

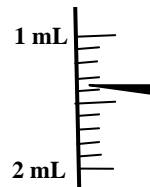
Chem 151 Drilling Question Set #7

Significant Figures

1. All values obtained in lab must be reported in correct number of significant figures, which is the number of digits known exactly plus one guessing digit at the end. Results of computations also should be rounded to correct number of significant figures.

Examples:

- The analytical balances in our lab weigh to ± 0.0001 g. The mass of all objects weighed on these balances should be recorded in 4 decimal places.
- The volume of solution delivered by a Brinkman dispenser set in the figure below should be recorded as 1.36 mL, where the last digit is a guessing digit.
- The uncertainty of a 10-mL volumetric flask is ± 0.02 mL. The volume of solution held in the flask should be recorded as 10.00 mL.



2. Counting Number of Significant Figures

- a. 0.012003
- b. 123.0
- c. 12300
- d. 12300. grams
- e. 123 atoms

Box 1

1. Start counting with the first non-zero digit.
2. Zeros between numbers are significant.
3. Zeros to the right of a number with a decimal are significant.
4. Zeros to the right of a number that has no decimal are not significant.
5. An integer has infinite number of significant figures.

3. Rounding

Round the following to 3 significant figures:

- f. 1.23499
- g. 1.2350
- h. 1.205
- i. 1.24501
- j. 0.20661
- k. 0.09504

Box 2

1. If the first discarded digit is < 5 , the remaining digits are left as it is.
2. If the first discarded digit is > 5 , the remaining digits are rounded up.
3. If the first discarded digit is $= 5$ followed by nonzero digits, the remaining digits are rounded up.
4. If the first discarded digit is $= 5$ followed by zeros, round it up if the number before the 5 is an odd number; round it down if the number before is an even number or a zero.

4. **Addition and Subtraction**

l. $1.2345 + 123.45$

m. $1.2345 + 0.0045$

Box 3

*In addition/subtract, the number of decimal places (**NOT** number of significant figures) in the answer should be same as the one with the fewest number of decimal places.*

5. **Multiplication and Division**

n. 1.2345×1.23

o. 1.2345×0.0012

p. The mass of one electron is 0.0005486 amu. What is the mass of 5 electrons?

q. How many moles of potassium iodide in 5 mL of 0.222 M KI solution?

Box 4

In multiplication/division, the answer should have the same number of significant figures as the one that has the fewest number of SF.

6. **In multi-step computations, you should keep track of the number of SF (and number of decimal places) in every step. You should keep at least one extra SF in the calculation process and round the answer to the correct number of SF.**

r. $(21.4 - 20.634 + 11.22) \times 8.375 =$

s. $(21.4 - 20.634) \times 8.375 =$

t. $\frac{0.123 \times 11.27}{2.0 - 1.4} + 3.024 =$

u. $\frac{0.123 \times 11.27}{22.0 - 1.4} + 3.024 =$

7. Common Logarithm

- a. $\log(1.63 \times 10^3) =$
- b. $\log(1.63 \times 10^4) =$
- c. $\log(1.63 \times 10^{23}) =$
- d. $\text{Antilog}(1.63) =$
- e. $\text{Antilog}(4.63) =$
- f. $\text{Antilog}(23.63) =$

Box 5

1. *The number of digits after the decimal in a common logarithm has the same number of SF as the original number.*
2. *The number of SF in an antilogarithm number is same as the number of digits after the decimal in the original number.*

More Exercise

Calculate the following and report your answers in correct number of significant figures.

8. Jill weighs an empty weigh-boat and records its mass as 0.5422 g. She added some AlCl_3 crystals on the weigh-boat and record the combined mass is 0.5622 g. What is the mass of AlCl_3 in the weigh-boat?

9. If Jill dissolves the AlCl_3 in Question 1 in water in a 10-mL volumetric flask, what is the molarity of Al^{3+} ions in solution? What is the molarity of Cl^- ions in solution?

10. 10 mL of 0.2 M AgNO_3 solution is added to the solution in Question 2. How many grams of silver chloride precipitate can be obtained?