TEST 1 (of 3)

Show all of your work. Student's should make use of the conversion factor method throughout and express their answers in scientific notation.

1. Name the smallest unit of an element that has the properties of that element.

2. Which state of matter involves particles that touch and flow over one another?

3. Categorize the following as either a physical (P) or chemical (C) property.

   (a) Copper can be easily shaped into sheets (malleable) and wires (ductile)

   (b) Copper can be melted and mixed with zinc to form brass

   (c) Copper forms a blue-green sulfate in humid air.

4. Round off each number to the indicated number of significant figures:

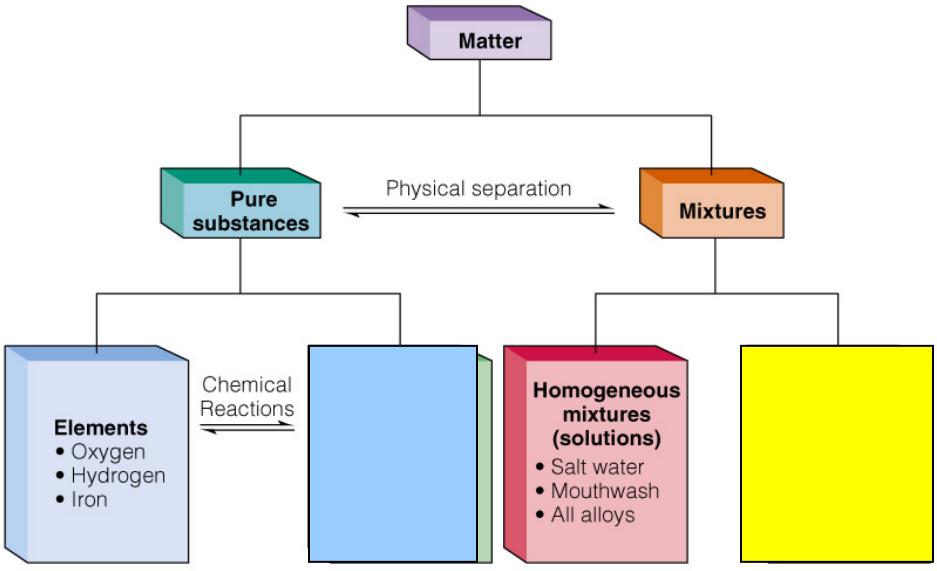
   (a) 0.895 (to 2 SF) (b) 0.00092321 (to 4 SF) (c) 176,000 (to 1 SF)

5. Convert the following into correct scientific notation:

   e.g. $14.3 \times 10^3 = 14{,}300 = 1.43 \times 10^4$

   (a) $200. \times 10^{-2}$ (b) 0.088×10^6 (c) 1.0 (d) 150,000.1

6. Complete the following diagram and give two examples from each missing category.



7. (a) Write down a conversion factor (CF) ratio for converting milliliters (mL) to cubic centimeters (cm^3).

(b) Write down a conversion factor (CF) ratio for converting milligrams to grams.

(c) The density of water at 21.2 °C is 0.997948 g/cm^3.
Calculate the volume of water in 2490 mg.

8. Carry out the following calculation, paying special attention to significant figures, rounding, and units.

$$\frac{1.102\ \text{kg} - 2046.1\ \text{mg}}{110.99\ \text{g /mol}}$$

[where mol is the SI unit for moles of substance]

9. Given °C = 5/9 (°F – 32) and K = °C + 273.15, convert 293 K to °F using:

(a) hard conversion (b) soft conversion

10. Specific heat is defined as:

$$Q = mc\,\Delta t$$

Where Q = heat gained or lost (Joules), m = mass (g), c = specific heat (J/g°C), Δt = temperature change (°C).

How much energy in joules is released as 0.1001 kg of aluminum (specific heat = 0.900 J/g °C) cools from 100.0 °C to 30.0 °C.

BONUS

Suppose your car gets 32 miles per gallon (mpg), what would this be in kilometers per liter?
(1 gallon = 4.5 Liters, 1 mile = 1.6 km).

(a) Write down a conversion factor for converting gallons to liters.

(b) Write down a conversion factor for converting miles to kilometers.

(c) Calculate the fuel economy in km / L.