

Recitation Worksheet 0: CHEM 1211 Review

Name:

key

MyID:

****Please read the instructions carefully. The purpose of recitation 0 is to practice submitting recitation worksheets to Gradescope. Recitation 0 will ONLY be graded for completion and NOT for accuracy. Recitation 0 is worth *two points* of your recitation grade. There is *no in-person recitation* for recitation 0. Your first recitation starts the week of Jan 23rd-27th. You are only required to submit the completed recitation 0 worksheet on Gradescope. If you have scratch work that is not included on the worksheet submitted to Gradescope, please submit it to "recitation worksheet 0 Dropbox" on the class eLC as per the instructions below.****

Instructions:

1. Please enter your first and last name as it appears on the eLC classlist (do not use a nickname).
2. Your UGA myID is a combination of letters and numbers (example: Dr. Abdelrahman MyID is ema88805).
Do not use your 81x number.
 - a. If you do not have access to a printer, type your answers in the worksheet PDF and then upload it to **Gradescope** by Friday, January 20th at 11:59 pm. Write your work on separate sheets of paper, convert to a PDF and upload to the "Recitation Worksheet 0 Dropbox" on eLC.
 - b. 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.
 - c. If you have access to a printer, print out the worksheet, write your answer in the answer boxes, and show your work on it when appropriate. Then convert it to a PDF and upload to **Gradescope** by Friday, January 20th at 11:59 pm. You do not need to upload anything to eLC. The pages must be in the correct order and have the same layout as the original, or Gradescope will not be able to read it.
 - d. There is a **Gradescope App** available for both iOS and Android devices that allows you to scan and submit your printed work or you can submit your fillable PDF directly. Detailed instructions on how to access and use the app can be found on your CHEM 1212 class eLC page under content → Welcome module → Gradescope → Gradescope new mobile app.
3. Answers must be written in the corresponding answer box, or no credit will be awarded.
4. The instructions for uploading worksheets to Gradescope can be found in the Content area of eLC in the Welcome Module.

Part I: CHEM 1211 Review

1. In a user's manual accompanying an American-made automobile, a typical pressure gauge performance of automobile tires is 32 lb/in². What is the pressure in kg/m²? (1 lb. = 453.59 g and 1 in. = 2.54 cm).

$$\boxed{2.2 \times 10^4} \text{ kg/m}^2$$

$$\begin{aligned} & \frac{32 \cancel{\text{lb}}}{\cancel{\text{in}}^2} \times \frac{453.59 \cancel{\text{g}}}{1 \cancel{\text{lb}}} \times \frac{1 \cancel{\text{kg}}}{1000 \cancel{\text{g}}} \times \left(\frac{1 \cancel{\text{in}}}{2.54 \cancel{\text{cm}}} \right)^2 \times \left(\frac{100 \cancel{\text{cm}}}{1 \cancel{\text{m}}} \right)^2 \\ &= 22498.109 \text{ kg/m}^2 \\ &\approx 22000 \text{ or } 2.2 \times 10^4 \text{ kg/m}^2 \end{aligned}$$

2. Blood alcohol content (BAC) is sometimes reported in weight-volume percent and, when it is, a BAC of 0.10% corresponds to 0.10 g of ethyl alcohol per 100 mL of blood. In many jurisdictions, a person is considered legally intoxicated if his or her BAC is 0.10%. Suppose that a 68 kg person has a total blood volume of 5.4 L and breaks down ethyl alcohol at a rate of 10.0 grams per hour. How many 145 mL glasses of wine, consumed over three hours, will produce a BAC of 0.10% in this 68 kg person? Assume the wine has a density of 1.01 g/mL and 11.5% ethyl alcohol by mass.

$$\boxed{2.10} \text{ glasses of wine}$$

- ① Grams of ethyl alcohol in 145 mL glasses of wine:

$$\frac{145 \cancel{\text{mL wine}}}{1 \text{ glass of wine}} \times \frac{1.01 \cancel{\text{g wine}}}{\cancel{\text{mL wine}}} \times \frac{11.5 \text{ g ethyl alcohol}}{100 \cancel{\text{g of wine}}} = 16.84175 \text{ g ethyl alcohol/glass of wine}$$

- ② Amount of ethyl alcohol present in 5.4 L of blood to produce 0.10% BAC

$$5.4 \cancel{\text{L blood}} \times \frac{1000 \cancel{\text{mL}}}{1 \cancel{\text{L}}} \times \frac{0.10 \text{ g ethyl alc.}}{100 \cancel{\text{mL blood}}} = 5.4 \text{ g ethyl alc.} \rightarrow 30.0 \text{ g} + 5.4 \text{ g} = 35.4 \text{ g}$$

If the person breaks down ethyl alcohol at a rate of 10.0 g/hr
 \therefore they must have consumed 35.4 g ethyl alc.

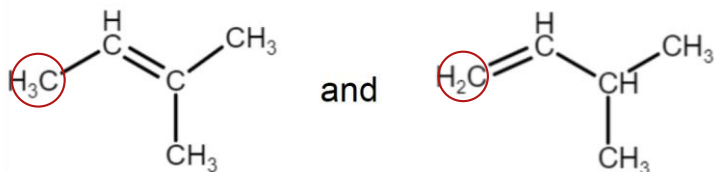
$$35.4 \text{ g ethyl alc.} \times \frac{1 \text{ glass of wine}}{16.84175 \text{ g ethyl alc.}} = 2.10 \text{ glasses of wine}$$

3. Students have proposed resonance structures for different chemical species. Which set(s) represent resonance structures? Select all that apply. Insert letters without spaces in the answer box, example **abcd**.

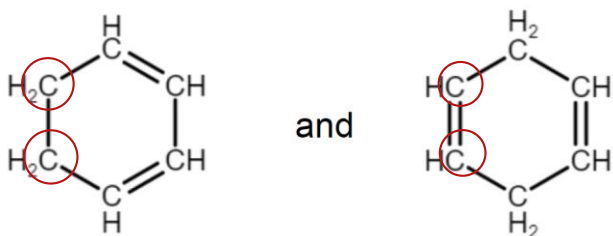
ce

Resonance is the movement of electrons not atoms

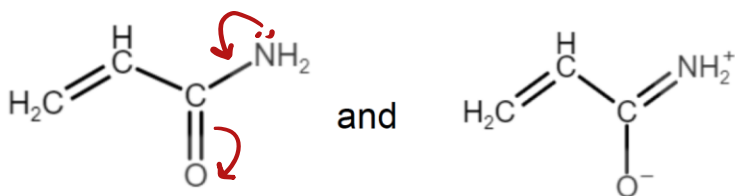
a.



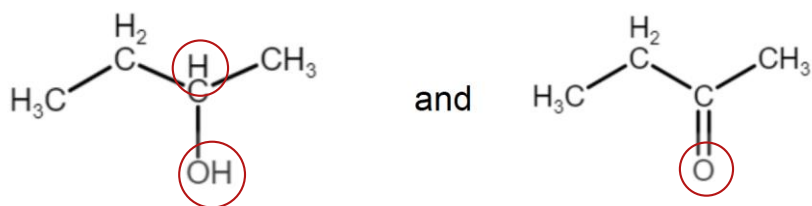
b.



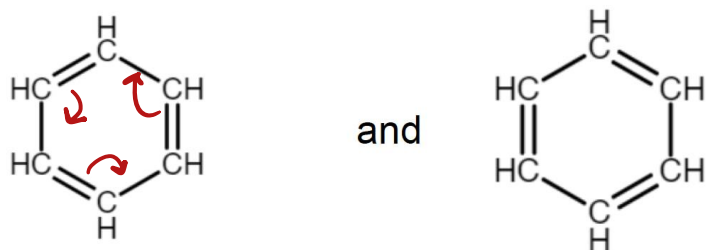
c.



d.



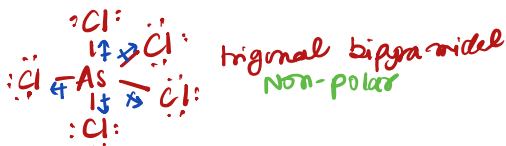
e.



4. Which of these molecules are polar? Select all that apply. Insert letters without spaces in the answer box, example **abcd**.

bcd

a. AsCl_5



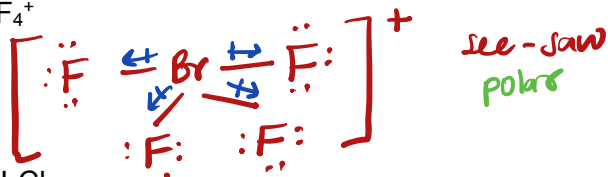
b. OF_2



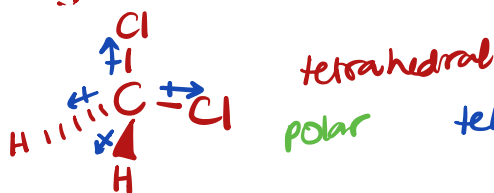
c. SOCl_2



d. BrF_4^+



e. CH_2Cl_2



f. IF_4^-

Molecular geometries resulting in a non-polar molecule

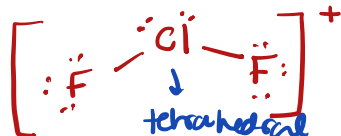
non-polar molecule

- ① linear
- ② trigonal planar
- ③ tetrahedral
- ④ square planar
- ⑤ trigonal bipyramidal
- ⑥ octahedral

5. What is the hybridization of the central atom in each of the ions or molecules below?

sp^3

I. ClF_2^+



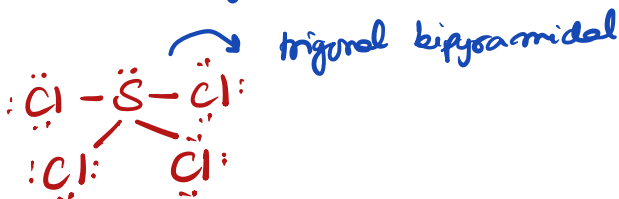
sp^2

II. H_2CO



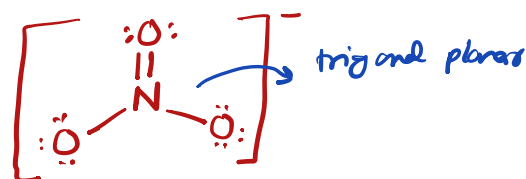
sp^3d

III. SCl_4



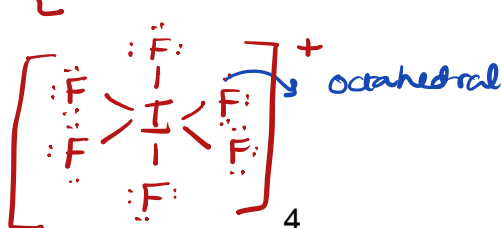
sp^2

IV. NO_3^-



sp^3d^2

V. IF_6^+



6. Dimethylolpropionic acid (shown below) is used in the preparation of water-soluble resins to make high gloss coatings with excellent flexibility and toughness. What is the hybridization of each of the carbon atoms labeled below?

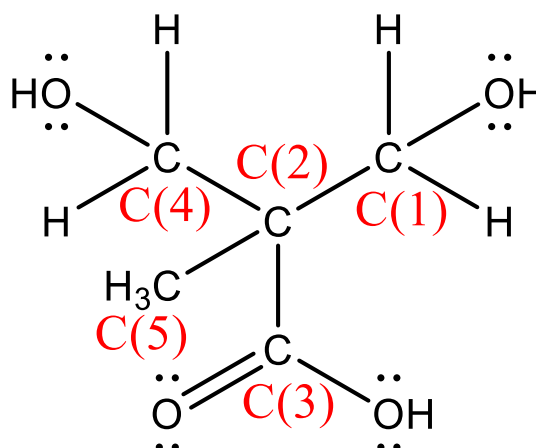
sp^3 C(1)

sp^3 C(2)

sp^2 C(3)

sp^3 C(4)

sp^3 C(5)

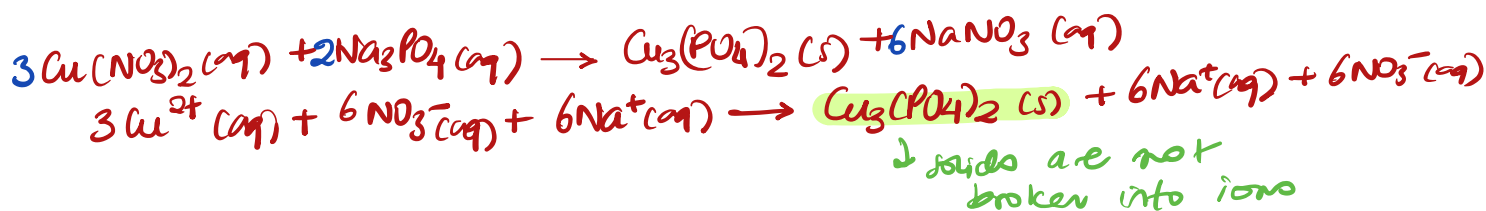


→ spectator ions are included in the total ionic equation

7. What is the **total ionic equation** for the reaction between copper(II) nitrate and sodium phosphate?

C

- $3 \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2 \text{Na}_3\text{PO}_4(\text{aq}) \rightarrow 6 \text{NaNO}_3(\text{aq}) + \text{Cu}_3(\text{PO}_4)_2(\text{s})$
- $\text{Cu}^{2+}(\text{aq}) + \text{NO}_3^-(\text{aq}) + \text{Na}^+(\text{aq}) + \text{PO}_4^{3-}(\text{aq}) \rightarrow \text{Na}^+(\text{aq}) + \text{NO}_3^-(\text{aq}) + \text{Cu}_3(\text{PO}_4)_2(\text{s})$
- $3 \text{Cu}^{2+}(\text{aq}) + 6 \text{NO}_3^-(\text{aq}) + 6 \text{Na}^+(\text{aq}) + 2 \text{PO}_4^{3-}(\text{aq}) \rightarrow 6 \text{Na}^+(\text{aq}) + 6 \text{NO}_3^-(\text{aq}) + \text{Cu}_3(\text{PO}_4)_2(\text{s})$
- $3 \text{Cu}^{2+}(\text{aq}) + 6 \text{NO}_3^-(\text{aq}) + 6 \text{Na}^+(\text{aq}) + 2 \text{PO}_4^{3-}(\text{aq}) \rightarrow 6 \text{Na}^+(\text{aq}) + 6 \text{NO}_3^-(\text{aq}) + 3 \text{Cu}^{2+}(\text{aq}) + 2 \text{PO}_4^{3-}(\text{aq})$
- $3 \text{Cu}^{2+}(\text{aq}) + 2 \text{PO}_4^{3-}(\text{aq}) \rightarrow \text{Cu}_3(\text{PO}_4)_2(\text{s})$
- No reaction occurs

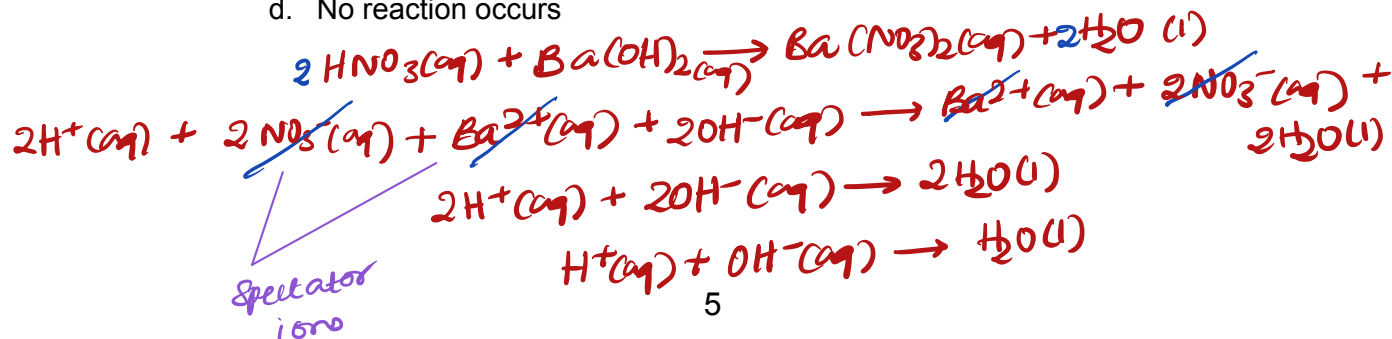


strong acid

8. What is the **net ionic equation** for the reaction between HNO_3 and $\text{Ba}(\text{OH})_2$?

C

- $2 \text{HNO}_3(\text{aq}) + \text{Ba}(\text{OH})_2(\text{aq}) \rightarrow \text{Ba}(\text{NO}_3)_2(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$
- $2 \text{H}^+(\text{aq}) + 2 \text{NO}_3^-(\text{aq}) + \text{Ba}^{2+}(\text{aq}) + 2 \text{OH}^-(\text{aq}) \rightarrow \text{Ba}^{2+}(\text{aq}) + 2 \text{NO}_3^-(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$
- $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$
- No reaction occurs



9. Which of these compounds are soluble in water? Select all that apply. Insert letters without spaces in the answer box, example **abcd**.

- bcegh**

a. BaSO_4 *insoluble*

☒ b. $\text{CH}_3\text{COONH}_4$

☒ c. NaClO_4

d. CaCO_3 *insoluble*

☒ e. FeBr_3

f. AgI *insoluble*

☒ g. ZnCl_2

☒ h. $\text{Pb}(\text{NO}_3)_2$

10. Classify the compounds below as an acid, base, or salt. Insert acid, base, or salt in the boxes below.

Acid

a. HClO_4

Acid

b. $\text{C}_6\text{H}_5\text{COOH}$

Base

c. RbOH

salt

d. CaCl_2

salt

e. NaBr

Base

f. $\text{Mg}(\text{OH})_2$

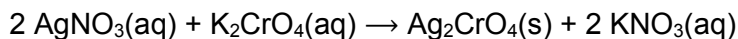
salt

g. K_2SO_4

Base

h. NH_3

11. How many milliliters of 0.650 M K_2CrO_4 are needed to precipitate all the silver in 415 mL of 0.186 M AgNO_3 as $\text{Ag}_2\text{CrO}_4(\text{s})$?

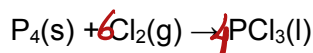


59.4

mL

$$\begin{aligned}
 & 415 \text{ mL } \text{AgNO}_3 \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.186 \text{ mol } \text{AgNO}_3}{\cancel{\text{L}}} \times \frac{1 \text{ mol } \text{K}_2\text{CrO}_4}{2 \text{ mol } \text{AgNO}_3} \times \frac{1 \text{ L}}{0.650 \text{ mol } \text{K}_2\text{CrO}_4} \times \frac{1000 \text{ mL}}{1 \text{ L}} \\
 & = 59.4 \text{ mL}
 \end{aligned}$$

12. Phosphorous trichloride, PCl_3 , is a commercially important compound used in the manufacturing of pesticides, gasoline additives, and a few other products. Liquid PCl_3 is made by the direct combination of phosphorous and chlorine as shown in the **unbalanced** equation below.



- a. What is the maximum mass of PCl_3 produced from 125 g of P_4 and 323 g of Cl_2 ?

417

g

From P_4

$$125 \text{ g } \text{P}_4 \times \frac{1 \text{ mol } \text{P}_4}{123.896 \text{ g } \text{P}_4} \times \frac{4 \text{ mol } \text{PCl}_3}{1 \text{ mol } \text{P}_4} \times \frac{137.324 \text{ g } \text{PCl}_3}{1 \text{ mol } \text{PCl}_3} = 554 \text{ g}$$

From Cl_2

$$323 \text{ g } \text{Cl}_2 \times \frac{1 \text{ mol } \text{Cl}_2}{70.90 \text{ g } \text{Cl}_2} \times \frac{4 \text{ mol } \text{PCl}_3}{6 \text{ mol } \text{Cl}_2} \times \frac{137.324 \text{ g } \text{PCl}_3}{1 \text{ mol } \text{PCl}_3} = 417.07 \text{ g} \sim 417 \text{ g}$$

limiting reactant

- b. What is the limiting reactant and what mass of the excess reactant remains?

i

- i. Cl_2 is the limiting reactant and 30.9 g of P_4 remain
 ii. P_4 is the limiting reactant and 137 g of Cl_2 remain
 iii. Cl_2 is the limiting reactant and 93.9 g of P_4 remain
 iv. P_4 is the limiting reactant and 198 g of Cl_2 remain
 v. P_4 is the limiting reactant and 30.9 g of Cl_2 remain

* From the previous question the limiting reactant is Cl_2

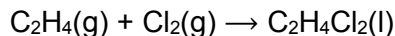
* Amount of P_4 remaining:

$$323 \text{ g } \text{Cl}_2 \times \frac{1 \text{ mol } \text{Cl}_2}{70.90 \text{ g } \text{Cl}_2} \times \frac{1 \text{ mol } \text{P}_4}{6 \text{ mol } \text{Cl}_2} \times \frac{123.896 \text{ g } \text{P}_4}{1 \text{ mol } \text{P}_4}$$

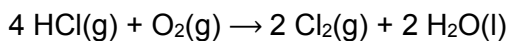
$$= 94.072 \text{ g of } \text{P}_4 \text{ reacted with } \text{Cl}_2$$

$$\text{Excess } \text{P}_4 \text{ remaining} = 125 \text{ g} - 94.072 = 30.9 \text{ g } \text{P}_4$$

13. Using Hess's law, determine ΔH° for the reaction below:

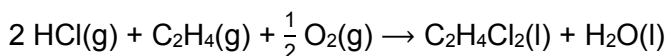


Given that,



$$\Delta H^\circ = -202.4 \text{ kJ/mol}$$

flip and multiply by 1/2



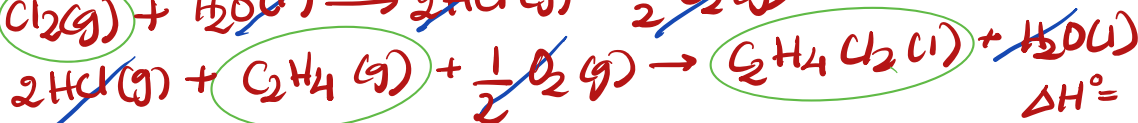
$$\Delta H^\circ = -318.7 \text{ kJ/mol}$$

stays the same

$$\boxed{-217.5} \text{ kJ/mol}$$



$$\Delta H^\circ = +101.2 \text{ kJ/mol}$$



$$\Delta H^\circ = -318.7 \text{ kJ/mol}$$



$$\Delta H^\circ = -217.5 \text{ kJ/mol}$$

Part II: CHEM 1212 Syllabus and Assignments

You may find the answers in the instructions of this document and in the course syllabus. Please read both of those before submitting:

14. Where should this recitation worksheet be submitted?

☒ C

a. eLC

b. By email to the instructor

☒ c. The worksheet must go to Gradescope. If the work is not written on the worksheet, then upload the work to eLC.

15. What time are recitation worksheets due?

☒ C

a. At the end of recitation

b. By the next lecture period

☒ c. Friday at 11:59 pm of the recitation week

16. What day and time are the exams? Choose the two that correctly pair (example: ab).

dg

- a. Monday
- b. Tuesday
- c. Wednesday
- ☒ d. Thursday
- e. During the lecture period
- f. 7:00 pm
- ☒ g. 5:30 pm

17. What assignments are due every week on WebAssign? Choose all that apply (example: ab).

de

- a. Exams
- b. In-Class Activities
- c. Recitations
- ☒ d. Reading Checks
- ☒ e. Progress Checks