

## Chemistry 1094 Spring 2018 Test 1

Wednesday, January 31, 2018

Time: 1 hour 50 minutes

Name: \_\_\_\_\_ Student Number: \_\_\_\_\_

*This test consists of **seven** pages of questions, a periodic table, and a page containing additional information about the elements. Please ensure that you have a complete paper and, if you do not, obtain one from me immediately. There are **64** marks available. Good luck!*

1) **[4 marks]** Express the following numbers in scientific notation, to the correct number of significant figures:

a) 1,200,000

b) 0.000 000 641 0

c) 450.0

d) 0.078

2) **[4 marks]** Perform the following calculations. Round your answers to the correct number of significant figures.

a) **[0.5 marks]**  $321.8 - 2.398$

b) **[0.5 marks]**  $851.3 \times 0.0020$

c) **[1 mark]**  $(421.2 - 0.002)/21.2$

d) **[2 marks]**  $(26.338 - 2.14)/(5.23 + 6.118)$

3) **[10 marks total]** Perform the following unit conversions. You need not express your answers to the correct number of significant figures.

a) **[2 marks]** 4.58 cm to nm

b) **[2 marks]** 6.3 ft to m, if 12 in = 1 ft, and 2.54 cm = 1 in

c) **[3 marks]** 12.6 m<sup>2</sup> to ft<sup>2</sup>, if 2.54 cm = 1 in, and 12 in = 1 ft

d) **[3 marks]**  $8.93 \frac{g}{cm^3}$  to  $\frac{lb}{in^3}$ , if 50 lb = 22679.6 g, and 2.54 cm = 1 in

- 4) **[5 marks]** The silver medals at this year's Pyeongchang Olympics have a mass of 580 grams, and are 92.5 mm in diameter. Assuming the volume of the medals is given by

$V = \pi \times \left(\frac{d}{2}\right)^2 \times t$  (d is diameter, and t is thickness), what should be the thickness of the silver medal? Give your answer in mm. The density of silver is 10.49 g/cm<sup>3</sup>. You need not express your answer to the correct number of significant figures.

- 5) **[4 marks]** Suppose you wanted to determine the density of gold. You could do that by taking a 193.2-gram piece of gold and putting it into a can completely filled with ethanol (D = 0.789 g/mL). This, of course, would cause some of the ethanol to spill out. (Assume the volume of ethanol spilled out was equal to the volume of gold.) If the can and ethanol had a mass of 1218.31 grams before you added the gold, and 1403.62 grams after you added the gold, what is the density of the gold? Give your answer in g/cm<sup>3</sup>. You need not express your answer to the correct number of significant figures.

- 6) **[4 marks]** Classify the following as **Heterogeneous mixtures**, **Homogeneous mixtures**, **Elements**, or **Compounds**. Circle your choice.

Brewed coffee      He      Ho      E      C

Gravel              He      Ho      E      C

Carbon dioxide    He      Ho      E      C

Silicon             He      Ho      E      C

- 7) **[4 marks]** Classify the following as **Chemical Changes**, **Chemical Properties**, **Physical Changes**, or **Physical Properties**. Circle your choice.

Magnesium is shiny and silver      CC    CP    PC    PP

Water is evaporating                  CC    CP    PC    PP

Iron will react with oxygen to form rust    CC    CP    PC    PP

Methanol is burning                    CC    CP    PC    PP

- 8) **[2 marks]** You are given a large sample of a solid and asked to determine whether that solid is a compound. You discover that a 0.500-gram sample of the solid contains 0.0500 grams of sodium, a 1.70-gram sample of the solid contained 0.200 grams of sodium, and a 0.750-gram sample of the solid contained 0.150 grams of sodium. Is the solid a compound? How do you know? (No marks for guessing. 😊)

9) **[3 marks]** If you take a 2-gram sample of  $S_8$  and convert it to  $SF_4$ , and a different 3-gram sample of  $S_8$  and convert it to  $SF_6$ , what will be the ratio  $\frac{\text{mass of F in } SF_4}{\text{mass of F in } SF_6}$ ?

10) **[6 marks]** Pick an element from the periodic table that matches the description given. Give the symbol for that element in the space provided.

A period 3 alkali metal \_\_\_\_\_

A halogen that is liquid at room temperature \_\_\_\_\_

A period 4 semiconductor \_\_\_\_\_

An actinoid used in nuclear weapons \_\_\_\_\_

A group VIA element that occurs naturally as a diatomic molecule \_\_\_\_\_

A period 4 metal that takes on more than one possible charge in ionic compounds \_\_\_\_\_

11) [18 marks] Fill in the missing information in the table below.

Formula	Name
NaCl	
	calcium sulphide
$\text{Al}(\text{NO}_3)_3$	
	sodium chlorite
$\text{Fe}_2(\text{SO}_3)_3$	
	mercury(I) acetate
$(\text{NH}_4)_2\text{CO}_3 \cdot 3\text{H}_2\text{O}$	
	titanium(II) iodate heptahydrate
$\text{H}_2\text{S}(\text{g})$	
	hydrobromic acid
$\text{HNO}_2$	
	sulphurous acid
$\text{HIO}_4$	
	Phosphoric acid
$\text{Cr}(\text{OH})_3$	
	calcium hydroxide
$\text{NF}_3$	
	dichlorine pentoxide