EXAM 1
PRACTICE PROBLEMS

CHEMISTRY 161A // FALL 2019

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PRACTICE PROBLEM 1

Complete the following table:

– answer –

Symbol:	$^{90}_{40}Zr$	$^{91}_{40}Zr^{4+}$	
# Protons			16
# Neutrons			16
# Electrons			
Mass Number (A)			
Net charge			–1

PRACTICE PROBLEM 2

For each of the following entries, write the chemical name or the chemical formula.

— answer —

Name	Formula
Chromium(III) phosphate	
Manganese(IV) oxide	
Nitrogen monoxide	
Aluminum sulfide	
	$Fe(NO_3)_3$
	NaN_3
	SO_3
	$BaSO_3$
Vanadium(IV) chlorate	
Zinc(II) nitrate	
	$Ga(CH_3COO)_3$
	$Mo(SCN)_4$
	$(NH_4)_2SO_4$

PRACTICE PROBLEM 3

How many hydrogen atoms are in a 50.0 g sample of ammonium carbonate?

— answer —

PRACTICE PROBLEM 4.1

A 3.25 g sample of a sugar containing only carbon, hydrogen, and oxygen was burned in excess oxygen. The mass of carbon dioxide collected was 4.76 g and the mass of water collected was 1.95 g. What is the empirical formula of the sugar?

— answer —

PRACTICE PROBLEM 4.2

A 3.25 g sample of a sugar containing only carbon, hydrogen, and oxygen was burned in excess oxygen. The mass of carbon dioxide collected was 4.76 g and the mass of water collected was 1.95 g. What is the empirical formula of the sugar?

The molecular mass of the sugar is 180.6 g/mol. What is the molecular formula of the sugar?

— answer —

PRACTICE PROBLEM 5

You perform a reaction between 0.200 g of cesium metal and 0.824 g of chlorine gas, and obtain 0.167 g of cesium chloride as a product. What is the percent yield of cesium chloride?

– answer –

$$\_\_\_\_\_\ Cs\ (s) + \_\_\_\_\_\ Cl_2\ (g) \rightarrow \_\_\_\_\_\ CsCl\ (s)$$

PRACTICE PROBLEM 6

First, balance the following chemical equation. If you start the reaction below with 1.665 g of phosphoric acid (H_3PO_4) and 2.000 g of sodium carbonate, how much (in grams) of each reactant remain after the reaction is over.

You may assume 100% for the reaction.

— answer —

$$\_\_\_\_\ H_3PO_4\ (aq) + \_\_\_\_\ Na_2CO_3\ (s) \rightarrow \_\_\_\_\ Na_3PO_4\ (aq) + \_\_\_\_\ CO_2\ (g) + \_\_\_\_\ H_2O\ (l)$$

PRACTICE PROBLEM 7

A metallic oxide (an ionic compound) has the formula M_xO_y. The molar mass of the compound is 250.2 g/mol and the charge on the metal ion is 3+. Identity the metal ion and write the name of the ionic compound.

– answer –

PRACTICE PROBLEM 8

Silicone exists in three stable isotopes, as listed in the table to the right.

Calculate the average atomic mass (in amu) of a sample of natural silicon.

– answer –

Isotope	^{28}Si	^{29}Si	^{30}Si
Mass (amu)	27.97693	28.97650	29.97377
Abundance	92.23%	4.67%	3.10%

PRACTICE PROBLEM 9

An unknown hydrocarbon has an empirical formula of CH and its mass spectrum is shown below. What is the molecular formula of the hydrocarbon?

— answer —