

Multiple Choice. Circle the one alternative that best completes the statement or answers the question.

1. What is the first step in the Scientific Method? (2 pts.)
 - (a) formulate a theory
 - (b) formulate a hypothesis
 - (c) test hypothesis
 - (d) find trends or patterns
 - (e) make observations or do experiments

SHORT ANSWER. Write the word, phrase, or number with units that best completes each statement or answers the question.

2. Isotopes are atoms with the same number of _____ but with different numbers of _____. (2 pts.)
3. How many protons and how many neutrons are in an atom of: ^{118}I ? (2 pts.)
4. What is the atomic number of platinum– 170 (1 pts.)
5. What is the complete element symbol for an atom that has 36 protons and 40 neutrons? (3 pts.)
6. What is the best answer for the following problem? (Follow Significant Figure Rules.) (2 pts.)

$$\frac{3.112}{273.15 + 26.1} = ?$$

7. What is the best answer for the following problem? (2 pts.)
$$4.21 + 38.44 + 3278 = ?$$
8. Write the following numbers to 3 significant figures. (1 pt. each)
 - a) 7 _____
 - b) 454,811 _____

9. What is the best answer for the following problem? (2 pts.)

$$(4.184)(18.2)(29.1-25.1) =$$

10. Give the correct chemical symbols for the following elements. (1 pt. each)

a) radium _____ b) arsenic _____

c) manganese _____ d) barium _____

11. Give the names of the elements that corresponds to the symbols below. (1 pt. each)

a) Ti _____ b) Au _____

c) Xe _____ d) P _____

12. Classify the following elements as **metal, nonmetal, or metalloid.** (1 pt. each)

a) sodium _____ b) sulfur _____

b) mercury _____ d) germanium _____

13. The name of the group of elements containing sodium and lithium is

_____. (1 pt.)

14. The name of the group of elements containing krypton and argon are called

_____. (1 pt.)

15. How many significant figures do each of the following values below have? (1 pt. each)

a) 5,320 _____ b) 0.00780 _____

16. The group of elements containing cadmium, chromium, and platinum is called the

_____. (1 pt.)

17. What is the definition of an extensive property? (2 pts.)

18. What is the definition of a homogeneous mixture? (2 pts.)

19. What ion does calcium form? (Give symbol and charge.) (2 pts.)

20. What ion does sulfur form? (Give symbol and charge.) (2 pts.)

PROBLEMS. MUST show ALL work, units, and answers with correct significant figures.

21. The density of copper is 8.96 g/mL at 20°C. What is the mass of 25.0 mL of copper at 20°C? Show work. (4 pts.)

22. The density of mercury is 13.6 g/cm^3 at 20°C . What is the volume of 21.3 g of mercury? Show work. (4 pts.)

23. Convert 0.025 g into mg. Show work. (3 pts.)

24. Convert 38.2 cm into decimeters. Show work. (4 pts.)

25. Convert $25.1 \mu\text{m}$ into nm. Show work. (4 pts.)

26. What is 35°C in Kelvin? Show work. (2 pts.)

27. What is $-11.4\text{ }^{\circ}\text{C}$ in degrees Fahrenheit? Show work. (3 pts.)

28. Convert 5.61 feet into centimeters. Use only exact conversion factors. Show work. (3 pts.)

29. The density of lead is 11.3 g/mL . What is this density in pounds/liter? ($1\text{ kg} = 2.20\text{ pounds}$) (5 pts.)

30. How many moles of nickel atoms are in 7.38×10^{24} nickel atoms? Show work. (3 pts.)

31. The volume of a large fish tank is measured to be 2.82 cubic feet. What is the volume of the fish tank in gallons? Show work. (1 gallon = 3.7854 L) (6 pts.)

32. How many grams of potassium are in 4.31 moles of potassium? (3 pts.)

33. How many moles of zinc are in 48.3 grams of zinc? Show work. (3 pts.)

34. Silver consists of two isotopes: ^{107}Ag (51.84%) with an atomic mass of 106.9051 amu and ^{109}Ag (48.16%) with an atomic mass of 108.9048 amu. What is the average atomic mass of silver? **MUST** show ALL work. Report answer to 4 significant figures. (4 pts.)

35. What is the mass of 5.22×10^{22} atoms of iron? Show work. (4 pts.)