

CHEMISTRY 15
EXAM I-Version A (White)

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May 31, 2001

An optical scoring machine will grade this examination. The machine is not programmed to accept the correct one of two sensed answers and will not sense answers which are lightly marked. Mark your answer sheet carefully with a No. 2 soft lead pencil and erase any undesired marks **COMPLETELY**. Avoid making any extraneous marks on the answer sheet other than the information asked below.

On the answer sheet:

1. Print your name in the space for **NAME (Last name first, CIRCLE your last name)**.
2. In the space marked **SUBJECT** write **Chem 15.**
3. In the space marked **TEST NO.** write **EXAM #1.**
4. In the space marked **HOOR** write **Summer I' 2001.**
5. Check to see that you have 20 examination questions, periodic table, scratch paper and a scantron with no mark in the upper right hand corner.

HAND IN ONLY THE ANSWER SHEET.

Useful Conversions

$$1 \text{ mol} = 6.0220 \times 10^{23}$$

$$1 \text{ lb} = 0.45359 \text{ kg}$$

$$1 \text{ L} = 1000 \text{ cm}^3$$

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CHOOSE THE ONE BEST ANSWER

Summer I' 2001

1. The dosage for a certain medication is $0.30 \text{ cm}^3/100 \text{ lb}$ of body weight. What is the **dosage in microliters (uL)** for a 9.0 kg baby? (1 lb = 0.45359 kg; 1 L = 1000 cm^3)
 - A. 6.6 uL
 - B. 15 uL
 - C. 2.7×10^3 uL
 - D. 60. uL
 - E. 0.030 uL

2. Which of the following processes is **NOT** a physical change?
 - A. vaporization
 - B. dissolution (the process of dissolving a substance)
 - C. deposition
 - D. combustion
 - E. freezing

3. Which of the following calculations involving measured numbers will result in an answer with **four** significant figures? (HINT: Don't guess. Work each one out.)
 - A. $15.30 / 0.150 =$
 - B. $10.10 + 0.20 + 91.7 =$
 - C. $(1.03 \times 10^3) - (9.28 \times 10^2) =$
 - D. $(125.0 + 79) / 2.000 =$
 - E. All of the above.

4. A certain HCl solution is 30.% HCl and has a density of 1.2 g/mL. What **mass of HCl** is present in 167 mL of this solution?
 - A. 2.2×10^2 g
 - B. 60. g
 - C. 39 g
 - D. 6.9×10^2 g
 - E. 85 g

5. Which of the following statements is **consistent** with **Dalton's Atomic Theory**?
 - A. Atoms of different elements have the same mass.
 - B. In a given chemical compound, the mass ratio of the elements is not a constant because atoms combine together in variable atom ratios.
 - C. The law of conservation of mass is obeyed because chemical reactions only rearrange the way the atoms are combined.
 - D. Matter consists of small indivisible particles called molecules.
 - E. The number of electrons characterizes the element.

6. Which of the following statements about **atomic structure** is **TRUE**?
- Electrons make up most of the mass of the atom.
 - Electrons and protons have a charge equal in magnitude but opposite in sign.
 - Neutrons have a charge of +1.
 - The electrons and protons reside within the nucleus.
 - The nucleus takes up most of the volume of the atom.
7. An ion has 33 protons, 38 neutrons and 36 electrons. The **correct** way to symbolize this ion is:
- $^{69}\text{As}^{-5}$
 - $^{38}\text{Kr}^{+3}$
 - $^{71}\text{Sr}^{-3}$
 - $^{74}\text{Lu}^{-2}$
 - None of the above are correct.
8. A **cation**
- of Ba^{+2} is formed by the gain of 2 protons by the neutral atom.
 - is bound to an anion with covalent bonds in a molecular compound.
 - of Sc^{+3} is formed by the loss of 3 electrons from the neutral atom.
 - is generally formed by the nonmetals in ionic compounds.
 - has more electrons than protons.
9. A certain theoretical element exists as the two isotopes ^{29}X and ^{33}X with atomic masses shown below. If the average atomic mass of element X is 30.00, what is the **percent natural abundance of ^{29}X** ?
- | <u>Isotope</u> | <u>Atomic Mass</u> |
|-----------------|--------------------|
| ^{29}X | 28.92 amu |
| ^{33}X | 33.92 amu |
- 89.3%
 - 26.5%
 - 37.6%
 - 58.2%
 - 78.4%
10. The **atomic masses** found on the periodic table
- are for the most abundant isotope of each element.
 - are always the same as the mass number.
 - are measured relative to the mass of one atom of carbon-12.
 - are the mass in amu of one mole of each element.
 - both A and B.

11. The most important discovery from **R. A. Milliken's experiments** with oil droplets was
- A. that the atom contains no parts.
 - B. the mass of the atom.
 - C. the existence of the proton.
 - D. the fundamental charge on the electron.
 - E. that most of the atom is occupied by the nucleus.
12. From **Rutherford's experiments** with alpha-particles, he concluded that
- A. alpha-particles reflected straight back had collided with something very massive within the atom.
 - B. alpha-particles deflected at small angles were attracted by electrons.
 - C. undeflected alpha-particles had destroyed the atom.
 - D. the atom contains only electrons.
 - E. massive, positively charged particles were dispersed evenly throughout the entire volume of the atom.
13. Which of the following compounds is classified as an **ionic compound**?
- A. H_2SO_4
 - B. $\text{Al}(\text{NO}_3)_3$
 - C. C_2H_6
 - D. Cl_2
 - E. S_2Cl_2
14. Which of the following is written with a **CORRECT formula unit**?
- A. KI_3
 - B. Ba_2Se
 - C. AlP
 - D. Na_2PO_4
 - E. $\text{Ca}(\text{SO}_3)_2$
15. The chemical formula for **lithium sulfide** is _____ while the chemical name for $\text{Co}_2(\text{SO}_4)_3$ is _____.
- A. Li_2S ; cobalt (III) sulfate
 - B. LiS_2 ; dicobalt trisulfide
 - C. Li_2SO_4 ; cobalt (II) sulfide
 - D. $\text{Li}_2(\text{SO}_3)_3$; cobalt sulfite
 - E. Li_2S ; cobalt (II) trisulfate

16. The chemical formula for **hydrobromic acid** is _____ while the chemical name for **P₂O₅** is _____.
- A. HBr; phosphorus oxide
 - B. HBrO₃; phosphorus(V) oxide
 - C. HBr; diphosphorus pentaoxide
 - D. HBrO₄; phosphoric oxate
 - E. HBrO₄; diphosphorus pentaoxide
17. The term carbohydrate means “hydrate” (water containing compound) of “carbon”. Thus, the chemical formula of sugar, a carbohydrate, can be written as C₁₂(H₂O)₁₁. How many **atoms of hydrogen** are present in 0.0040 mol of sugar?
- A. 0.088 atoms H
 - B. 2.9×10²¹ atoms H
 - C. 6.8×10²⁴ atoms H
 - D. 5.3×10²² atoms H
 - E. 1.9×10⁻²⁵ atoms H
18. How many **moles** are present in 27.0 g N₂O₅?
- A. 0.250 mol
 - B. 4.07 mol
 - C. 0.900 mol
 - D. 2.50 mol
 - E. 0.714 mol
19. The **theoretical weight percent of oxygen** in KClO₃ is:
- A. 62.4%
 - B. 76.7%
 - C. 25.5%
 - D. 13.9%
 - E. 39.2%
20. What **mass of hydrogen** is combined with 10. g carbon in the compound C₂H₆?
- A. 3.3 g
 - B. 0.40 g
 - C. 40. g
 - D. 30. g
 - E. 2.5 g

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Answer Key

Summer I' 2001

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|-----|---|-----|---|
| 1. | D | 11. | D |
| 2. | D | 12. | A |
| 3. | B | 13. | B |
| 4. | B | 14. | C |
| 5. | C | 15. | A |
| 6. | B | 16. | C |
| 7. | E | 17. | D |
| 8. | C | 18. | A |
| 9. | E | 19. | E |
| 10. | C | 20. | E |