

CH 150 Final Exam Cover Sheet

Sample Final Exam

Name: _____

This exam consists of thirty-two (32) multiple-choice questions and three (3) short answer questions.

A periodic table and scratch paper are available for you to use on this exam. This is a closed book exam; no notes are allowed.

Before you start:

- Write your name in the space above
- Sign the integrity statement below. **Failing to sign the integrity statement on this exam imparts an immediate grade of zero.**
- For multiple choice questions: clearly enter your letter answer in the appropriate location. **Circle** the letter which corresponds to your answer.
- For short answer questions: clearly **circle** your final answer, showing all work.

Point values and your exam score will be summarized on the final page.

Integrity statement:

I have neither given nor received aid on this exam.

Your signature

Part I: Multiple Choice Questions (160 Points) There is *only* one best answer for each question.

1. Which one of the following is not matter?

- a. pasta
- b. dimethyl sulfide
- c. elemental aluminum
- d. coffee
- e. a shadow

Letter answer to question #1: _____

2. Which one of the following is a physical process?

- a. the rusting of iron
- b. the evaporation of liquid water
- c. the baking of a potato
- d. the formation of polyethylene from ethylene
- e. the explosion of nitroglycerine

Letter answer to question #2: _____

3. Which one of the following is NOT a physical property of water?

- a. it boils at 100 °C at a pressure of 1 atmosphere
- b. it is clear and colorless
- c. it is translucent (you can see through it pretty well) under normal conditions
- d. it reacts rapidly with potassium metal to form potassium hydroxide
- e. it feels cold while skiing on Mt. Hood

Letter answer to question #3: _____

4. A combination of sand, salt and water is an example of a(n)

- a. homogenous mixture
- b. heterogeneous mixture
- c. compound
- d. pure substance
- e. amalgam

Letter answer to question #4: _____

5. Which one of the following has the element name and symbol correctly matched?

- a. P, potassium
- b. Mg, magnesium
- c. C, copper
- d. Ag, gold
- e. Ti, tin

Letter answer to question #5: _____

6. Which of the following numbers contains five significant figures?

- a. 4.2010
- b. 0.03702
- c. 12562.00
- d. 1.0370
- e. more than one of the above

Letter answer to question #6: _____

7. The answer to this problem should have how many significant figures? $(56.412 + 2.49) * (1.451 \times 10^5) / 5.467$

- a. one
- b. two
- c. three
- d. four
- e. five

Letter answer to question #7: _____

8. Which of the following is the greatest mass? (Note: M = 10^6 , and p = 10^{-12})

- a. 4.22×10^{-8} Mg
- b. 4.22×10^9 pg
- c. 4.22×10^2 mg
- d. 4.22×10^6 μ g
- e. 4.22×10^8 ng

Letter answer to question #8: _____

9. What is the volume of a 7.29 g piece of metal with a density of 9.43 g/cm³?

- a. 12.2 cm³
- b. 0.773 cm³
- c. 1.29 cm³
- d. 115 cm³
- e. none of these

Letter answer to question #9: _____

10. Water (46 g) is measured at a temperature of 37.0 °C where the density is 0.970 g/cm³. What is the volume of the water?

- a. 37 mL
- b. 45 mL
- c. 46 mL
- d. 47 mL
- e. 48 mL

Letter answer to question #10: _____

11. The gold foil experiment performed in Rutherford's lab

- a. confirmed the plum pudding model of the atom.
- b. lead to the discovery of the atomic nucleus.
- c. lead to the discovery that mass is spread essentially uniformly throughout the atom.
- d. lead to the discovery that protons, neutrons and electrons reside in the center of the atom.
- e. more than one of the above is correct

Letter answer to question #11: _____

12. Isotopes are atoms that have the same number of _____ but differing number of _____.

- a. protons, electrons
- b. neutrons, protons
- c. protons, neutrons
- d. electrons, protons
- e. dollars, cents

Letter answer to question #12: _____

13. The elements in groups 1A, 7A and 8A are called, respectively:

- a. alkaline earth metals, halogens, chalcogens
- b. alkali metals, halogens, noble gases
- c. alkaline earth metals, halogens, noble gases
- d. alkaline earth metals, transition metals, halogens
- e. alpha, beta, gamma

Letter answer to question #13: _____

14. An element in the upper right corner of the periodic table is:

- a. definitely a metal
- b. either a metal or metalloid
- c. either a metalloid or nonmetal
- d. definitely a nonmetal
- e. definitely a metalloid

Letter answer to question #14: _____

15. Which pair of elements should be most similar in chemical properties?

- a. Se and O
- b. Al and As
- c. I and B
- d. K and Kr
- e. Cs and Ce

Letter answer to question #15: _____

16. How many subatomic particles are in a neutral atom with an atomic number of 70 and a mass number of 126?

- a. 56 electrons, 56 protons, 56 neutrons
- b. 126 electrons, 126 protons, 126 neutrons
- c. 56 electrons, 56 protons, 70 neutrons
- d. 70 electrons, 70 protons, 56 neutrons
- e. 56 electrons, 56 protons, 126 neutrons

Letter answer to question #16: _____

17. Which of the following has 46 protons?

- a. $^{118}\text{Sn}^{2+}$
- b. ^{48}Ti
- c. $^{116}\text{Pd}^{2+}$
- d. $^{112}\text{Cd}^{2+}$
- e. $^2\text{H}^{1+}$

Letter answer to question #17: _____

18. How many subatomic particles are in the following atom: $^{31}\text{P}^{3+}$

- a. 18 electrons, 15 protons, 31 neutrons
- b. 15 electrons, 18 protons, 16 neutrons
- c. 15 electrons, 12 protons, 19 neutrons
- d. 12 electrons, 15 protons, 16 neutrons
- e. 18 electrons, 15 protons, 16 neutrons

Letter answer to question #18: _____

19. Which of the following has 26 electrons?

- a. $^{56}\text{Fe}^{2+}$
- b. $^{52}\text{V}^{3+}$
- c. $^{58}\text{Ni}^{2+}$
- d. $^{24}\text{Mg}^{2+}$
- e. ^{26}Al

Letter answer to question #19: _____

20. Elements belonging to which group of the periodic table form ions with a +1 charge:

- a. alkaline earth metals
- b. chalcogens
- c. halogens
- d. alkali metals
- e. noble gases

Letter answer to question #20: _____

21. Of the choices below, which one is a compound?

- a. P_4
- b. Cl_2
- c. CO
- d. Co
- e. Rn

Letter answer to question #21: _____

22. Which of the following is most likely to gain electrons when forming an ion?

- a. silver
- b. chromium
- c. rubidium
- d. bromine
- e. uranium

Letter answer to question #22: _____

23. Which of the following is NOT an ionic compound?

- a. VCl_5
- b. NaCl
- c. CCl_4
- d. PCl_3
- e. more than one of the above

Letter answer to question #23: _____

24. How many grams are found in 1 mol of barium metal?

- a. 56
- b. 137
- c. 6.022×10^{23}
- d. 1 amu
- e. 1.37×10^{-5}

Letter answer to question #24: _____

25. The correct name of the compound AsCl_3 is:

- a. arsenic chloride
- b. arsenic(III) chloride
- c. arsenic pentachloride
- d. arsenic trichloride
- e. monoarsenic trichloride

Letter answer to question #25: _____

26. Which of the following are isoelectronic with neon?

- i) Cl^{1-} ii) P^{3-} iii) Al^{3+} iv) Na^{1+} v) Ca^{2+}

- a. i and ii
- b. i, ii and iii
- c. iii and iv
- d. i, ii, iii and v
- e. i, ii and v

Letter answer to question #26: _____

27. The correct name for the formula $\text{Fe}(\text{PO}_4)_2$ is

- a. iron phosphate
- b. iron(VI) phosphate
- c. iron(II) phosphate
- d. iron(III) phosphate
- e. Duff Beer

Letter answer to question #27: _____

28. The correct formula for gold(III) nitrite is:

- a. AuNO_3
- b. $\text{Au}_3(\text{NO}_2)_2$
- c. Au_3N_2
- d. $\text{Au}(\text{NO}_3)_2$
- e. $\text{Au}(\text{NO}_2)_3$

Letter answer to question #28: _____

29. Potassium reacts with an unknown element (X) to form a compound with the general formula KX. What would be the most likely formula for the compound formed between calcium and element X?

- a. CaX
- b. Ca₂X
- c. CaX₂
- d. Ca₂X₃
- e. Ca₃X₂

Letter answer to question #29: _____

30. Which one of the following subshells contains five orbitals and can hold ten electrons total?

- a. 4d
- b. 6f
- c. 5s
- d. 4p
- e. 7g

Letter answer to question #30: _____

31. Which of the following geometries have bond angles of 180°?

- a. linear
- b. tetrahedral
- c. octahedral
- d. bent
- e. trigonal planar

Letter answer to question #31: _____

32. Which of the following has orbitals listed in order of increasing energy?

- a. 1s 2s 2p 3s 3p 3d 4s 4p
- b. 1s 2s 2p 3s 3p 4s 4p 3d
- c. 1s 2s 2p 3s 3p 4s 3d 4p
- d. 1s 2s 3s 4s 2p 3p 4p 3d
- e. none of the above

Letter answer to question #32: _____

Part II: Short Answer / Calculation, 40 points total. *Show all work!*

1. Write the complete nl^x spectroscopic notation (“electron configuration”) for selenium and silver. (10 points)

2. My drone travels at a maximum speed of 65.7 km/hr. While traveling this speed, how many miles could it travel while I watched an episode of Star Trek (which lasts 48.7 minutes)? 1.609 km = 1 mile. (10 points)
3. Cacodyl, a compound with an irritating garlic-like odor, was discovered in 1842 by the German chemist Bunsen. Its molar mass is 210 g/mol, and it is 22.83% C, 5.76% H and 71.36% As. Determine the empirical and molecular formula for cacodyl. (10 points)
4. Draw the Lewis Structure for nitrogen triiodide. How many valence electrons does it have? Describe the electron pair geometry and molecular geometry of the molecule. List the bond angle(s) and tell if it is polar or nonpolar. (10 points)

CH 150 Final Exam Point Distribution Sheet

*Avoid a point penalty - do **not** write on this page!*

Multiple choice questions:

$\frac{\text{number of multiple choice questions correct}}{\text{}} \times 5 \text{ points per question} = \text{ } \text{ points}$

Short answer questions:

$\text{ } \text{ points}$

Total points on this exam:

$\text{ } \text{ points}$

<i>Grade</i>	<i>Percentage</i>	<i>Points on This Exam</i>
A	90% - 100%	180 - 200
B	80% - 89%	160 - 179
C	65% - 79%	130 - 159
D	50% - 64%	100 - 129
F	0% - 49%	0 - 99

Answers**Part I:** Multiple Choice Questions

1. E
2. B
3. D
4. B
5. B
6. E
7. D
8. D
9. B
10. D
11. B
12. C
13. B
14. D
15. A
16. D
17. C
18. D
19. C
20. D
21. C
22. D
23. E
24. B
25. D
26. C
27. B
28. E
29. C
30. A
31. A
32. C

Part II: Short Answer / Calculation.

1. Se: $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 3d^{10} 4p^4$ Ag: $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 3d^{10} 4p^6 5s^2 4d^9$
2. 33.1 miles
3. C_2H_6As and $C_4H_{12}As_2$
4. NI_3 has 26 valence electrons (13 pairs) and is tetrahedral (EPG) / trigonal pyramid (MG). Polar. 109° angles