Chapter 1
Introduction to Baking

How Baking Works

Words, Phrases, and Concepts

- Formulas
- Scale capacity
- Scale readability
- Weight ounce
- Fluid ounce
- Density
- Viscosity
- Baker’s percentage
- Tempering

Importance of Accuracy

Most bakery items:

- Are all made of the same ingredients.
- Differ only in method of preparation or the proportion of ingredients.
- Small changes can have a large effect on the quality of a product.

Kitchen chefs make adjustments along the way; pastry chefs often cannot.

Examples: soup and bread.

Balances and Scales

- Two main types:
  - baker's balance
  - digital electronic
- Precision of a scale depends on:
  - Scale design
    - While many electronic scales are more precise than baker's balances, this is not always the case.
    - Electronic scales vary in their precision.
  - Whether scale is well-maintained
  - Whether scale is properly calibrated

Balances and Scales

- Check that your scale works properly using a standard weight on a daily basis.
- If necessary, recalibrate scale.

Balances and Scales

Know your scale's:

- Capacity: the maximum amount that it can weigh.
- Readability: the smallest weight that can be read off display panel.

Example: 100 oz. x 0.1 oz.

Example: Max = 4.0 kg, d = 5 g

Balances and Scales

Readability of a scale is not the smallest amount that the scale can accurately weigh.

Smallest quantity to be weighed =
scale readability x 10

Example: d = 1 gram

Example: d = 0.25 ounce

Balances and Scales

With digital electronic scales:

- Vibrations and breezes cause readings to fluctuate.
- Hot pans and cold bowls cause readings to drift.
- Nearby induction burners (magnetic fields) and use of plastic weighing containers (static electricity) can disrupt readings.

Units of Measure

- Metric units:
  - grams and kilograms, for weight
  - milliliters and liters, for volume
- U.S. common units/Canadian imperial units:
  - ounces and pounds, for weight
  - teaspoons and quarts, for volume

Units of Measure

- Why use metric:
  - Used by most countries throughout world
  - Fewer math calculations when scaling a formula up or down
- Gram scales are not necessarily more accurate than ounce scales.

Example: scale where d = 5 grams and another where d = 0.1 ounce.

Weight and Volume Measurements

Measure all dry ingredients by weight, not volume.

- Will get same measurement; even if, ingredient has settled or was sifted.
- When dry ingredients are measured by volume; settling and sifting will affect the measurement.

Weight and Volume

- Liquids are sometimes measured volumetrically, using measuring cups.
- Besides water, liquids often measured volumetrically include: milk, cream, eggs.
  - All have about the same density as water.
  - 16 fluid ounces of each weighs about 16 ounces by weight.
  - 500 milliliters of each weighs about 500 grams by weight.

Weight and Volume

- For all other liquids,
  - When formula calls for 16 oz, use a scale; when it calls for 16 fluid oz, use a measuring cup.
  - When formula calls for 500 grams, use a scale; when it calls for 500 milliliters, use a measuring cup.

Do not confuse weight and volume measurements.

Density and Thickness

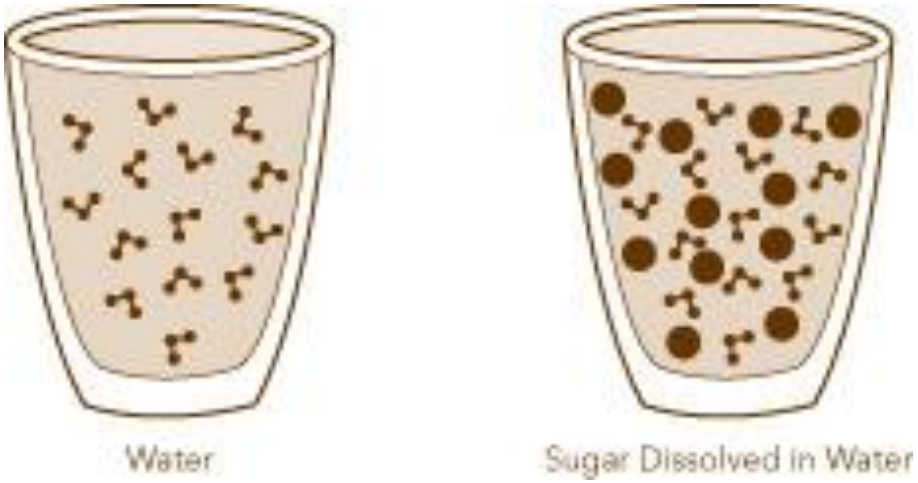
- Density is a measure of the compactness of particles, or molecules, in a liquid or solid.
- Dense ingredients have less air or empty space between particles or molecules.

Density and Thickness

Dense ingredients take up less space than the same weight of less dense ingredients.

Which ingredient above is the least dense? Which is the densest? How can you tell?

Density and Thickness



Why does a cup of sugar syrup weigh more than a cup of water?

Density and Thickness

Viscosity is a measure of how easily a liquid flows.

- Thin liquids: particles or molecules slide past each other easily.
- Thick liquids: particles or molecules bump or tangle with each other.

Density and Thickness

Molasses is thick because molecules do not slide past each other easily.

Density and Thickness

- Density and Viscosity are not the same.
- Cannot judge the density of a liquid by its thickness.
- Which is denser:
  - Heavy cream or milk?
  - Whole eggs or orange juice?
  - Oil or water?

Density and Thickness

TABLE 1.2 A COMPARISON OF THE APPROXIMATE WEIGHTS OF 1 PINT AND 1 HALF-LITER OF VARIOUS INGREDIENTS

INGREDIENT	APPROXIMATE WEIGHT PER U.S. PINT (2 CUPS), IN WEIGHT OUNCES	APPROXIMATE WEIGHT PER HALF-LITER (500 ML), IN GRAMS
Splenda	4.0	120
Ginger, ground	6.0	180
Flour, sifted	8.2	245
Flour, unsifted	9.2	275
Sugar, granulated	14.1	420
Oil, vegetable	14.8	445
Cream, heavy	16.4	490
Water	16.7	500
Milk, whole	17.0	510
Eggs, whole	17.2	515
Orange juice	17.4	520
Coffee liqueur	17.5	525
Simple syrup (equal parts sugar and water)	20.6	615
Honey, molasses, and glucose corn syrups	23.0	690

Baker's Percentage

- Also called formula percentage or indicated as "on flour weight basis."
- Is a ratio of the amount of an ingredient to the amount of flour.
- Not the same as the more commonly used percentage which is based on total batch size.

Baker's Percentage

- Advantage of percentages:
  - can more easily compare formulas to one another.
- Advantage of baker's percentages over total batch percentages:
  - fewer calculations when changing the amount of one ingredient in a formula.
- Calculation:

Baker's percentage =

100% x (weight of ingredient) ÷ (total weight of flour)

Baker's Percentage

BROWN SUGAR SPICE COOKIES

INGREDIENT	POUNDS	OUNCES	GRAMS	BAKER'S PERCENTAGE
Flour, pastry	2	8	1,200	= 100% × 1200 ÷ 1200 = 100%
Brown sugar, dark	1	4	600	= 100% × 600 ÷ 1200 = 50%
Butter	1		500	
Eggs		4	125	
Cinnamon		0.7	20	
Salt		0.25	8	
Total	5	4.95	2,453	

Controlling Temperatures

- Ingredients can change properties with a change in temperature.
  - *Example*: butter
- Tempering: technique for carefully combining ingredients that are at widely different temperatures.
  - *Example*: cold yolks and hot milk.
  - *Example*: warm gelatin and cold whipped cream.

Controlling Temperatures

- Control oven temperatures.
  - Check oven temperatures before use.
  - Avoid excessive opening of oven door during baking.
- Oven temperature can greatly affect how well a product rises.