Cleaning and Sanitizing in the Brewery

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What are typical soils found in the Brewery

- Protein
- Carbohydrates
- Scale

Cleaning in the Brewery

It takes Energy to clean

- You can use Mechanical Energy
- You can use Chemical Energy

or

- A combination of Both

Mechanical Energy

- Hand scrubbing with an abrasive pad
- Impingement with a directed jet of high pressure water

Chemical Energy

- Use of specialty formulated detergents to remove specific soil loads.

  Commonly used Cleaners in the Brewery
  - Caustic Soda based Cleaners
  - Non-Caustic Cleaners
  - Acid based Cleaners

The most effective Cleaning method in the Brewery is a combination of both

Mechanical and Chemical Energy

Caustic Soda

- Sodium or Potassium Hydroxide (NaOH or KOH)
- Use in concentrations between 1%-4%
- Use at temperatures between

  120°F - 160°F (50°C - 70°C)
- CIP for 15 – 30 minutes
- Can be combined with Sodium Hypochlorite with caution.

Caustic Soda

Advantages

- Good on proteins and carbohydrates
- Inexpensive, especially if built in the brewery
- Can be re-used

Caustic Soda

Disadvantages

- Can set Beerstone
- Hard on the Brewer – Dangerous
- Must be neutralized before disposing
- Higher temperatures needed for good effect
- Can’t be used on “soft” metals
- Doesn’t rinse well

Non Caustic Cleaners

Typical Ingredients

Sodium Carbonate and Sodium Metasilicate

- Use in concentrations of 1-2 oz. per gallon of water
- Use at temperatures between

  70°F - 180°F (20°C - 82°C)
- CIP for 30 – 45 minutes

Non Caustic Cleaners

Advantages

- Doesn’t set Beerstone
- Good cleaning on Proteins & Carbohydrates
- Lower temperatures can be used
- Can be use on “soft” metals
- Rinses well
- Safer on the Brewer

Non Caustic Cleaners

Disadvantages

- Can’t be reused
- Expensive
- Doesn’t work well on antifoams and oils
- Can take more water to rinse due to buffering capacity

Acid Cleaners

Typical Ingredients
Phosphoric and Nitric Acid Blend

- Use in concentrations of 1% - 3%
- Use at temperatures between
  120°F - 140°F (50°C - 60°C)
- CIP for 15 – 30 minutes

Acid Cleaners

Advantages

- Nitric is an oxidizing acid
- Good cleaner
- Removes beerstone
- Moderate cost
- Re-passivates Stainless Steel
- Not neutralized by CO_2

Acid Cleaners

Disadvantages

- Can’t be used on “soft” metals
- Hard on Brewers – Dangerous
- Must be used at high temperatures
- Nitric acid off-gasses above 140°F

Sanitizing in the Brewery

What is a sanitizer?

Sanitizers are substances that reduce the microbiological load to below a tolerable level. 5 log reduction in Bacteria

99.999% reduction

What is Sterilizing?

The complete elimination of all microorganisms.

Sanitizers in the Brewery

Commonly used Sanitizers in the Brewery

- Bleach
- Peroxyacetic Acid aka Peracetic Acid
- Phosphoric Acid/Anionic Surfactant
- Iodaphor
- Chlorine Dioxide
- Pasteurization

Bleach

Sodium Hypochlorite

- Use in concentrations of about 1%
- Use at room temperature

Bleach

Advantages

Inexpensive and readily available

Good kill spectrum

Bleach

Disadvantages

Not a true post rinse sanitizer

Can leave detectable flavor in beer

Corrosive to Stainless Steel

Can produce toxic THM’s

Peroxyacetic Acid

Acetic Acid and Hydrogen Peroxide

- Use concentrations of about 100-200ppm
- Use at temperatures from 32°F to 105°F

Peroxyacetic Acid

Advantages

- Good kill spectrum
- Kills by oxidation
- Breaks down to acetic acid and water
- Doesn’t flavor beer
- Good bottle rinse

Peroxyacetic Acid

Disadvantages

- Doesn’t work well with soil load
- Corrosive to “soft” metals

Phosphoric Acid/Anionic Surfactant

Advantages

- Removes beerstone well (also Nitric blends)
- Good Kill spectrum
- Inexpensive, especially if built in the brewery
- Doesn’t flavor beer

Phosphoric Acid/Anionic Surfactant

Disadvantages

- Works best at high temperatures
- Corrosive on “soft” metals
- Foams too much for CIP

Iodaphor

- Use in concentrations of about 12-25ppm
- Use at temperatures from 50°F to 105°F

Iodaphor

Advantages

- Good kill Spectrum
- Color is an indication of strength
- Solutions can be sweetened

Iodaphor

Disadvantages

- Doesn’t work well with a soil load
- Stains plastics and other materials
- If overused it can flavor beer

Chlorine Dioxide

Stabilized Sodium Chlorite

- Use in concentrations of 50 – 100ppm
- Use at temperatures from 32°F to 70°F

Chlorine Dioxide

Advantages

- An O_2 donor
- More environmentally friendly than other sanitizers
- Doesn’t impart Chlorine like flavor in beer
- It is forgiving in the amount used
- Doesn’t harm yeast
- Breaks down to H_2O and NaCl

Chlorine Dioxide

Disadvantages

- Use it or lose it
- Mildly corrosive on Stainless Steel
- Not effective on wild yeast
- Expensive
- Must be activated

Pasteurization

Just Plain Heat

- Concentration not applicable
- Hold at 180°F for 30 min or more

Pasteurization

Advantages

- Most beer spoilers are killed below this temperature
- Penetrates soil load
- No chemical residue

Pasteurization

Disadvantages

- Takes longer than other sanitizers
- Difficult to use on large equipment
- Can give beer a “cooked” flavor

Conclusion

- Clean well with a method that is appropriate for the application.
- Only after you have properly cleaned can you properly sterilize.

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