

Chem 1A Midterm 1

Practice Test

Credit will only be given for answers on this sheet. Units must be included in your answers and points will be taken off for incorrect or missing units. No partial credit will be awarded. Calculators are allowed. Cell phones may not be used as calculators.

Name:	Perm Number

Make sure your writing is dark and large enough to be picked up by a scanner. Failure to do this results in the loss of 5 points on the exam.

If you are sitting next to someone with the same version of the test, you both will lose 5 points on the exam.

If you are still writing after time is called, you will lose 5 points on the exam.

Fundamentals	
Question (Points)	Answer
1 (6 pts) 1,2,3	a. $3.251 \times 10^{-3} \text{ kg}$
	b. 0.0504 mol
	c. 1.4×10^4 widgets
2 (4 pts)	$\text{MnO}_2(\text{s}) + 4\text{HCl}(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + \text{MnCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
3 (12 pts) 6,6	a. $4\text{Ga}(\text{s}) + 3\text{O}_2(\text{g}) \xrightarrow{\Delta} 2\text{Ga}_2\text{O}_3(\text{s})$
	b. $4\text{KClO}_3(\text{s}) \xrightarrow{\Delta} 4\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
4 (6 pts) 3,3	a. p= 10 n= 12 e-= 10
	a. p= 83 n= 126 e-= 80
5 (7 pts) 1,3,3	a. 9
	b. 1
	c. 3.58×10^9
6 (6 pts)	700 g

Multiple Choice	
Question (Points)	Answer
7 (7 pts)	☐ A ☐ B ☐ C ☐ D ☒ E
8 (5 pts)	☐ A ☐ B ☐ C ☐ D ☒ E
9 (6 pts)	☐ A ☒ B ☐ C ☐ D ☐ E
10 (5 pts)	☒ A ☐ B ☐ C ☐ D ☐ E
11 (6 pts)	☒ A ☐ B ☐ C ☐ D ☐ E
12 (5 pts)	☐ A ☐ B ☒ C ☐ D ☐ E

Challenge	
Question (Points)	Answer
13 (16 pts) 7,9	a. MnO_2
	b. Mn_3O_4
14 (9 pts)	$\text{FeO} = 0 \text{ g}$ $\text{Al} = 3.149 \text{ g}$ $\text{Fe} = 8.0255 \text{ g}$ $\text{Al}_2\text{O}_3 = 4.8842 \text{ g}$

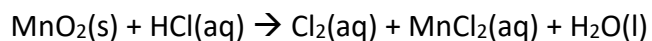
Fundamentals

1a) 1 pts How many kilograms are in 3251 mg?

1b) 2 pts How many moles of Cu are in 3.20 g?

1c) 3 pts How many widgets are in 2.3×10^{-20} moles?

2) 4 pts Balance the following equation.



3a) 6 pts Convert the following into balanced equations
When gallium metal is heated in oxygen gas, it melts and forms solid gallium(III) oxide.

3b) 6 pts When crystalline potassium chlorate is heated to just above its melting point, it reacts to form two different crystalline compounds, potassium chloride and potassium perchlorate.

4a) 3 pts How many protons, neutrons, and electrons neon-22 have?

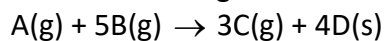
4b) 3 pts How many protons, neutrons, and electrons $^{209}\text{Bi}^{3+}$ have?

- 5a) 1 pts How many significant figures does 0.000123045560 have?
- 5b) 3 pts Complete the following calculations making sure to report your answer to the correct significant figures.
- 12.0(11.90 – 11.8)
- 5c) 3 pts
$$\frac{1.203 \times 10^6}{0.000360 - 2.40 \times 10^{-5}}$$
- 6) 6 pts An iron bar weighed 664 g. After the bar had been standing in moist air for a month, exactly one-eighth of the iron turned to rust (Fe_2O_3). Calculate the final mass of the iron bar and rust.

Multiple Choice

- 7) 7 pts Compound X_2Y is 60% X by mass. Calculate the percent Y by mass of the compound X_2Y_2 .
- A) 50%
 - B) 20%
 - C) 30%
 - D) 40%
 - E) None of the above.
- 8) 5 pts Which of the following is *not* the correct chemical formula for the compound named?
- A) All of the formulas are correct.
 - B) Fe_2O_3 iron(III) oxide
 - C) PBr_5 phosphorus pentabromide
 - D) CoO cobalt(II) oxide
 - E) $CaSO_4$ calcium sulfite
- 9) 6 pts For a new element, 67.16% is an isotope with mass 280.8 amu, 2.76% is an isotope with mass 283.7 amu, and 30.08% is an isotope with mass 284.8 amu. Calculate the average atomic mass of this new element.
- A) 280.8 amu
 - B) 282.1 amu
 - C) 283.1 amu
 - D) 313.4 amu
 - E) None of the above.
- 10) 5 pts What is the correct formula for chromium(VI) oxide?
- A) CrO_3
 - B) Cr_2O_3
 - C) Cr_6O
 - D) CrO_6
 - E) None of the above.

11) 6 pts Consider the following balanced equation:



When equal masses of A and B are reacted, which is limiting?

- A) If the molar mass of A is less than the molar mass of B, then B must be limiting.
- B) More information is needed.
- C) If the molar mass of A is greater than the molar mass of B, then A must be limiting.
- D) If the molar mass of A is less than the molar mass of B, then A must be limiting.
- E) If the molar mass of A is greater than the molar mass of B, then B must be limiting.

12) 5 pts How many of the following chemical formulas are written incorrectly?

ClNa BaBr₂ LaF₂ ClRb

- A) All are written incorrectly.
- B) One is written incorrectly.
- C) Two are written incorrectly.
- D) All are written correctly.
- E) Three are written incorrectly.

Challenge

- 13) 30.00 g of a solid compound X contains 63.3% Mn and 36.7% O by mass. When X is heated, 3.68 g of oxygen gas is evolved and a new solid compound Y containing Mn and O is formed.
- 13a) *7 pts* Determine the empirical formula of X.

- 13b) *9 pts* Determine the empirical formula of Y.

- 14) 9 pts A mixture of 10.325 g of FeO and 5.734 g of aluminum metal is placed in a crucible and heated in a high temperature oven, where the following reaction takes place: $3\text{FeO}(s) + 2\text{Al}(l) \rightarrow 3\text{Fe}(l) + \text{Al}_2\text{O}_3(s)$
After the reaction has gone to completion what and how much (in grams) will be left in the crucible?