



**HOP &
BREW
SCHOOL**

Batch	1007.	10.5P	
Batch	1008	11.1P	OG 5.1
Batch	1009	12.1P	OG 5.4
Batch	1010	13.1P	OG 5.6
Batch		13.2P	OG 5.7%

DESIGNING EFFICIENT BEERS: GETTING THE MOST FROM YOUR HOPS

OUR MISSION

Our Mission is to connect family hop farms with the world's finest brewers, providing the highest quality hop products and uncompromising service for the ultimate benefit of our customers, employees and growers.

OUR VISION

Our Vision is to be the global hop supplier of choice. We want our passion for preserving the planet, treating people with respect and dignity, and our commitment to healthy communities to be reflected in every beer brewed with our hops.

OUR VALUES

- **Passion:** For people, product, planet and process
- **Respect:** Teamwork and collective responsibility
- **Integrity:** Transparency and accountability in all we do
- **Dedication:** Safety, quality and sustainability
- **Excellence:** An emphasis on innovation and continuous improvement

GROWERS

We are the only 100% grower owned hop company. Our grower families have been harvesting hops in the Northwest since the 1800s and have acquired a wealth of knowledge and expertise throughout the decades to create the highest quality hops.

These grower-owners include:

- 3D Farm/BC Hop Farm
- Brulotte Farms
- B.T. Loftus Ranches
- C&C Hop Farms
- Carpenter Ranches
- Gasseling Ranches
- Perrault Farms
- Sauve & Son Farms
- Sodbuster Farms
- Van Horn Farms



**CHARLIE
DAVIDSON**

3D & BC HOP FARMS
4th Generation
Woodburn, OR



**ED
ST. MARY**

BLACK STAR RANCHES
5th Generation
Moxee, WA



**REGGIE
BRULOTTE**

BRULOTTE FARMS
6th Generation
Toppenish, WA



**MIKE
SMITH**

B.T. LOFTUS RANCHES
3rd Generation
Yakima, WA



**KEITH
HOUSER**

C & C HOP FARMS
3rd Generation
Moxee, WA



**CRAIG
CARPENTER**

CARPENTER RANCHES
5th Generation
Granger, WA



**JOHN
COLEMAN**

COLEMAN AGRICULTURE
6th Generation
St. Paul, OR



**KEVIN
RIEL**

DOUBLE R HOP RANCHES
5th Generation
Harrah, WA



**PATRICK
GASSELING**

GASSELING RANCHES
4th Generation
Wapato, WA



**BRENTON
ROY**

OASIS FARMS
4th Generation
Prosser, WA



**STEVE
PERRAULT**

PERRAULT FARMS
3rd Generation
Toppenish, WA



**RICK
SAUVE**

SAUVE & SON FARMS
3rd Generation
Mabton, WA



**DOUG
WEATHERS**

SODBUSTER FARMS
3rd Generation
Salem, OR



**RICH
VAN HORN**

VAN HORN FARMS
2nd Generation
Moxee, WA

In addition to our grower owners, we receive hops from an additional 50 families throughout the Pacific Northwest.

YAKIMA CHIEF RANCHES

Yakima Chief Ranches, formerly Select Botanical Group (SBG), is Yakima Chief Hops partner from propagation to pint.

Works with Hop Breeding Company to develop new hop varieties.

YCR is an integrated crop management company that specializes in breeding new hop varieties for the global brewing industry.

Footprints® - Comprehensive brand management program that ensures the highest level of attention is given to the growing and harvesting of hops.



HOP BRANDS, VARIETIES & BLENDS

Portfolio of over 80 varieties:

- American Hops from the Pacific Northwest - A full portfolio of hops that can be used to create the world's best beers – hops for delivering aroma, flavor and bitterness.
- Select Imported hops from Germany, New Zealand, & Australia.

New hop brands released through Hop Breeding Company:

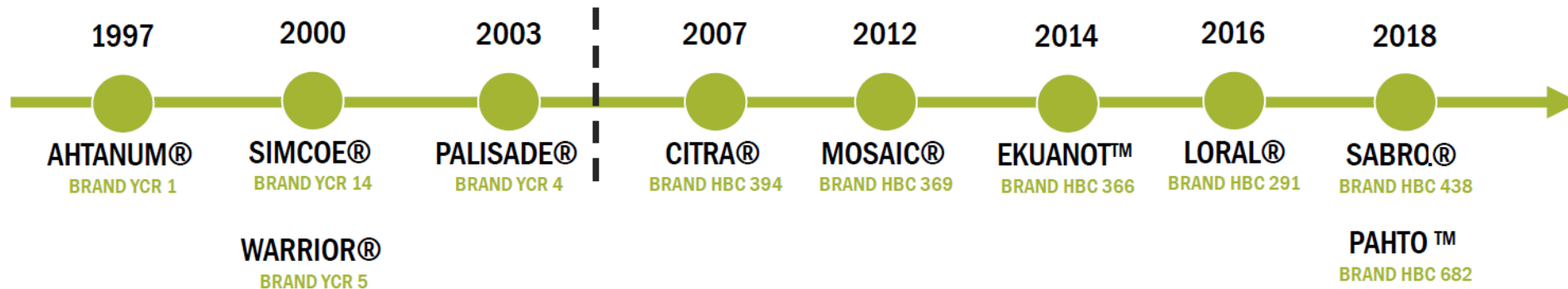
YCH also offers proprietary blends.

Community Blends

- Pink Boots Blend
- Falconer's Flight® Blend
- Veterans Blend

Expression Blends

- Zythos® Blend
- Independence Blend
- Pacific Crest Blend





TEST CASE #1: WEST COAST IPA

MAXIMUM FLAVOR, MAXIMUM EFFICIENCY

TEST CASE #1: WEST COAST IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	90%	Pahto™ T-90 Pellets	25	60 min before flameout		2.2
Wheat Malt	5%	Mosaic® T-90 Pellets	18	10 min after flameout	2 g/l	6
Crystal 60 Malt	5%	Simcoe® T-90 Pellets	18	10 min after flameout	2 g/l	6
Rice Hulls	As needed	Citra® T-90 Pellets	0	Dry Hop #1	5 g/l	15
		Sabro® T90 Pellets	0	Dry Hop #2	5 g/l	15
		Loral® T-90 Pellets	0	Dry Hop #2	5 g/l	15
	100%		61		19.7 g/l	59.2

PRODUCTS



FRESH HOPS
WHOLE, WET HOP CONES



WHOLE LEAF HOPS
WHOLE, KILN-DRIED HOP CONES



HOP PELLETS
T-90 PELLETS & PELLET BLENDS

YAKIMA CHIEF HOPS: T-90 PELLET QUALITY



All specs optimized for highest utilization of oil and alpha.

T-90 PELLET SPECIFICATIONS

Pellet Size: **1/4"** (6.35 mm)

Pellet Temperature at Die: **90° – 105°F** (32.2° – 40.6°C)

Pellet Density: **31 – 35 lbs/ft³** (496.6 – 560.6 g/L or kg/m³)

Packaging Type: **Nitrogen Flushed Soft Pack**

Residual O₂ Content of Package: **<2%**

TEST CASE #1: WEST COAST IPA

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Pale Ale Malt	90%	Pahto™ T-90 Pellets	25	60 min before flameout		2.2
Wheat Malt	5%	Mosaic® T-90 Pellets	18	10 min after flameout	2 g/l	6
Crystal 60 Malt	5%	Simcoe® T-90 Pellets	18	10 min after flameout	2 g/l	6
Rice Hulls	As needed	Citra® T-90 Pellets	0	Dry Hop #1	5 g/l	15
		Sabro™ T-90 Pellets	0	Dry Hop #2	5 g/l	15
		Loral® T-90 Pellets	0	Dry Hop #2	5 g/l	15
	100%	Totals	61		19.7 g/l	59.2

PRODUCTS



FRESH HOPS
WHOLE, WET HOP CONES



WHOLE LEAF HOPS
WHOLE, KILN-DRIED HOP CONES



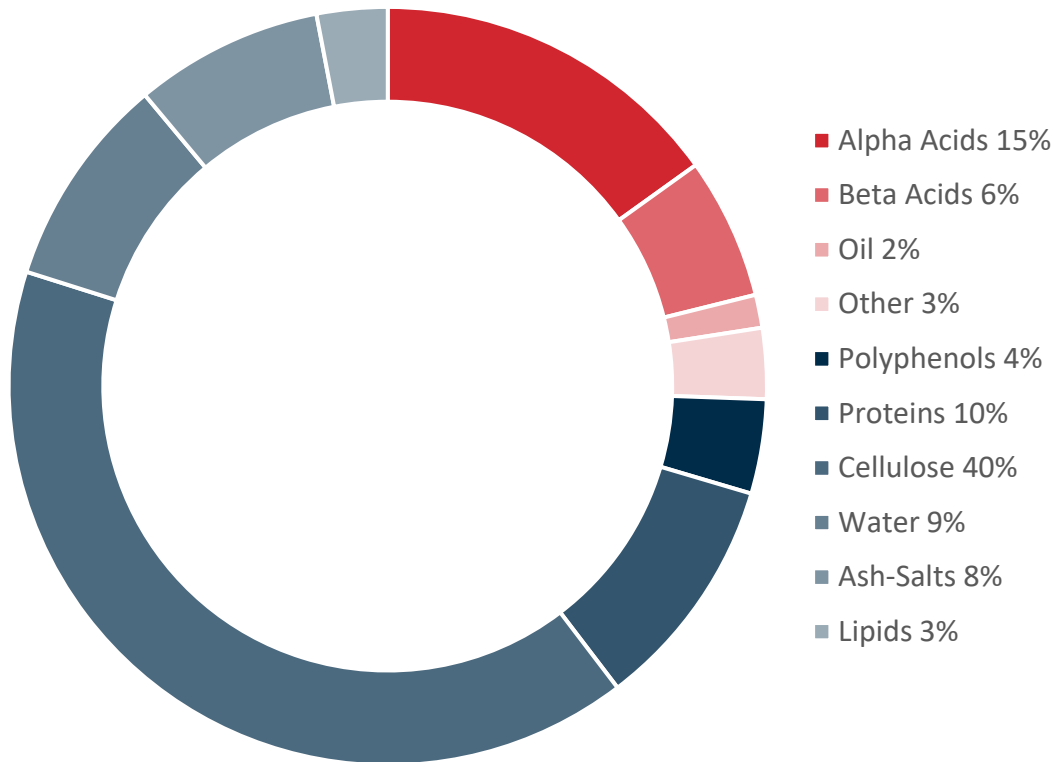
HOP PELLETS
T-90 PELLETS & PELLET BLENDS



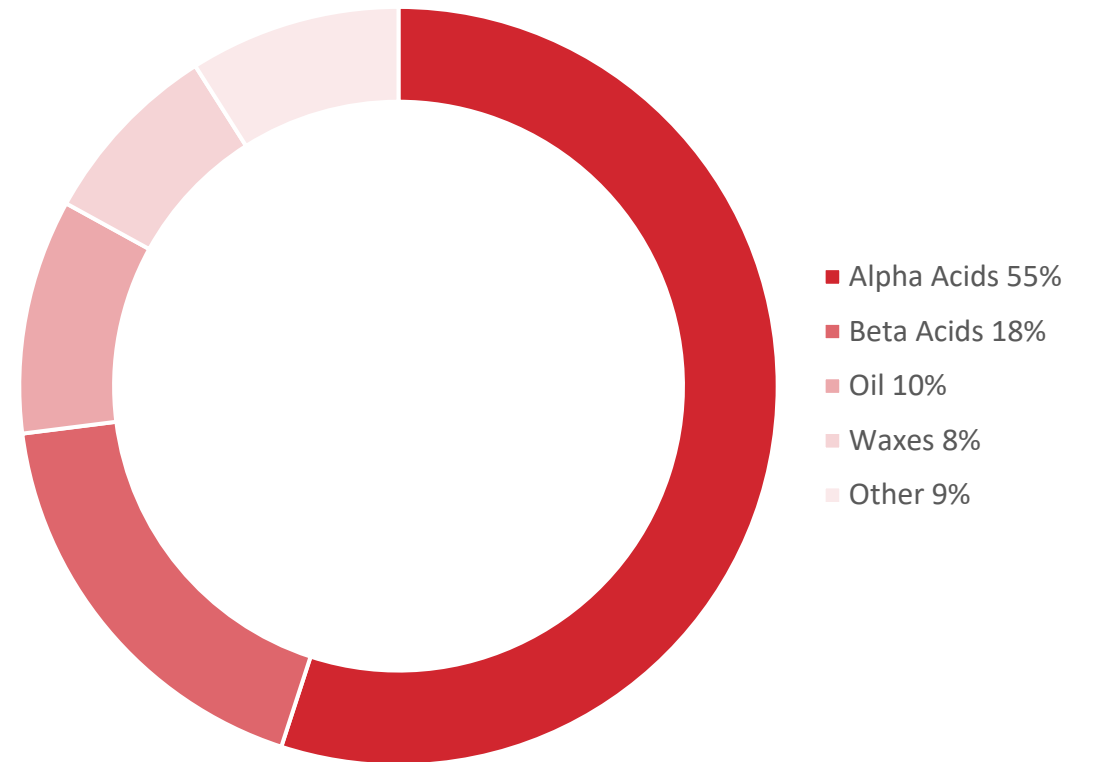
CO₂ EXTRACT
AND CO₂ EXTRACT
DERIVED PRODUCTS

WHOLE LEAF / PELLETS VS EXTRACT

WHOLE LEAF / PELLET COMPOSITION



HOP EXTRACT COMPOSITION



The extraction process filters out all of the hop's solid plant matter and other contaminants leaving behind the purest resin and oil content possible.

BENEFITS OF USING CO₂ EXTRACT

DOSING EFFICIENCY

- Working with ¼ of the mass
 - Reduces wort loss
- Reduces brew kettle foam formation during the boil
- Reduces vegetal & polyphenol flavor contribution

SHIPPING, STORAGE HANDLING

- ¼ of the mass of T-90 pellets, less shipping cost
- Better product stability over time
- Ambient storage vs. cold storage



TIPS FOR USING CO₂ EXTRACT

HOT-SIDE ONLY

- Kettle
- Whirlpool- with care
- Fermenter- No!!!!

HEAT TIN BEFORE USE

- Soak in hot water
- Tin and ink are food-safe

TAKE CARE TO FULLY INCORPORATE

- Dilute with water/wort
- Pour slowly



TEST CASE #1: WEST COAST IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	90%	Pahto™ CO2 Extract	25	60 min before flameout	1x 300gma tin	-
Wheat Malt	5%	Mosaic® T-90 Pellets	18	10 min after flameout	2 g/l	6
Crystal 60 Malt	5%	Simcoe® T-90 Pellets	18	10 min after flameout	2 g/l	6
Rice Hulls	As needed	Citra® T-90 Pellets	0	Dry Hop #1	5 g/l	15
		Sabro™ T-90 Pellets	0	Dry Hop #2	5 g/l	15
		Loral® T-90 Pellets	0	Dry Hop #2	5 g/l	15
	100%	Totals	61		19.7 g/l	59.2
				New Total	19 g/l	57.0

TEST CASE #1: WEST COAST IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	90%	Pahto™ C02 Extract	25	60 min before flameout	1x 300gma tin	-
Wheat Malt	5%	Mosaic® T-90 Pellets	18	10 min after flameout	2 g/l	6
Crystal 60 Malt	5%	Simcoe® T-90 Pellets	18	10 min after flameout	2 g/l	6
Rice Hulls	As needed	Citra® T-90 Pellets	0	Dry Hop #1	5 g/l	15
		Sabro™ T-90 Pellets	0	Dry Hop #2	5 g/l	15
		Loral® T-90 Pellets	0	Dry Hop #2	5 g/l	15
	100%	Totals	61		19.7 g/l	59.2
				New Total	19 g/l	57.0

PRODUCTS



FRESH HOPS
WHOLE, WET HOP CONES



WHOLE LEAF HOPS
WHOLE, KILN-DRIED HOP CONES



HOP PELLETS
T-90 PELLETS & PELLET BLENDS



CO₂ EXTRACT
AND CO₂ EXTRACT
DERIVED PRODUCTS



BRACT



CRYO HOPS®

**5g Cryo Hops®
Powder**

**4g CRYO HOPS®
Powder + 2g T-90**

10g T-90 Pellets

**5g Cryo Hops®
Pellets**



Cryo Hops® should first be used at 50% by weight of a typical T-90 dose. Each glass has an equivalent total hop dose.

**5g Cryo Hops®
Powder**

**4g Cryo Hops®
Powder + 2g T-90**

10g T-90 Pellets

**5g Cryo Hops®
Pellets**



Hop products after dissolving in room temperature water. Powder tends to float without convection or agitation.

**5g Cryo Hops®
Powder**

**4g Cryo Hops®
Powder + 2g T-90**

10g T-90 Pellets

**5g Cryo Hops®
Pellets**

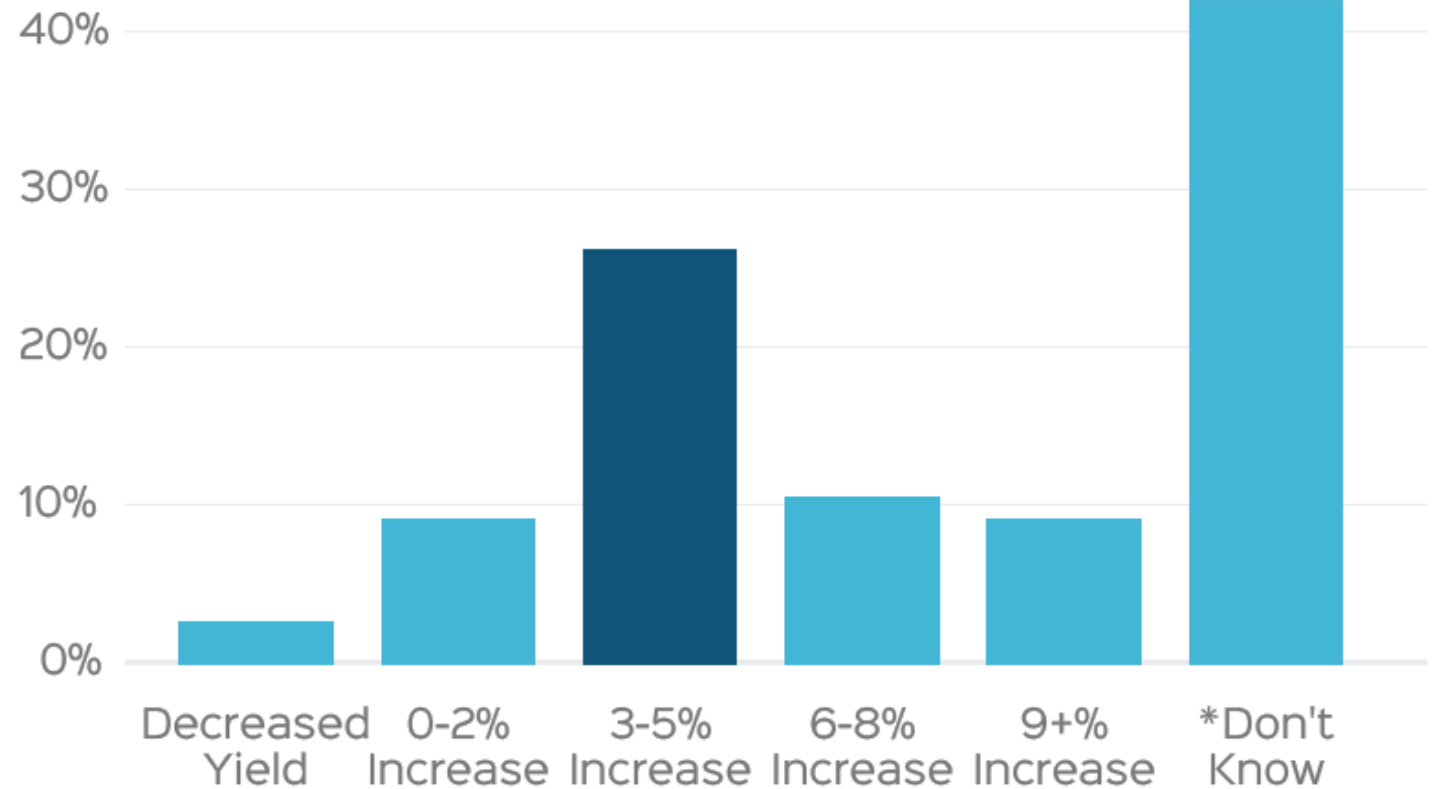


Hop products after dissolving, mixing and allowing to settle. Sediment in T-90 is 2-3x higher than Cryo Hops®

YIELD

WHAT IS THE TYPICAL CHANGE IN BEER YIELD?

3-5% yield improvement is most common but this depends on beer style and how efficient the brewer already is.



* Many brewers didn't know their change in yield either because they hadn't used CRYO HOPS enough times or they brewed new recipes and had no basis for comparison.

COST SAVINGS

10g T-90 Pellets 5g Cryo Hops® Pellets



INCREASED BEER YIELD

	Pellets	CRYO HOPS Pellets	Net
Revenue/hl	\$400		
Estimated Final Yield Increase	2%		
Dose Rate	50%		
Hops kg/hl	1		
Avg. Cost of Hops/KG	\$30.25	\$72.60	
Batch Yield (HL)	30	30.6	0.6
Net Revenue/batch	\$12,000	\$12,240	\$240
Total Cost of Hops/batch	\$908	\$1089	\$181
Net Increase in Revenue/batch			\$ 59

COST SAVINGS

10g T-90 Pellets 5g Cryo Hops® Pellets



INCREASED BEER YIELD

	Pellets	CRYO HOPS Pellets	Net
Revenue/hl	\$400		
Estimated Final Yield Increase	5%		
Dose Rate	50%		
Hops kg/hl	1		
Avg. Cost of Hops/KG	\$30.25	\$72.60	
Batch Yield (HL)	30	31.5	1.5
Net Revenue/batch	\$12,000	\$12,600	\$600
Total Cost of Hops/batch	\$908	\$1089	\$181
Net Increase in Revenue/batch			\$ 419

TEST CASE #1: NEW ENGLAND IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	60%	Pahto™ CO2 Extract	25	60 min before flameout	1x 300gma tin	-
Wheat Malt	30%	Mosaic® T-90 Pellets	18	10 min after flameout	2 g/l	6
Rolled Oats	10%	Simcoe® CRYO HOPS® Pellets	18	10 min after flameout	1 g/l	3
Rice Hulls	As needed	Citra® CRYO HOPS® Pellets	0	Dry Hop #1	2.5 g/l	7.5
		Sabro™ T-90 Pellets	0	Dry Hop #2	5 g/l	15
		Loral® CRYO HOPS® Pellets	0	Dry Hop #2	2.5 g/l	7.5
	100%	Totals	66		19.7 g/l	59.2
				New Total	14.1 g/l	42.4

NOTE: EFFECTIVE DOSING RATE IS THE SAME



TEST CASE #2: IMPERIAL IPA

MAXIMUM FLAVOR, MAXIMUM EFFICIENCY

TEST CASE #2: IMPERIAL IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	87%	Warrior™ T90 Pellets	31*	60 minutes before flameout		3.7
Crystal 30	3%	Mosaic® T90 Pellets	18*	10 min after flameout	2 g/l	6
Dextrose	10%	Simcoe® T90 Pellets	18*	10 min after flameout	2 g/l	6
		Idaho 7® T90 Pellets	0	Dry Hop #1	4 g/l	12
		Sabro™ CRYO HOPS® Pellets	0	Dry Hop #2	2 g/l	6
		Citra® CRYO HOPS® Pellets	0	Dry Hop #2	4 g/l	12
		Loral™ T90 Pellets	0	Dry Hop #2	4 g/l	12
	100%	Totals	67		19.2 g/l	57.7

TEST CASE #2: IMPERIAL IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	87%	Warrior™ T90 Pellets	31*	60 minutes before flameout		3.7
Crystal 30	3%	Mosaic® T90 Pellets	18*	10 min after flameout	2 g/l	6
Dextrose	10%	Simcoe® T90 Pellets	18*	10 min after flameout	2 g/l	6
		Idaho 7® T90 Pellets	0	Dry Hop #1	4 g/l	12
		Sabro™ CRYO HOPS® Pellets	0	Dry Hop #2	2 g/l	6
		Citra® CRYO HOPS® Pellets	0	Dry Hop #2	4 g/l	12
		Loral™ T90 Pellets	0	Dry Hop #2	4 g/l	12
	100%	Totals	67		19.2 g/l	57.7

TEST CASE #2: IMPERIAL IPA



CONVERSION

IBU



KETTLE ADDITION IBUS

↻ RESET

↓ SAVE

Formula & Measurements ⓘ

Measurement System

Metric

Measurement Scale

Commercial

Gravity Units

Plato

Time, Volume & Gravity ⓘ

Boil Time

min 60

Pre-boil Volume

hL 31

Post-boil Volume

hL 30

Pre-boil Gravity - Calculate

°P 18

Post-boil Gravity

°P 19

Addition 1 ⓘ

31.3 IBU

Variety

Warrior® Brand

Product

Extract

Utilization

% 35

GMA

450

Location

Kettle

Boil Time

min 60



☑ RECIPE CONFIGURATION COMPLETED

☑ ADDITION COMPLETED

Total ≈ 31.3* IBU

*This is an estimated IBU value, your results may differ based on your brewing system

TEST CASE #2: IMPERIAL IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	87%	Warrior™ CO2 Extract	31*	60 minutes before flameout	450 gma	-
Crystal 30	3%	Mosaic® T90 Pellets	18*	10 min after flameout	2 g/l	6
Dextrose	10%	Simcoe® T90 Pellets	18*	10 min after flameout	2 g/l	6
		Idaho 7® T90 Pellets	0	Dry Hop #1	4 g/l	12
		Sabro™ CRYO HOPS® Pellets	0	Dry Hop #2	2 g/l	6
		Citra® CRYO HOPS® Pellets	0	Dry Hop #2	4 g/l	12
		Loral™ T90 Pellets	0	Dry Hop #2	4 g/l	12
	100%	Totals	67		19.2 g/l	57.7
			New Totals		18 g/l	54

USING CO₂ EXTRACT FOR AROMA

RULE OF THUMB

- **150 gma = 1kg of aroma hops**
 - Ex. Replace 6kg Simcoe T90 addition with 900 gma Simcoe CO2 Extract

REMEMBER:

- HEAT TIN BEFORE USE
 - Soak in hot water
 - Tin and ink are food-safe
- TAKE CARE TO FULLY INCORPORATE
 - Dilute with water/wort
 - Pour slowly



TEST CASE #2: IMPERIAL IPA

Malt Type	Grist Percentage	Variety	Desired IBU	Addition Time	Dosing Rate	kg/30hl
Pale Ale Malt	87%	Warrior™ CO2 Extract	31*	60 minutes before flameout	450 gma	-
Crystal 30	3%	Mosaic® CO2 Extract	18*	10 min after flameout	3x 300gma tins	-
Dextrose	10%	Simcoe® CO2 Extract	18*	10 min after flameout	3x 300gma tins	-
		Idaho 7® T90 Pellets	0	Dry Hop #1	4 g/l	12
		Sabro™ CRYO HOPS® Pellets	0	Dry Hop #2	2 g/l	6
		Citra® CRYO HOPS® Pellets	0	Dry Hop #2	4 g/l	12
		Loral™ T90 Pellets	0	Dry Hop #2	4 g/l	12
	100%	Totals	67		19.2 g/l	57.7
			New Totals		14 g/l	42



THANKS FOR JOINING US!



HOP & BREW SCHOOL

Have questions about this session or others?

Email us at brewschool@yakimachief.com or brewinghelp@yakimachief.com

For more sessions visit: hopandbrewschool.com