

### Recitation Worksheet Three

Name:

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. Fill out the table below with either the proper name or formula.

Compound Name	Formula
Calcium chloride dihydrate	
	$\text{Fe}(\text{OH})_2$
Sulfur hexafluoride	
	$\text{HIO}_2$
Magnesium cyanide	

2. Which of the following compounds is named correctly?

- A.  $\text{CuCl}$ ; copper(I) chloride
- B.  $\text{K}_2\text{SO}_4$ ; potassium(I) sulfate
- C.  $\text{MnCO}_3$ ; magnesium carbonate
- D.  $\text{Al}(\text{CN})_3$ ; aluminum(III) cyanide
- E. More than one of the compounds is named correctly

3. Which of the following is the correct name for the compound  $\text{PCl}_3$ ?

- A. Phosphorus(III) chloride
- B. Phosphorus tetrachloride
- C. Monophosphorus tetrachloride
- D. Phosphorus(I) trichloride
- E. Phosphorus trichloride

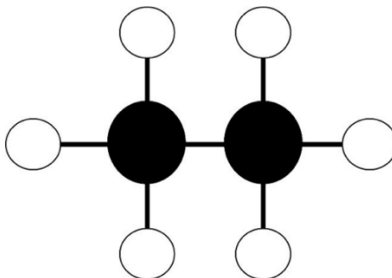
4. Which of the following compounds has their formula and name incorrectly matched? Choose all that apply, and answer with capital letters with no spaces in between (e.g. ABCDE).

- A.  $\text{Na}_2\text{SO}_3$ ; sodium sulfite
- B.  $(\text{NH}_4)_2\text{O}$ ; ammonium oxide
- C.  $\text{Cu}_2\text{Cr}_2\text{O}_7$ ; copper(II) chromate
- D.  $\text{Ca}(\text{SCN})_2$ ; carbon thiocyanate
- E.  $\text{Li}_3\text{PO}_4$ ; lithium phosphate

5. Which one of the following compounds is chromium(III) oxide?

- A.  $\text{CrO}_3$
- B.  $\text{Cr}_2\text{O}_3$
- C.  $\text{Cr}_3\text{O}_2$
- D.  $\text{Cr}_3\text{O}$
- E.  $\text{Cr}_2\text{O}_4$

6. What is the name of the pictured compound if white spheres represent hydrogen and black spheres represent carbon?



- A. Dicarbon hexahydride
- B. Methane
- C. Ethane
- D. Methanol
- E. Ethanol

7. What is the name of the compound  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ ?

- A. Pentanol
- B. Hexanol
- C. Pentanoic acid
- D. Hexanoic acid

8. What is the name of the compound  $\text{CH}_3\text{COOH}$ ?

- A. Methanol
- B. Ethanol
- C. Methanoic acid
- D. Ethanoic acid

9. What is the name of the compound  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$ ?

- A. Pentacarbon decahydrogen dioxide
- B. Butanol
- C. Butanoic acid
- D. Pentanoic acid
- E. Pentanol

10. The theoretical element Hx has three isotopes: Hx-302, Hx-303, and Hx-305. If the average atomic mass for Hx is 304.300 amu, what is likely the most abundant isotope?

- A. Hx-302
- B. Hx-303
- C. Hx-305

11. The hypothetical element "R" has two naturally occurring isotopes:  $^{109}\text{R}$  and  $^{110}\text{R}$ . What is the average atomic mass of "R" if the isotope  $^{109}\text{R}$  has a natural abundance of 55.45%? The masses of both isotopes are provided in the table below.

Isotope of "R"	Mass
$^{109}\text{R}$	109.112231 amu
$^{110}\text{R}$	110.718210 amu

amu

12. What is the molar mass (g/mol) for the following compounds? Answer with five sig figs.

$\text{Zn}(\text{NO}_3)_2$   g/mol

$\text{CH}_3\text{COOH}$   g/mol

$\text{O}_2$   g/mol

13. How many chromium atoms are in 46.8 g of lead(IV) dichromate?

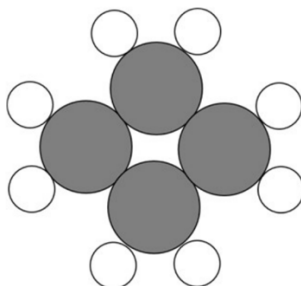
14. What is the mass of an ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ ) sample containing  $6.91 \times 10^{22}$  molecules of ethanol?

15. How many mercury atoms are in 1.50 mL of liquid elemental mercury? The density of liquid mercury is  $13.5 \text{ g/cm}^3$ .

16. What is the mass percent of manganese in manganese(VI) oxide?

17. Heme, the portion of red blood cells that produce the red color, has a formula of  $\text{C}_{34}\text{H}_{32}\text{FeN}_4\text{O}_4$ . What is the mass percent of iron in heme?

18. In the diagram below, gray circles represent atoms of element A and white circles represent atoms of element B. What is the correct **empirical formula** for the compound shown?



- A.  $\text{AB}_2$
- B.  $\text{AB}$
- C.  $\text{AB}_4$
- D.  $\text{A}_4\text{B}_8$

19. The molar mass of an unknown compound is 60.21 g/mol. If the compound is 6.71% hydrogen and 93.29% silicon by mass, what is the molecular formula?

20. A compound is 51.43% copper, 9.72% carbon, and 38.85% oxygen. What is the empirical formula?

21. Which of the following is an empirical formula? Choose all that apply, and answer with capital letters with no spaces in between (e.g. ABCDE).

A.  $\text{C}_2\text{H}_6\text{O}_2$

B.  $\text{N}_2\text{O}_3$

C.  $\text{C}_4\text{H}_8$

D.  $\text{N}_3\text{O}_9$

E.  $\text{OCl}_2$

22. Amylose is a carbohydrate and a component of starch, which plants use to store energy. Carbohydrates are so named because they are complex molecules composed of carbon, hydrogen, and oxygen. Combustion analysis of 1.00 g of amylose yields 1.63 g  $\text{CO}_2$  and 0.556 g  $\text{H}_2\text{O}$ .

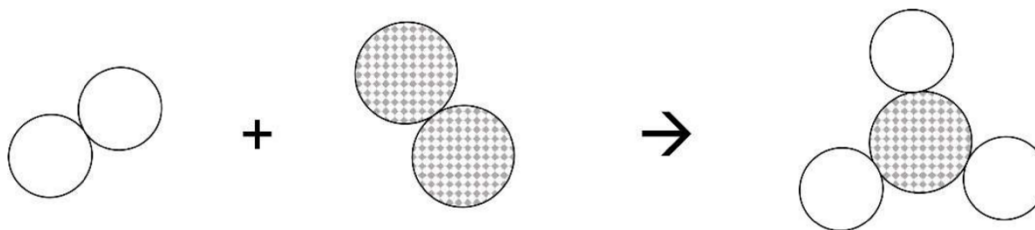
What is the mass of oxygen that was present in the original sample of amylose?

grams

What is the empirical formula of amylose?

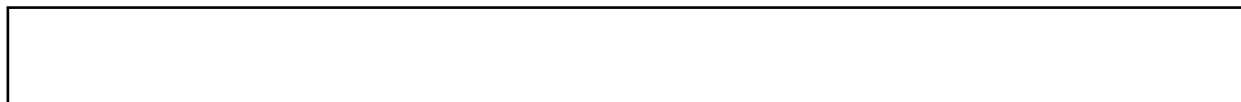
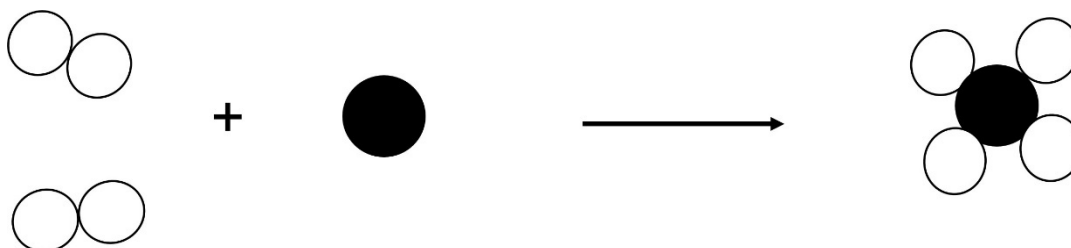


23. If the white circles represent hydrogen and the patterned circles represent nitrogen in the **unbalanced** image below, what is the correct, balanced equation?



- A.  $\text{H}_2 (\text{g}) + \text{N}_2 (\text{g}) \rightarrow \text{NH}_3 (\text{g})$
- B.  $3 \text{H}_2 (\text{g}) + \text{N}_2 (\text{g}) \rightarrow 2 \text{NH}_3 (\text{g})$
- C.  $2 \text{H} (\text{g}) + 2 \text{N} (\text{g}) \rightarrow \text{N} (\text{g}) + 3 \text{H} (\text{g})$
- D.  $6 \text{H} (\text{g}) + 2 \text{N} (\text{g}) \rightarrow 2 \text{N} (\text{g}) + 6 \text{H} (\text{g})$
- E.  $2 \text{H}_2 (\text{g}) + \text{N}_2 (\text{g}) \rightarrow 2 \text{NH}_3 (\text{g})$

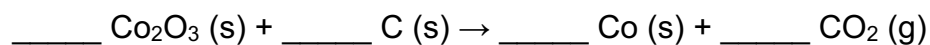
24. What is the balanced reaction depicted in the following image, given the black spheres represent carbon and the white spheres represent hydrogen?



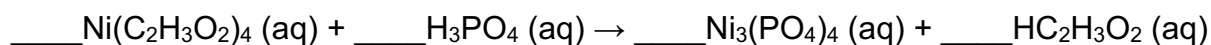
25. Write the balanced reaction of elemental aluminum with hydrochloric acid, which yields aluminum chloride salt and hydrogen gas. Make sure to include states of matter.

26. Write the balanced **combustion reaction** of propanol (C<sub>3</sub>H<sub>7</sub>OH). Make sure to include states of matter.

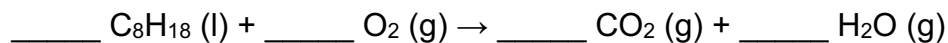
27. What is the coefficient for each compound when the following reaction is balanced? Write the integers in order, with no commas (e.g. 1287) on your answer sheet and include 1 even if it is usually left out.



28. What is the coefficient for each compound when the following reaction is balanced? Write the integers in order, with no commas (e.g. 1287) on your answer sheet and include 1 even if it is usually left out.



29. A 500. mL sample of octane ( $\text{C}_8\text{H}_{18}$ ) combusts with excess oxygen according to the **unbalanced** reaction below. If the density of octane is 0.70 g/mL, how many grams of carbon dioxide are produced?

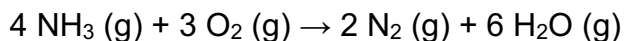


grams

30. A rod of 150. g of pure iron is exposed to air and rusts due to the presence of oxygen. How many grams of rust (iron(III) oxide) are produced?

grams

31. When  $8.00 \times 10^{22}$  molecules of ammonia react with an excess of oxygen according to the balanced chemical equation shown below, how many grams of nitrogen gas are produced?



grams

32. Consider the following balanced reaction below. How many moles of oxygen are required to produce 2.33 moles of water? Assume that there is excess  $\text{C}_3\text{H}_7\text{SH}$  present.



moles