

Dimensional Analysis

- 1.) Burritos are amazing. The standard burrito is 6 inches long and delicious. The moon is, at any given time, 238,900 miles from the earth. How many burritos away is the moon from the earth?

12 inches = 1 foot 5,280 feet = 1 mile 1 supreme = beans, guac and queso

Write in scientific notation.

- 2.) Craters be thirsty. A Big Gulp soft drink at 7-11 is ^{2ish} 30 ounces. The Grand Canyon is big. Seriously. It has a volume of 5,450,000,000,000 cubic yards.

1 ounce = ~~1.805~~ 0.00104 cubic feet 1 cubic yard = 27 cubic feet

30 ounces = 1 Big Gulp

Write in scientific notation.

5,450,000,000,000

$5.45 \times 10^{12} \text{ yd}^3$

$$5.45 \times 10^{12} \text{ yd}^3 \times \frac{27 \text{ ft}^3}{1 \text{ yd}^3} \times \frac{1 \text{ ounce}}{0.00104 \text{ ft}^3} \times \frac{1 \text{ Big Gulp}}{30 \text{ ounces}}$$

4,716,346,154.

4,716,346,150,000,000

$4.7 \times 10^{15} \text{ Big Gulps}$

3.) Mo' money, mo (weight) problem. Money is awesome. And money in bin form... as in Scrooge McDuck's money bin... is beyond awesome. (Note: watching an episode of DuckTales is a homework assignment if you have never watched it)

[A penny weighs 2.5 grams.] Jeff Bezos, owner and founder of Amazon, has a net worth of \$145,400,000,000. What would be the weight, in pounds, of Jeff Bezos's fortune if he liquidated all of his assets and exchanged it for pennies?

1 pound = 454 grams

Write in scientific notation.

$$\cancel{\$145,400,000,000} * \frac{\cancel{100 \text{ pennies}}}{\cancel{\$1}} * \frac{\cancel{2.5 \text{ grams}}}{\cancel{1 \text{ penny}}} * \frac{1 \text{ pound}}{454 \text{ gram}}$$

$$\approx 80,000,000,000$$

$$8.0 * 10^{10} \text{ pounds}$$

4.) Tim Janus is a great man. He holds the world record for longest belch at 18.1 seconds. Think about that for a second. Imagine it...

Anyway... How many world record Tim Janus belches are there in one year?

1 min = 60 sec

60 min = 1 hr

24 hr = 1 day

365 days = 1 yr

Write in scientific notation.

- 5.) Flatulence can be awkward. Especially public flatulence. And disruptive. But also funny. The world record for longest SUSTAINED (cannot stress this enough) fart is 2 minutes 48 seconds.

The Alamo Draft House is holding a Harry Potter marathon. All of the Harry Potter movies combined are 19 hours and 39 minutes long. How many consecutive world record, and incredibly disruptive farts, could be contained within one Harry Potter marathon?

- 6.) Always room for jello. A small box of jello makes 473 cubic centimeters of jello. The Great Pyramid at Giza has a volume of 91,230,000 cubic feet. How many boxes would it take to fill the entire pyramid with jello?

1 cubic inch = 16.387 cubic centimeters 1728 cubic inches = 1 cubic foot

Write in scientific notation

7.) Nate is going to be a rich man. Incredible advancements in fudge-related technologies have ~~lead~~ to the creation of fudge bladder protection system. If this technology had been available one hundred years ago, the titanic would never have sank.

One Phat Fudge container holds 1.12 ounces of fudge. The total volume of the Titanic was 14,293,562.5 cubic feet. How many packages of fudge would be necessary to fill up the Titanic?

General Chemistry Chapter 1 Pre-Test

Essays

- 1.) (45 pts total, 5 pts each) Briefly answer each of the following essay questions.
- What is a hypothesis? What is an important determinant of a good hypothesis? Describe the transition from hypothesis to theory.
 - What is the difference between a substance and a mixture? Give an example of each.
 - What is the difference between a homogeneous mixture and a heterogeneous mixture? Give an example of both.
 - What are the three states of matter? Describe the three states of matter with respect to the proximity and movement of particles.

2.) (9 pts total, 1 pts each) Complete the following table

Base Quantity	Name of Unit	Symbol
length	meter	m
mass	kilogram	kg
time	second	s
temperature	Kelvin	K
amount	mole	mol

3.) (12 pts total, 4 pts each) Solve each of the following density problems.

- a) If the density of a compound is 8.62 g/mL and the volume is 12.2 mL , find its mass? (Be mindful of significant digits)

$$V(D) = \left(\frac{M}{V}\right)V$$

$$M = VD = (12.2 \text{ mL})(8.62 \text{ g/mL}) = 105 \text{ g}$$

- b) If the volume of a compound is 84.3 mL and the mass is 36.8 g , what is the density of the compound? (Be mindful of significant digits)

- c) If the mass of a compound is 48.7 g and its density is 13.6 g/mL , what is the volume of the sample? (Be mindful of significant digits)

Absolute zero \rightarrow no movement Kelvin \rightarrow Absolute Temp

4.) (16 pts total, 4 pts each) Convert the following temperatures:

Absolute zero =

$$-273.15^{\circ}\text{C}$$

a) 350 K into $^{\circ}\text{C}$ (Be mindful of significant digits)

$$^{\circ}\text{C} = \text{K} - 273$$

$$350 - 273 = \boxed{77^{\circ}\text{C}}$$

$$^{\circ}\text{C} + 273 = \text{K}$$

$$-273 \quad -273$$

b) 104°F into $^{\circ}\text{C}$ (Be mindful of significant digits)

$$^{\circ}\text{C} = \text{K} - 273$$

$$\frac{5^{\circ}\text{C}}{9^{\circ}\text{F}} \quad \frac{9^{\circ}\text{F}}{5^{\circ}\text{C}}$$

$$(104 - 32) * \frac{5}{9}$$

$$72 * \frac{5}{9} = \boxed{40^{\circ}\text{C}}$$

$$104^{\circ}\text{F} \rightarrow ^{\circ}\text{C}$$

c) 85.0°C into $^{\circ}\text{F}$ (Be mindful of significant digits)

$$85^{\circ}\text{C} \rightarrow ^{\circ}\text{F}$$

$$\frac{9}{5} (85) + 32$$

$$153 + 32 = \boxed{185^{\circ}\text{F}}$$

d) 53°C into K (Be mindful of significant digits)

$$53^{\circ}\text{C} \rightarrow \text{K}$$

$$53 + 273 = \boxed{326 \text{ K}}$$

5.) (18 pts total, 6 pts each) Use your knowledge of dimensional analysis and life to answer the following related questions. **Write your answers in scientific notation.**

a) The longest home run hit in major league baseball this season was 486 feet. Approximately how many centimeters did the ball travel?

$$12 \text{ in} = 1 \text{ ft}$$

$$\boxed{1 \text{ in} = 2.54 \text{ cm}}$$

$$486 \text{ ft} * \frac{12 \text{ in}}{1 \text{ ft}} * \frac{2.54 \text{ cm}}{1 \text{ in}} =$$

$$\boxed{1.48 * 10^4 \text{ cm}}$$

- b) According to its website, Netflix contains approximately 125,000,000 hours of programming at any given time. How many years would it take an individual to watch the current Netflix library of content?

$$125,000,000 \text{ hrs} * \frac{1 \text{ day}}{24 \text{ hr}} * \frac{1 \text{ year}}{365.25 \text{ days}}$$

$$14,259 \text{ years}$$

- c) Nate has a problem. Recently, Nate (and the rest of the country) discovered the Popeye's chicken sandwich. According to nutritional data offered on the website, a chicken sandwich and fries combo meal contains 1004 calories. While Nate wants to fend off excess weight gain until the holiday season, he cannot help but eat five of these combo meals a day. If he burns 363 calories for every 30 minutes of running, how long will he need to run every day to keep his slim physique?