

To get the most out of this Practice Exam:

- Feel free to use a periodic table, scrap paper, and a non-programmable calculator, but do not use your textbook or lecture notes.
- Set a timer for 50 minutes (the amount of time you'll have for the exam). When the time is up, grade yourself using the **Answer Key** on page 7. It is important to get a sense of the length of time you'll have for the exam. If you are doing well on the questions you complete, but aren't getting to the end of the practice exam, see if you can find areas where you can speed up by practicing.
- Each question is worth 5 pts. If you earn < 73% (less than a "C") you are not yet ready to pass Exam #2.
- Complete the **Practice Exam – Self Reflection** on page 8. It will help you identify your strength/weaknesses and possible resources for getting help.
- Print out one copy of **Practice Exam – Correction Template** on page 9 for each question you get wrong. Use the space on the page to analyze your mistake.
- Get help and/or extra practice with questions you don't understand.

Soluble salts include:

- All Li^+ , Na^+ , K^+ , NH_4^+ , NO_3^- and $\text{C}_2\text{H}_3\text{O}_2^-$
- All SO_4^{2-} except: Ca^{2+} , Sr^{2+} , Ba^{2+} , Pb^{2+}
- All Cl^- , Br^- , and I^- except: Ag^+ , Pb^{2+} , Hg_2^{2+}

Insoluble salts include:

- All PO_4^{3-} and CO_3^{2-} except: Li^+ , Na^+ , K^+ , and NH_4^+
- All OH^- and S^{2-} except: Li^+ , Na^+ , K^+ , NH_4^+ , Ca^{2+} , Sr^{2+} , and Ba^{2+}

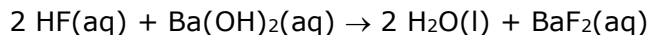
1) The formula for butane is $\text{C}_4\text{H}_{10}(\text{g})$. What are the coefficients in front of the two products in the balanced combustion reaction for butane?

- A)** 4, 5 **B)** 8, 12 **C)** 6, 8
D) 8, 10 **E)** 5, 5 **F)** 4, 8

2) How many atoms are there in a 5.22 g sample of MgCl_2 ? 1 mol = 6.02×10^{23} things

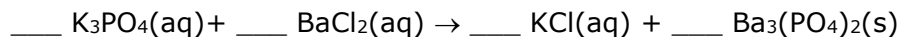
- A)** 5.26×10^{23} **B)** 9.90×10^{22} **C)** 1.48×10^{23}
D) 3.30×10^{22} **E)** 1.04×10^{23} **F)** 2.71×10^{24}

3) Write the net ionic equation for the following reaction. Note: HF(aq) is weak acid.



- A)** $\text{H}^+\text{(aq)} + \text{OH}^-\text{(aq)} \rightarrow \text{H}_2\text{O(l)}$
- B)** $2 \text{H}^+\text{(aq)} + 2 \text{F}^-\text{(aq)} + \text{Ba}^{2+}\text{(aq)} + 2 \text{OH}^-\text{(aq)} \rightarrow 2 \text{H}_2\text{O(l)} + \text{Ba}^{2+}\text{(aq)} + 2 \text{F}^-\text{(aq)}$
- C)** $\text{HF(aq)} + \text{OH}^-\text{(aq)} \rightarrow \text{H}_2\text{O(l)} + \text{F}^-\text{(aq)}$
- D)** $2 \text{HF(aq)} + \text{Ba}^{2+}\text{(aq)} + 2 \text{OH}^-\text{(aq)} \rightarrow 2 \text{H}_2\text{O(l)} + \text{Ba}^{2+}\text{(aq)} + 2 \text{F}^-\text{(aq)}$
- E)** $2 \text{HF(aq)} + \text{Ba(OH)}_2\text{(aq)} \rightarrow 2 \text{H}_2\text{O(l)} + \text{BaF}_2\text{(aq)}$
- F)** No reaction: everything is a spectator ion

4) What is the coefficient in front of the KCl(aq) when the following reaction is balanced?



- | | | |
|-------------|-------------|-------------|
| A) 4 | B) 2 | C) 1 |
| D) 6 | E) 5 | F) 3 |

5) What is the molar mass of iron(II) hydroxide?

- | | | |
|------------------------|------------------------|-----------------------|
| A) 89.87 g/mol | B) 72.858 g/mol | C) 72.9 g/mol |
| D) 89.866 g/mol | E) 89.9 g/mol | F) 72.86 g/mol |

6) What is the mass of 6.0 mol of C?

- | | | |
|------------------|----------------|-------------------|
| A) 0.50 g | B) 39 g | C) 0.014 g |
| D) 2.0 g | E) 72 g | F) 82 g |

- 7) A sample is determined to contain 70.00% C, 3.36% H, and 26.64% O with a molar mass around 240 g/mol. Determine the molecular formula of this compound.
- | | | |
|--------------------------|-----------------------------|-----------------------------|
| A) $C_7H_4O_2$ | B) $C_5H_3O_2$ | C) $C_{16}H_{20}O_2$ |
| D) $C_{14}H_8O_4$ | E) $C_{14}H_{10}O_2$ | F) $C_2H_7O_3$ |

- 8) A 4.70 g sample of phosphorus reacts with oxygen to form 8.34 grams of a phosphorus-oxygen compound. What is the empirical formula of the compound?
- | | | |
|--------------------|------------------|--------------------|
| A) P_3O_2 | B) PO_2 | C) P_2O_3 |
| D) P_2O_5 | E) PO | F) P_5O_3 |

- 9) What is the formula of the solid that is formed when an aqueous solution of tin(IV) acetate is added to an aqueous solution of iron(III) nitrate?
- | | | |
|-----------------------------|-----------------------------|------------------------------|
| A) $Fe(C_2H_3O_2)_3$ | B) $Sn(C_2H_3O_2)_4$ | C) $Fe(NO_3)_3$ |
| D) $Sn(NO_3)_4$ | E) $Sn(NO_3)_3$ | F) no solid is formed |

- 10) What is the mass % (to 3 sig figs) of Na in Na_2CO_3 ?
- | | | |
|-----------------|-----------------|-----------------|
| A) 37.4% | B) 18.7% | C) 31.2% |
| D) 29.9% | E) 15.1% | F) 43.4% |

11) Solid ammonium dichromate decomposes to produce gaseous water, gaseous nitrogen, and solid chromium(III) oxide. What is the coefficient in front of the water when this decomposition reaction is balanced?

- | | | |
|-------------|-------------|-------------|
| A) 2 | B) 3 | C) 5 |
| D) 6 | E) 1 | F) 4 |

12) Which of the following has the greatest molar mass?

- | | | |
|----------------------------------|--------------------------|-------------------------|
| A) N_2O_4 | B) HNO_2 | C) NO_3 |
| D) NH_3 | E) HNO_3 | F) NO |

13) A solution contains 0.55 g of dissolved Sn^{4+} ions. How many grams of Na_2CO_3 must be added to the solution to completely precipitate all of the dissolved Sn^{4+} ?

- | | | |
|------------------|------------------|------------------|
| A) 0.62 g | B) 0.49 g | C) 3.8 g |
| D) 1.2 g | E) 0.45 g | F) 0.98 g |

14) Which of the following statements about oxidation-reduction reactions is false?

- A)** If one substance is oxidized, then another must be reduced
- B)** They are also called redox reactions
- C)** Reduction is the gain of electrons
- D)** They involve the transfer of electrons from one substance to another
- E)** They require oxygen as a reactant
- F)** Oxidation is the loss of electrons
- G)** Combustion reactions are a type of oxidation-reduction reaction

15) A solution contains one or more of the following ions; Mg^{2+} , Ag^{+} , and Ca^{2+} . When KBr is added to the solution, a precipitate forms. The precipitate is filtered off and K_2SO_4 is added to the remaining solution, also producing a precipitate. This second precipitate is filtered off and K_3PO_4 is added to the remaining solution, producing no precipitate. Which ions were present in the original solution?

- A)** Mg^{2+} only **B)** Ag^{+} only **C)** Ca^{2+} only
D) Ag^{+} and Mg^{2+} **E)** Ca^{2+} , and Mg^{2+} **F)** Ag^{+} and Ca^{2+}

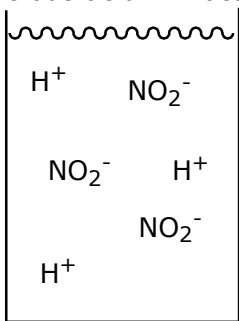
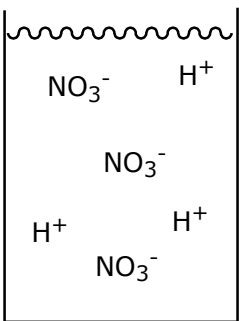
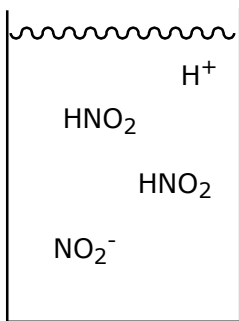
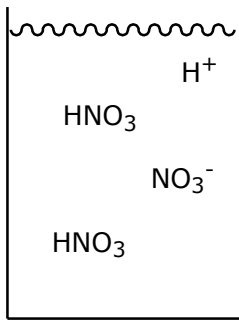
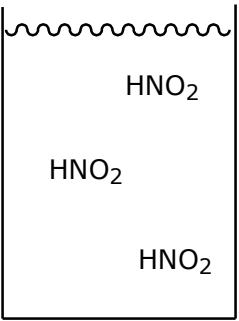
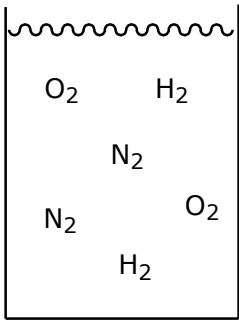
16) Which of the following is not expected to react with HCl(aq) to form a gas?

- A)** NaHCO_3 **B)** Na_3PO_4 **C)** Na_2CO_3
D) Na_2S **E)** Na_2SO_3 **F)** they will all form gas

17) Xylose, a sugar isolated from wood, has the empirical formula CH_2O . If a 6.25 mole sample of xylose has a mass of 938.3 g, what is xylose's molecular formula?

- A)** CH_2O **B)** $\text{C}_2\text{H}_4\text{O}_2$ **C)** $\text{C}_3\text{H}_6\text{O}_3$
D) $\text{C}_4\text{H}_8\text{O}_4$ **E)** $\text{C}_5\text{H}_{10}\text{O}_5$ **F)** $\text{C}_6\text{H}_{12}\text{O}_6$

18) Nitrous acid is a weak acid. Which of the following drawings best represents the behavior of nitrous acid in water?

- A)** 
B) 
C) 
- D)** 
E) 
F) 

- 19) A sample of $\text{Sn}(\text{CO}_3)_2$ has 5.00×10^{23} O atoms. How much does the sample weigh?
- A)** 33.0 g **B)** 198 g **C)** 3.30×10^{47} g
D) 6.60×10^{47} g **E)** 66.0 g **F)** 99.1 g

20) Which reaction (A-F) is correctly classified using the codes (1-9) below?

1 precipitation	6 synthesis
2 acid-base	7 decomposition
3 gas evolution	8 displacement
4 oxidation-reduction	9 double displacement
5 combustion	

- A)** $\text{H}_2\text{CO}_3(\text{aq}) + 2 \text{KOH}(\text{aq}) \rightarrow 2 \text{H}_2\text{O}(\text{l}) + \text{K}_2\text{CO}_3(\text{aq})$ **4, 9**
B) $2 \text{HNO}_3(\text{aq}) + \text{K}_2\text{CO}_3(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) + 2\text{KNO}_3(\text{aq})$ **3, 8**
C) $3 \text{N}_2\text{H}_4(\text{l}) \rightarrow 4 \text{NH}_3(\text{g}) + \text{N}_2(\text{g})$ **4, 7**
D) $\text{Li}_2\text{SO}_4(\text{aq}) + \text{SrCl}_2(\text{aq}) \rightarrow \text{SrSO}_4(\text{s}) + 2 \text{LiCl}(\text{aq})$ **2, 9**
E) $\text{CH}_4(\text{g}) + 2 \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2 \text{H}_2\text{O}(\text{g})$ **5, 9**
F) $\text{Cu}_2\text{O}(\text{s}) + \text{C}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{CO}(\text{aq})$ **1, 8**

Answer key: Each question is worth 5 points

1) D	5) A	9) F	13) F	17) E
2) B	6) E	10) F	14) E	18) C
3) C	7) D	11) F	15) F	19) A
4) D	8) C	12) A	16) B	20) C

Practice Exam – Self Reflection

- A) What grade did you earn on this practice exam?
- B) Are you satisfied with your grade on this practice exam? YES _____ NO _____
- C) What is your current grade in CHEM 4? (check Canvas)
- D) Are you satisfied with your current grade in CHEM 4? YES _____ NO _____
- E) Why do you think you made mistakes on this practice exam? *[Check all that apply.]*
- | | |
|--|--|
| ☐ Did not study enough | ☐ Unfamiliar with terminology |
| ☐ Difficulty with the mathematics | ☐ Difficulty applying the concept to new contexts |
| ☐ Did not understand the concepts | ☐ Careless mistakes |
| ☐ Felt rushed during the exam | ☐ Thought I knew the material better than I did |
| ☐ Family/personal issues | ☐ Test anxiety/panicked |
| ☐ Other (explain): | |
- F) Which of these resources have you been taking advantage of? *[Check all that apply.]*
- | | |
|--|--|
| ☐ PAL sessions | ☐ Study groups |
| ☐ PAL leader office hours | ☐ Practice exams |
| ☐ Instructor office hours | ☐ Optional <i>MasteringChemistry</i> homework |
| ☐ Commit to Study mentoring | ☐ PARC tutoring |
| ☐ Review posted clicker questions | ☐ Other (explain): |
- G) Discuss your weakness and strengths in terms of your study skills and how you approached the class up until taking this practice exam and discuss any changes you plan on making moving forward.
- a. Strengths:
- b. Weaknesses:
- c. Changes you plan on making (be as specific as possible):

Practice Exam – Correction Template

(print out 1 copy of this template for each question you got wrong)

- 1) What question # from the practice exam are you correcting?
- 2) What concepts are being dealt with in the question? In other words, what type of problem is it?
- 3) Where in your textbook (what page) and when in your lecture notes (what date) is this type of problem dealt with?

Part I: Working a similar problem to the one you got wrong

- 4) Write out a similar problem and all the work needed for you to fully understand it. [Continue on back as needed.]

Part II: Correcting the problem you got wrong

- 5) Write out the question that you got wrong and all the work needed for you to fully understand it. Include clarifying/explanatory comments. [Continue on back as needed.]