

Chemistry 1105 R11 Fall 2023 Test 1

Friday, September 29, 2023

Time: 1 hour 50 minutes

Name: _____

Student #: _____

*This test consists of **seven** pages of questions, a page containing the names, symbols, and masses of the elements, and a periodic table. Please ensure that you have a complete test and, if you do not, obtain one from me **immediately**. There are **51** marks available. Good luck!*

1) **[6 marks]** The Capilano water reservoir has the following approximate dimensions:

Width: 300 m

Depth: 87 m

Water volume: 5.79×10^{10} L

a) What is the length of the reservoir? ($V = W \times D \times L$) $1 \text{ L} = 1 \text{ dm}^3$ exactly. Give your answer in km.

b) If you use 20 litres of water, how many nm will the water level in the reservoir fall?

- 2) **[4 marks]** A can is filled to the very top with maple syrup (density 1.37 g/cm^3). The can and maple syrup have a combined mass of 1000.0 grams. A rock of mass 87.6 grams is added, causing some of the maple syrup to spill out. The new mass of the can, the maple syrup left in the can, and the rock, is 1073.9 grams. What is the density of the rock? Give your answer in g/cm^3 , and **to the correct number of significant figures**.

- 3) **[2 marks]** An unknown sample (potentially of a compound) had its oxygen content measured. The following data were determined:

Sample mass (g)	mass of oxygen in sample (g)
2.00	0.400
2.10	0.400
2.20	0.400

Is the sample being analyzed a compound? How do you know? (No marks for guessing.

☺)

4) [3 marks] If you took 5 grams of S_8 and converted it to SF_4 , and 8 grams of S_8 and converted it to S_2F_2 , what would be the ratio $\frac{\text{mass F in } SF_4}{\text{mass F in } S_2F_2}$?

5) [2 marks] Classify the following as **Heterogeneous** mixtures, **Homogeneous** mixtures, **Elements**, or **Compounds**. Circle your choice.

A cheese sandwich He Ho E C

Table sugar He Ho E C

Oxygen He Ho E C

Coffee with milk He Ho E C

6) [2 marks] Pick an element from the periodic table that matches the description given. Only give the symbol of the element (no names necessary)

A group IA non-metal _____

A period 3 transition metal _____

A liquid element _____

A solid halogen _____

7) **[4 marks total]** Gallium (Ga) has a periodic table mass of 69.723 Da.

a) **[3 marks]** Complete the following table for gallium (Ga):

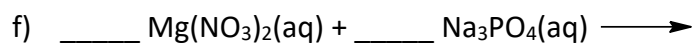
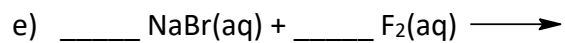
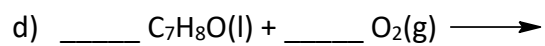
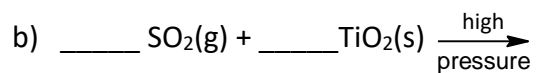
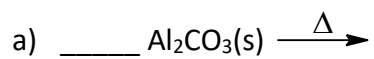
Nuclide Symbol	mass (Da)	percent abundance
	68.9256	60.108

b) **[1 mark]** Which isotope of gallium has the greatest number of protons?

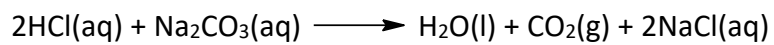
8) [12 marks] Complete the following table:

Compound Name	Compound Formula
potassium sulphide	
	FeCl_2
lead(II) phosphite	
	$\text{Al}(\text{ClO}_4)_3 \cdot 4\text{H}_2\text{O}$
gallium hydroxide	
	$\text{HI}(\text{g})$
sulphurous acid	
	HIO_4
sulphur tetrafluoride	
	S_2F_2

9) [12 marks] Each of the following reactions is known to occur. Complete and balance them, giving the phases of all products. You need only give the molecular equation in each case.



10) **[4 marks total]** For the following reaction:



a) **[2 marks]** Give the full ionic equation.

b) **[1 mark]** Identify any spectator ions.

c) **[1 mark]** Give the net ionic equation.