

# **BUILDING QUALITY**

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# DOES A QUALITY PROGRAM = A LAB?



# WHAT IS QUALITY ANYWAY?





# PLAN



# EX. MASH ISSUES



# TROUBLESHOOTING MATRIX

Mashing	✓
Grist:	
Total weight	Grist case load cells
Composition	Milled to recipe
Particle sizing	Seive analysis
Water: (usage)	
Strike T	Mash H <sub>2</sub> O RTD
Strike Vol	Mash FM
Sparge start/stop	<del>Mash RTD</del> Time
Spurge T	Mash H <sub>2</sub> O RTD
Spurge Vol	Mash FM
Mashing:	
Pac-heat	SOP/Aud.t
Temp	Mash RTD+handheld
Temp profile/ramps	SOP/Audit or data log
Water: (quality)	
pH	pH
Total alkalinity	alkalinity titration
Chlorine	
Additions:	
CaCl	Added to recipe
CaSO <sub>4</sub>	Added to recipe
Phosphoric acid	mash pH

# EX. TASTE YOUR WATER



Then test your water!



# DON'T FREAK OUT! DON'T BE LAZY!



You're already making great beer!

# WHERE WILL YOU TEST?



# WHO WILL PERFORM THE TESTS?

QUALITY BREWER?



QUALITY SCIENTIST NERD?



# WHAT TO TEST

	Sensory	Alcohol	Gravity	IBU	Turbidity	pH	CO2	DO	Chlorine	Bio	Cell counts
Water*	Light Blue	Grey	Grey	Grey	Light Green	Light Blue	Grey	Grey	Light Blue	Light Green	Grey
Malt	Light Blue	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Grist*	Light Blue	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Hops	Light Blue	Grey	Grey	Light Green	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Yeast	Light Blue	Grey	Grey	Grey	Grey	Light Green	Grey	Grey	Grey	Light Green	Light Blue
Adjuncts	Light Blue	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Light Green	Grey
Wort	Light Blue	Grey	Light Blue	Light Green	Grey	Light Blue	Grey	Light Blue	Grey	Light Blue	Light Blue
Fermenting beer	Light Blue	Light Green	Light Blue	Light Green	Grey	Light Blue	Grey	Grey	Grey	Light Green	Light Blue
Maturation	Light Blue	Light Green	Light Blue	Light Green	Grey	Light Blue	Grey	Light Blue	Grey	Light Green	Grey
Bright beer	Light Blue	Light Green	Light Blue	Light Green	Light Green	Light Blue	Light Green	Light Blue	Grey	Light Green	Grey
Packaged beer*	Light Blue	Light Green	Light Blue	Light Green	Light Green	Light Blue	Light Green	Light Blue	Grey	Light Green	Grey

# WATER



# MALT



# HOPS

Cold Infusion: 2 g pellets → 200 ml, 20°C water

Hop Tea: Vegetal

Physical inspection

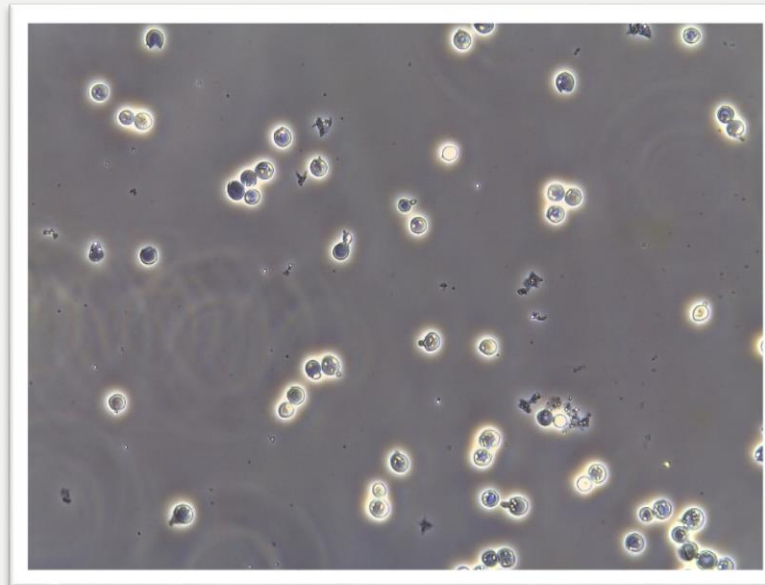
\$0.00



# YEAST

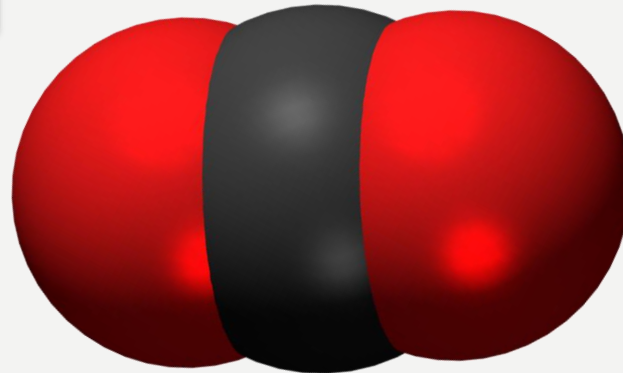


\$600.00+	• Plating
\$540.00+	• Cell Counts • Viability
\$0.00	• Sensory • pH



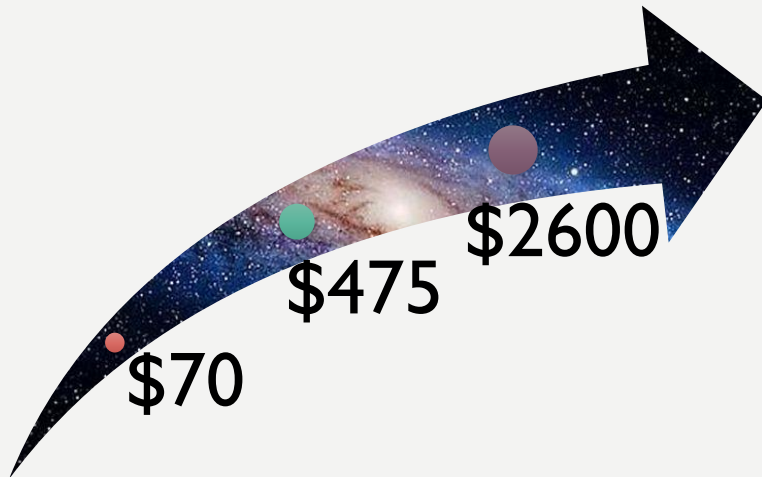


# ADJUNCTS AND PROCESSING GASSES



# BREWHOUSE AND BEYOND

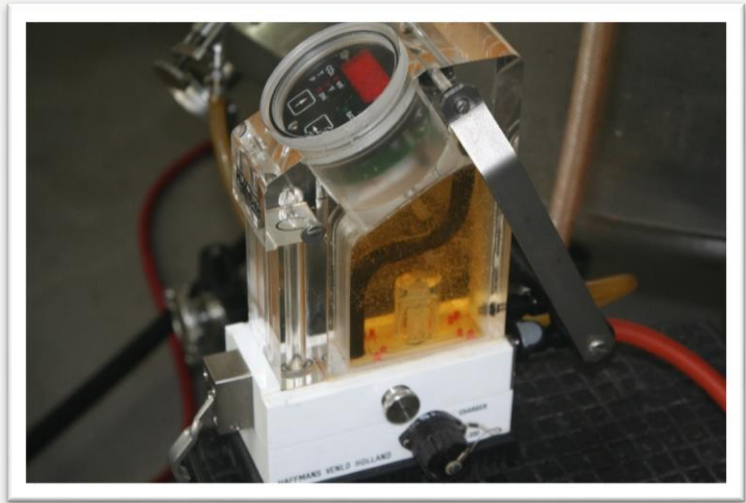
## GRAVITY



## DUAL JUNCTION PH METER

- Meter: \$200+
- pH Buffers ~\$20.00/L
  - 4.01
  - 7.00
  - 10.01

# GASSES

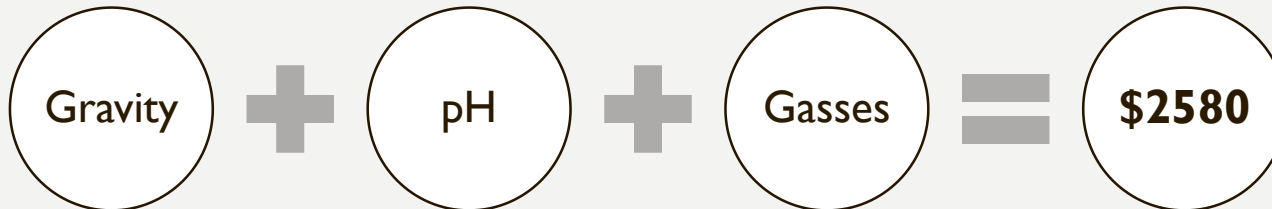


**DO**

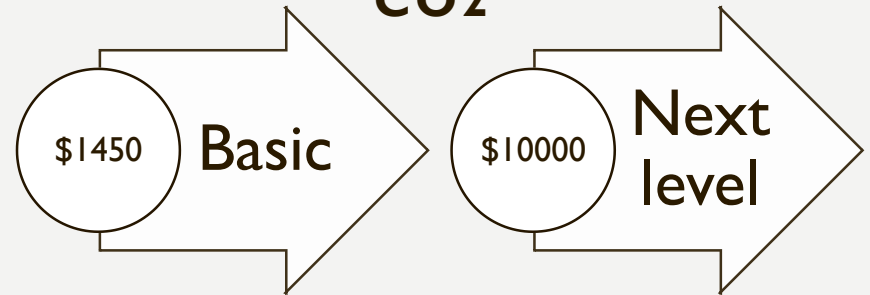
\$800.00+

Knock out aeration for yeast

Packaging



**CO2**



# ADDITIONAL TESTING

- Bitterness: \$0.00; \$6000+
- Turbidity: \$0.00; \$1200+
- Crown gauge: ~\$100.00
- Seam check: \$500 - \$12k+



Google:

“UCDAVIS Hanseniaspora”



## BIO PROGRAM

Wort Stability  $\$350/500 =$   
\$.07/test

HLP  $\$109/500$  grams

Auto-clave  $\$330.00$

WLD/WLN  $\$112.00/500$   
grams

LMDA  $\$330.00/500$   
grams

UBA  $\$158.00/500$  grams

Sterile plates  
 $\$145.00/500 =$  \$.30/plate

# RESOURCES

**A Guideline to Growing Your Quality Laboratory**

An instrument guide for purchasing lab equipment and expanding your quality program by using the official Methods of Analysis of the American Society of Brewing Chemists (ASBC).

Legend: ■ Recommended to be purchased, ■ Optional Purchase

Volume produced (bbls x 1000) per year	<15	20-30	35-50	60-77	78-100	ASBC Method of Analysis & Method Number
<b>General - Equipment</b>						
Analytical Balance or Top Loading Scale						Use in many methods for weighing all types of items.
Autoclave or Pressure Cooker						Sanitizers, Culture Media (Microbiological Control-4 & 5)
Centrifuge						Bitterness Units (Beer-23A, B), color (Beer-10), Yeast Solids % by Spin-down (Yeast-5B)
Cleanbenches						Microbiological Applications and Microbiological Controls
Drying Oven						Total Contents of Bottles & Cans (Fils-1), Moisture (Brewers' Grain-3 & Malt-3), Preparation of Sample (Brewers' Grain-2)
Fumehood						Chemical preparation (various analytical methods)
Refrigerator / Cooler						Sample storage, chemical storage
Shaker Table and/or Wrist Shaker						Beer Bitterness (Beer-23), Beer Decarbonation by Rotary Shaker (Beer-1D)
Titration Burette						Total Acidity (Beer-6)
Stir plate / Hot plate						Degassing, chemical preparation, microbiological media preparation
Waterbath						Attempere samples
<i>*All beer production volumes, many complex analytical tests can be outsourced to an external laboratory or test kits may be used in lieu of purchasing equipment.</i>						
<b>Beer Materials and Packaging</b>						
Crimp Gauge						Crimp Determination Test-Crowns (Bottle Closure-4)
Fiability Meter						Malt Modification by Fiability (Malt-12)
Malt Sieves / Sieve Shaker						Malt Modification by Fiability (Malt-12), Grist by Standard Sieve (Malt-15A), Grist by Manual Sieve (Malt-15B)
Mash Bath						High-Diast, Caramel, and Black Malts (Malt-9), Soluble Extract (Brewers' Grain-3)
Pycnometer						Alcohol (Beer-4B), Malt Extract (Malt-4), Real Extract (Beer-5), Specific Gravity (Beer-2A), Total Contents of Bottles & Cans by Calculation from Measured Net Weight (Fils-1)
Torque Meter						Removal torque Procedures for Crowns (Bottle Closure-5B)
Universal Lab Disk Mill						Preparation of Sample (Brewers' Grain-2), High-Diast, Caramel, and Black Malts (Malt-9)
<b>Chemistry</b>						
Alcohol Meter						Alcohol (Beer-4)
CO2 Meter						Dissolved Carbon Dioxide (Beer-13); at balance 40,000 bbls, chemical methods may be used.
Digital Density Meter						Extract (Wort-3), Malt Extract (Malt-4), Real Extract (Beer-5), Soluble Extract (Brewers' Grain-3), Specific Gravity by Digital Density Meter (Beer-2B), Total Contents of Bottles & Cans by Calculation from Measured Net Weight (Fils-1)
Distillation Equipment						Note: Diacetyl (Beer-25B) Note: Recommend Gas Chromatograph for Diacetyl
Foam Meter						Foam Collapse Rate-Sigma Value (Beer-22)
Gas Chromatograph						Alcohol Determined by GC (Beer-4C), Diacetyl (Beer-25C), Lower Boiling Volatiles in Beer or Ales (Beer-20)
Hydrometer						Apparent extract (Beer-3), Apparent Extract by Hydrometer (Wort-6), Extract (Wort-3), Soluble Extract (Brewers' Grain-3), Total Contents of Bottles & Cans by Calculation from Measured Net Weight (Fils-1), Yeast Fermentable Extract (Wort-5)
Oxygen Meter						Dissolved Oxygen (Beer-34)
pH Meter						Beer pH (Beer-8), pH of Water Suspension (Fiber Acids-2), Total Acidity (Beer-8), Wort pH (Wort-6)
UV/Vis Spectrophotometer						Beer Bitterness (Beer-23), Beer Color (Beer-10), Diacetyl (Beer-25 D), PAN (Wort-2), Iron (Beer-18A, C), Total Polyphenols (Beer-35), Wort Color (Wort-9)
Turbidimeter or Haze Meter						Physical Stability (Beer-27)

continues

\* The ASBC Methods of Analysis are an important tool for brewers both large and small to ensure quality and maintain their competitive edge. ASBC members receive a subscription to the methods as a benefit of their membership. For more information, go to [www.asbcnet.org](http://www.asbcnet.org).

## BA QUALITY PYRAMID

