would it sink?

- a. Ethanol (density = 0.789 g/mL)

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- b. Castor oil (density = 0.969 g/mL)
- c. Glycerol (density = 1.26 g/mL)
- d. Water (density = 1.00 g/mL)

ANSWER: a

50. The specific gravity of mercury is 13.6. Calculate the density of mercury in g/mL. (The density of water is 1.00 g/mL.)

ANSWER: 13.6 g/mL