About Baker's Percentages and Hydration

Managing the subtle art of communicating with bakers

Introduction:

Since flour is the primary ingredient in bread, bakers use it as the basis for their calculations. Bakers define the term Baker's percentage or ingredient percentage (IP) as the weight of the ingredient (IW) in a recipe divided by the total flour weight (TFW) in that same recipe. As a formula we can write:

IP = IW ÷ TFW which is the same as TFW = IW ÷ IP

Two things are interesting about this definition. First, notice that the ingredient percentage (IP) of the flour in a recipe will always be 100%. Second, the total ingredient percentage of a recipe will always be greater than 100%. Both results are due to the use of the amount of flour as the basis rather than the total weight of the ingredients. The result is probably a little different than the way you may have studied percentages in high school, but you will get used to it in time.

Scaling recipes

One reason to use baker's percentages is that it becomes quite easy to scale such a recipe to make any amount of dough you wish. Simply divide the total weight (TW) of dough you want by the total percentage (TP) of the recipe. That number is the total flour weight. Then take that result and multiply it against each ingredient percentage (IP) to get the weight of that ingredient (IW). Putting it all together, we can write the formula:

IW = IP x (TW ÷ TP)

As an example, let's make a 1 ½ pound loaf of "Basic Sourdough" whose baker's percentages are given in table 1. Divide the total weight (1 ½ pounds, or 24 ounces) by the total percentage in the recipe (166.8). Then take the result (0.1438) and multiply it by each ingredient percentage to get the weight of the ingredient to add as shown below.

Table 1 - Basic Sourdough recipe

	Bakers' Percentage	Weight (ounces)	Weight (grams)
Sourdough Starter	45.3	6.5	185
Warm water	35.2	5.1	144
Oil	1.3	0.2	5
Flour, unbleached bread	83.0	11.9	339
Salt	2.0	0.3	8
Total	**166.8**	**24.0**	**681**

All that remains is to get out the scale and make the bread! And, the next time you have a party, you can make a whole bunch of the same bread by just recalculating with the appropriate total weight (TW).

Why use weights?

The definitions of baker's percentages are in weights and for good reasons. While it may seem more convenient to measure the volumes of your ingredients, volume measurements are problematic for bakers. Did you know that there are three different 1 cup measures?

The real reason to avoid using volumes, though, is the variability of the measurement. The weight of a cup of flour depends on many factors besides the quantity and quality of the flour. For instance, the technique of scooping can yield ½ to 1 cup differences in measuring a pound of flour. That is quite a bit when you are aiming for a consistent loaf! And, with weights, it does not matter whether or not you pack your brown sugar.

Using weights also lets you vary your ingredients. Whether you use table, sea or kosher salt, the weight of the salt in a recipe will remain the same. If you use volume measures you will need to find a conversion.

Good kitchen scales are inexpensive. Make sure that the scale you choose has enough capacity for the largest amount of dough you plan to make. Also, make sure that it weighs in increments of 1 gram or less, otherwise you will not be able to measure the trace ingredients accurately. One convenient feature is "add-and-weigh" (also called "tare"). It allows you to weigh ingredients as you add them to the bowl, resetting the scale to zero after each one. A removable pan will aid clean up.

Northwest Sourdough Recipes will provide you with volume and weight measurements as well as baker's percentages. Use the system that works best for you.

Why use metric?

The reason to use metric units is because it is easier. Really! Let's do a simple example. If you add 8 ounces of flour to 12 ounces of water, what is the total weight of your starter? The answer is 1 pound 4 ounces on most scales. You get that by taking 8 + 12 = 20 and then dividing by 16 to get 1 pound with a remainder of 4. It starts to sound like math class!

Now let's do that same example in metric units. Add 8 grams of flour to 12 grams of water and you get 20 grams of starter. And, as your needs get more complex, the advantages become greater.

However, there is nothing in the definition of the baker's percentage that requires the metric system. If you want to think in pounds and ounces, feel free. And, if you like to convert between systems, there are 28.3 grams in an ounce.

Northwest Sourdough Special Recipe weights will be stated in grams as well as pounds and ounces.

Hydration:

Hydration is defined as the sum of the ingredient percentages (IP) of all of the liquid ingredients in a recipe that can be absorbed by the flour. Hydrating liquids include water, milk, soy milk, juice, or other liquid. In the example recipe, the hydration of the dough is 58.4% as water is the only liquid. Notice that we did not include the oil in the hydration calculation as oil does not get absorbed by the flour.

Hydration is a very important measure of both starter and dough. It affects the process of bread building and the type and character of the final result. Most bread books discuss it and web articles abound.

Starter hydration

Your sourdough starter is a mixture of flour and water. It probably will not surprise you to know that we will use baker's percentages to discuss starters too. Since the flour percentage is always 100%, we don't mention it and only talk about the ingredient percentage (IP) of the water. Water is the only liquid in most starters, so the ingredient percentage (IP) of the water is the hydration. Thus we can talk of 166% starters and 100% starters as well as many other hydrations. You should use the hydration that gives you the best results for your baking.

There are two methods you may use when considering the effect of your starter's hydration on the final dough. The first is to treat is as if it were a single ingredient. You already know how to do that. However, as we will see, that method is little better than an estimate.

The other method is to separate the starter into the equivalent weight of flour and water, adding each to the ingredient list. Let's calculate the hydration of the loaf we made above using this method. Table 1 tells us that we need 6.5 ounces (or about 184 g) of starter.

Table 2 - 166% hydration starter	Bakers' Percentage	Weight (grams)
Warm water	166.0	?
Flour, unbleached bread	100.0	?
Total	**266.0**	**184.0**

The ingredient percentage (IP) of the water is the hydration of the starter and the ingredient percentage of the flour in the starter is 100%, as always. That means that the total percentage (TP) of the starter is 266%. We know that the total weight (TW) of the starter is 184 grams, so we can use the formula from page 1 to find the ingredient weight (IW) of the water.

IW = IP x (TW ÷ TP) = 166% x (184 g ÷ 266%) = 115 g

Everything that is not water is flour, so subtract the weight of the water (115 g) from the total weight (184 g) to get the ingredient weight of the flour (69 g). As a quick double check divide the weight of the water by the weight of the flour to get the hydration. 115 g ÷ 69 g is indeed 166%.

Table 3 - 1 ½ Pound Loaf of Basic Sourdough with starter separated	Weight (grams)	Bakers' Percentage
Warm water (144 g + 115 g from starter)	259	63.5
Oil	5	1.2
Flour, unbleached bread (339 g + 69 g from starter)	408	100.0
Salt	8	2.0
Total	**680**	**166.7**

Notice that the first method gives the hydration as 35.2% as shown in the first table, while the second method yields a hydration of 63.5%. That is because the second calculation considers the fact that 166% starter is more water than flour.

Written for Northwest Sourdough by RKG Consulting