

Laboratory Basics

by Jessica McElvain, SSQ Consultants

During the set-up of a brewery, the laboratory is often overlooked. The equipment can be intimidating, especially for brewers starting out that have not had the opportunity to work in a laboratory setting. The beer is the exciting part for most, not microscopes and pH meters. However, a basic laboratory plays a critical role in producing quality beer.

Set-up a basic laboratory as early as possible. The sooner a pattern of running protocols is established, it will be second nature to scale up the number of samples and processes as needed. The list below is, in my opinion, the equipment and laboratory supplies that every brewery needs from conception.

You may notice that this list does not include any equipment for identifying infections. Proper screening for microbiological contaminants is a topic that would easily occupy multiple posts. Sanitation is key to preventing infections and there are companies that you can hire to test for microbial contaminants. This is the route that I would recommend for breweries in the early stages of development, especially if no one on staff has extensive experience in microbiological work (e.g., aseptic sampling, plating, gram staining).

This supply list is all about making sure you are pitching viable yeast at a consistent rate (pitch rate has been addressed under the Ingredients section on this website). Remember, you, as a brewer, do not make beer. You make food for yeast. Yeast makes beer. Treat the yeast right, pitch consistently at the proper rate, and you will increase your odds of having a reproducible great beer.

Supplies for the Basic Brewery Laboratory

- **Space:** Make sure this space is well lit and close to your brewing space. In brewing processes there are natural down times that one can do a laboratory process. If the laboratory is in an inconvenient or unpleasant spot in the brewery, the less likely you will be to perform tests or enjoy the work. Do not forget to consider temperature in the space since most laboratory equipment does not function well with large temperature swings.
- **Microscope:** This is critical for counting yeast to determine pitch rates and yeast health. OMAX makes an excellent entry level microscope with a digital camera. The camera is an important tool for troubleshooting, especially if you need to send pictures to other brewers to help identify problems.
- **Hemocytometer:** Essential for counting yeast cells. LW Scientific makes an excellent Neubauer Bright Line, Double counting chamber hemacytometer. Bright line is a must to ensure you can see the grid.

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- **Scale (small capacity, grams):** Accurate dilution is key for yeast counts. The scale will allow you to perform serial dilutions by weight.
- **Methylene blue:** For identifying viable yeast.
- **Saline solution:** Great for dilutions and a substitute contact solution in a pinch.
- **Lens paper:** Be kind to your microscope. Do not use anything but lens paper to clean the optics. Also great for blotting the pH meter probe.
- **pH meter:** A small portable pH meter is great to take from the laboratory to the brewery floor to test the pH of wort, fermenting beer, mash water, or whatever else catches your fancy.
- **pH calibration solution (pH 4, pH 7, pH 10):** If you do not properly calibrate your pH meter, all your readings will be garbage. Keep a close eye on temperature. Always calibrate with three buffers. A straight line can always be drawn through two points. The third point is key.
- **Hydrometers and graduated cylinder:** Purchase a several to cover a range of specific gravities. The graduated cylinder should have a large enough diameter that hydrometer does not get caught on the sides, but not so large that you are wasting beer. The initial gravity of your wort will affect your pitch rate
- **Miscellaneous laboratory supplies:** Beakers of various sizes, pipettes, spray bottle, pipet aids.

The approximate cost of the items listed is \$1000.



Contributing Author

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Jess spent a decade in the biotech industry as a CR&D Biochemist, becoming proficient in a variety of laboratory techniques, instrumentation, OSHA compliant safety protocols, and SOP development. She attended the Master Brewers Program at UC Davis, earning her IBD Diploma in Brewing. Jess started SSQ Consultants to address the need of QA/QC guidance and OSHA compliant documentation in breweries.