**CHE1031 Module 1 Quiz: Introduction & essential information KEY**

*This is a take-home quiz. You may use any and all resources to answer the questions. However, be aware that this will not be the case for exams and quizzes are a chance to prepare for exams.*

* *Please show all work for full & partial credit.*

**1.1: Chemistry in context**

**1.** Identify each of the following statements as being most similar to a hypothesis, a law, or a theory. Explain your reasoning.

(a) The pressure of a sample of gas is directly proportional to the temperature of the gas.

(b) Matter consists of tiny particles that can combine in specific ratios to form substances with specific properties.

(c) At a higher temperature, solids (such as salt or sugar) will dissolve better in water.

*(a) theory*

*(b) law of constant composition*

*(c) hypothesis*

**1.1: Chemistry in context**

**2.** Classify each of the following as an element, a compound, or a mixture:

(a) iron

(b) oxygen gas

(c) mercury oxide

(d) pancake syrup

(a) element

(b) compound / molecule

(c) compound / molecule

(d) mixture (homogenous)

**3.** A sulfur atom and a sulfur molecule are not identical. What is the difference?  
A sulfur molecule consists of a collection of sulfur atoms, often S8.

**4.** Antoine Lavoisier, the French scientist credited with first stating the law of conservation of matter, heated a mixture of tin and air in a sealed flask to produce tin oxide. Did the mass of the sealed flask and contents decrease, increase, or remain the same after the heating?

The mass of the sealed flask remained the same. However, the mass of the ‘tin’ increased because the reaction combined tin (Sn) & oxygen (O) to create tin II oxide (SnO).

**1.3 Physical and chemical properties**

**5.** Classify each of the following changes as physical or chemical:

(a) coal burning

(b) ice melting

(c) mixing chocolate syrup with milk

(d) explosion of a firecracker

(e) magnetizing of a screwdriver

(a) chemical

(b) physical

(c) physical – the milk and syrup mix but don’t react with one another

(d) chemical

(e) physical

**1.4: Measurements**

**6.** Give the name and symbol of the prefixes used with SI units to indicate multiplication by the following exact quantities.

(a) 103

(b) 10−2

(c) 10−3

(e) 0.000001

(a) kilo

(b) centi

(c) milli

(d) micro

**1.5: Measurement, uncertainty, accuracy, and precision**

**7.** Express each of the following numbers in scientific notation with correct significant figures:

(a) 704

(b) 0.03344

(c) 1000.00

(d) 0.0000000651

(a) 7.04 E2

(b) 3.344 E-2

(c) 1.00000 E3

(d) 6.51 E-8

**8.** Perform the following calculations and report each answer with the correct number of significant figures.

(a) 0.147 + 0.0066 + 0.012

(b) 38 × 95 × 1.792

(c) 15 – 0.15 – 0.6155

(d) (88.5 − 87.57) / 45.13

(a) 0.166

(b) 610

(c) 14

(d) 2 E-2

**1.6: Mathematical treatment of measurement results**

**9.** Many medical laboratory tests are run using 5.0 μL blood serum. What is this volume in milliliters?  
5.0 uL 1 L 1 E3 mL = 0.005 mL

1 E6 uL 1 L

**10.** As an instructor is preparing for an experiment, he requires 225 g phosphoric acid. The only container readily available is a 150-mL Erlenmeyer flask. Is it large enough to contain the acid, whose density is 1.83 g/mL?

225 g 1 mL = 192 mL Nope, the 150-mL flask is too small

1.83 g

**11.** In typical room air conditions, the average molecule of gas travels at a speed of 500.0 m/s.

Convert that speed to miles per hour.

500.0 m 1 km 1 mile 60 s 60 min = 1118 miles/hr

1 s 1 E3 m 1.6093 km 1 min 1 hr

**12.** One molecule of water occupies a volume of 2.99 E-23 mL. Under standard temperature & pressure water vapor has a density of 2.69 E22 molecules/L. If a room measures 8.2 x 12.0 x 11.5 feet:

(a) What is the volume of the room in cubic centimeters?

(b) What volume (cubic cm) is occupied by water molecules?

(a) 8.2 x 12.0 x 11.5 = 1100 ft3 123 in3 2.543 cm3 = 3.1 E7 cm3

13 ft3 13 in3

(b) 3.1 E7 mL 1 L 2.69 E22 molecules 2.99 E-23 mL = 2.5 E4 mL

1 E3 mL 1 L 1 molecule