

UNITS 1, 2, 3 PRACTICE PROBLEMS - ANSWERS

1. Define alchemy?

A pseudoscientific forerunner of chemistry in medieval times.

2. Where did many of our earliest understandings of chemistry evolve?

Greek philosophers.

3. Classify the following as macroscopic, microscopic, or particulate: a carbon dioxide molecule

Particulate.

4. Classify the following as macroscopic, microscopic, or particulate: a red blood cell

Microscopic.

5. Define MATTER.

Matter is anything that has mass and occupies space.

6. Who proposed the four elements of matter are earth, water, fire, and air.

Aristotle.

7. Which state of matter (solid, liquid, or gas) has no atoms moving?

All states of matter have atoms moving.

8. What is the symbol for Antimony?

Sb.

9. The smallest particle of an element that retains the chemical properties of the element is a(n)?

Atom.

10. Classify boron, carbon dioxide, methane, and lead as element or compound.

Compound: carbon dioxide, methane Element: boron, lead

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?

It can be separated into hydrogen and oxygen by electrolysis, it forms bubbles when calcium is added, etc.

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?

Lavoisier

17. List the diatomic molecules.

hydrogen, iodine, bromine, oxygen, nitrogen, chlorine, iodine, fluorine (HI BrONCII F)

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?

Air.

21. What is the chemical symbol for mercury?

Hg

22. A mixture of 80% nitrogen (N₂) and 20% oxygen (O₂) which can be separated into these compounds by cooling is commonly called??

Air.

23. What does the following chemical formula indicate? Al_2O_3
- 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 (unopened soda pop)
 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) Ar_2 b) Br_2 c) Cr_2 d) Dr_2 e) Er_2
29. Write 8.34×10^{-3} in decimal notation.
 0.00834
30. What is the base unit for temperature?
 Kelvin
31. Write 7.19×10^{-4} in decimal notation.
 0.000719
32. What is mass measured with?
 Balance.
33. Is volume a derived unit?
 Yes.
34. What is the SI base unit for volume?
 Liter.
35. How many milligrams are in 1 gram?
 1000 mg
36. How many decimeters are in 1 meter?
 10 dm
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
 10.1 cm^3
38. What is the definition of density?
 mass/volume
39. What is the density of a metal if a 15.4 gram sample has a volume of 1.96 cm^3 ?
 7.86 g/cm^3
40. 5.00 mL = _____ cm^3 ?
 5.00 cm^3
41. 2.5 dL = _____ cm^3 ?
 250 cm^3
42. 8.345 L = _____ dm^3 ?
 8.345 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?
 19.4 mg/mL

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

Student A has done the most precise work (Student C is the most accurate).

45. What is the volume of a rectangular solid having the following dimensions?

length = 8.30 cm

width = 3450 mm

height = 0.0540 m

15500 cm³

46. What volume of a liquid having a density of 3.48 g/cm³ is needed to supply 5.00 grams of the liquid?

1.44 cm³

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?

19.3 g/mL

48. Solve to the correct significant figures: 1.23 m x 0.89 m = ?

1.1 m²

49. Round the following measurement to three significant figures: 0.90985 cm²

0.910 cm²

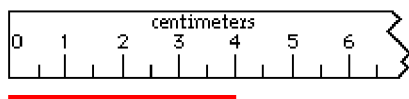
50. Solve to the correct significant figures: 3.12 g + 0.8 g + 1.033 g = ?

5.0 g

51. When performing the calculation 34.530 g + 12.1 g + 1 222.34 g, How many significant figures will the final answer have?

5 sig. figs. (1268.97 rounded to 1269.0)

52. When measuring the length of this red line with the metric ruler provided, the first decimal place that is uncertain is:



Tenths of a centimeter. (4.0 cm)

53. How many significant figures are in the measurement 102.400 meters?

6 sig. figs.

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?

100.01 g

55. What is the temperature in degree Celsius of 452 K?

179°C

56. What is the temperature in Kelvin of 67°F?

293 K

57. How many significant figures are in 0.004050000?

7 sig. figs.

58. The unaided human eye has a resolving power of 0.1 mm. What is the equivalent resolving power in micrometers?

1 x 10² μm

59. The hormone adrenaline in blood plasma is present in 6 x 10⁻⁸ grams per liter. What is the amount in micrograms per milliliter?

6 x 10⁻⁵ μg/mL

60. The world's oceans contain approximately 1.4 x 10⁹ km³ of water. What is the volume in cubic meters?

1.4 x 10¹⁸ m³

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?

15,200 g

62. Who is credited to the discovery of the proton?

Rutherford

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.

Millikan.

65. Who is credited to the discovery of the neutron?

Chadwick.

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.

Thomson.

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?

30 protons, 35 neutrons, 28 electrons

69. What is the total number of subatomic particles in ${}^{44}_{21}\text{Sc}^{3+}$?

62

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).

126 neutrons, 82 electrons

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 VI I I b, symbol Fe b) period 5, group VII I a; symbol I
c) period 2, group VI I a, symbol F d) period 6; group VIII I b; symbol I r

75. Who discovered the nucleus in the atom?

Rutherford

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?

Alkaline earth metals.

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 transition metal.
- c) a noble gas.
- d) a metalloid.
- e) a nonmetal.

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.

39.947 amu