

Heeeeeeeey, Kool-Aid® Man!!!!

INTRODUCTION

Today we are going to make our own plastic cup full of Kool-Aid®. Boy, that's sounds good! Let's open up the package, grab some sugar, and go for it! But there is only one problem: the directions on the package ask for measurements like quarts and cups. We can only measure in milliliters and grams. Looks like we will have to do some conversions. I sure hope you know how to use conversion factors! I've had Great Bluedini Kool-Aid® without enough sugar before and it was awfully bitter!

OBJECTIVES

- make Kool-Aid® by mixing together the correct amount of water, sugar, and Kool-Aid® powder.
- use conversion factors to convert English measurements to SI system measurements.

EQUIPMENT

clean 100 mL beaker	clean evaporating dish	plastic spoon
clean 250 mL beaker	plastic cup	triple-beam balance

CHEMICALS

Kool-Aid® powder	water
sugar	

SAFETY

This lab is a special exception to the rule of "No food or drink in the laboratory." It is extremely important that before we use lab equipment to measure chemicals for human consumption we make sure the equipment is clean! Let me stress that in all other labs you **MUST NOT** eat or drink anything! This lab is definitely a chemistry lab even though we are making Kool-Aid®: cooking and preparing food is, when you come right down to it, chemistry.

PROCEDURE

Put about 40 mL of sugar in your clean 100 mL beaker. We will use part of this sugar later, along with water and Kool-Aid® powder to make our drink.

Use the following problems to help convert from the American units to the SI system of measurement. Please write down each conversion factor equation. Be sure to include the proper numbers and the proper units at all times.

TO FIND THE CORRECT AMOUNT OF SUGAR

How many milliliters of water does one plastic cup hold?

One plastic cup holds approximately three hundred and fifty milliliters of water.

$$350 \text{ mL} = 1 \text{ plastic cup}$$

$$1 \text{ plastic cup} \times \frac{\quad}{1 \text{ plastic cup}} = \quad \text{mL} \quad (4 \text{ points})$$

How many quarts of water does one plastic cup hold? One plastic cup holds approximately three hundred and fifty milliliters of water. There are a thousand milliliters in one liter. One quart is approximately 0.94 liters. $350 \text{ mL} = 1 \text{ plastic cup}$ $1 \text{ L} = 1000 \text{ mL}$ $0.94 \text{ L} = 1 \text{ quart}$

$$1 \text{ plastic cup} \times \frac{\quad}{1 \text{ plastic cup}} \times \frac{\quad}{1000 \text{ mL}} \times \frac{1 \text{ quart}}{\quad} = \quad \text{quart} \quad (8 \text{ points})$$

How many cups of sugar do we need to make one plastic cup full of Kool-Aid®?

One plastic cup holds approximately three hundred and fifty milliliters of water. There are a thousand milliliters in one liter. One quart is approximately 0.94 liters. To make two quarts of Kool-Aid® we need one cup of sugar.

350 mL = 1 plastic cup 1 L = 1000 mL 0.94 L = 1 quart 1 cup of sugar = 2 quarts of Kool-Aid®

$$1 \text{ plastic cup} \times \frac{\quad}{1 \text{ plastic cup}} \times \frac{\quad}{1000 \text{ mL}} \times \frac{1 \text{ quart}}{\quad} \times \frac{1 \text{ cup of sugar}}{\quad} = \quad ? \text{ cup of sugar} \quad (10 \text{ points})$$

How many pints of sugar do we need for our plastic cup? There are two cups in one pint.

$$? \text{ cup of sugar} \times \frac{\quad}{\quad} = \quad \text{pint} \quad (4 \text{ points})$$

How many quarts of sugar do we need for our plastic cup? There are two cups in one pint. There are two pints in a quart.

$$? \text{ cup of sugar} \times \frac{\quad}{\quad} \times \frac{\quad}{2 \text{ pints}} = \quad \text{quart} \quad (6 \text{ points})$$

How many liters of sugar do we need for our plastic cup? There are two cups in one pint. There are two pints in one quart. One quart is approximately 0.94 liters.

$$? \text{ cup of sugar} \times \frac{\quad}{\quad} \times \frac{\quad}{2 \text{ pints}} \times \frac{\quad}{\quad} = \quad \text{L} \quad (8 \text{ points})$$

How many milliliters of sugar do we need for our plastic cup? There are two cups in one pint. There are two pints in one quart. One quart is approximately 0.94 liters. One thousand milliliters equal one liter.

$$? \text{ cup of sugar} \times \frac{\quad}{\quad} \times \frac{\quad}{2 \text{ pints}} \times \frac{\quad}{\quad} \times \frac{\quad}{1 \text{ L}} = \quad \text{mL} \quad (10 \text{ points})$$

How many grams of sugar do we need for our plastic cup? There are two cups in one pint. There are two pints in one quart. One quart is approximately 0.94 liters. One thousand milliliters equal one liter. The density of sugar is 0.80 grams per milliliter.

$$? \text{ cup of sugar} \times \frac{\quad}{\quad} \times \frac{\quad}{2 \text{ pints}} \times \frac{\quad}{\quad} \times \frac{\quad}{1 \text{ L}} \times \frac{\quad}{\quad} = \quad \text{grams} \quad (12 \text{ points})$$

Once you have found the correct amount of sugar, measure it on the triple-beam balance using the evaporating dish. Pour the sugar into the plastic cup. Next we must measure the Kool-Aid® powder and the water.

TO FIND THE CORRECT AMOUNT OF KOOL-AID® POWDER

How many grams of Kool-Aid® do we need in for our plastic cup? One plastic cup holds approximately 350 milliliters. One thousand milliliters equal one liter. One quart is approximately 0.94 liters. There are two pints in quart. In one pint there are sixteen fluidounces (16 fl oz). A serving size of 0.6 grams makes eight fluidounces.

$$1 \text{ plastic cup} \times \text{—————} \times \text{—————} \times \frac{1 \text{ quart}}{\text{—————}} \times \text{—————} \times \frac{16 \text{ fl oz}}{\text{—————}} \times \text{—————} = \text{grams of Kool – Aid®} \quad (14 \text{ points})$$

Pour the correct amount of powder into the plastic cup. Lastly, pour in 350 mL of water using the 250 mL beaker. I hope your calculations were correct: if not you're in for some bitter Kool-Aid®. Stir together with the spoon.

SHOW ME YOUR KOOL-AID® WHEN YOU HAVE FINISHED!!!

24 POINTS