

## Shaklee's Technological "Difference" Ensures High Quality Products

### Introduction

Shaklee's Research Labs in Hayward, California has invested in state-of-the-art technology to assure the highest level of quality during the research, testing and product development phases of its nutritional supplements. The technologies we employ also ensure that quality control is carried over seamlessly to our manufacturing plant in Norman, Oklahoma. Since there are typically more ingredients in Shaklee's products than are found in those of many other natural products companies, it is all the more crucial to establish the very best in-house processes and machinery to meet research and production challenges posed by these products.

There are few clear-cut product development and manufacturing methodologies in the natural products industry, so Shaklee stepped up to the challenge to create procedures that don't just adhere to but exceed industry norms. This brings unique benefits to our consumers in terms of giving you the confidence that the ingredients in Shaklee's products have been thoroughly tested and are consistent in their biological effects when ingested.

There are three technologies that accomplish this task: The HPLC (High Performance Liquid Chromatography), the ICP (Inductive Coupled Plasma) and the LCMS (Liquid Chromatography Mass Spectroscopy). These give us the capability to chemically analyze raw, natural ingredients as potential ingredients in forthcoming nutritional supplements. These instruments can identify adulterants at an early stage of research and ensure the stability of emerging product profiles.

### The HPLC equipment.

The goal of chemically analyzing an ingredient is to separate a mixture into its individual components and evaluate each of them without interference from the other components. These components (called analytes) are passed through a separation system known as the chromatography part, and after separation we need to "detect" them in order to precisely characterize each analyte. This is usually achieved by measuring an optical property and translated into charts or graphical images. As an example when we analyze the herb Echinacea with the HPLC we analyze the natural chemicals contained in the extract. These chemicals are separated by HPLC indicating that it contains a number of acids. This data helps to tell us which of the acids may bring the sought for health benefits we are looking for when designing a new supplement.

### The ICP (Inductively Coupled Plasma ) equipment

This is the equipment we use to test minerals and analyze the combination of elements on a molecular level. Each element emits a unique optical ray pattern. The ICP amplifies electrical signals so that we can verify that the amount of mineral composition in our products corresponds exactly to our required products specifications. This is important to show that Shaklee products are free of unwanted minerals.

## The LCMS (Liquid Chromatography Mass Spectroscopy) and GCMC (Gas Chromatography Mass Spectroscopy) equipment

This is the equipment that gives us a major competitive advantage as few natural products companies invest in this instrument.

In general chromatography is used to separate mixtures of chemicals into individual components much like the HPLC does except that the LCMS or GC is used to *confirm* the results from the HPLC-generated components and *identify* any anomalies or areas of instability where degradations of constituents may have occurred. Where anomalies occur, our research scientists are immediately alerted to initiate toxicological studies. We would weed out the presence of potentially toxic adulterants that might have found their way into the extract through a variety of ways.

The HPLC or LCMS/GC also tests for such stability issues as humidity, light, room temperature and supplement shelf-life. If the test results are satisfactory, research scientists and chemists proceed to create a “prototype” and develop a method which itself must then be *validated*, again by using sophisticated technical methods.

It is important to emphasize that we undertake testing at all stages of production development, manufacturing and even *after product launch*. Shaklee doesn't just comply with GMP. We exceed industry standards and hence welcome the new FDA guidelines, which call for more precise ingredient labeling that have come about largely in response to lax practices by some nutritional supplement makers.

Our state-of-the-art technology allows us to confront the multiple challenges for a natural products company and reap the advantages in terms of sourcing raw ingredients, identifying the potency and bioavailability of products, and, most of all, ensuring the safety of ingredients and products for consumers.

What sets Shaklee truly apart from its peers is its strong commitment to confirm extract stability from the beginning stages to final, manufactured product. This is the difference Shaklee brings to its distributors and their consumers.