Water

Objective: understand your water, but don’t obsess over it.

• pH alone doesn’t tell you much

• know what you’re dealing with (have your water tested)

• key components: hardness (calcium/magnesium) and alkalinity (bicarbonates)

• temporary vs. permanent hardness
Practical suggestions:

• make sure you have enough calcium for optimal mash conditions

• adjust sparge water to pH 5.5-5.8 using food grade acid

• consider cutting your water with RO water for beers requiring soft water

• track your mash pH

• minimize messing with your water
Milling

Objective: expose the starches in your grain to make them available for sugar conversion.

- invest in a good mill

- husks should be cracked, but you don’t want to produce flour

- track your brewhouse efficiency (target 75-80%) and adjust mill gap accordingly (http://www.brewersfriend.com/brewhouse-efficiency/)

- special consideration: flaked grains, rye malt, darker malts
The Mash

Objective: activation of enzymes to convert starches to fermentable sugars and produce wort.

Temperature rests:

- protein (104-140)
- beta amylase (131-150)
- alpha amylase (154-162)
- mash out (168 to 170)
Mashing Techniques

- Step mash (rest at different temperatures)
- Decoction (boiling a portion of the mash)
- Single Infusion (holding at one temperature)
  - Low end (142-149) will produce drier, more fermentable beers
  - Higher end (152-156) will produce fuller bodied, sweeter beers
The Mash

- Key Factors:
  1. pH (5.0-5.6)
  2. Thickness (thinner = more fermentability)
  3. Dough Balls
  4. Temperature
  5. Grist composition (wheat/rye/dark malts)
  6. Measure extraction with refractometer
Lauter and Sparge

Objective: rinse grain bed with hot water to move wort from mash tun to boil kettle.

- Recirculate wort until it runs clear
- Heat and treat sparge water to temp of ~165 and pH 5.5-5.8
- Begin runoff (lauter) from mash tun to kettle, beginning to sparge as necessary
- stop collecting wort in kettle when gravity falls below 1.010 or pH surpasses 5.8
- avoid splashing and over sparging
The Boil

Objectives:

1. Sterilization
2. Drive off DMS
3. Hop utilization
4. Protein coagulation
5. Color development/kettle caramelization
Boiling

Check Points:

• Boil without lid
• Evaporate at least 10% of starting volume
• Avoid scorching
• Devise a method to strain hops
• Consider clarity agents/yeast nutrient/fermcap
Heat Exchange

Objectives:

1. Cool wort to fermentation temperature as quickly (and sanitarily) as possible

2. Keep your heat exchanger absurdly clean
Heat Exchange: summary

1. Gauge the efficacy of your heat exchanger, keeping in mind that it will vary seasonally

2. Develop a protocol for cleaning/sanitizing your heat exchanger

3. Consider recapturing water used during heat exchange
Fermentation

Objectives: too many to mention, really. In sum, create tasty, clean wort for yeast to get down on.
Fermentation

The Essentials:

1. Pitch plenty of yeast (always build starters)
2. Oxygenation
3. Cleanliness and Sanitation
4. Temperature control
5. Gravity Measurements
6. Yeast strain
7. A trained palate to assess fermentation quality
Fermentation

• Implications for brewers:

1. choose your yeast strain wisely
2. short vs. long lag times
3. first 48 hours of fermentation are key
4. monitoring fermentation (temperature/gravity/pH/taste)
5. yeast harvesting and propagation
Conditioning and Secondary Fermentation

Objective: know what you’re trying to do and execute accordingly

• key questions to resolve:

  1. How did primary fermentation go?

  2. How will this beer be packaged?
Conditioning and Secondary Fermentation

- conditioning vs. secondary fermentation
- dry hopping/ingredient additions
- avoiding oxygen uptake (a co2 tank is key)
- temperature
Packaging

Objective: Get your beer into bottles/keg/tank in a sanitary environment while minimizing oxygen uptake.

1. carbonation procedures
   A. “Priming”/bottle conditioning
   B. Force carbonating

2. post-packaging storage
Developing an Identity

Key Questions to ask yourself:

1. Is home brewing primarily a hobby?

2. Do I want to win competitions or simply have a laugh?

3. Do I want to become pro?

4. What will make my brewing unique?

5. How will I seek feedback and continue to learn?