

1. Dimensional Analysis problems:

$$1 \text{ lb} = 453.59 \text{ g} \quad 1 \text{ qt} = 0.9464 \text{ L} \quad 1 \text{ in} = 2.540 \text{ cm} \quad 1 \text{ ft} = 12 \text{ in} \\ 1 \text{ mi} = 5280 \text{ ft}$$

a. An object has a mass of 1.068 lb and a volume of 6.59 qt. What is the *density of the object in  $\text{kg m}^{-3}$* ?

b. If a room measures 12.5 ft by 10.7 ft by 9.2 ft and a gallon of paint covers  $3.00 \times 10^2 \text{ ft}^2$  and a gallon of paint costs \$35.46, what is the *cost* of painting the room?

c. The Voyager 1 spacecraft was launched on 5 September 1977. It is currently the farthest man-made object from Earth at a distance of about 98 Astronomical Units (AU,  $1 \text{ AU} = 9.3 \times 10^7 \text{ mi}$ ). What is the approximate *speed of Voyager 1 in  $\text{km/yr}$*  (at least 2 significant figures)?

2. Chlorine has two naturally occurring isotopes. Chlorine-35 has a mass of 34.96885 amu and Chlorine-37 has a mass of 36.96950 amu. If the relative average atomic mass of chlorine is 35.453 amu, what are the *fractional abundances* of the two isotopes?
3. An alloy of iron (54.7%), nickel (45.0%), and manganese (0.3%) has a density of 8.17 g/cm<sup>3</sup>. *How many iron atoms* are in a block of alloy measuring 10.0 cm × 20.0 cm × 15.0 cm?

4. Complete the following table.

Name of Compound	Formula of Compound
Iron(II) Phosphate	
	$S_2Cl_2$
	$Cr_2(SO_3)_3$
Nitrous acid	
Diphosphorus Pentoxide	
	$Li_3P$

5. A double replacement reaction occurs in solution between manganese(III) acetate and potassium oxalate. A solid is formed. 36.32 mL of 0.2972 M manganese(III) acetate solution is mixed with 53.99 mL of 0.1599 M potassium oxalate solution.

a. Write the *chemical*, *total ionic* and *net ionic equations* for this reaction.

b. How many *grams of the solid* can form?

c. If the percent yield is 86.33%, how many *grams of the solid* actually did form?

6. Balance the following oxidation-reduction reactions.

