INTRODUCTION

Functions of Food Packaging

Packaging is an essential part of processing and distributing foods. Whereas preservation is the major role of packaging, there are several other functions for packaging, each of which must be understood by the food manufacturer. Indeed, faulty packaging will undo all that a food processor has attempted to accomplish by the most meticulous manufacturing practices. Packaging must protect against a variety of assaults including physical damage, chemical attack, and contamination from biological vectors including microorganisms, insects, and rodents. Environmental factors such as oxygen and water vapor will spoil foods if they are allowed to enter packages freely. Contamination of foods by microorganisms can spoil foods or cause life-threatening diseases. Many foods would not survive distribution without physical damage were it not for the protection afforded by packaging.

In order to be successful, packaging must also aid consumers in using products. Food packaging should have features which make the product easier to utilize and add convenience. This may be as simple as reclosure after partial use or as complicated as aiding in the microwave cooking of a product (Fig. 21.1). Many new food products are in reality standard foods packaged in a new way that aids in preparation or storage. Aseptically packaged milk is an example.

Packaging also serves to unitize or group product together in useful numbers or amounts. In some cases this might be an amount to be used at a single time like most canned foods, or in other cases, multiple servings are grouped together such as a six-pack of sodas. Products such as condiments are seldom totally consumed at one time and so reclosure for storage becomes important.

Food packaging must also be able to communicate and educate. It is the package which identifies the product for the consumer. In addition to convincing consumers to buy a product, the package must also inform consumers about how to prepare or use the product, contents or amount of product contained, ingredients, nutritional content, and other pertinent information. Much of this information is required by specific laws in many countries, including the United States.

The package is also an important part of the manufacturing process and must be efficiently filled, closed, and processed at high speeds in order to reduce costs (Fig. 21.2). It must be made of materials which are rugged enough to provide protection during distribution but be of low enough cost for use with foods. Packaging costs,
which include the materials as well as the packaging machinery, are a significant part of the cost of manufacturing foods, and in many cases, these costs can be greater than the cost of the raw ingredients used to make the food. Therefore, packaging materials must be economical, given the value of the food product.

Packaging of foods has become so complex that an entire industry has developed to satisfy the need. In fact, the packaging industry as a whole is one of the largest industries in the United States. About half of the packaging used in the United States goes for foods, with about 23% being used for industrial products (Table 21.1). Today, most sizable food companies have a packaging division, and universities offer special curricula leading to a degree in package engineering. The food scientist does not have to become an expert in packaging, but increasingly he/she will be called on to assist with packaging decisions and problems. This commonly involves defining the kinds of protection essential to a specific food product and specifying in quantitative terms what the package must do. There will be considerable help available from suppliers of packaging materials and equipment, but they, in turn, will depend on the food scientist to make them aware of the peculiarities and subtleties of a particular food system.

Requirements for Effective Food Packaging

Some of the more important general requirements of food packages are that they (1) be nontoxic, (2) protect against contamination from microorganisms, (3) act as a barrier to moisture loss or gain and oxygen ingress, (4) protect against ingress of odors or environmental toxicants, (5) filter out harmful UV light, (6) provide resistance to physical damage, (7) be transparent, (8) be tamper-resistant or tamper-evident, (9) be easy to open, (10) have dispensing and resealing features, (11) be disposed of easily, (12) meet size, shape, and weight requirements, (13) have appearance, printability...