

CHEMISTRY

FALL SEMESTER FINAL EXAM REVIEW/STUDY GUIDE

Directions: Complete **ALL** questions below. Turn this in on **the day of your final.**

- **Read BELOW!!!!**
 - All answers must be ...
 - a. **hand written,**
 - b. **numbered,**
 - c. on a **separate sheet** of paper,
 - i. **labeled by Unit**
 - d. you MUST **show ALL work.** !!!!!
 - You can earn 10 bonus points on your final. **(All or None)**
 - You must correctly answer **every** question in order to receive the bonus points
 - Due at the BEGINNING of the period on the day of YOUR SCHEDULED FINAL EXAM.

1. Study the lab safety rules. – Write 3 rules.
2. Know the following pieces of lab equipment and its use. Complete the chart below:

Name of Glassware	Use/Definition	Draw a Picture
beaker		
graduated cylinder		
pipette		
ring stand		
Erlenmeyer flask		

3. Describe the proper way to smell an unknown chemical in lab.
4. What is chemistry?
5. What is qualitative data?
6. What is quantitative data?
7. What are the SI base units for mass, length, and volume?
8. How does one determine the number of significant digits in a number?
9. How many sig figs are in each of the following?
 - a) 0.000343
 - b) 34030000
 - c) 3200
 - d) 3200.0
 - e) 32.002
 - f) 0.000030340
10. What is precision?
11. What is accuracy?
12. Convert the following using dimensional analysis: (SHOW WORK!)
 - a) 5000cm → km
 - b) 32304 mL → DL
 - c) 8324 cg → g
 - d) 325.6 dm → Dm
13. Convert the following using dimensional analysis: (SHOW WORK!)
 - a) 19.0 ft into miles
 - b) 37 hours into days
 - c) 4.23 cm into inches

Chemistry 2019 Final Exam Review

10 Bonus Points on the Final

Name: _____

Give the number of significant figures:

14. 420.0 _____

15. 7589 _____

16. 432506.43 _____

17. 0.0000476 _____

18. 0.03 _____

19. 35.17 _____

20. 0.00004 _____

21. 8671.5 _____

Express your answer to the following with the appropriate number of significant figures:

22. 2.21×0.3

23. $789.234 \div 47.36$

24. $2.90 \times 0.01733 \times 920$

25. 2.02×4.113

26. $\frac{(72)(4.022)}{9.03}$

9.03

Convert the following:

27. 34 m = _____ cm

28. 0.15 mg = _____ g

29. 32.98 L = _____ mL

30. 1286 m = _____ km

31. 72 cm = _____ m

32. 948 mm = _____ cm

33. 32 Dm = _____ m

34. 87 km = _____ Hm

Place the following in scientific notation:

35. 0.000 000 110

36. 0.000 027

37. 6 220 000 000

38. 77 000 000 000

39. 410 000

40. 0.000 000 011

Place the following in standard form:

41. 4.3×10^8

42. 2.5×10^{-10}

43. 1.2×10^{-4}

44. 6.2×10^{11}

45. 4.4×10^{-6}

46. 1.3×10^5

Perform the following calculations:

47. 1.10×10^3) (3.922×10^6)

48. (2.377×10^6) (1.81×10^9)

49. $(6.30 \times 10^8) \div (2.50 \times 10^3)$

50. $(7.64 \times 10^6) \div (1.343 \times 10^8)$

UNIT 2: Matter and Phase Change

51. What is a physical property?

52. Give 4 examples of physical properties.

53. What is a chemical property?

54. Give 3 examples of chemical properties.

55. What is a physical change?

56. How do you know if a physical change has occurred?

57. What is a chemical change?

58. How do you know if a chemical change has occurred?

59. Label the following as chemical or physical change.

a) Silver tarnishing

b) Ice melting

c) Evaporating water from a salt
water solution

d) Burning

e) Rusting

f) Cutting

60. What are the six phase changes of matter?

61. Define each phase change of matter.

62. Draw a phase diagram and label each state of matter (3) and phase change. (6)

63. What is the difference between triple point and critical point?

64. Define temperature.

65. Define element.

10 Bonus Points on the Final

66. Define compound.
67. Define mixture.
68. Label each of the following as element, compound, or mixture:
- | | |
|-------------------|---------------|
| a) Water | e) Carbon |
| b) salad dressing | f) Kool-Aid |
| c) Liquid bromine | g) Salt water |
| d) carbon dioxide | h) Gatorade |
69. What is the difference between a compound and a mixture?

Density: $D=m/V$

70. What is the formula for density?
71. What are the units of density?
72. Given that the density of iron is 11.35 g/cm^3 , what would be the volume of a 5.7 gram piece of iron?
73. What is the density of 37.72 g of water whose volume is 6.80 cm^3 ?
74. The density of Aluminum is 2.70 g/cm^3 . The volume of a solid piece of Al is 1.50 cm^3 . What is the mass of this piece?

UNIT 3 and 4a: From the Atom to the Periodic Table**Atomic Theory/Isotope Notation**

75. What are all the parts Dalton's atomic theory?
76. What did Aristotle contribute to the atomic theory?
77. What did Chadwick discover?
78. What did Bohr discover?
79. What did Democritus do?
80. What did Rutherford discover?
81. How did Rutherford make his discovery? (Describe experiment)
82. What did Thomson discover?
83. How did Thomson make his discovery? (Describe experiment)
84. What is the law of definite proportions?
85. What is an isotope?
86. What do isotopes have in common?
87. How do isotopes of the same element differ?
88. How do you find the mass number?
89. How do you find the number of neutrons?
90. How do you determine the number of protons?
91. How do you determine the number of electrons?
92. What determines an element's identity?
93. What determines an element's behavior?
94. What have more in common: elements in the same period or elements in the same family?
95. What are the sub atomic particles of an atom?
96. What is the charge on each sub atomic particle in an atom?
97. Where is each sub atomic particle in the atom?
98. How many protons, neutrons, and electrons are in C^{-4} ?
99. How many protons are present in a titanium atom with a mass of 48 g/mol ?
100. Where are the metals, non-metals and metalloids on the periodic table?
101. What are valence electrons?

10 Bonus Points on the Final

102. How many valence electrons does each family on the periodic table contain?
 103. What is a nuclear symbol?
 104. How many protons, neutrons, and electrons are in the following?

- a. C-14 d. $\frac{18}{8}\text{O}^{2-}$
 b. $\frac{42}{20}\text{Ca}$ e. $\frac{25}{12}\text{Mg}^{2+}$
 c. S-32 d. $\frac{36}{17}\text{Cl}^{-1}$

Fill in the chart:

	Nuclear Symbol	Mass Number	Atomic Number	# Protons	# Neutrons	# Electrons
105.	$\begin{matrix} 59 & & +1 \\ & \text{N} & \\ 28 & & \end{matrix}$					
106.		35	17			17
107.	$\begin{matrix} 1 & & +1 \\ & \text{H} & \\ 1 & & \end{matrix}$					
108.		32	16			18

The Periodic Table/Periodic Trends

109. Draw or print a periodic table and LABEL the following:
- a) Families/groups
 - b) Periods
 - c) alkali metals
 - d) alkaline earth metals
 - e) transition metals
 - f) halogens
 - g) noble gases
 - h) lanthanides
 - i) actinides
 - j) metals
 - k) non-metals
 - l) metalloids
 - m) charge of each family
 - n) number of valence electrons of each family
110. What is group 1? What are some characteristics of group 1?
 111. What is the possible charge of group 1?
 112. What is group 2? What are some characteristics of group 2?
 113. What is the charge on group 2?
 114. What are groups 3-12 called? And what are some characteristics of these groups?
 115. What is group 17 (7A)? What are some characteristics of group 7A?
 116. What is the charge on group 17 (7A)?
 117. What is group 18 (8A)? What are some characteristics of group 8A?
 118. What are the two sections at the bottom of the periodic table called?
 119. Where are the radioactive elements located on the periodic table?
 120. What is a cation?
 121. What is an anion?
 122. What is atomic radius?
 123. What are the group and periodic trends of atomic radius?

Chemistry 2019 Final Exam Review

Name: _____

10 Bonus Points on the Final

124. What is ionization energy?
125. What are the group and periodic trends of ionization energy?
126. What is electronegativity?
127. What are the group and periodic trends of electronegativity?
128. What element has the highest electronegativity?
129. What are metalloids?
130. What is the law of conservation of mass?

Trends:

- | | | | | |
|------|--|----|----|----|
| 131. | Which of the following has the smallest ionization energy? | N | P | As |
| 132. | Which of the following has the highest ionization energy? | O | C | N |
| 133. | Which of the following has the most electronegative? | Al | Si | P |
| 134. | Which of the following has the least electronegative? | Cl | Br | I |
| 135. | Which of the following has the largest atomic radius? | Na | K | Li |
| 136. | Which of the following has the smallest atomic radius? | Na | Mg | Al |

UNIT 4b: Electron Configuration

137. Write the long hand electron configuration, noble gas configuration, AND the orbital diagram for the following:
 - a. Magnesium
 - b. Phosphorous
 - c. Selenium
 - d. Xenon
 - e. Calcium
 - f. Oxygen
 - g. Gold
 - h. Silicon
 - i. Sulfur
 - j. Arsenic
138. List the 7 diatomic molecules.
139. What element ends in $3p^2$?
140. What element ends in $6s^1$?
141. How many valence electrons are in the p orbitals of Kr?
142. How many valence electrons are in the s orbitals of Rb?

UNIT 5-7: Bonding and Nomenclature

143. What are ionic compounds composed of?
144. What are covalent molecules composed of?
145. What are acids composed of?
146. How are ionic bonds formed?
147. How are covalent bonds formed?
148. What are properties of ionic compounds?
149. What are properties of covalent compounds?
150. How do you name ionic compounds?
151. When do you use roman numerals and what do the roman numerals represent?
152. How do you name covalent compounds?
153. What are the 10 prefixes?
154. What do the prefixes in the name represent?
155. What is a Lewis structure?
156. How do you draw a Lewis structure?
157. What is a single bond?

10 Bonus Points on the Final

158. What is a double bond?
 159. What is a triple bond?
 160. What is a binary acid?
 161. What is a ternary acid?
 162. What is the difference among a nonpolar and polar bond?
 163. How many oxygen atoms are in aluminum hydroxide?
 164. How many iron atoms are in Iron (II) sulfate?
 165. How many lone pairs on the central atom of Carbon tetrahydride?
 166. List the 4 types of intramolecular forces. Rank them in order of strength.
 167. List the 3 main types of intermolecular forces. Rank them in order of strength.
 168. A substance with strong intermolecular forces has a _____ boiling point, _____ melting point, and a _____ vapor pressure.

169. **Write the chemical formula AND compound name for the following:**

a. Ca and NO ₃	b. V ³⁺ and CrO ₄	c. Al and OH	d. Pb ²⁺ and C ₂ H ₃ O ₂
e. Ca and PO ₄	f. K and ClO ₃	g. Fe ²⁺ and ClO ₃	h. NH ₄ and CrO ₄
i. K and SO ₄	j. Sn ⁴⁺ and OH	k. Cu ⁺ and SO ₄	l. Na and PO ₄
m. Ba and NO ₃	n. Mg and NO ₃	o. K and MnO ₄	p. Cr ³⁺ and NO ₃
q. Al and SO ₄	r. NH ₄ and SO ₄	s. Sn ²⁺ and PO ₄	t. Pb ⁴⁺ and SO ₄

Molar Mass and the MOLE

170. What is the mole? (Definition and Number)
 171. What are the units of molar mass?

Write the formula for the following compounds:

172. carbon tetrabromide
 173. silicon dioxide
 174. tetraphosphorus decoxide
 175. diarsenic trisulfide
 176. sulfur trioxide
 177. diphosphorus pentoxide
 178. dinitrogen trioxide

Determine what type of bond will exist between the following pairs of atoms (Ionic, Covalent, Acid) AND predict the polarity of each bond:

179. H and I
 180. Se and Cl
 181. Li and F
 182. S and O
 183. C and H
 184. Cu and S
 185. K and Br
 186. Ca and Cl
 187. I and Br

Draw the Lewis structure for the following molecules:

188. N₂
 189. BCl₃
 190. Cl₂O
 191. Pl₃
 192. O₃
 193. NF₃

Write the formula for the following acids:

194. Nitric acid
 195. Chlorous acid
 196. Hydroiodic acid
 197. Hydrobromic acid
 198. Acetic acid
 199. Hydrofluoric acid
 200. Sulfurous acid
 201. Hypochlorous acid
 202. Perchloric acid
 203. Chloric acid

Chemistry 2019 Final Exam Review

Name: _____

10 Bonus Points on the Final

Write the correct name for the following acids:

- | | | | |
|------|--------------------------------|------|---------------------------------|
| 204. | HCl | 208. | H ₂ CO ₃ |
| 205. | H ₂ SO ₄ | 209. | H ₂ Se |
| 206. | HCN | 210. | H ₂ CrO ₄ |
| 207. | H ₂ S | | |

Name the following compounds AND circle the ones that are soluble in water

- | | | | |
|------|------------------------------------|------|---|
| 211. | AgCl | 215. | Sr ₃ (PO ₄) ₂ |
| 212. | Na ₂ SO ₄ | 216. | K ₂ SO ₄ |
| 213. | NH ₄ NO ₃ | 217. | FeBr ₃ |
| 214. | Al(ClO ₄) ₃ | 218. | NaCl |

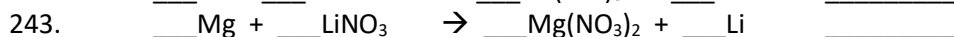
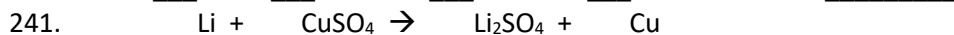
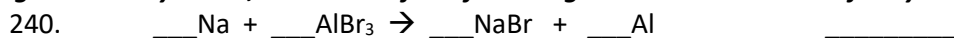
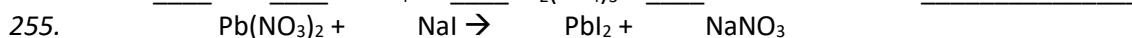
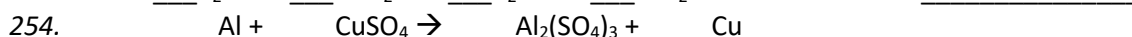
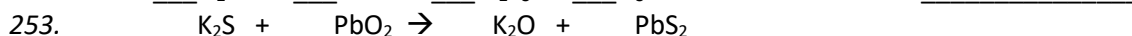
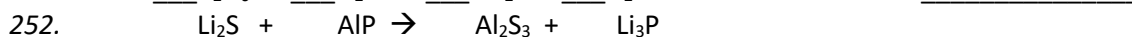
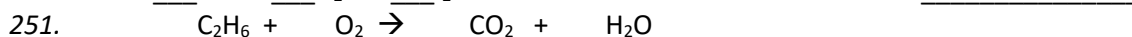
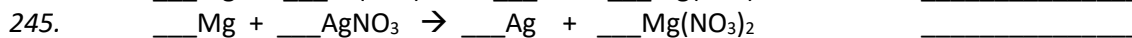
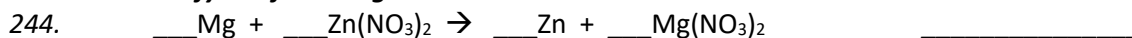
Identify the type, name AND molar mass of the compound:

		<u>Type</u> Ionic – I Covalent – C Acid – A	<u>Name</u>	<u>Molar Mass</u> (Include Unit)
219.	CO ₂			
220.	CCl ₄			
221.	PCl ₅			
222.	SeF ₆			
223.	As ₂ O ₅			
224.	SO ₃			
225.	ICl ₃			
226.	PBr ₅			

UNIT 8: Chemical Reactions

227. What is a reactant?
228. What is a product?
229. What is the law of conservation of mass/matter?
230. Why do we balance equations?
231. What are indicators of a chemical change?
232. What are the 5 reaction types and describe each and provide the general equation?
233. What are the requirements for each type? (How do you recognize each reaction type?)
234. What type can be predicted using the activity series?
235. How is solubility determined? What are you given to help determine this?
236. What does soluble mean?
237. What does insoluble mean?
238. What is aqueous? Symbol?
239. What is a precipitate? Symbol?

10 Bonus Points on the Final

Using the activity series, determine if the following reactions will occur. If they do, you must balance.**Balance AND identify the following reactions:**

Chemistry 2019 Final Exam Review

Name: _____

10 Bonus Points on the Final

Electronegativity Table:

H 2.1																	He ---
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne ---
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.2	S 2.5	Cl 3.0	Ar ---
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La-Lu 1.1-1.2	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn ---
Fr 0.7	Ra 0.9	Ac-No 1.1-1.7															

Blank Periodic Table:
