



Super Chemist

Unit 1- Intro to Chem and Math Sweet Sheet

Purpose of the Sweet Sheet- You are to complete the Sweet Sheet. When you correct the "Sweet Sheet" if you say, "Sweet!", you are in good shape for the test. If however, you say, "Oh, (silly) Sheet!", you need to come in for tutoring. 😊

Sweet Sheet Unit 1

Part One: Scientific Notation and Significant Figures

1. Write the number in scientific notation.

a. 730,000

$$7.3 \times 10^5$$

b. 6,100

$$6.1 \times 10^3$$

c. 8,915,000,000

$$8.915 \times 10^9$$

d. 0.00000748

$$7.48 \times 10^{-6}$$

e. 0.00093

$$9.3 \times 10^{-4}$$

f. 0.00000000000540

$$5.40 \times 10^{-11}$$

2. Write the number in standard form.

a. 8.04×10^{-5}

$$.0000804$$

b. 1.39×10^{-2}

$$.0139$$

c. 7.45×10^3

$$7,450$$

3. State the number of Significant Digits in the following.

a. 0.0000345204

6

b. 30.04520000

10

c. 45,930,400,000

6

4. Write the product in scientific notation and proper significant digits.

a. $(7.35 \times 10^{-4})(3.45 \times 10^5)$

$$2.54 \times 10^2$$

b. $(3.678 \times 10^{-9}) / (2.5 \times 10^{-12})$

$$1.5 \times 10^3$$

c. $(4.587 \times 10^{-10}) + (8.82 \times 10^{-8})$

8.86×10^{-8}

d. $2,500 - 456.3$

2000

Part 2: Percent Error, Accuracy and Precision

1. Answer the questions showing work.

a. Sally finds the mass of an object to be 76.3g. If the actual mass of the object is 82.4g, what is her percent error?

$$\frac{|82.4 - 76.3|}{82.4} \times 100 = 7.40\%$$

b. During a lab you measure the density of a substance to be 1.45g/mL. The actual value according to Super Chemist Smith is 1.53g/mL. What is your percent error?

$$\frac{|1.53 - 1.45|}{1.53} \times 100 = 5.23\%$$

c. Hughston and Hannah determine the weight of an object three different times. The values they determined were 2.87g, 2.86g, and 2.85g. The accepted value is known to be 2.98g.

-Are the values Hughston and Hannah determined precise? Explain.

yes, they are close to each other

-Are the values accurate? Explain.

not really, but not terrible

-Calculate the percent error for the first measurement.

$$\frac{|2.98 - 2.87|}{2.98} \times 100 = 3.69\%$$

d. Bob and Francine found the density of a substance. Their results were: 9.67 g/mL, 9.87 g/mL and 9.53 g/mL. If the actual density of the substance was 9.63 g/mL, what can you say about their accuracy and precision?

low for both

e. In the same experiment, Shaneequa and Pete measure the substance's density to be 8.94 g/mL, 8.98 g/mL and 8.92 g/mL. What can you say about Shaneequa and Pete's accuracy and precision?

precision - high
accuracy - low

Part 3: Conversions, Metric System, and Dimensional Analysis

You must memorize the following and be able to convert between them. You must use Dimensional Analysis and SHOW YOUR WORK!!! I expect you to know the following:

3 feet = 1 yard, 12 inches = 1 foot.

1. Filling the following numbers, given the first.

Mega	Kilo	Hecto	Deca	Base (m,g,L)	Deci	Centi	Milli	Micro	Nano	Pico
3×10^{-6}	.003	.03	.3	3	30	300	3,000	3×10^6	3×10^9	3×10^{12}
5×10^{-8}	5×10^{-5}	5×10^{-4}	.005	.05	.5	5	50	5×10^8	5×10^{11}	5×10^{14}
1×10^{-1}	100	1000	1×10^4	1×10^5	1×10^6	1×10^7	1×10^8	1×10^{11}	1×10^{14}	1×10^{17}

a. The diameter of an atom is about 10.0nm. How many inches is this? Hint: 1 in = 2.54cm

$$\frac{10.0 \text{ nm}}{1 \text{ nm}} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} = 3.94 \times 10^{-7} \text{ inches}$$

or

$$4 \times 10^{-7} \text{ inches}$$

b. An experiment calls for 0.436 kg of sodium hydroxide. Express this mass in milligrams.

$$\frac{0.436 \text{ kg}}{1 \text{ kg}} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 4.36 \times 10^5 \text{ mg}$$

c. A typical laboratory beaker has a volume of 800 mL. What is its volume in megaliters and picoliters?

$$\frac{800 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ L}}{1 \text{ L}} \times \frac{1 \times 10^{-6} \text{ ML}}{1 \text{ L}} = 8.0 \times 10^{-7} \text{ ML}$$

$$\frac{800 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ L}}{1 \text{ L}} \times \frac{1 \times 10^{12} \text{ pL}}{1 \text{ L}} = 8.0 \times 10^{11} \text{ pL}$$

d. A condor has a wing span of 3.05 meters. What is the wingspan in feet? Hint: 2.54 cm = 1 inch.

$$\frac{3.05 \text{ m}}{1 \text{ m}} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ in}} = 10.0 \text{ ft.}$$

e. If Bob weights 95kg, how much does he weigh in pounds? Hint: 1kg = 2.205 pounds.

$$\frac{95 \text{ kg}}{1 \text{ kg}} \times 2.205 \text{ lbs} = 209 \sim 210 \text{ lbs.}$$

f. Pricilla is driving in Canada. The speed limit is 125 km/hr. She looks down at her speedometer and sees she is going 80 miles per hour. Is she speeding? Prove it!

$$\frac{125 \text{ km}}{\text{hr}} \times \frac{0.622 \text{ miles}}{1 \text{ km}} = 77.8 \text{ mi/hr. Yes!}$$

g. A bottle of apple juice can serve 8 people 8 ounces of juice. Lettie invites 29 people to a party. If each person is apt to drink two glasses of juice and each bottle costs \$3.76, how much will the apple juice cost? → (8 oz. each)

$$1 \text{ bottle} = 8 \cdot 8 = 64 \text{ oz.}$$

$$\frac{29 \text{ people}}{1 \text{ person}} \times \frac{16 \text{ oz.}}{64 \text{ oz.}} \times \frac{1 \text{ bottle}}{1 \text{ bottle}} = 7.25 \text{ must buy 8 bottles}$$

$$\frac{8 \text{ bottles}}{1 \text{ bottle}} \times \$3.76 = \underline{\underline{\$30.08}}$$

Part 4: Density Problems

1. Find the density of a substance with a mass of 5.45 g in 29 mL of solution.

$$\frac{5.45 \text{ g}}{29 \text{ mL}} = 0.19 \text{ g/mL}$$

2. If the density of Katrinium is 9.37 g/mL, how many milliliters does Mrs. Smith need to get 18.7 g of Katrinium?

$$\frac{18.7 \text{ g}}{9.37 \text{ g/mL}} = 2.00 \text{ mL}$$

3. The density of lead is 11.34 g/cm³. If a Super Chemist has 48 mL of lead, how many grams does he have?

$$\frac{48 \text{ mL}}{1 \text{ mL}} \times \frac{11.34 \text{ g}}{1 \text{ cm}^3} = 540 \text{ g of lead}$$

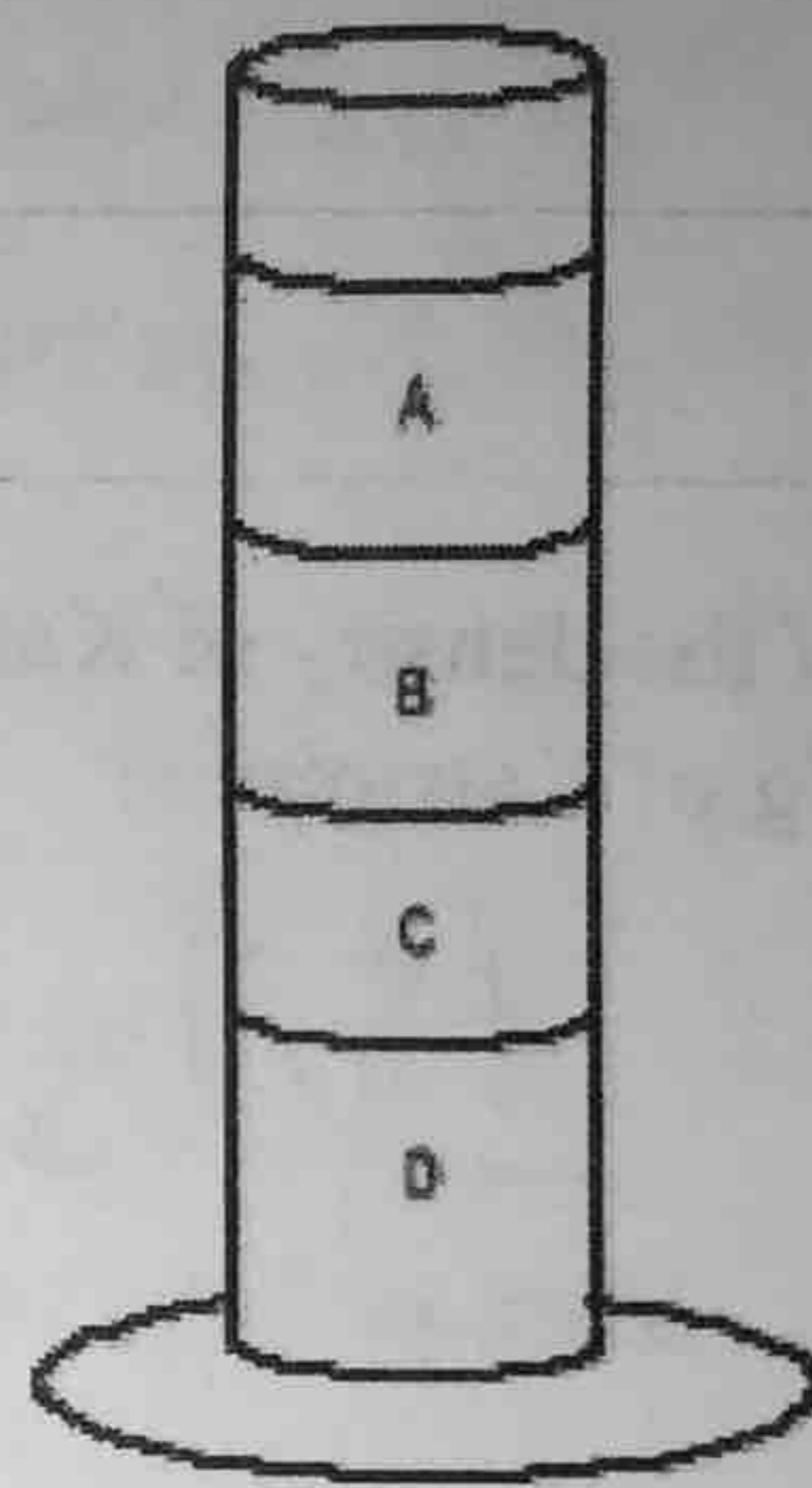
or 544 g of lead

4. If a substance has a mass of 2.457 g and takes up 9.245 mL of volume, what is the density of the substance?

$$\frac{2.457 \text{ g}}{9.245 \text{ mL}} = 0.2658 \text{ g/mL}$$

5. Given the following densities. Determine which substance corresponds with which letter in the density column.

Material	Density
Water with food coloring	1.00 ✓
Vegetable oil	0.91 ✓
Honey	1.36 ✓
Rubbing alcohol	0.87 ✓
Glycerin	1.26 ✓



Answers:

Top Level Rubbing Alcohol

A Vegetable Oil

B Water

C Glycerin

D Honey