Using Practice Exams Effectively

This practice exam contains **actual questions** that have been asked on one of my exams in a previous quarter. This can be a useful studying tool if used properly.

Important notes about the practice exam:

- This practice exam should not be the only studying tool you are using, because **the practice exams only show a small subset of the possible questions that could be tested**.
- **Work the recommended book problems** to make sure that you fully understand all of the concepts that might be on the actual exams.
  - You need to be able to **explain why every step is done** in solving all of the recommended book problems (**without looking at the solutions**). Do not memorize the answers – this will not work.
  - Work problems multiple times to build skill and efficiency (but do not memorize).
- **The actual exam will contain questions that differ from the practice quizzes. They are not necessarily any easier or harder; they are just different.**
  - It would be pointless to give an exam with the exact same questions as the practice, because it would mean the exam is testing your memorization skills instead of your actual understanding of the material.
  - **To prepare for this, make sure you understand how to do all of the recommended book problems as discussed above.**

What this practice exam is intended to do:

- Help you diagnose general areas of strength/weakness and determine what you need to spend more time studying before the exam
- Allow you to check if you are answering questions quickly enough to complete the actual exam within the time limit
- Give you an idea of the general format of a multiple-choice exam

While taking the exam:

- Take this with a **50 minute time limit**, including the time it would take you to fill out a parscore
- **Do not use any outside notes or help**
- Do not look at any of the answers until you have completed the entire exam

After you complete the exam, check your answers against the key. For any problems you miss:

- Go through the worked-out solutions to see how to answer each question correctly
- **Make sure you understand why every step is done** in solving the problems you miss
- **Rework book problems** that are related to the questions you missed. This will help to strengthen your understanding of the topic. Without this, you will not gain a full understanding of the topic and risk missing similar questions on the actual exam.

<u>Before doing anything, fill in the following on your ParSCORE form:</u>
1) **Write your name**
2) Bubble in **FORM A**
3) **Bubble in your PERM** number (7 digits only—no extra numbers)

Instructions: No hats or hoods allowed. No books or notes allowed. No sharing of calculators. Cell phones, iPods, headsets/headphones, and any other electronic devices must be turned off and put away.

There are a total of seven pages (18 questions) on the exam. **Not every question is worth the same number of points**--point values are indicated for each question.

You may work out the problems and write your answers on this exam; however, you must completely fill in the appropriate bubble(s) on your ParSCORE form. Turn in the ParSCORE form only. **Only the answers indicated on your ParSCORE will be graded**, so please be very careful bubbling in your ParSCORE. No credit will be awarded for an incorrectly-bubbled answer. The correct answers to the exam will be posted on our course web page.

1. (5 pts) Which of the following is considered a nonelectrolyte?

a) HCl
b) PF_5
c) Na_3PO_4
d) NH_4Br
e) More than one of these is a nonelectrolyte

2. (5 pts) When potassium fluoride is added to an aqueous solution containing an unknown solute, a precipitate forms. Which of the following could be the identity of the unknown solute?

a) $AgCH_3COO$
b) Na_3PO_4
c) $Mg(NO_3)_2$
d) More than one of these
e) None of these

3. (5 pts) Compound A and Compound B have the same empirical formula but different molecular formulas. Compound A and Compound B consist only of nitrogen and oxygen. Which of the following statements must be true?

a) Compound A and Compound B must have the same molar mass
b) Compound A and Compound B have the same chemical properties
c) One mole of Compound A contains the same number of nitrogen atoms as one mole of Compound B
d) The mass percentage of oxygen in Compound A is the same as the mass percentage of oxygen in Compound B
e) More than one of these statements is true

4. (5 pts) Determine the number of electrons in $^{56}_{26}Fe^{2+}$

a) 24
b) 26
c) 28
d) 30
e) none of these

5. (5 pts) The isotope of an unknown element, Y, has a mass number of 79. The most stable ion of the isotope has 36 electrons and forms a binary compound with sodium having a formula of Na_2Y. Which of the following statements is/are true?

a) The binary compound formed between Y and fluorine will be a covalent compound
b) The isotope of Y contains 38 protons
c) The isotope of Y contains 45 neutrons
d) (a) and (b) are true
e) (a) and (c) are true

6. (5 pts) Which of the following is a variable-charge metal?

a) Mg
b) Co
c) Zn
d) More than one of these
e) None of these

7. (5 pts) Two different isotopes of the same element are isolated as neutral atoms. The atoms **MUST** have the same number of:

      I.   Protons

      II.   Neutrons

      III.   Electrons

a) I. only
b) II. only
c) I. and II. only
d) I. and III. only
e) I., II., and III.

8. (5 pts) How many grams of $CuSO_4$ are there in 50 mL of a 0.50 M solution of $CuSO_4$?

a) 0.025 g
b) 3990 g
c) 4.0 g
d) 8.0 g
e) 16 g

9. (6 pts) Calculate the total number of atoms in 40 grams of barium hydroxide (molar mass = 171.3 g/mol)

a) 4.2×10^{23}
b) 8.4×10^{23}
c) 2.8×10^{22}
d) 1.4×10^{23}
e) 7.0×10^{23}

10. (6 pts) What is the concentration of chloride ion in a solution prepared by adding 40.0 mL of water to 20.0 mL of a 5.00 M calcium chloride?.

a) 2.50 M
b) 3.33 M
c) 1.67 M
d) 5.00 M
e) 10.0 M

11. (6 pts) A substance X_2Z is 60% X by mass. What is the percentage of X by mass in XZ?

a) 43%
b) 30%
c) 50%
d) 67%
e) 23%

12. (6 pts) You have been given 100 gram samples of each of the following compounds. Which contains the greatest mass of nitrogen?

a) $C_6H_4N_3O_6$
b) N_2O
c) NH_3

13. (6 pts) Consider the following reaction: $2\ Al + 3\ MgCl_2 \ ---> \ 2\ AlCl_3 + 3\ Mg$

When 63.3 g of Al (26.98 g/mol) reacts with 189.5 g of $MgCl_2$ (95.21 g/mol), you actually form 44.7 g of $AlCl_3$ (133.34 g/mol). What is the percent yield for this reaction?

a) 21.4 %
b) 17.7 %
c) 25.3 %
d) 70.6 %
e) 23.6 %

14. (6 pts) The molar mass of an acid H_3X was determined by titration. It took 31 mL of 0.20 M NaOH to completely neutralize a 0.72 gram sample of H_3X. What is the molar mass of H_3X? Note: H_3X has three acidic hydrogens.

a) 116 g/mol
b) 39 g/mol
c) 0.116 g/mol
d) 232 g/mol
e) 348 g/mol

15. (6 pts) NO can be produced by the two-step process shown below. The two steps occur sequentially according to the following equations:

$$N_2 + 3 H_2 \text{ ---> } 2 NH_3$$

$$4 NH_3 + 5 O_2 \text{ ---> } 4 NO + 6 H_2O$$
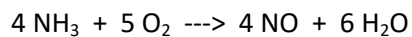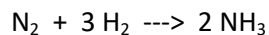
What mass of H_2 must be used to produce 50 grams of NO (30 g/mol) by the process shown above, assuming 100% yield in each reaction?

a) 2.5 g
b) 50 g
c) 10 g
d) 5.0 g
e) 25 g

16. (6 pts) A 8.6 gram sample of Mo metal is reacted with excess HCl to produce 0.18 grams of H_2 gas and the compound $MoCl_x$. What is the value of "x" in the formula $MoCl_x$?
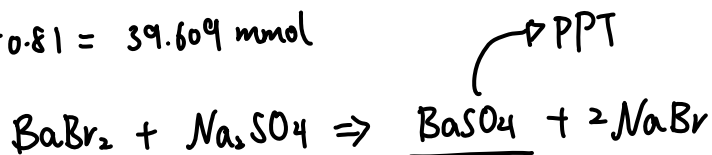
a) 2
b) 3
c) 4
d) 5
e) 6

17. (6 pts) 39.5 mL of a 0.45 M $BaBr_2$ solution is added to 48.9 mL of a 0.81 M Na_2SO_4 solution, resulting in the formation of a precipitate. What is $[SO_4^{2-}]$ in solution after the reaction has gone to completion?

a) 0.45 M
b) 0.00 M
c) 0.36 M
d) 0.089 M
e) 0.25 M

$BaBr_2 =$
$39.5 \times 0.45 = 17.775$ mmol

$Na_2SO_4 =$
$48.9 \times 0.81 = 39.609$ mmol

$\rightarrow$ PPT

$BaBr_2 + Na_2SO_4 \Rightarrow \underline{BaSO_4} + 2NaBr$

$$\frac{39.609 - 17.775}{39.5 + 48.9} = 0.24699 \approx 0.25\,M$$

E

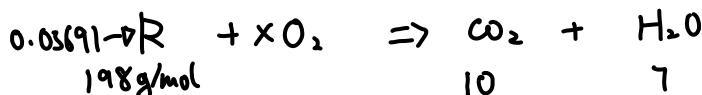**18.** (6 pts) A 7.31 gram sample of an unknown compound containing C, H, and O is combusted in excess oxygen to produce 16.24 grams of CO_2 and 4.65 grams of H_2O. What is the empirical formula of the unknown compound?

a) $C_3H_6O_2$
b) $C_5H_7O_2$
c) C_5H_7O
d) $C_3H_3O_2$
e) C_2H_5O

B

$\overline{44}$ $\overline{18}$
0.3691 mol   0.2583 mol

$0.03691 - DR + XO_2 \Rightarrow CO_2 + H_2O$
$198 g/mol$ 10   7

1   :   0.6998

$\approx$ 10   :   7

10C 14H

134 g   64 g O , 40

$C_{10}H_{14}O_4$
$C_5H_7O_2$
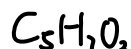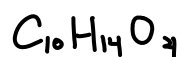
Answers:

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

Notes: Question 5 is based on book problem 2.69, Question 9 is based on book problem 3.24, Question 15 is based on book problem 3.74, Question 16 is based on book problem 3.128 Question 17 is based on book problem 4.45