

Testbank

to accompany

Chemistry 3e

by

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Chapter 2: The language of chemistry

True/False questions

1. A large crowd at a rugby match was described as 45 000 in the morning newspaper the next day. A chemistry student stated that, mindful of the purpose of using scientific notation, this should be correctly expressed in scientific notation as 4.5000×10^4 . Does the number expressed this way truly represent the crowd estimate?

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

2. Any number known accurately to six or more significant figures is defined as an exact number.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

3. The ambiguity in the precision of a number being expressed can be eliminated by proper use of scientific notation.

- *a. True
- b. False

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

4. The result of the following operation, 8.52010×7.9 , should be expressed as 67.3088.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

5. 500 nm is longer than 1250 fm.

- *a. True
- b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

6. 50 pm is longer than 50 nm.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

7. An increase of one kelvin in temperature is a smaller change than an increase of one degree Celsius.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

8. The SI unit for specific volume is $\text{m}^3 \text{kg}^{-1}$.

- *a. True
- b. False

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

9. The SI unit for length is inches.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

10. The SI unit for volume is litres.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

11. Water boils at 100 K.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

12. Water freezes at 0 K.

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

13. There are 3 significant figures in the following number: 3.508×10^{-2}

- a. True
- *b. False

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

14. There are 3 significant figures in the following number: 12.1×10^{-2}

- *a. True
- b. False

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

15. 4.18×10^2 is larger than 126.

- *a. True
- b. False

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

16. 1.578×10^{-2} is larger than 1.578×10^{-4} .

- *a. True
- b. False

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

17. The chemical formula of sulfur dioxide is SO_2 .

- *a. True
- b. False

Answer: a

Learning objective 2.3 - apply basic chemical nomenclature.

18. The chemical formula of hydrogen fluoride is HFl .

- a. True
- *b. False

Answer: b

Learning objective 2.3 - apply basic chemical nomenclature.

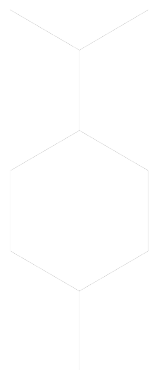
19. The chemical formula of magnesium chloride is MgCl_2 .

- *a. True
- b. False

Answer: a

Learning objective 2.3 - apply basic chemical nomenclature.

20. The structure of 4-isopropyl-1-methylcyclohexane is:



- *a. True
- b. False

Answer: a

Learning objective 2.3 - apply basic chemical nomenclature.

21. The name of the following compound is 7-ethyl-6,6-dimethyloctane.



- a. True
- *b. False

Answer: b

Learning objective 2.3 - apply basic chemical nomenclature.

22. The following structures represent identical compounds.



- *a. True
- b. False

Answer: a

Learning objective 2.2 - represent substances and processes using common chemistry conventions.

23. The following structures represent constitutional isomers.



- *a. True
- b. False

Answer: a

Learning objective 2.2 - represent substances and processes using common chemistry conventions.

Learning objective 2.3 - apply basic chemical nomenclature.

Multiple-choice questions

24. Which one of the following is an SI base unit?

- a. Ounce
- b. Newton
- *c. Ampere
- d. Litre

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

25. The kilo is:

- a. a unit of mass.
- b. a unit employed in medical terminology.
- *c. a decimal multiplier in the metric system.
- d. a unit of speed.

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

26. The SI base units of temperature and mass respectively are:

- a. degree and gram.
- *b. kelvin and kilogram.
- c. celsius and milligram.
- d. kelvin and gram.

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

27. Which one of the following is a unit of surface area?

- a. Pascal
- b. Joule
- *c. Square metre
- d. Cubic centimetre

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

28. The SI derived unit for surface area is:

- a. square centimetre.
- *b. square metre.
- c. square kilometre.
- d. cubic metre.

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

29. The boiling point of barium is 725 °C. What is the equivalent temperature in kelvin?

- a. 725 K
- *b. 998.15 K
- c. 451.85 K
- d. 1450 K

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

30. The melting point of lead acetate, a white solid, is 280°C. What is the equivalent temperature in kelvin?

- *a. 553.15 K
- b. 6.85 K
- c. 378.15 K
- d. 583.15 K

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

31. The boiling point of chlorine is –34.6 °C. What is the equivalent temperature in kelvin?

- a. –30.3 K
- b. 177.4 K
- *c. 238.55 K
- d. 307.6 K

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

32. How many significant figures do the following three measurements have?

7.103 cm

0.0005 m

$1.3400 \times 10^{-4} \text{ dm}^3$

- a. 3, 5 and 4
- b. 3, 1 and 3
- *c. 4, 1 and 5
- d. 4, 1 and 3

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

33. How many significant figures do the following three measurements have?

120 m

0.0076 m

$5.404 \times 10^{-2} \text{ m}^3$

- a. 4, 1 and 5
- b. 3, 1 and 3
- *c. 2, 2 and 4
- d. 4, 4 and 5

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

34. After evaluating the following expression, how many significant figures should be displayed in the final result?

$$\frac{13.726 + 0.027}{8.221}$$

- a. 1
- *b. 2
- c. 3
- d. 4

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

35. After evaluating the following expression, how many significant figures should be displayed in the final result?

$$\frac{1.700 + 0.5438}{8.2}$$

- a. 1
- *b. 2
- c. 3
- d. 4

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

36. How many significant figures should there be in result of the operation, $8.5201 + 1.93$?

- a. 1
- b. 2
- *c. 3
- d. 4

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

37. When the expression, $412.272 + 0.00031 - 1.00797 + 0.000024 + 12.8$, is evaluated, the result should be expressed as:

- a. 424.
- b. 424.0.
- c. 424.06.
- *d. 424.1.

Answer: d

Learning objective 2.1 - use measurements and units in calculations.

38. When the expression, $16.0200 + 0.00048 - 11.184 - 221.1$, is evaluated, the result should be expressed as:

- *a. -216.3
- b. -216.26
- c. -216.2635
- d. -2.2×10^2

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

39. When a student evaluates the following expression, the result should be expressed as:

$$\frac{0.04616 \times 0.082057 \times 293.30}{0.654}$$

- a. 1.69.
- *b. 1.70.
- c. 1.699.
- d. 1.69870.

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

40. When a student evaluates the following expression, the result should be expressed as:

$$\frac{4.268 \times 0.082057 \times 373.15}{\frac{744.6}{760.0} \times 2.688}$$

- a. 49.623
- b. 49.631
- *c. 49.62
- d. 49.63

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

41. The number, 0.0030600, is properly expressed in scientific notation as:

- a. 3.0600×10^{-2}
- *b. 3.0600×10^{-3}
- c. 0.306×10^{-2}
- d. 0.30600×10^{-2}

Answer: b

Learning objective 2.1 - use measurements and units in calculations.

42. The number, 0.02100, is properly expressed in scientific notation as:

- a. 0.21×10^{-1}
- b. 2.1×10^{-2}
- *c. 2.100×10^{-2}
- d. 21.0×10^{-3}

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

43. The SI prefixes giga and micro represent, respectively:

- *a. 10^9 and 10^{-6}
- b. 10^{-9} and 10^{-6}
- c. 10^6 and 10^{-3}
- d. 10^3 and 10^{-3}

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

44. The SI prefixes mega and nano represent, respectively:

- a. 10^9 and 10^{-6}
- b. 10^{-9} and 10^{-6}
- *c. 10^6 and 10^{-9}
- d. 10^3 and 10^{-3}

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

45. A distance of 18×10^{-3} m is equivalent to:

- a. 1.8 mm
- b. 1.8 mm
- c. 0.18 m
- *d. 1.8 cm

Answer: d

Learning objective 2.1 - use measurements and units in calculations.

46. The diameter of an atom was determined and a value of 2.35×10^{-8} cm was obtained. How many nanometres is this?

- *a. 2.35×10^{-1} nm
- b. 2.35×10^{-19} nm
- c. 2.35×10^{-15} nm
- d. 2.35×10^1 nm

Answer: a

Learning objective 2.1 - use measurements and units in calculations.

47. How many micrometres are there in 3.672 km?

- a. 3.672×10^6
- b. 2.723×10^{-7}
- c. 2.723×10^{-4}
- *d. 3.672×10^9

Answer: d

Learning objective 2.1 - use measurements and units in calculations.

48. How many mm are there in 6.3 km?

- a. 6.3×10^{-5} mm
- b. 6300 mm
- *c. 6.3×10^6 mm
- d. 6.3×10^5 mm

Answer: c

Learning objective 2.1 - use measurements and units in calculations.

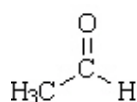
49. How many dm^3 are there in 3.6 m^3 ?

- a. 360 dm^3
- *b. $3.6 \times 10^3 \text{ dm}^3$
- c. 0.3600 dm^3
- d. $3.6 \times 10^4 \text{ dm}^3$

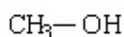
Answer: b

Learning objective 2.1 - use measurements and units in calculations.

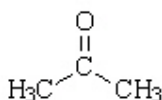
50. Which functional groups are named correctly?



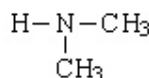
alcohol
I



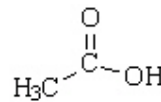
aldehyde
II



ketone
III



amine
IV



carboxylic acid
V

- a. I, III, V
- b. II, III, IV
- *c. III, IV, V
- d. I, III, IV

Answer: c

Learning objective 2.3 - apply basic chemical nomenclature.

51. The common name for the compound, CH_4 , is

- a. carbon tetrahydride
- *b. methane
- c. carbonic acid
- d. hydrocarbonate

Answer: b

Learning objective 2.3 - apply basic chemical nomenclature.

52. One of the components of kerosene is an alkane with 16 carbon atoms. Which of the formulae below is that of an alkane?

- *a. $C_{16}H_{34}$
- b. $C_{16}H_{22}$
- c. $C_{16}H_{32}$
- d. $C_{16}H_{12}$

Answer: a

Learning objective 2.3 - apply basic chemical nomenclature.

53. Which one of the following is correctly classified as a hydrocarbon?

- a. $C_6H_{12}O_6$
- *b. C_8H_{16}
- c. NaHCl
- d. C_2H_5OH

Answer: b

Learning objective 2.3 - apply basic chemical nomenclature.

54. What is the correct name for the compound IBr_3 ?

- a. Bromic iodide
- b. Iodine bromate
- *c. Iodine tribromide
- d. Iodine tribromine

Answer: c

Learning objective 2.3 - apply basic chemical nomenclature.

55. What is the correct name for the compound S_2Cl_2 ?

- a. Disulfur chlorate
- b. Sulfur(I) chloride
- c. Disulfur dichlorine
- *d. Disulfur dichloride

Answer: d

Learning objective 2.3 - apply basic chemical nomenclature.

56. What is the correct name for the compound HI?

- a. Hydriodic acid
- b. Hydrogen monoiodide
- *c. Hydrogen iodide
- d. Iodic acid

Answer: c

Learning objective 2.3 - apply basic chemical nomenclature.

57. What is the correct name for the compound HCN?

- a. Hydrocarbonitride
- b. Hydrocyanic acid
- c. Hydrogen carbonitride
- *d. Hydrogen cyanide

Answer: d

Learning objective 2.3 - apply basic chemical nomenclature.

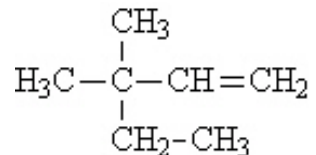
58. A typographical error on an exam produced the formula, P_4Se_7 , in one of the questions. How would you name this compound?

- a. Tetraphosphorus hexaselenide
- *b. Tetraphosphorus heptaselenide
- c. Phosphorus heptaselenite
- d. Phosphorus(IV) selenide

Answer: b

Learning objective 2.3 - apply basic chemical nomenclature.

59. What is the IUPAC name for the following compound?

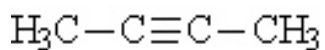


- *a. 3,3-dimethyl-1-pentene
- b. 3-methyl-3-ethyl-1-butene
- c. Isopropylpentene
- d. 3,3-dimethyl-3-pentene

Answer: a

Learning objective 2.3 - apply basic chemical nomenclature.

60. What is the IUPAC name for the following compound?

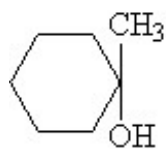


- a. Dimethyl acetylene
- b. 1-butyne
- c. 3-butene
- *d. 2-butyne

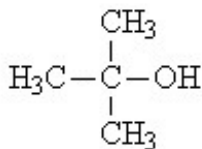
Answer: d

Learning objective 2.3 - apply basic chemical nomenclature.

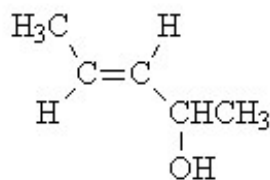
61. Which of the following compounds are secondary alcohols?



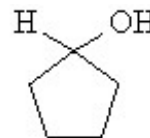
I



II



III



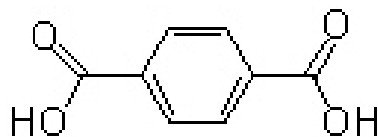
IV

- a. I, III
- b. II, III
- *c. III, IV
- d. I, IV

Answer: c

Learning objective 2.3 - apply basic chemical nomenclature.

62. The structure below is for terephthalic acid, a starting material of Kevlar that is used in bulletproof vests:



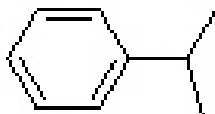
What is the correct molecular formula for this compound?

- a. $C_6H_6O_4$
- b. $C_8H_2O_4$
- *c. $C_8H_6O_4$
- d. $C_{10}H_4O_4$

Answer: c

Learning objective 2.2 - represent substances and processes using common chemistry conventions.

63. Cumene is an important industrial chemical used in the manufacture of acetone and phenol.



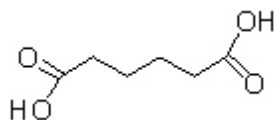
What is the correct molecular formula for this compound?

- a. C_8H_{12}
- b. C_9H_{11}
- *c. C_9H_{12}
- d. $C_{10}H_{10}$

Answer: c

Learning objective 2.2 - represent substances and processes using common chemistry conventions.

64. Adipic acid is used in the industrial manufacture of nylon used in carpet fibre, among other things.



What is the correct molecular formula for this compound?

- a. $C_4H_2O_4$
- *b. $C_6H_{10}O_4$
- c. $C_8H_6O_4$
- d. $C_6H_4O_4$

Answer: b

Learning objective 2.2 - represent substances and processes using common chemistry conventions.

Short-answer questions

65. How many significant figures are there in the number 4.125?

Answer: 4

Learning objective 2.1 - use measurements and units in calculations.

66. How many significant figures are there in the number 0.00017?

Answer: 2

Learning objective 2.1 - use measurements and units in calculations.

67. What is the SI prefix for 10^{-9} ?

Answer: nano

Learning objective 2.1 - use measurements and units in calculations.

68. What is the SI prefix for 10^3 ?

Answer: kilo

Learning objective 2.1 - use measurements and units in calculations.

69. What is the SI unit of mass?

Answer: kg

Learning objective 2.1 - use measurements and units in calculations.

70. What is the SI unit of length?

Answer: m

Learning objective 2.1 - use measurements and units in calculations.

71. Express 0.000045 in scientific notation.

Answer: 4.5×10^{-5}

Learning objective 2.1 - use measurements and units in calculations.

72. Express 671000 in scientific notation.

Answer: 6.71×10^5

Learning objective 2.1 - use measurements and units in calculations.

73. What is 485 K in degrees Celsius?

Answer: $211.85\text{ }^{\circ}\text{C}$

Learning objective 2.1 - use measurements and units in calculations.

74. What is $-28\text{ }^{\circ}\text{C}$ in degrees kelvin?

Answer: 245.15 K

Learning objective 2.1 - use measurements and units in calculations.

75. Convert 218 mm to nm.

Answer: $2.18 \times 10^8\text{ nm}$

Learning objective 2.1 - use measurements and units in calculations.

76. Convert 48 mg to kg.

Answer: $4.8 \times 10^{-5}\text{ kg}$

Learning objective 2.1 - use measurements and units in calculations.

77. Determine the molecular formula and draw the line structure for 2-methylbutane.

Answer:

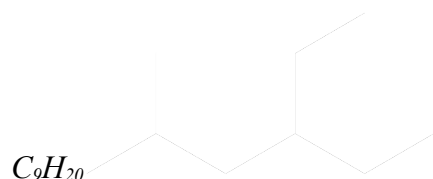


Learning objective 2.2 - represent substances and processes using common chemistry conventions.

Learning objective 2.3 - apply basic chemical nomenclature.

78. Determine the molecular formula and draw the line structure for 4-ethyl-2-methyl-hexane.

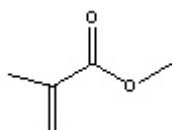
Answer:



Learning objective 2.2 - represent substances and processes using common chemistry conventions.

Learning objective 2.3 - apply basic chemical nomenclature.

79. Determine the chemical formula from the line structure for methyl methacrylate.



Answer: $C_5H_8O_2$

Learning objective 2.2 - represent substances and processes using common chemistry conventions.

80. Draw the line structure of 2-propanol.

Answer:



Learning objective 2.2 - represent substances and processes using common chemistry conventions.

Learning objective 2.3 - apply basic chemical nomenclature.

81. What is the chemical name for BrF_5 ?

Answer: bromine pentafluoride

Learning objective 2.3 - apply basic chemical nomenclature.

82. What is the chemical name for N_2O_5 ?

Answer: dinitrogen pentaoxide

Learning objective 2.3 - apply basic chemical nomenclature.

83. What is the chemical name for CO_2 ?

Answer: carbon dioxide

Learning objective 2.3 - apply basic chemical nomenclature.

84. What is the chemical name for SF_6 ?

Answer: sulfur hexafluoride

Learning objective 2.3 - apply basic chemical nomenclature.

85. What is the chemical formula for aluminium bromide?

Answer: AlBr_3

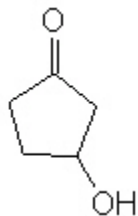
Learning objective 2.3 - apply basic chemical nomenclature.

86. What is the chemical formula for calcium fluoride?

Answer: CaF_2

Learning objective 2.3 - apply basic chemical nomenclature.

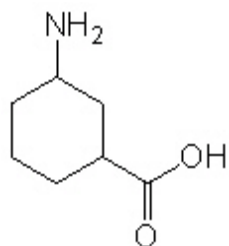
87. What functional groups are present in the following compound?



Answer: ketone, alcohol

Learning objective 2.3 - apply basic chemical nomenclature.

88. What functional groups are present in the following compound?



Answer: primary amine, carboxylic acid

Learning objective 2.3 - apply basic chemical nomenclature.

89. What is the correct formula for lithium phosphate?

Answer: Li_3PO_4

Learning objective 2.3 - apply basic chemical nomenclature.

90. What is the correct formula for barium sulfite?

Answer: BaSO_3

Learning objective 2.3 - apply basic chemical nomenclature.