

Coffee Brewing Equipment

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This module on Coffee Brewing Equipment is broken down into three sections:

- Introduction to coffee
- How coffee brewers work
- How water quality impacts coffee



Part One
Introduction to coffee



The second largest commodity next to Oil...

As one of the most popular beverages in the world, fresh brewed coffee can be found in almost every traditional foodservice operation, and a wide variety of other venues.



Thanks to the efforts of a select group of companies, the Specialty Coffee Industry has expanded and modified the drinking habits of coffee consumers during the past twenty years.



This group has introduced select coffee beans, alternate roasting methods, and brewing techniques from around the world.



Fresh brewed coffee is sometimes called “drip coffee”, and is made through a process that we will review in 7 steps.

Proper coffee extraction is about contact time, temperature & coffee grind.



Steps 1 & 2...

- Imported coffee beans are screened for size, shape, colour, aroma, and general quality.
- Accepted beans are cooked in a coffee roaster to release the desired flavour.





Steps 3 & 4...

- Roasted beans are ground to a specific size and texture for each brewing method.
- A paper filter is placed in the equipment brewing basket to hold the grind and control the water flow.

Steps 5, 6 & 7...

- A prescribed amount of ground coffee in placed in the brewing basket.
- Water is heated to 190 degrees F, and slowly released over the coffee grind.
- The water moves through the coffee grind and paper filter, and drips into the finished pot.





Part Two
Coffee Brewing Equipment



Types of Coffee Brewers

Most types of coffee brewers use the simple steps that we have described, but a variety of equipment designs are available to meet customer needs.



Plumbed In Brewers

Plumbed-In Brewers are the most common design in the foodservice industry, and they include a direct water line connection. These brewers are also referred to as "Automatic" because there is no need to manually fill the tank.



Single Cup 'Pod' Brewers are now available in a growing number of self-service locations. The paper filter is replaced with a pre-measured coffee packet, which is discarded after each brew cycle.



Satellite Brewers fill larger, insulated containers during each brew cycle.

The satellite units are designed to hold the fresh coffee flavour for a longer period of time, the thermos pots are portable and can be moved to other locations.

The 1-gallon and 2.5-gallon satellite containers are very popular models for locations that offer a variety of coffee flavors throughout the day.

Larger 5-gallon satellite containers are also available for high volume locations.



Coffee Urns fill much larger stainless tanks during each brew cycle, for high volume applications.

Hotels and banquet facilities typically use coffee urns that brew 3 to 10 gallons on each side of a dual brewer.



Pour-Over Brewers are less common in the restaurant industry, but they will be found in some low volume locations and in many office coffee programs.

The pour-over design is not connected to the cold water supply, and the customer manually fills the water tank.



Pre-Mix Coffee Machines dispense a concentrated “coffee syrup”, into this special brewer and mix it with hot water for a finished drink.

This equipment is usually designed to dispense a single cup for each cycle, and this equipment can offer an extremely fast rate of service.





Part Three

How water quality impacts coffee

Water quality concerns for coffee brewing systems include:

- Suspended Solids / Turbidity can cause abrasion, clogging and equipment damage.
- Small solids/dirt can also contribute to the formation and volume of mineral scale.



- Natural, Organic Chemicals (T.O.C.) can leave tannin colours and stains.
- Chemical disinfectants are mildly acidic, and may be corrosive to metal surfaces.
- Chemical disinfectants can also attack rubber seals & gaskets.



- Mineral scale removal requires acid cleaning, which causes additional wear to the coffee brewer.
- Iron, Manganese, and Sulfur can also create corrosion or rust problems.



Recipe for Mineral Scale

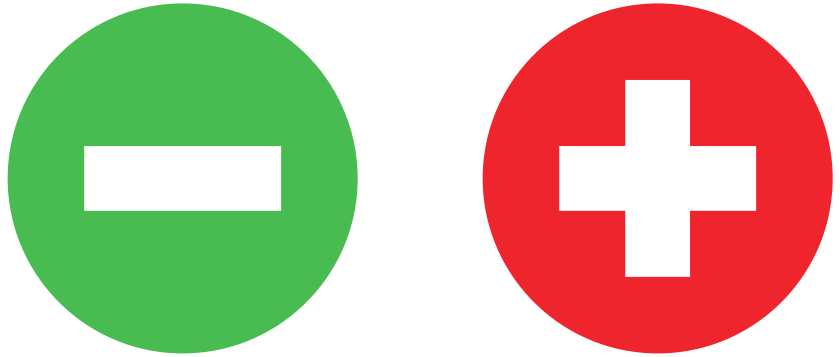
Mineral scale consists of precipitated minerals and small solids. It forms at a point of energy transfer such as the freezing process in ice machines or the heating process in coffee brewers.

Mineral scale is actually the reforming of rock from its component minerals.



There are three key ingredients for forming mineral scale:

- Calcium or magnesium cations (minerals) with a positive charge.
- Carbonate or sulfate anions (minerals) with a negative charge.
- Small dirt particles and solids.



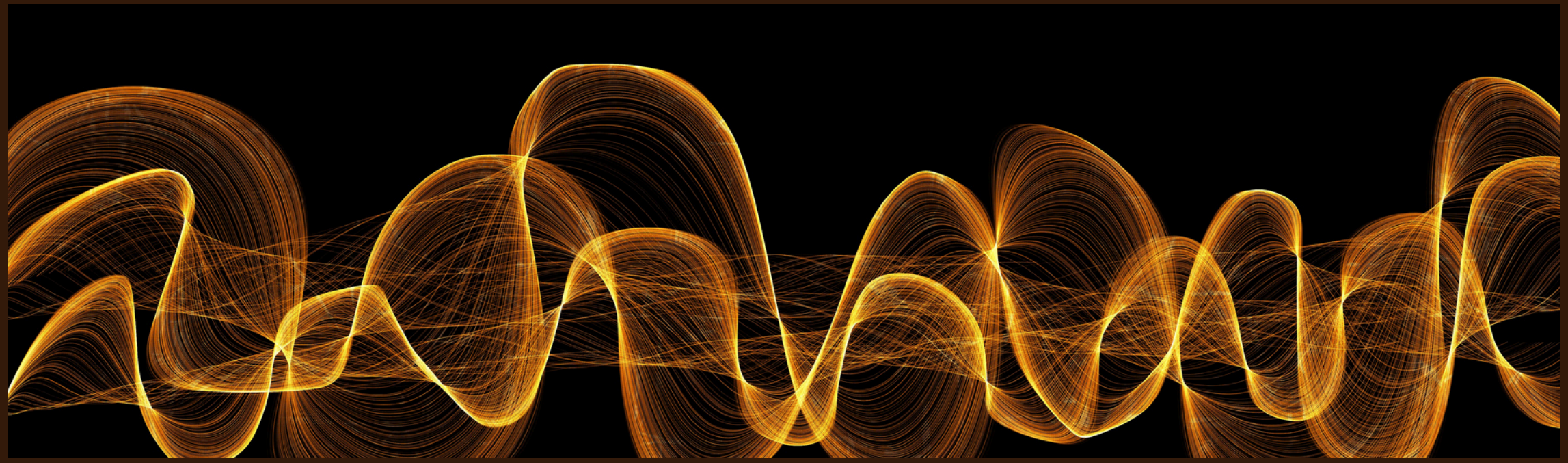
There are two key conditions for scale formation. The pH level must be neutral (7.0) or above, and there must be an energy transfer to act as a catalyst.





The Catalyst...

When the temperature of water is raised or lowered, the dissolved minerals begin to “precipitate” out of solution. The components of rock (minerals/ions) start to reform, and this mineral scale attaches itself to the heating elements, reservoir walls, and the sides of metal tubing.



Scale acts as an insulator, causing reduced energy transfer and efficiency loss, resulting in increased energy demands.

Just ¼" of scale can result in a 40% loss of energy transfer.



Increased operating costs also include the need for deliming – an acid cleaning process that removes mineral scale. This process is harsh to equipment surfaces and decreases equipment life.

These chemicals can also be hazardous to service personnel and create safe disposal problems.

Mineral Scale Facts

- There are 7,000 grains of mineral content in one pound of dissolved rock.
- There are approximately 15 grains per gallon of hardness in the average water supply.
- 467 gallons of this water contains more than one pound of dissolved rock.
- Almost 1.5 pounds of dissolved rock will enter a coffee brewer every 6-8 weeks (at 15-20 pots /day).



Coffee verses Suspended Solids

In addition to the potential equipment abuse that we have discussed, solid particles can affect the finished drink in several ways.

Many suspended particles will dissolve into the liquid coffee. This process may release earthy taste issues, increase the total dissolved solid content, and alter the delicate flavors of brewed coffee.



Coffee verses Chemicals

Chlorine and Chloramine can alter the aroma and flavour of brewed coffee in several ways:

- They oxidize the aromatics and oils in the coffee grind, releasing harsh or bitter tastes.
- They can also reduce the pH balance, producing an acidic coffee product.
- They can release chemical / medicinal tastes and odours in the final product.





RECAP

Coffee is 98.3% water.

You cannot serve a great cup of coffee without great water. Providing your clients with the right watercare solution will not only deliver consistency from one day to the next but also protect their equipment investment. It's a win - win!

This concludes this module.

Thank you for your time!

