**CHE1031 Module 1: Lecture examples**

**1.2: Phases & classification of matter**

**1.** How could you measure the mass of objects without a balance or scale?

**2.** In chemistry we tend to measure weights but record them as masses. *Is that valid?*

**3.** Mixtures occur in all physical states. Give an example of each.

**1.3: Physical & chemical properties**

**4.** What are some extensive & intensive properties of people?

**1.4: Measurements**

**5.** The maximum takeoff weigh of a jet is 298,000 kg. Express this number using scientific notation.

**6.** The average weight of a mosquito is 0.0000025 kg. Express this number using scientific notation.

**7.** What’s the best way to use a calculator for scientific notation?

**8.** Express these with unit prefixes instead of scientific notation:

(a) 8 E9 years

(b) 3,000,000 Hz

(c) 2 E-3 moles

(d) 1 E-6 L

**9.** Is density an intensive or extensive property? Why

**10.** What is the density of a cube of lead each side of the cube measures 2.00 cm and the cube’s mass is 90.7 g?

**11.** What is the volume of a cube with edge lengths of 0.843 cm?

**12.** If the mass of that cube is 5.34 g, what is the density of the cube?

**13.** Are enormous numbers exact? Grains of sand on a beach? Stars in the sky?

**14.** Imagine that I gave each student in class the same Stanley measuring tape and asked each to measure the dimensions of the room. Would all the measurements be the same?

**15.** There are 1609.344 m in 1 mile. How many meters in 1.35 miles?

**16.** Solve with the appropriate number of significant figures.

(64.2 + 7.9)

220.3

**17.** Using the data provided here, calculate the density of the rebar with the proper number of significant digits. Mass = 69.658 g; displaced final volume = 22.4 mL; initial volume = 13.5 mL.

**18.** How do these machines compare in terms of accuracy & precision?



**1.6 Mathematical treatment of measurement results**

**19.** The mass of a frisbee is 125 grams. Convert that mass to ounces.

**20.** Convert a volume of 9.345 quarts to liters.

**21.** A 4.00-quart sample of antifreeze weighs 9.26 pounds. What is the density of the antifreeze in units of g/mL?

**22.** When driven the 1250 km from Philadelphia to Atlanta, a Lamborghini Aventador Roadster uses 213 L of gas.

(a) What is the average mileage of the roadster (mpg)?

1. What is the cost of the trip when gas costs $2.50 per gallon?

**22.** The average speed of a nitrogen molecule in air at 25°C is 515 m/s. Convert this speed to miles/hour.

**23.** What is the mass (g) of a piece of gold that’s 2 inches on each side? The density of gold is 19.3 g/cm3.

**23.** The Earth’s oceans contain 1.36x109 km3 of water. Convert to liters!