THE UNIVERSITY OF ZAMBIA
SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF CHEMISTRY
ACADEMIC YEAR 2022
TERM 1
CHE 1000: INTRODUCTORY CHEMISTRY

TUTORIAL SHEET 1 **21st March 2023**

Answer all the problems in a HARD COVER book and submit in ROOM 124 before 10:00 hrs on Friday, 24th March 2023

1. How many significant figures are in each of the values

   (a) 6.07×10^{-15} (b) 0.003840 (c) 17.00 (d) $8. \times 10^{8}$

   (e) 463.8052 (f) 300 (g) 301 (h) 300.

2. Evaluate each of the following and write the answer to the appropriate number of significant figures
   (a) 212.2 +26.7 + 402.09

   (b) 1.0028 + 0.221 +0.10337

3. Use the exponential notation to express the physical quantities

   (a) V = 15.50 mL to L (b) m = 5.00 μg to g (c) m=2000 g

   (d) λ= 256.4 nm to m

4. Perform the following conversion
   (a) 2.41×10^{2} cm to meters

   (b) Using prefix 1.0 cm^3 to m^3

5. (a) The radius of a gold atom is 144 picometer (pm). What is this radius in nanometers (nm)?

(b) A small hole in a space shuttle requires a 23.6 cm^2 patch.

i) what is the patch's area in square kilometers?

ii) If the patching material costs 23.05 ngwee/ mm^2, what is the cost of the patch in Zambian kwacha?

(c) The speed of light in a vacuum is 2.98 $x10^8$ m/s. What is its speed in km/h and in km/min ?

6. (a) An Erlenmeyer flask weighs 121.3 g when empty and 283.2 g when filled with water (density is 1.000 g/cm^3).

i) What is its volume?

ii) How much does the flask weigh when filled with carbon tetra chloride (density is 1.590g/cm^3)

(b) i) A student found that a brass cylinder weighs 75.04 g in air and 66.11 g in water (density is 0.998 g/cm^3). What is the density of brass?

ii) Geologists in the field use mineral oil (density is 1.750g/cm^3) to determine the density of mineral samples. A sample of galena (an ore of lead) weighs 24.61 g in air and 18.83 g in mineral oil. What is the density of galena?

7. (a) Perform each of the following conversions

i) 68^oF to ^oC

ii) –164^oC to K and ^oF

iii) 0 K to ^oC and ^oF

(b) A child has a body temperature of 38.7^oC.

i) If the normal body temperature is 98.6^oF, is the child running a fever?

ii) What is the normal body temperature in K?
Solution

8. At Arthur Davies stadium in Kitwe, the Post Newspaper reported that there were 50000 people who watched Power Dynamos Football Club Vs Nkana Football Club. If you assume that this number contains 3 significant figures, how many people could actually have been at this game?

9. Round off the following numbers to the indicated significant figures
   a) 17.4555 to 2 significant figures

   b) 4.765000 to 3 significant figures

   c) 144000 to 1 significant figure

   d) 4.865121 to 3 significant figures

   e)

   f) 2.0423 to 1 significant figure

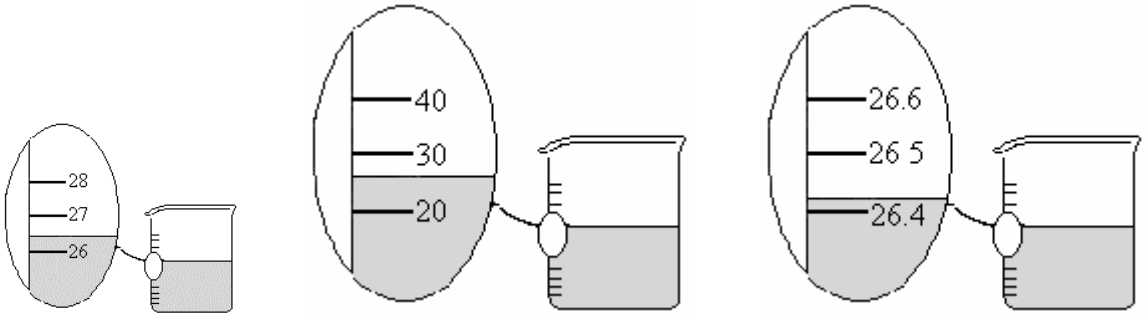
10. As part of the calibration of a new laboratory balance, a 1.000-g mass is weighed with the following results:

Trial	Mass
1	1.201 ± 0.001
2	1.202 ± 0.001
3	1.200 ± 0.001

    The balance is ….

11. A scientist obtains the number 0.045006700 on a calculator. If this number actually has four (4) significant figures, how should it be written?

12. The beakers shown below have different precisions as shown.



    Suppose you pour the water from these three beakers into one container. What would be the volume in the container reported to the correct number of significant figures?

13. You are asked to determine the perimeter of the cover of your textbook. You measure the length as 33.16 cm and the width as 24.83 cm. How many significant figures should you report for the perimeter?

14. A piece of antimony with a mass of 17.41 g is submerged in 46.3 cm^3 of water in a graduated cylinder. The water level increases to 48.9 cm^3. The correct value for the density of antimony from these data is?