

## Conversion Factor to Adjust Final Yield Sheet

### Creating a Factor to Adjust Product Volume

A conversion factor is a way to represent the same quantity using different units of measurement. Conversion factors are useful when scaling up or scaling down a recipe such that each ingredient maintains its ratio in the recipe.

The juice volume is the limiting factor and it determines the final volume produced. Therefore, the ratio is calculated based on the juice volume. Students will first need to convert the original recipe from the US customary unit (ounces/cups) to metric units (grams/milliliters.) The gelatin weight in grams will also need to be calculated.

In a science laboratory, changing the gelatin or dry ingredients changes the weight/volume (w/v) ratio. For this activity, I found that slight differences in weight/volume ratios do not affect the product production because the total volume produced is relatively large. Therefore, I did not adjust the volume to account for changes in gelatin increases or decrease.

### Changing Ratios for Increasing or Decreasing Volumes

Molds of different shapes and sizes require different volumes. Therefore, students should start by determining how much water is needed to fill the molds. Once the volume is known, students can adjust the original recipe to avoid wasting or not preparing enough hydrogel to fill the molds. The required volume to fill a mold is referred to as the product yield.

1. Determine the new volume in milliliters required to fill the mold. This volume is the new product yield.
2. Look at the original recipe. Convert the volume with original US customary units volume to milliliters.
3. Find the conversion factor by dividing the required yield (Step 2) by the old yield (Step 1). Formula is  $\text{conversion factor} = (\text{new juice volume})/(\text{old juice volume})$ .

Example:  $\text{conversion factor} = 100 \text{ ml for mold} / 200 \text{ ml for original recipe} = 0.5$ . Therefore, each ingredient (in this recipe the only other

4. Based on the new volume, determine the weight of gelatin. Multiply the ingredients by the conversion factor.

Ingredient	Recipe Amount	Conversion Factor for Yield Change	New Ingredient Amount
Juice (ml)			
Gelatin (g)			

Table 1: Table of ingredients for recipe adjusted for new yield