

Measurements & Math Review – Discussion #1 – CHEM 210 LAB

POWERS OF 10

Negative powers: $10^{-x} = \frac{1}{10^x}$

Multiplication with the same base (of 10): $10^x \cdot 10^y = 10^{x+y}$

Division with the same base (of 10): $\frac{10^x}{10^y} = 10^{x-y}$

Nested Exponentials: $(10^x)^y = 10^{x \cdot y}$

Addition and subtraction with numbers including base 10 exponentials (as in scientific notation) requires that the exponent on the power of 10 be identical: $[a \times 10^z] + [b \times 10^z] = [(a+b) \times 10^z]$

- 1) $10^2 \cdot 10^5 =$ 2) $\frac{10^3}{10^7} =$ 3) $(5.7 \times 10^{-25}) - (1.3 \times 10^{-25}) =$
- 4) $(10^3)^6 =$ 5) $\frac{10^6}{10^{-12} \cdot (10^{-2})^{-2}} =$ 6) $(3.0 \times 10^5) + (2 \times 10^4) =$

SCIENTIFIC NOTATION

A numbers written in scientific notation should always reflect all of the significant figures in a number.

Express the following numbers in scientific notation with the proper number of significant digits:

7) 0.000 002 158

8) 6,024,000

9) 500.0

10) 0.00120

Express the following numbers in long form with the proper number of significant digits:

11) 3.56×10^{-3}

12) 6.85×10^5

13) 9.500×10^2

14) 3.80×10^{-2}

MOLES, METRIC UNITS, DIMENSIONAL ANALYSIS

15) Calculate the number of moles equal to 1.23×10^{24} molecules of PCl_5 .

16) Calculate the mass equal to 2.50 mol of Uranium atoms.

17) Calculate the number of formula units equivalent to 5.93 g of SiO_2 .

18) Calculate the number of **pg** equal to 4.5×10^{-6} **cg**.

DENSITY

19) Calculate the density of a mineral sample if it causes the level of water in a graduated cylinder to increase from 22.3 mL to 35.6 mL and has a mass of 60.891 g.

20) Ethylene glycol, used in antifreeze, has a density of 1.11 g/mL. What is the mass in kg of 1.00 gallons of the compound?