

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 exams. 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:

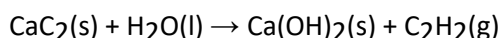
- Go through the worked-out solutions to see how to answer each question correctly
- **Make sure you understand why every step is done** in solving the problems you miss
- **Rework book problems** that are related to the questions you missed. This will help to strengthen your understanding of the topic.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

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 quiz. **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 quiz; 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 quiz will be posted on our course web page.

1. (5 pts) Determine the **SUM** of **ALL** coefficients when the following reaction is balanced with lowest whole-number coefficients. Include coefficients of one.



- a) 8
- b) 5
- c) 9
- d) 10
- e) 4

2. (5 pts) What ions are produced when sodium chromate (Na_2CrO_4) is dissolved in water?

- a) Na^+ , Cr^{6+} and O^{2-}
- b) Na^+ and CrO_4^-
- c) Na_2^{2+} and CrO_4^{2-}
- d) Na_2^{2+} and CrO_4^-
- e) Na^+ and CrO_4^{2-}

3. (5 pts) A one-mole sample of which compound, when added to 1.0 L of water, will produce the solution that best conducts electricity?

- a) $\text{Ca}_3(\text{PO}_4)_2$
- b) SF_4
- c) KNO_3
- d) CH_3COOH , a weak acid
- e) More than one of these will conduct electricity the best

4. (5 pts) For which of the following compounds does 1.0 g represent 2.27×10^{-2} mol?

- a) NH_3
- b) C_2H_6
- c) H_2O
- d) CO_2
- e) CO

5. (5 pts) Which of the following has the same number of neutrons as ${}^{25}_{12}\text{Mg}^{2+}$?

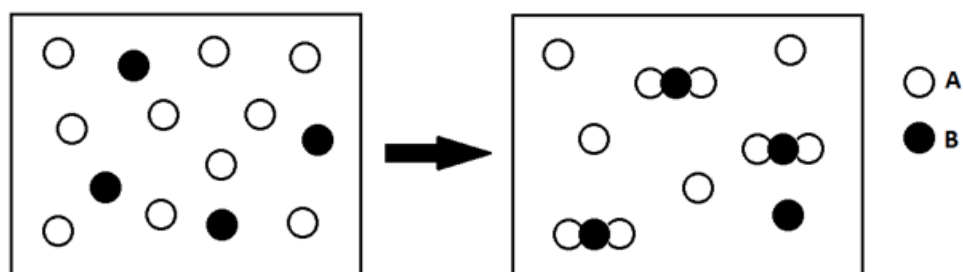
- a) ${}^{24}_{12}\text{Mg}$
- b) ${}^{19}_9\text{F}^-$
- c) ${}^{27}_{14}\text{Si}$
- d) ${}^{25}_{10}\text{Ne}$
- e) more than one of these

6. (5 pts) Which of the following compounds is/are named incorrectly?

- I. $\text{Ni}_3(\text{PO}_4)_2$ nickel(III) phosphate
- II. IF_3 iodine trifluoride
- III. HCN hydrocyanic acid

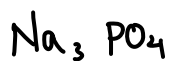
- a) Compound I. is incorrectly named
- b) Compound II. is incorrectly named
- c) Compound III. is incorrectly named
- d) Compounds I. and III. are incorrectly named
- e) Compounds I., II., and III. are incorrectly named

7. (5 pts) Determine the balanced, net ionic equation for the reaction occurring when FeCl_3 is added to $\text{Ba}(\text{OH})_2$.
- $2 \text{Fe}^{3+}(\text{aq}) + 6 \text{Cl}^{-}(\text{aq}) + 3 \text{Ba}^{2+}(\text{aq}) + 6 \text{OH}^{-}(\text{aq}) \rightarrow 2 \text{Fe}(\text{OH})_3(\text{s}) + 3 \text{Ba}^{2+}(\text{aq}) + 6 \text{Cl}^{-}(\text{aq})$
 - $2 \text{FeCl}_3(\text{aq}) + 3 \text{Ba}(\text{OH})_2(\text{aq}) \rightarrow 2 \text{Fe}(\text{OH})_3(\text{s}) + 3 \text{BaCl}_2(\text{aq})$
 - $\text{Fe}^{3+}(\text{aq}) + 3 \text{OH}^{-}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_3(\text{s})$
 - $2 \text{Fe}^{3+}(\text{aq}) + 6 \text{Cl}^{-}(\text{aq}) + 3 \text{Ba}^{2+}(\text{aq}) + 6 \text{OH}^{-}(\text{aq}) \rightarrow 2 \text{Fe}^{3+}(\text{aq}) + 6 \text{OH}^{-}(\text{aq}) + 3 \text{Ba}^{2+}(\text{aq}) + 6 \text{Cl}^{-}(\text{aq})$
 - None of these
8. (5 pts) Calculate the mass percentage of nitrogen in magnesium nitrate.
- 0.00%
 - 51.6%
 - 25.8%
 - 18.9%
 - 9.44%
9. (6 pts) The reaction of element A with element B is represented in the following diagram. Determine the percent yield for the reaction shown in this diagram.



- 80%
- 67%
- 100%
- 57%
- 75%

10. (6 pts) How many grams of solid sodium phosphate should be added to enough water to prepare 250 mL of a solution with $[\text{Na}^+] = 0.30 \text{ M}$?



- a) 7.7 g
- b) 3.0 g
- c) 12 g
- d) 4.1 g
- e) 37 g

$$\frac{0.3}{3} = 0.1 \text{ M} \Rightarrow \text{Na}_3\text{PO}_4$$

$$0.1 \times \frac{250}{1000} = 0.025 \text{ mol}$$

$$0.025 \times (22.99 \times 3 + 30.97 + 16 \times 4) = 4.0985 \text{ g}$$

D

11. (6 pts) The empirical formula of a particular compound is $\text{C}_2\text{H}_4\text{O}$. The molar mass of this compound is 88 g/mol. How many H atoms are there in a 2.00 gram sample of this compound?

not molecular

- a) 1.09×10^{23}
- b) 2.19×10^{23}
- c) 5.47×10^{22}
- d) 1.37×10^{22}
- e) 0.0227

A

$$\frac{2}{88} \times 4 \times 6.02 \times 10^{23} = 5.47 \times 10^{22}$$

C

12. (6 pts) Consider the following reaction: $\text{Na}_2\text{SO}_4 (\text{s}) + 2 \text{C} (\text{s}) \rightarrow \text{Na}_2\text{S} (\text{s}) + 2 \text{CO}_2 (\text{g})$

What will be the limiting reactant when 35 grams of Na_2SO_4 reacts with 25 grams of C? Assume the reaction goes to completion.

- a) C
- b) Na_2SO_4
- c) Both are the limiting reactant

$$\frac{35}{46 + 32 + 16 \times 4}$$

$$0.246$$

$$\frac{\left(\frac{25}{12}\right)}{2}$$

$$1.041$$

B

13. (6 pts) You have been given 50 mL of a 2.5 M AgNO_3 solution. How much water should be added to dilute this solution to a final concentration of 1.0 M AgNO_3 ?

- a) 100 mL
- b) 125 mL
- c) 175 mL
- d) 50 mL
- e) 75 mL

E

$$\frac{50 \times 2.5}{50 + x} = 1$$

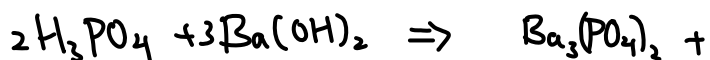
$$50 \times 2.5 = 50 + x$$

$$x = 75$$

14. (6 pts) What volume of 2.3 M phosphoric acid is required to completely neutralize 50 mL of 1.2 M barium hydroxide? Phosphoric acid contains three acidic hydrogens.

- a) 78 mL
- b) 26 mL
- c) 8.7 mL
- d) 39 mL
- e) 17 mL

E



$$\frac{1}{3} \times \frac{50}{1000} \times 1.2 = 2.3 \times \frac{V}{1000} / 2$$

$$V = 17.3 \text{ mL}$$

15. (6 pts) Calculate the total concentration of chloride ion when 300 mL of a 2.0 M NaCl solution is added to 300 mL of a 2.5 M CaCl₂ solution. Assume the volumes are additive.

- a) 9.0 M
- b) 4.5 M
- c) 3.5 M
- d) 2.25 M
- e) 7.0 M

$$\frac{300 \times 2 + 300 \times 2.5 \times 2}{600}$$
$$= 1 + 2.5 = 3.5$$
$$= C$$

16. (6 pts) Rhenium (Re) has two stable isotopes: ¹⁸⁵Re which has a mass of 184.953 amu and ¹⁸⁷Re which has a mass of 186.956 amu. If the average mass of Re is 186.207 amu, what is the natural abundance of ¹⁸⁷Re?

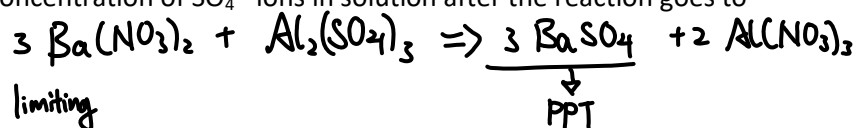
- a) 50.00%
- b) 62.60%
- c) 76.48%
- d) 37.40%
- e) 23.52%

$$186.207 = \frac{184.953 \times (100 - x) + 186.956 \times x}{100}$$

$$x = 62.6 \%$$

B

17. (6 pts) 185 mL of a 1.1 M $\text{Ba}(\text{NO}_3)_2$ solution is added to 180 mL of a 2.7 M $\text{Al}_2(\text{SO}_4)_3$ solution, resulting in the formation of a precipitate. What is the final concentration of SO_4^{2-} ions in solution after the reaction goes to completion?



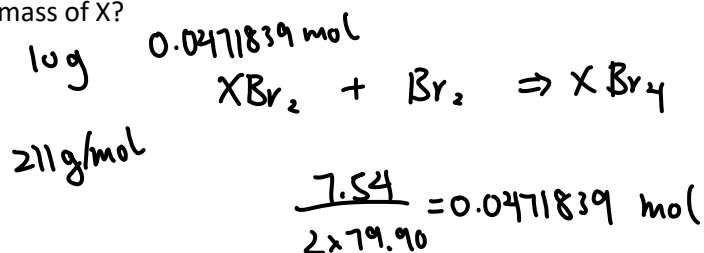
- a) 3.4 M
b) 1.3 M
c) 2.7 M
d) 0.8 M
e) 0.0 M

$$1.1 \times 185 \qquad 2.7 \times 180$$

$$\frac{(2.7 \times 180 - \frac{1.1 \times 185}{3}) \times 3}{185 + 180} \Rightarrow 3.44$$

A

18. (6 pts) Element X forms stable compounds with the formulas XBr_2 and XBr_4 . Treatment of 10.00 g of XBr_2 with excess Br_2 forms 17.54 g of XBr_4 . What is the molar mass of X?



- a) 79.9 g/mol
b) 52.1 g/mol
c) 132 g/mol
d) 212 g/mol
e) 160 g/mol

B

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

For more practice, work the assigned problems from the textbook! Lists of problems and solutions are on Gauchospace.