

Chapter 7: Popping Methods: Oil

Popcorn pops when it is heated to the correct temperature. That heating can be accomplished in several different ways, popping in Hot Oil, popping in Hot Air, and popping in Microwave Ovens.

Popping with oil is the process that Charles Cretors patented in 1893.

This process is the one most commonly used in point of purchase popping in concession stands, and in homes before the advent of the microwave.

To pop popcorn in oil, corn and oil are placed in a container in a ratio of three parts corn and one part oil by volume. When the corn and oil reach the proper temperature, the corn begins to pop. Enough heat needs to be applied to heat the corn to approximately 450°F (250°C) within about three minutes. A normal popping cycle would be 2-1/2 to 3-1/2 minutes. At this time the corn will expand to its greatest volume. The time cycle may be adjusted by either changing the heat rate or, if the heat rate is fixed, by increasing or decreasing the amount of corn and oil put into the cooking pan.

During the popping process the corn and oil must be agitated to produce an even transfer of heat. In commercial machinery, a motor turns an agitator on the bottom of the popper kettle. In the home, the pot in which the corn is being popped is shaken over a burner on a stove.

Popping corn in oil is probably the simplest snack production process available and permits the manufacture of the end product at the point of purchase. The aroma, animation and the obvious freshness of the product make it ideal for concession stands where the consuming public can view the process.

Oil popping (Machinery)

Machinery for popping corn in oil is primarily used in the concession industry and as such the range of equipment available is generally sized for a concession stand. The standard poppers are gas or electrically heated. Individual poppers suitable for industrial applications are typically 40 Pounds (18 Kg) per hour production and kettles sizes range from 4 oz. to 60 oz. kettles. As volume requirements increase, machines are built with a second kettle for cabinet and table designs.

As volume requirements increase, production lines made up of one or more banks of the large oil poppers are set up on a conveyor belt. Typically six poppers are set side by side and one operator to add corn, oil and salt to the machines. Operating on a typical three-four minute cycle the operators will dump and empty and refill a popper every thirty seconds. Corn is usually fed by hand with sized measuring cups.

Oil may be added to the kettle in several different ways

Oil is circulated from a large central oil storage tank to volumetric measuring points above each popper. When it is time to recharge a popper the dry ingredients are added to the kettle and the oil measure is emptied into the kettle. Another approach is to have a timed metering pump at each popper. This pump may draw oil from a manifold that circulates from a central tank or from individual 50 Pound (22.68Kg) pails. In another option the pumps are immersed in the pails themselves and are equipped with a heat element to melt oil that is solid at room temperature.

In general terms any shelf stable oil that will tolerate the high temperature of the popping process can be used. When choosing popping oil several factors should be considered.

1. Melting point. If the melting point is above body temperature, 98.60°F (37°C), the finished product will leave a waxy coating on the inside of the mouth of the consumer.

Popcorn is often consumed in conjunction with cold drinks, which will accentuate this waxy sensation and create an undesirable product.

2. Usability. Melting point also affects usability. Liquid oils are generally easier to handle. Coconut oil has a melt point of 76°F (24°C) and can solidify in pipes in cold weather climates. Some Canola oil varieties will separate into liquid and solid phases at lower temperatures.

3. Cleanability. The temperature in a popping kettle usually exceeds 450°F. This temperature will carbonize and burn oil left in the kettle. Some oils are more inclined to creating a carbon buildup the kettles. This has a direct relationship to the amount of polyunsaturated fat in the oil. The oil chosen should not smoke at the popping temperature. Oils heated to their smoke points begin to decompose and will have a very short shelf life.

Popular popping oils in the United States

- * Coconut
- * Corn
- * Peanut (Potential allergy problems should be considered)
- * Sunflower
- * High Oleic Sunflower
- * Canola
- * Soybean
- * Commercially sold oil blends

The oils listed above are popular and may be found in many locations. All have melting points below body temperature and some are liquid oils that do not have a solid phase. The primary differences are their flavors and how they perform in the popping kettles.

For many years Coconut oil was the most popular popping oil. It was relatively inexpensive, it is a 76°F melting oil, is very stable, and has a good flavor. From the manufacturing point of view this oil is also desirable for the fact that it does not create a lot of carbon in the popping kettle. The only negative is that it is highly saturated and is considered to be unhealthy by some consumers

Oil Pop Processes.

Salted (Savory) Corn

This is the simplest oil pop product to make and most commonly seen product in the United States. Corn, Oil and Salt are added to a popping Kettle and the kettle is heated. The corn will pop and the product as it exits the kettle only needs cleaning of unpopped or undersized kernels before packaging for sale.

If the popcorn kettle is still hot from the last cycle the full popping cycle from loading raw materials to dumping the kettle will be between 3 and 4 minutes. If the time cycle is significantly less the corn is probably being popped too quickly and will have hard centers and be undersized. If it takes much longer the kettle is being overloaded. A good indication the kettle is ready to dump is when you can count to four between pops. The popping oil used usually has Beta carotene and butter flavor added to give the finished popcorn a yellow color and butter flavor.

Sugar (Sweet) Corn

Sweet Popcorn is very similar to Salted corn in its process. In this process the amount of corn and oil placed in the popping kettle is reduced and an amount of sugar equal to approximately 75% of the normal corn is added. On the surface this appears to be a very simple change. The situation is complicated by the fact that the corn requires a kettle temperature of 450°F (250°C) to pop the corn. Sugar begins to burn at a much lower

temperature, about 320°F (160°C). The temperature of the popping kettle must be reduced to reduce burning of the sugar and as a result the time for the popping cycle is increased and the output of the kettle reduced from its capacity for salted corn.

Sugar corn is usually a white product and is the result of popping oil that has no color added to it and is popped with white sugar.

In the actual process there are two approaches to the addition of the sugar to the kettle. Sugar can be added with the corn and oil. The result is a slightly browned product near the end of the popping cycle. The sugar may also be added just as the corn begins to pop. This will give a whiter corn but the sugar on the corn may not melt completely and have a flat grainy appearance. The choice of method will depend on the local market.

In the actual operation of the kettle the operator must be more attentive when making sugar corn due to the fact that the kettle must be emptied as soon as the corn is done popping. If it is allowed to remain in the kettle the sugar will begin to burn. Even with careful operation the sugar will create an accumulation of carbon on the surface of the kettle. A kettle making sugar corn will require more frequent cleaning than a kettle making salted corn.