UNDERSTANDING AND MEASURING pH

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The acidity or pH of a food product is an important parameter in determining safety and stability. pH is a measure of the amount of acidity or alkalinity in a food and is based on a scale that ranges from 1 for the most acidic/least basic to 14 for the most basic (or alkaline)/least acidic. Water has a pH value of 7.0 which is considered neutral on the pH scale. Microorganisms, including yeasts, molds and bacteria are sensitive to a food's pH. Lower pH values will offer some protection against microbial growth, however, very few foods have pH values low enough to completely inhibit the growth of microorganisms, especially yeasts and molds which can tolerate lower pH conditions than most bacteria. Adding acids such as vinegar, lemon/lime juice or citric acid to a product with an initial pH greater than 4.6 to reduce it to a pH below 4.6 is called acidification and results in an acidified food. This pH value is critical because Clostridium Botulinum, which can produce an extremely potent neurotoxin, will not grow if the pH of a food is 4.6 or less. Trace amounts of this toxin, which causes the food borne illness known as botulism, are enough to kill.

MEASURING THE pH OF FOOD PRODUCTS

A processor of an acidified food will need to measure the pH of the product in process and after equilibration to ensure that it does not exceed pH 4.6. Equilibrium pH is the pH of a food product after the added acid has blended equally throughout the food and this should be tested roughly 24 hours after processing. Typically, the upper limit for pH is set lower than 4.6 at 4.0 or 4.2 to build in a margin of safety. Accurately monitoring the pH is key to knowing that you are selling a safe product. There are two ways to measure the pH of a food, the first is paper strips, often referred to as litmus paper and the second is a pH meter that uses a glass electrode. The paper strips are inexpensive but rely on a color change in the paper to indicate the product pH and can be inaccurate and difficult to read. Therefore, the use of paper strips is not recommended for a processor of an acidified food. Instead, use a reliable and properly calibrated pH meter. To ensure that you are measuring pH accurately, it is important to understand the factors that can affect pH including the temperature and the consistency of the product. For example, if a product is chunky like salsa, or if the product has liquid and solids such as pickles, some sample preparation (blending to create a uniform mixture) will be required before measuring the pH.

SELECTING A pH METER

For specific details on the proper way to measure pH along with recommendations on what to look for when purchasing a pH meter, refer to the link below. Note that the specific pH meter models listed may no longer be available, but the general guidance provided regarding accuracy (the range of pH units the meter may read above or below the actual pH, for example +/- 0.1 units), calibration (checking and adjusting against a known standard), electrode (the part of the instrument that is immersed in the sample) and temperature compensation (pH readings are affected by temperature and some meters come with automatic temperature compensation) should be considered when selecting a model to purchase. You can expect to pay somewhere in the range of $100 to $500 for a meter with the recommended features.

Guide: https://foodsafety.wisc.edu/assets/Measuring_pH.pdf

REFERENCES:

1. https://extension.okstate.edu/fact-sheets/the-importance-of-food-ph-in-commercial-canning-operations.html
2. https://extension.okstate.edu/fact-sheets/choosing-and-using-a-ph-meter-for-food-products.html
3. https://www.extension.purdue.edu/extmedia/fs/fs-15-w.pdf
4. https://ext.vt.edu/food-health/food-innovations/basics.html

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