

Gen Chem I Exam 1 Review (Chapters 1 & 2)**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- _____ 1. All of the following are properties of antimony. Which one is **not** a physical property?
- It is a solid at room temperature.
 - It has both yellow and gray forms (allotropes) in the solid state.
 - It burns in an atmosphere of chlorine.
 - It is one of the few substances that expands upon freezing.
 - The gray form melts at 631°C.
- _____ 2. The following properties describe zinc. Which one(s) is (are) **chemical** properties?
- It is bluish-white metal.
 - It corrodes upon prolonged contact with moist air.
 - Its density is 7.14 g/cm³.
 - It melts at 419°C.
 - It conducts electricity.
- IV and V
 - IV
 - V
 - II, IV, and V
 - II
- _____ 3. Identify which of the following properties of methane would be observed only with a change in composition.
- The melting point is -182.5°C.
 - The density is 6.67 × 10⁻⁴ g/cm³.
 - Carbon dioxide forms when it burns.
 - The boiling point is -161.5°C.
 - It dissolves slightly in water.
- _____ 4. Which of these physical changes would require the liberation of energy?
- condensation of steam to form liquid water
 - melting of ice
 - boiling of water
 - all of the above
 - none of the above
- _____ 5. Which answer lists all the substances below that are **compounds** and not any elements or mixtures?
- ethyl alcohol
 - neon
 - sulfur
 - water
 - crude oil
- I, II, and III
 - I, IV, and V
 - IV and V
 - II, III, and V
 - I and IV

- _____ 6. A sample of matter that can be decomposed into three different elements
- must be a solution.
 - must be a compound.
 - must be a heterogeneous mixture.
 - must be a homogeneous mixture.
 - could be any of the preceding four answers.
- _____ 7. Below is a list of common prefixes used in the SI and metric systems. Included with each is an abbreviation and meaning. Which set contains an **error**?
- | | | | | | |
|-----------|---|-----------|-----------|---|-----------|
| a. mega- | M | 10^6 | d. micro- | m | 10^{-6} |
| b. deci- | d | 10^{-1} | e. kilo- | k | 10^3 |
| c. centi- | c | 10^{-2} | | | |
- _____ 8. Which of the following is equivalent to 10 cm?
- 1 m
 - 0.1 dm
 - 100 mm
 - 1000 μm
 - 1 mm
- _____ 9. The answer to the following calculation, rounded to the proper number of significant digits, is:
- $$23.413 \text{ g} \div (2.15 \text{ cm} \times 1.1 \text{ cm} \times 3.73 \text{ cm})$$
- 2.654 g/cm^3
 - 2.65 g/cm^3
 - 2.7 g/cm^3
 - 3.0 g/cm^3
 - 2.66 g/cm^3
- _____ 10. If 5.76×10^{13} neon atoms (spherical) were laid in a line, each touching the next, the line would measure 2.54 miles. What is the diameter of a neon atom in \AA ?
- 0.92 \AA
 - 0.71 \AA
 - 1.86 \AA
 - 1.44 \AA
 - 1.74 \AA
- _____ 11. What is the area (in mm^2) of a rectangular surface that is 0.640 inch wide and 1.14 inches long?
- 471 mm^2
 - 328 mm^2
 - 84.2 mm^2
 - 242 mm^2
 - 680 mm^2
- _____ 12. Assuming a magnesium atom is spherical, calculate its volume in nm^3 . The **diameter** of a magnesium atom is 3.20 \AA . The volume of a sphere is $V = (4/3) \pi r^3$.
 $1 \text{ \AA} = 1 \times 10^{-10} \text{ m}$ and $1 \text{ nm} = 1 \times 10^{-9} \text{ m}$ (Both of these relationships are exact.) $\pi = 3.14$
- $5.57 \times 10^3 \text{ nm}^3$
 - $2.34 \times 10^{-22} \text{ nm}^3$
 - $5.57 \times 10^{-24} \text{ nm}^3$
 - $1.71 \times 10^{-2} \text{ nm}^3$
 - $5.57 \times 10^{-3} \text{ nm}^3$

- _____ 13. The 1970 standard established by the U.S. government for carbon monoxide emission for automobiles limited exhaust to 23.0 grams of CO per vehicle-mile. Assume that in a given metropolitan area there are 82,700 automobiles, driven an average of 13.5 miles per 24-hour period. How many tons/day of CO could legally be discharged into the area's atmosphere?
- a. 270 tons/day
b. 0.155 tons/day
c. 28.3 tons/day
d. 0.0535 tons/day
e. 39.0 tons/day
- _____ 14. Caffeine, a stimulant in coffee and some cola drinks, is 49.47% carbon, 5.19% H, 28.8% N, 16.48% O. What is the mass of carbon contained in 37.1 g of caffeine?
- a. 18.4 g
b. 36.8 g
c. 6.11 g
d. 1840 g
e. 24.3 g
- _____ 15. A metal cube having a mass of 112 grams is dropped into a graduated cylinder containing 30.00 mL of water. This causes the water level to rise to 39.50 mL. What is the density of the cube?
- a. 2.86 g/mL
b. 11.8 g/mL
c. 10.8 g/mL
d. 3.74 g/mL
e. 10.6 g/mL
- _____ 16. A gold ring has a mass of 15.37 g. If this ring is pure gold (density = 16.1g/mL), what would the volume of the ring be?
- a. 15.37 mL
b. 1.04 mL
c. 0.955 mL
d. 16.1 mL
e. 8.05 mL
- _____ 17. Liquid propane boils at 231K. What is its boiling point in °C?
- a. 42°C
b. 315°C
c. -42°C
d. 504°C
e. -231°C
- _____ 18. How much heat is released as the temperature of 25.2 grams of iron is decreased from 72.1°C to 9.8°C? The specific heat of iron is 0.444 J/g•°C.
- a. 113 J
b. 566.1 J
c. 1.11 kJ
d. 0.697 kJ
e. 957 J
- _____ 19. If 10.0 g of copper cools from 35.0°C to 28.8°C and loses 23.6 joules of heat, what is the specific heat of copper?
- a. 0.076 J/g•°C
b. 3.8×10^2 J/g•°C
c. 0.38 J/g•°C
d. 0.62 J/g•°C
e. 76 J/g•°C

- ___ 28. What is the formula for aluminum fluoride?
- a. AlF
 - b. Al_2F_3
 - c. Al_3F
 - d. Al_3F_2
 - e. AlF_3
- ___ 29. What is the formula for manganese(III) oxide?
- a. MgO
 - b. MnO
 - c. MnO_4
 - d. Mg_2O_3
 - e. Mn_2O_3
- ___ 30. What is the name of $\text{Fe}(\text{OH})_3$?
- a. iron hydroxide
 - b. iron trihydroxide
 - c. iron (III) hydroxide
 - d. iron (II) hydroxide
 - e. none of these
- ___ 31. What is the formula for copper(II) nitrate?
- a. CuNO_3
 - b. Cu_2NO_3
 - c. CuNO_2
 - d. Cu_2NO_2
 - e. $\text{Cu}(\text{NO}_3)_2$
- ___ 32. Determine the number of sulfur atoms in 27.1 g of molecular sulfur (S_8).
- a. 0.845
 - b. 5.27×10^{23}
 - c. 5.09×10^{23}
 - d. 2.07×10^{23}
 - e. 0.106
- ___ 33. Determine the formula weight of calcium phosphate.
- a. 230 amu
 - b. 279 amu
 - c. 215 amu
 - d. 310 amu
 - e. 135 amu
- ___ 34. What is the mass of 2.2×10^9 CO_2 molecules?
- a. 9.7×10^{10} g
 - b. 1.0×10^{-12} g
 - c. 1.2×10^6 g
 - d. 4.4×10^{-14} g
 - e. 1.6×10^{-13} g
- ___ 35. What is the mass in grams of 5.00×10^{12} water molecules?
- a. 1.50×10^{-10} g
 - b. 1.67×10^{35} g
 - c. 2.17×10^{12} g
 - d. 6.69×10^9 g
 - e. 4.61×10^{-13} g
- ___ 36. A sample of ethane, C_2H_6 , contains a total of $16N$ atoms, where $N = 6.02 \times 10^{23}$. How much C_2H_6 is in the sample?
- a. 2.0 g
 - b. 30 g
 - c. 60 g
 - d. 16 mol
 - e. 4 mol

- ___ 37. Calculate the percent by mass of nitrogen in ammonium carbonate.
- 14.5%
 - 27.8%
 - 29.2%
 - 33.3%
 - 17.1%
- ___ 38. A compound contains carbon, oxygen, and hydrogen. Analysis of a sample showed that it contained by mass 68.9% carbon and 4.92% hydrogen. What is the simplest formula for this compound?
- $C_6H_6O_2$
 - $C_7H_6O_2$
 - $C_8H_6O_2$
 - $C_6H_4O_3$
 - C_7H_8O
- ___ 39. A compound is known to contain only carbon, hydrogen, and oxygen. If the complete combustion of a 0.150-g sample of this compound produces 0.225 g of CO_2 and 0.0614 g of H_2O , what is the empirical formula of this compound?
- C_3H_4
 - CH_4O
 - C_3HO_3
 - $C_3H_4O_3$
 - $C_5H_7O_5$
- ___ 40. A compound contains, by mass, 87.5% nitrogen and 12.5% hydrogen. Its molecular weight is found to be 32 g/mol. What is its molecular formula?
- N_2H_6
 - N_2H_4
 - N_2H_5
 - NH_3
 - NH_2
- ___ 41. A compound contains, by mass, 26.7% carbon, 71.1% oxygen and the remainder hydrogen. A 0.23 mole sample of this compound weighs 20.7 g. What is the molecular formula of this compound?
- $C_3H_6O_2$
 - $C_2H_2O_4$
 - C_2H_4O
 - CHO_2
 - C_3OH
- ___ 42. What mass of calcium metal could be obtained from one kg of limestone that is 50.0% pure $CaCO_3$? (No other calcium-containing compounds are present.)
- 0.05 kg
 - 0.2 kg
 - 0.4 kg
 - 0.5 kg
 - 0.1 kg
- ___ 43. How do **nonmetals** form **negative** ions?
- by losing one or more electrons
 - by sharing electrons
 - by gaining one or more protons
 - by gaining one or more electrons
- ___ 44. What is the formula for the ionic compound formed by **calcium** and **bromine**?
- $CaBr$
 - Ca_2Br
 - $CaBr_2$
 - Ca_3Br_2
- ___ 45. The **empirical formula** of a compound is **CHBr** and its **molecular weight** is **185**. What is its **molecular formula**? (atomic weights: C = 12.01, H = 1.008, Br = 79.90)
- CH_2Br
 - $C_2H_2Br_2$
 - $C_3H_3Br_3$
 - C_2HBr

Gen Chem I Exam 1 Review (Chapters 1 & 2)
Answer Section

MULTIPLE CHOICE

- | | | |
|------------|--------|--|
| 1. ANS: C | PTS: 1 | TOP: Chemical and Physical Properties |
| 2. ANS: E | PTS: 1 | TOP: Chemical and Physical Properties |
| 3. ANS: C | PTS: 1 | TOP: Chemical and Physical Properties |
| 4. ANS: A | PTS: 1 | TOP: Chemical and Physical Changes |
| 5. ANS: E | PTS: 1 | TOP: Mixtures, Substances, Compounds, and Elements |
| 6. ANS: E | PTS: 1 | TOP: Mixtures, Substances, Compounds, and Elements |
| 7. ANS: D | PTS: 1 | TOP: Measurements in Chemistry |
| 8. ANS: C | PTS: 1 | TOP: Measurements in Chemistry |
| 9. ANS: C | PTS: 1 | TOP: Use of Numbers |
| 10. ANS: B | PTS: 1 | TOP: The Unit Factor Method (Dimensional Analysis) |
| 11. ANS: A | PTS: 1 | TOP: The Unit Factor Method (Dimensional Analysis) |
| 12. ANS: D | PTS: 1 | TOP: The Unit Factor Method (Dimensional Analysis) |
| 13. ANS: C | PTS: 1 | TOP: The Unit Factor Method (Dimensional Analysis) |
| 14. ANS: A | PTS: 1 | TOP: Percentage |
| 15. ANS: B | PTS: 1 | TOP: Density and Specific Gravity |
| 16. ANS: C | PTS: 1 | TOP: Density and Specific Gravity |
| 17. ANS: C | PTS: 1 | TOP: Heat and Temperature |
| 18. ANS: D | PTS: 1 | TOP: Heat Transfer and the Measurement of Heat |
| 19. ANS: C | PTS: 1 | TOP: Heat Transfer and the Measurement of Heat |
| 20. ANS: B | PTS: 1 | DIF: * Harder Question |
| | | TOP: Heat Transfer and the Measurement of Heat |
| 21. ANS: B | PTS: 1 | TOP: Additional Questions |
| 22. ANS: A | PTS: 1 | TOP: Additional Questions |
| 23. ANS: B | PTS: 1 | TOP: Additional Questions |
| 24. ANS: E | PTS: 1 | TOP: Chemical Formulas |
| 25. ANS: C | PTS: 1 | TOP: Chemical Formulas |
| 26. ANS: A | PTS: 1 | TOP: Ions and Ionic Compounds |
| 27. ANS: A | PTS: 1 | TOP: Ions and Ionic Compounds |
| 28. ANS: E | PTS: 1 | TOP: Names and Formulas of Some Ionic Compounds |
| 29. ANS: E | PTS: 1 | TOP: Names and Formulas of Some Ionic Compounds |
| 30. ANS: C | PTS: 1 | TOP: Names and Formulas of Some Ionic Compounds |
| 31. ANS: E | PTS: 1 | TOP: Names and Formulas of Some Ionic Compounds |
| 32. ANS: C | PTS: 1 | TOP: The Mole |
| 33. ANS: D | PTS: 1 | TOP: Formula Weights, Molecular Weights, and Moles |
| 34. ANS: E | PTS: 1 | TOP: Formula Weights, Molecular Weights, and Moles |
| 35. ANS: A | PTS: 1 | TOP: Formula Weights, Molecular Weights, and Moles |
| 36. ANS: C | PTS: 1 | DIF: * Harder Question |
| | | TOP: Formula Weights, Molecular Weights, and Moles |
| 37. ANS: C | PTS: 1 | TOP: Percent Composition and Formulas of Compounds |
| 38. ANS: B | PTS: 1 | TOP: Derivation of Formulas from Elemental Composition |
| 39. ANS: D | PTS: 1 | TOP: Derivation of Formulas from Elemental Composition |
| 40. ANS: B | PTS: 1 | TOP: Determination of Molecular Formulas |
| 41. ANS: B | PTS: 1 | TOP: Determination of Molecular Formulas |

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|------------|--------|---------------------------|
| 42. ANS: B | PTS: 1 | TOP: Purity of Samples |
| 43. ANS: D | PTS: 1 | TOP: Additional Questions |
| 44. ANS: C | PTS: 1 | TOP: Additional Questions |
| 45. ANS: B | PTS: 1 | TOP: Purity of Samples |