

Recitation Worksheet Two

Name:

Key

UGA ID:

Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname that is not reflected in eLC).
- Your UGA myID is a combination of letters and numbers (example: mine is jmj81738). Do *not* enter your 81x number.
- Download this worksheet and print it if you have a printer. Write the answers in the answer boxes and show your work when appropriate. Using the instructions in the Welcome module on eLC, convert your worksheet to a PDF and then upload it to Gradescope. If you have an iPhone or Android device, you can scan and upload directly through the Gradescope app. The pages must be in the correct order or Gradescope will not be able to read it.
- If you do not have a printer, download the worksheet and type your answers in the answer boxes and upload it to Gradescope. Write your work on separate sheets of paper, convert these pages to a PDF using the instructions in the Welcome module on eLC, then upload them to the dropbox on eLC for this worksheet.
- If you are using an app to annotate the worksheet, make sure the pages are in the correct order and have the same layout as the original or Gradescope will not be able to read it.
- Answers must be written in the corresponding answer box or no credit will be awarded.
- This worksheet is due no later than **11:59 PM on the Friday of the recitation week.**
- The instructions for uploading worksheets to Gradescope can be found in the Content area of eLC in the Welcome Module.
- **You must show your work to receive credit.**

1. Which of the following is the correct formula for magnesium sulfide?

A

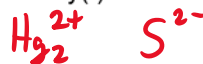
- A. MgS
- B. Mg₂S
- C. MgS₂
- D. MnS
- E. Mn₂S
- F. MnS₂
- G. None of the above



2. Which of the following compounds is named mercury(I) sulfide?

B

- A. HgS
- B. Hg₂S
- C. HgS₂
- D. Hg₂S₂
- E. None of the above



3. What is the correct name for ZrO_2 ?

E

- A. Zirconium oxygenide
- B. Zirconium(II) oxygenide
- C. Zirconium(IV) oxygenide
- D. Zirconium(II) oxide
- E. Zirconium(IV) oxide
- F. Zirconium oxide
- G. None of the above

$x = 2 \times 2 = 4$

4. What is the correct name for AgBr ?

D

- A. Silver(I) bromide
- B. Silver(II) bromide
- C. Silver(III) bromide
- D. Silver bromide
- E. None of the above

5. Which of the following compounds is named potassium permanganate?

C

- A. KMnO_3
- B. K_2MnO_3
- C. KMnO_4
- D. K_2MnO_4
- E. None of the above



6. Which of the following compounds is named sodium peroxide?

D

- A. NaO
- B. Na₂O
- C. NaO₂
- D. Na₂O₂
- E. None of the above



7. Which of the following is/are named incorrectly? Choose all that apply, and answer with capital letters with no spaces in between (e.g. ABCDE).

BC

- A. P_2O_5 , diphosphorus pentoxide
- B. NO, ~~mon~~nitrogen monoxide
- C. NH_4^+ , ~~nitrogen tetrahydride~~ ammonium
- D. S_2Cl_2 , disulfur dichloride
- E. All of the above are named correctly

8. What is the correct formula for hydrocyanic acid?

HCN

9. What is the correct formula for perbromic acid?

D

- | | |
|-------------|---------------|
| A. $HBrO$ | E. H_2BrO |
| B. $HBrO_2$ | F. H_2BrO_2 |
| C. $HBrO_3$ | G. H_2BrO_3 |
| D. $HBrO_4$ | H. H_2BrO_4 |

BrO_4^- = perbromate
-ate to -ic

10. Which of the following is/are **invalid** name(s) for an acid? Choose all that apply, and answer with capital letters with no spaces in between (e.g. ABCDE).

AF

- A. Hypochloric acid ^{ous}
- B. Chloric acid
- C. Chlorous acid
- D. Perchloric acid
- E. Hydrochloric acid
- F. ~~Hydro~~chlorous acid
- G. All of the following are valid names

11. In the following drawings, shaded spheres represent cations and unshaded spheres represent anions, either monatomic or polyatomic. Answer the question with the letter of the box.

I. Which drawing represents the ionic compound zinc phosphate? ²⁺ ³⁻ D



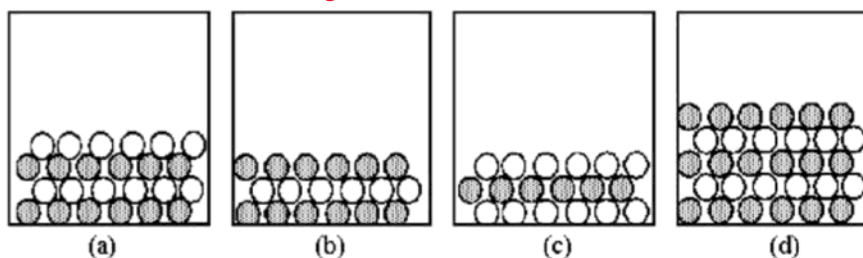
II. Which drawing represents the ionic compound silver carbonate? B



III. Which drawing represents the ionic compound potassium perchlorate? ⁺ ⁻ A



IV. Which drawing represents the ionic compound magnesium fluoride? ²⁺ ⁻ C



12. What is the correct name for ²⁺ ⁻ $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$?

E

- A. Nickel dichloride
- B. Nickel dichloride heptahydrate
- C. Nickel dichloride hexahydrate
- D. Nickel(II) chloride heptahydrate
- E. Nickel(II) chloride hexahydrate
- F. Nickel(II) chloride

13. What is the correct name for C_5H_{12} ?

E

- A. Tetracarbon hydride
- B. Pentacarbon hydride
- C. Hexacarbon hydride
- D. Propane
- E. Pentane
- F. Hexane

14. What is the correct formula for octanoic acid?

C

- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
- B. $\text{H}_3\text{C}-(\text{CH}_2)_5-\text{COOH}$
- C. $\text{C}_7\text{H}_{15}\text{COOH}$
- D. $\text{CH}_3(\text{CH}_2)_7\text{OH}$
- E. None of the above

15. Various organic compounds such as cholesterol, estradiol (an estrogen hormone), and metoprolol (a drug for hypertension) have complex structures. Based on their names alone, which of the following categories below would you predict to *broadly* classify these compounds?

D

- A. Ionic compounds
- B. Inorganic acids
- C. Carboxylic acids
- D. Alcohols
- E. More information is needed

16. Gallium has two naturally occurring isotopes. Based on the information provided below, what is the mass of Ga-69?

Isotope	Mass (amu)	Relative Abundance (%)
Ga-69	?	60.108
Ga-71	70.925	39.892

68.920

amu

$$69.720 = x(0.60108) + 70.925(0.39892)$$

$$69.720 = x(0.60108) + 28.293401$$

$$41.426599 = x(0.60108)$$

$$68.920275 = x$$

from periodic table
which reports the average
value

17. Chlorine has two naturally occurring isotopes. The average atomic mass of chlorine is 35.45 amu as listed in the periodic table. If you were to isolate one singular chlorine atom, what is the probability of that atom having an atomic mass of 35.45 amu?

A

- A. 0 %
- B. 50 %
- C. 100 %
- D. More information is needed to answer this question (i.e. the relative abundances of chlorine's two isotopes)

18. Report the molar masses of the elements and compounds below. Report your answers to five sig figs.

Elemental bromine: 159.80 g/mol
 Br_2

Copper(II) sulfate: 159.62 g/mol
 CuSO_4

Copper(II) sulfate pentahydrate: 249.72 g/mol
 $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

19. How many moles of Zr are in a 10.50 g sample of Zr? How many atoms?

I. 0.1151 moles

II. 6.932E22 atoms

$$10.50 \text{ g} \times \frac{\text{mol}}{91.22 \text{ g}} = 0.1151 \text{ mol}$$

$$0.1151 \text{ mol} \times \frac{6.022 \times 10^{23} \text{ atoms}}{\text{mol}} = 6.932 \times 10^{22} \text{ atoms}$$

20. Consider samples of three different hypothetical elements. Which of the following would you predict contain the largest number of atoms? The order of increasing atomic masses for the three elements is provided below.

Element A < Element X < Element Z

A

- A. 5.00 grams of element A
- B. 5.00 grams of element X
- C. 5.00 grams of element Z
- D. They all have the same number of atoms
- E. More information is needed (i.e. the exact atomic masses of each element)

21. Consider a hypothetical compound, MX_2 , which contains exactly one "M" atom (atomic mass = 27.16 g/mol) and an unknown number of "X" atoms (atomic mass = 34.12 g/mol). If 100.0 grams of this hypothetical compound contains 3.680×10^{23} atoms, how many "X" atoms are present in this compound? Report your answer as a whole number (e.g. 7).

4

$$3.680 \times 10^{23} \text{ atoms} \times \frac{\text{mol}}{6.022 \times 10^{23} \text{ atoms}} = 0.6110927 \text{ mol}$$

$$\text{molar mass} = \frac{100.0 \text{ g}}{0.6110927 \text{ mol}} = 163.64130 \frac{\text{g}}{\text{mol}}$$

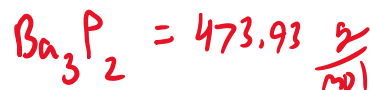
$$163.64130 \frac{\text{g}}{\text{mol}} - 27.16 \frac{\text{g}}{\text{mol}} = 136.48130 \frac{\text{g}}{\text{mol}} \quad X = \frac{136.48130}{34.12} = 4$$

22. Consider a 10.00 gram sample of barium phosphide. How many cations are present? How many anions?

I.

3.812 E22

cations



II.

2.541 E22

anions

$$10.00 \text{ g Ba}_3\text{P}_2 \times \frac{\text{mol}}{473.93 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ Ba}_3\text{P}_2}{\text{mol}} \times \frac{3 \text{ Ba}^{2+}}{\text{Ba}_3\text{P}_2} = \text{cations}$$

$$10.00 \text{ g Ba}_3\text{P}_2 \times \frac{\text{mol}}{473.93 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ Ba}_3\text{P}_2}{\text{mol}} \times \frac{2 \text{ P}^{3-}}{\text{Ba}_3\text{P}_2} = \text{anions}$$

23. Consider a sample of iron(III) iodate that has a mass of 25.00 grams. How many molecules are present? How many total atoms? How many iron atoms? Iodine atoms? Oxygen atoms?

$$\text{Fe}(\text{IO}_3)_3 = 580.55 \frac{\text{g}}{\text{mol}}$$

I. molecules

II. total atoms

III. iron atoms

IV. iodine atoms

V. oxygen atoms

$$25.00 \text{ g Fe}(\text{IO}_3)_3 \times \frac{1 \text{ mol}}{580.55 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 2.593231 \times 10^{22} \text{ molecules}$$

$$2.593231 \times 10^{22} \text{ molecules} \times \frac{13 \text{ atoms}}{1 \text{ molecule}} = 3.3711997 \times 10^{23} \text{ atoms}$$

$$2.593231 \times 10^{22} \text{ molecules} \times \frac{1 \text{ Fe}}{1 \text{ molecule}} = 2.593231 \times 10^{22} \text{ Fe atoms}$$

$$2.593231 \times 10^{22} \text{ molecules} \times \frac{3 \text{ I}}{1 \text{ molecule}} = 7.779692 \times 10^{22} \text{ I atoms}$$

$$2.593231 \times 10^{22} \text{ molecules} \times \frac{9 \text{ O atoms}}{1 \text{ molecule}} = 2.3339075 \times 10^{23} \text{ O atoms}$$

Extra Practice Questions: these questions will not be graded.

1. Which of the following is the correct formula for rubidium nitride?

D

- A. RbN
- B. Rb₂N
- C. RbN₂
- D. Rb₃N
- E. RbN₃
- F. None of the above



2. What is the correct name for Al₂O₃?

D

- A. Aluminum oxygenide
- B. Aluminum(III) oxygenide
- C. Aluminum(III) oxide
- D. Aluminum oxide
- E. None of the above



3. Which of the following compounds is named barium phosphate?

E

- A. BaPO₃
- B. BaPO₄
- C. Ba₃(PO₃)₂
- D. Ba₂(PO₃)₃
- E. None of the above



4. What is the correct formula for oxalic acid?

H

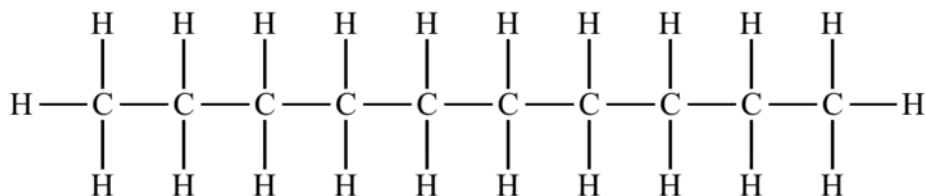
- A. HCO₃
- B. H₂CO₃
- C. HC₂O₃
- D. H₂C₂O₃
- E. HCO₄
- F. H₂CO₄
- G. HC₂O₄
- H. H₂C₂O₄



5. What is the correct name of the organic compound provided below?

F

- A. Octacarbon hydride
- B. Nonacarbon hydride
- C. Decacarbon hydride
- D. Octane
- E. Nonane
- F. Decane



6. A block of Cu contains 3.439×10^{24} atoms. If the density of Cu is 8.96 g/cm^3 , what is the volume of the block in liters?

0.0405

L

$$3.439 \times 10^{24} \text{ atoms} \times \frac{\text{mol}}{6.022 \times 10^{23} \text{ atoms}} \times \frac{63.55 \text{ g}}{\text{mol}} \times \frac{\text{cm}^3}{8.96 \text{ g}} \times \frac{1 \text{ mL}}{1 \text{ cm}^3} \times \frac{\text{L}}{1000 \text{ mL}}$$

7. Exactly 50.00 grams of an element contains 3.8128×10^{23} atoms. What is the identity of the element? Write the chemical symbol below (i.e. H for hydrogen, He for helium, etc.).

Se

$$3.8128 \times 10^{23} \text{ atoms} \times \frac{\text{mol}}{6.022 \times 10^{23} \text{ atoms}} = 0.6331751 \text{ mol}$$

$$\text{molar mass} = \frac{50.00 \text{ g}}{0.6331751 \text{ mol}} = 78.97084 \frac{\text{g}}{\text{mol}} = \text{Selenium}$$