

Take-Home Quiz  
Topic 05: Polyatomic Ions and Nomenclature

**Objective:**

This is to assess your comprehension of the material we have covered so far and to help prepare you for the exam.

**Instructions and Notes:**

- Most of the quiz problems are from or adapted from “Exercises” at the end of the chapters in the Chemistry: Atoms First 2e Online Textbook (OpenStax)
- You must *CLEARLY LABEL* all problems and *SHOW ALL WORK* neatly and legibly to receive credit. If the problems do not require calculations/work then you must explain how you got the answer. (can be a few words up to a few sentences or even a few arrows)
- If the problem requires calculations, the answers should be highlighted or boxed.
- Book sections covered: 3.7, 4.3

**Submission:**

The quiz is usually due ~1 week after we start this section (see our due date schedule). Summer session is due sooner. This should be scanned as a single PDF and submitted online through Canvas. The file cannot be larger than 20 Mb (20,000 kB).

**Helpful Tips:**

- Start as soon as we're done with the lecture.
- Refer to the lecture and/or videos (if available).
- Use the corresponding chapter in the book to help you through difficult problems/concepts.
- There are answers and solutions available to the odd numbered problems (book number not quiz number) on the OpenStax website under “Student Resources”. It is not advised to rely on the solutions because you will not have access to the solutions during the exam. Only use the solutions as a last resort. Struggling is good and that is when you are learning the most!
- Work together with your classmates.
- Go to tutoring in the ASTC or MESA, ask your classmates in our Discord room, watch YouTube Videos, come to office hours, etc.
- To ensure your mastery of the material, do the quiz multiple times.

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**Questions Not In Book**

- 1) What are fixed charged ions? What groups in the periodic table are mostly fixed charged ions?
- 2) What are variably charged ions? What groups in the periodic table are mostly variably charged ions?
- 3) Give an example of an element with two different charges.
- 4) What are the symbols and charges of the two elements that are fixed charge but located in groups 11 and 12?
- 5) List the name, formula, and charge of a polyatomic ion with a 1+ charge.
- 6) List the name, formula, and charge of a polyatomic ion with a 1- charge.
- 7) List the name, formula, and charge of a polyatomic ion with a 2- charge.
- 8) List the name, formula, and charge of a polyatomic ion with a 3- charge.
- 9) What is the difference between naming an ionic compound with a fixed charge cation and a variably charged cation?
- 10) What makes something an acid?

**3.7 Ionic and Molecular Compounds**

(From Chapter 3.7 #97) For each of the following compounds, state whether it is ionic or covalent. If it is ionic, write the symbols for the ions involved:

- |                                          |                  |                                  |
|------------------------------------------|------------------|----------------------------------|
| 11) $\text{NF}_3$                        | 12) $\text{BaO}$ | 13) $(\text{NH}_4)_2\text{CO}_3$ |
| 14) $\text{Sr}(\text{H}_2\text{PO}_4)_2$ | 15) $\text{IBr}$ | 16) $\text{Na}_2\text{O}$        |

(From Chapter 3.7 #99) For each of the following pairs of ions, write the symbol for the formula of the compound they will form.

- |                                      |                                        |                                   |
|--------------------------------------|----------------------------------------|-----------------------------------|
| 17) $\text{Ca}^{2+}, \text{S}^{2-}$  | 18) $\text{NH}_4^+, \text{SO}_4^{2-}$  | 19) $\text{Al}^{3+}, \text{Br}^-$ |
| 20) $\text{Na}^+, \text{HPO}_4^{2-}$ | 21) $\text{Mg}^{2+}, \text{PO}_4^{3-}$ |                                   |

(From Chapter 3.7 #100) For each of the following pairs of ions, write the symbol for the formula of the compound they will form.

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- 22)  $K^+$ ,  $O^{2-}$       23)  $NH_4^+$ ,  $PO_4^{3-}$       24)  $Al^{3+}$ ,  $O^{2-}$   
25)  $Na^+$ ,  $CO_3^{2-}$       26)  $Ba^{2+}$ ,  $PO_4^{3-}$

### 4.3 Chemical Nomenclature

(From Chapter 4.3 #23) Name the following compounds:

- 27) CsCl                      28) BaO                      29)  $K_2S$   
30)  $BeCl_2$                       31) HBr (g)                      32)  $AlF_3$

(From Chapter 4.3 #25) Write the formulas of the following compounds:

- 33) rubidium bromide      34) magnesium selenide      35) sodium oxide  
36) calcium chloride      37) hydrogen fluoride      38) gallium phosphide  
39) aluminum bromide      40) ammonium sulfate

(From Chapter 4.3 #27) Write the formulas of the following compounds:

- 41) chlorine dioxide      42) dinitrogen tetraoxide      43) potassium phosphide  
44) silver sulfide      45) aluminum fluoride trihydrate      46) silicon dioxide

(From Chapter 4.3 #29) Each of the following compounds contains a metal that can exhibit more than one ionic charge. Name these compounds:

- 47)  $Cr_2O_3$                       48)  $FeCl_2$                       49)  $CrO_3$   
50)  $TiCl_4$                       51)  $CoCl_2 \cdot 6H_2O$                       52)  $MoS_2$

(From Chapter 4.3 #31) The following ionic compounds are found in common household products. Write the formulas for each compound:

- 53) potassium phosphate      54) copper(II) sulfate      55) calcium chloride  
56) titanium(IV) oxide      57) ammonium nitrate  
58) sodium bisulfate (the common name for sodium hydrogen sulfate)

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(From Chapter 4.3 #33) What are the IUPAC names of the following compounds?

59) manganese dioxide

60) mercurous chloride ( $\text{Hg}_2\text{Cl}_2$ ) [ $\text{Hg}_2^{2+}$  is a polyatomic ion, Mercury (I)]

61) ferric nitrate [ $\text{Fe}(\text{NO}_3)_3$ ]      62) titanium tetrachloride      63) cupric bromide ( $\text{CuBr}_2$ )

**More Questions Not In Book**

Write the formulas of the following compounds:

64) hydrochloric acid

65) hydrocyanic acid

66) hydrofluoric acid

67) nitric acid

68) nitrous acid

69) phosphorous acid

70) sulfuric acid

Name the following compounds:

71)  $\text{H}_3\text{PO}_4$

72)  $\text{HBr}$

73)  $\text{HI}$

74)  $\text{HC}_2\text{H}_3\text{O}_2$

75)  $\text{HClO}$

76)  $\text{HClO}_4$

77)  $\text{H}_2\text{SO}_3$