

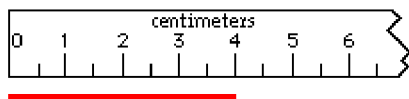
UNITS 1, 2, 3 PRACTICE PROBLEMS

1. Define alchemy?
2. Where did many of our earliest understandings of chemistry evolve?
3. Classify the following as macroscopic, microscopic, or particulate: a carbon dioxide molecule
4. Classify the following as macroscopic, microscopic, or particulate: a red blood cell
5. Define MATTER.
6. Who proposed the four elements of matter are earth, water, fire, and air.
7. Which state of matter (solid, liquid, or gas) has no atoms moving?
8. What is the symbol for Antimony?
9. The smallest particle of an element that retains the chemical properties of the element is a(n)?
10. Classify boron, carbon dioxide, methane, and lead as element or compound.
11. Which of the following is a homogeneous solution?
a) vinegar (5% acetic acid) b) water c) baking soda d) sewage e) diamond
12. List some chemical properties of water?
13. Which of the following is a physical combination of two or more pure substances?
a) salt b) air c) sand d) water e) natural gas
14. To what category would a sample containing more than one phase belong?
a) compound b) element c) diatomic mixture
d) homogeneous mixture e) heterogeneous mixture
15. Which of the following is an example of a chemical change?
a) water boiling b) ice melting
c) natural gas burning d) iodine vaporizing
e) dry ice turning from the solid phase to the gas phase
16. Who gave oxygen its name, disproving the phlogiston theory?
17. List the diatomic molecules.
18. Which of the following is a pure substance?
a) vinegar (5% acetic acid) b) concrete c) baking soda d) sewage e) brass
19. How would you classify steel?
a) heterogeneous mixture b) homogeneous, solution
c) homogeneous, compound d) homogeneous, element
20. According to the phlogiston theory, what is the carrier of phlogiston?
21. What is the chemical symbol for mercury?
22. A mixture of 80% nitrogen (N₂) and 20% oxygen (O₂) which can be separated into these compounds by cooling is commonly called??
23. What does the following chemical formula indicate? Al₂O₃
a) 3 atoms aluminum, 2 atoms oxygen b) 1 atom aluminum, 1 atom oxygen
c) 1 atom aluminum oxygen d) 6 atoms aluminum oxygen
e) 2 atoms aluminum, 3 atoms oxygen
24. Which of the following is a chemical compound?
a) Co b) CO c) Pb d) Sn e) Ar
25. Which of the following is a chemical compound?
a) alcohol b) aluminum c) antimony d) argon e) astatine
26. How would you classify soda pop?
a) heterogeneous mixture b) homogeneous, solution
c) homogeneous, compound d) homogeneous, element
27. How would you classify propane?
a) heterogeneous b) homogeneous, solution c) homogeneous, pure substance
28. Which of the following is a diatomic molecule?
a) Ar₂ b) Br₂ c) Cr₂ d) Dr₂ e) Er₂
29. Write 8.34×10^{-3} in decimal notation.

30. What is the base unit for temperature?
31. Write 7.19×10^{-4} in decimal notation.
32. What is mass measured with?
33. Is volume a derived unit?
34. What is the SI base unit for volume?
35. How many milligrams are in 1 gram?
36. How many decimeters are in 1 meter?
37. What is the volume of a metal cube with the following dimensions?
 length = 3.2 cm, width = 2.1 cm, height = 1.5 cm
 Volume = length x width x height
38. What is the definition of density?
39. What is the density of a metal if a 15.4 gram sample has a volume of 1.96 cm^3 ?
40. $5.00 \text{ mL} = \underline{\hspace{1cm}} \text{ cm}^3$?
41. $2.5 \text{ dL} = \underline{\hspace{1cm}} \text{ cm}^3$?
42. $8.345 \text{ L} = \underline{\hspace{1cm}} \text{ dm}^3$?
43. Seawater contains 19.4 g of chloride ion in 1.00 L. How many mg of chloride ions are in 1.00 mL of seawater?
44. A crucible is known to weigh 24.3162 g. Three students in the class determine the mass of the crucible by repeated massings on a simple balance. Using the following information, which student has done the most precise determination?

Student	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
A	24.8	24.9	24.8	24.9	24.8
B	24.8	24.0	24.2	24.1	24.3
C	24.5	24.1	24.5	24.1	24.3

45. What is the volume of a rectangular solid having the following dimensions?
 length = 8.30 cm width = 3450 mm height = 0.0540 m
46. What volume of a liquid having a density of 3.48 g/cm^3 is needed to supply 5.00 grams of the liquid?
47. A metal sample having a mass of 30.9 grams was added to a graduated cylinder containing 23.2 mL of water. The volume of the water plus the sample was 24.8 mL. What is the density of the metal?
48. Solve to the correct significant figures: $1.23 \text{ m} \times 0.89 \text{ m} = ?$
49. Round the following measurement to three significant figures: 0.90985 cm^2
50. Solve to the correct significant figures: $3.12 \text{ g} + 0.8 \text{ g} + 1.033 \text{ g} = ?$
51. When performing the calculation $34.530 \text{ g} + 12.1 \text{ g} + 1\,222.34 \text{ g}$, How many significant figures will the final answer have?
52. When measuring the length of this red line with the metric ruler provided, the first decimal place that is uncertain is:



53. How many significant figures are in the measurement 102.400 meters?
54. The mass of a watch glass was measured four times. The masses were 99.997 g, 100.008 g, 100.011 g, and 100.005 g. What is the average mass of the watch glass?
55. What is the temperature in degree Celsius of 452 K?
56. What is the temperature in Kelvin of 67°F ?
57. How many significant figures are in 0.004050000?
58. The unaided human eye has a resolving power of 0.1 mm. What is the equivalent resolving power in micrometers?
59. The hormone adrenaline in blood plasma is present in 6×10^{-8} grams per liter. What is the amount in micrograms per milliliter?
60. The world's oceans contain approximately $1.4 \times 10^9 \text{ km}^3$ of water. What is the volume in cubic meters?

61. An unknown liquid has a density of 0.786 g/cm³ and a volume of 19.4 liters. What is the mass of the liquid?
62. Who is credited to the discovery of the proton?
63. Which one of Dalton's major conclusions explained the law of conservation of mass?
 Matter is composed of small, indivisible particles called atoms.
 Atoms of the same element are identical and have the same properties.
 Compounds are composed of atoms of different elements combined in small whole-number ratios.
 Atoms of the same element have the same mass.
 Reactions are merely the rearrangement of atoms into different combinations.
64. Who is credited to the following: The charge of the electron was determined by performing the Oil Drop Experiment.
65. Who is credited to the discovery of the neutron?
66. Who is credited to the following: The charge/mass ratio for 20 different metals in the cathode ray tube was the same, which suggested that electrons are present in all kinds of matter.
67. Taken by itself the fact that 8.0 grams of oxygen and 1.0 grams of hydrogen combine to give 9.0 grams of water demonstrate what natural law?
 a) Conservation of Energy b) Conservation of Mass c) Periodicity
 d) The Atomic Theory e) Atomic Number
68. How many protons, neutrons, and electrons does the element $^{65}_{30}\text{Zn}^{2+}$ contain?
69. What is the total number of subatomic particles in $^{44}_{21}\text{Sc}^{3+}$?
70. Which of the following is an isotope of $^{204}_{82}\text{Pb}$?
 a) $^{199}_{81}\text{Tl}$ b) $^{202}_{80}\text{Hg}$ c) $^{212}_{82}\text{Pb}$ d) $^{206}_{80}\text{Hg}$ e) $^{197}_{81}\text{Tl}$
71. The isotopes of the same element have _____.
 a. different number of protons
 b. different number of neutrons
 c. different atomic numbers
 d. different number of electrons
72. Find the number of the neutrons and electrons for lead-208 (this is the mass number).
73. The average atomic mass (amu) of each element is determined by _____.
 a. adding the number of protons and neutrons in any atom of the element.
 b. adding the number of protons and electrons in any atom of the element.
 c. adding the number of neutrons and electrons in any atom of the element.
 d. adding the number of protons in any atom of the element.
 e. None of the above are true.
74. Define position and symbol in Periodic Table of the Iron.
 a) period 4, group VIII b, symbol Fe b) period 5, group VIII a; symbol I
 c) period 2, group VII a, symbol F d) period 6; group VIII b; symbol Ir
75. Who discovered the nucleus in the atom?
76. Which one of the following statements about the isotopes of a given element is correct?
 a. The atoms have the same number of protons but differing numbers of neutrons.
 b. The atoms have the same number of neutrons but differing numbers of electrons.
 c. The atoms have the same number of electrons but differing numbers of protons.
 d. The atoms have the same number of neutrons but differing numbers of protons.
 e. The atoms have the same number of protons but differing numbers of electrons.
77. Which of the following elements is a noble gas?
 a. Li b) Mg c) Ni d) Br e) Rn
78. What is the name for the elements in Group 2A?
79. Element No. 15 is
 a) an alkaline earth metal. b) a transition metal. c) a nonmetal.
 d) a noble gas. e) a metalloid.

80. Which of the following elements is a nonmetal?
 a) Bi b) Ge c) B d) Se e) Si
81. An element has an atomic mass of 35.5. It probably contains a mixture of ____
 a) isomers. b) allotropes. c) radioactive atoms.
 d) isotopes. e) optics.
82. Element No. 36 is
 a) an alkaline earth metal b) a nonmetal.
 c) a noble gas. d) a metalloid.
83. All of the following nonmetals exist as diatomic molecules EXCEPT
 a) F b) H c) N d) I e) Kr
84. The chemical properties of selenium would be most similar to
 a) As b) Br c) S d) P e) I
85. Which pair of elements could be called metalloids?
 a. Li and Na
 b. Cu and Ag
 c. F and Cl
 d. Si and Ge
 e. Na and Mg
86. Element No. 26 is
 a. an alkaline earth metal.
 b. transition metal.
 c. a nonmetal.
 d. a noble gas.
 e. a metalloid.

87. Argon in nature consists of the following isotopes:

Isotope	Atomic Mass (amu)	Percent Abundance
Argon-36	35.968 amu	0.337%
Argon-38	37.963 amu	0.063%
Argon-40	39.962 amu	99.600%

Calculate the average atomic mass of argon.