

## Converting from English Units to International Units

### Background

The quantity of three dimensional space occupied by a liquid, solid, or gas is the scientific definition of volume. It can be measured in cubic centimeters or (cc's) usually the unit used in medicine. The equivalent of one (cc) is also one milliliter (ml) which is one thousand of a liter (L). Liter (L) is usually the universal unit for measuring any kind of liquid in a scientific setting. At timeline 12:30 of the Virtual Science University Lecture One on Safety and Volume Measurement, Dr Carrasco is talking about using 30 cc's of volume measurement in a syringe which in turn equals also 30 milliliters in a graduated cylinder which in turn equals one ounce. Actually one ounce equals 29.573 cc's which rounded off is 30 cc's. Using this norm, we will convert from English Units an ounce to International Units milliliters (ml). If you want to be precise, you can use 29.573 cc's to equal one ounce. For example in a small plastic bottle of Niagara water there are 500 (ml) of water and the label says 16.9 fluid ounces. When you actually divide 500 (ml) by 29.573, you actually get 16.9073 ounces which is rounded off to 16.9 fluid ounces.

***Note to Teacher:** While students are engaged in their lab setting, have them listen to the music track and then the actual song of PHAT CAC. Brain research indicates that when we listen to something different while we are learning something new, neurons will be connected which will help us remember the information more efficiently.*

## Strategy

You will convert fluid ounces from substances you consume on a daily basis to milliliters (ml) or (cc). You will pair up in groups of two students.

***Teacher's Note:*** *In this exercise, pair up a left brain child with a right brain. This challenges the class to work in a real world scenario. This activity should take approximately 50 minutes. With some students, this activity may take longer.*

## Materials

Syringe (one that can hold a small amount of fluid, preferably one or five ounce syringe)  
Tea Spoon  
Table Spoon  
One Cup  
One Pint  
One Quart  
One Half-Gallon  
One Gallon  
Graduated Cylinder (1L)  
Graduated Cylinder (500 ml)  
Medium Graduated Cylinder (100 ml)  
Small Graduated Cylinder (10 ml)  
Small Beaker (25ml)  
Small Carbonated Soda Can (8 Fl. OZ)  
Small Bottle of Over the Counter Flu Medicine  
Small Bottle of Over the Counter Cough Medicine  
Small Bottle of Over the Counter Antidiarrheal Medicine  
Small Bottle of Over the Counter Antacid

***Note to Teacher:*** *For the above Over the Counter Medicines use Vicks Nyquil, Robitussin, Pepto-Bismol, and Phillips Milk of Magnesium.*

## Procedure

1.) For each of the four medications, figure out how many cc's or ml's must be measured out for proper dosage. Follow the exact directions given in the bottle. You will only measure the amounts. You will **NOT** ingest or take the medicine. You will discard by the method given by the classroom teacher.

- a.) Over the Counter Flu Medicine \_\_\_\_\_ml
- b.) Over the Counter Cough Medicine Syrup \_\_\_\_\_ml
- c.) Over the Counter Anti-Diarrhea \_\_\_\_\_ml
- d.) Over the Counter Antacid \_\_\_\_\_ml

2.) Using a medium or large graduated cylinder (100ml) or (500 ml), figure out the number of ml's in:

a.) one cup \_\_\_\_\_ ml

b.) one pint \_\_\_\_\_ ml

c.) one quart \_\_\_\_\_ ml

d.) one half gallon \_\_\_\_\_ ml

e.) one gallon \_\_\_\_\_ ml

3.) What is the total number of milliliters in a bottle of Over the Counter Flu Medicine

\_\_\_\_\_ ml

4.) What is the total number of milliliters in a bottle of Over the Counter Cough Medicine?

\_\_\_\_\_ ml

5.) What is the total number of milliliters in a bottle of Over the Counter Antidiarrheal Medicine?

\_\_\_\_\_ ml

6.) What is the total number of milliliters in a bottle of Over the Counter Antacid?

\_\_\_\_\_ ml

7.) How many milliliters in a cup of Pepsi? \_\_\_\_\_ ml

8.) How many cups in an 8 Fl. OZ can of Pepsi? \_\_\_\_\_ cups

**Teacher's Note:** Go to timeline 12:30 to 15:38 of VSU Lecture One, Safety and Volume Measurement to help the student understand how much is one ounce and why medications are measured in cc's.

### Analysis

1.) Create a table of the conversions for

a.) one cup

b.) one pint

c.) one quart

d.) one half gallon

e.) one gallon

### Questions & Conclusions

1.) Why is volume measurement so important in medicine and daily living?

2.) How many cc's equals one ounce? \_\_\_\_\_

3.) Name at least three units of volume measurement.

\_\_\_\_\_

### Challenge

1.) Do a Power Point Slide of the content of this lab. Present it to the class. Create your own song about volume measurement.

2.) How is the concept of Density connected to Volume Measurement?

### Reference:

Gardner, H. (1991). The unschooled mind: How children think and how schools should teach. New York: Basic.

McCarthy, B. (1987). The 4Mat system: Teaching to learning styles with right/left mode techniques. Barrington IL: EXCEL

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