

CHEM 103

R&R 1

30 May 2024

Adapted from a 24 May 2016 document

Please simplify/solve/express in scientific notation to 3 sig figs. If you can, try to manipulate each one in multiple ways. For instance:

$$\left(16 \cdot \frac{1}{4}\right)^{1/2} = 16^{1/2} \cdot \left(\frac{1}{4}\right)^{1/2} = 4 \cdot \frac{1}{2} = 2 \quad \text{OR} \quad \left(16 \cdot \frac{1}{4}\right)^{1/2} = (4)^{1/2} = 2$$

There is often an “easiest” way to simplify a given expression, but it takes practice to develop comfort with different operations.

1)  $\sqrt[5]{1.2 \times 10^{19}} =$

2)  $\log x = 8.73$

3)  $\left(12 \cdot \frac{1}{6}\right)^7 =$

4)  $4^5 \cdot 6^5 =$

5)  $\frac{1}{2} \cdot \ln(50) \cdot \ln(400) =$

6)  $\log_x 8 = 3$

7) If Jane and Dan are  $1.97 \times 10^{-2}$  miles apart, how many micrometers apart are they?

Note: 1 mile = 5280 ft; 1 ft = 12 in; 1 in = 0.0254 m; 1 m =  $1 \times 10^6$   $\mu\text{m}$

8)

$$\frac{6.626 \times 10^{-34} \cdot 3.00 \times 10^8}{484 \times 10^{-9}} =$$

9)  $(8^6 \cdot 27)^{1/3} =$

10) Pure water has its highest density of  $1000. \text{ kg}\cdot\text{m}^{-3}$  at temperature  $4^\circ\text{C}$ .

You heat water to  $90^\circ\text{C}$  and find that a  $15.0 \text{ mL}$  sample has mass  $14.5 \text{ g}$ .

By what percent of its original, highest density has your sample's density decreased?

Note:  $1 \text{ mL} = 1 \text{ cm}^3$

$1 \text{ m}^3 = 1 \times 10^6 \text{ cm}^3$  (does this make sense?)

$1 \text{ kg} = 1000 \text{ g}$

11) What is the difference between accuracy and precision? Is it possible for measurements to be precise but not accurate? Accurate but not precise?

12) Given the chemical symbol, provide the name of the following elements:

a. Na

b. F

c. Cu

d. Ag

e. Fe

f. Pb

13) Please connect and fill in the boxes with the terms below, providing brief explanations.

Compounds

Homogeneous mixture

Heterogeneous mixture

Pure substances

Mixtures

Elements

Matter