

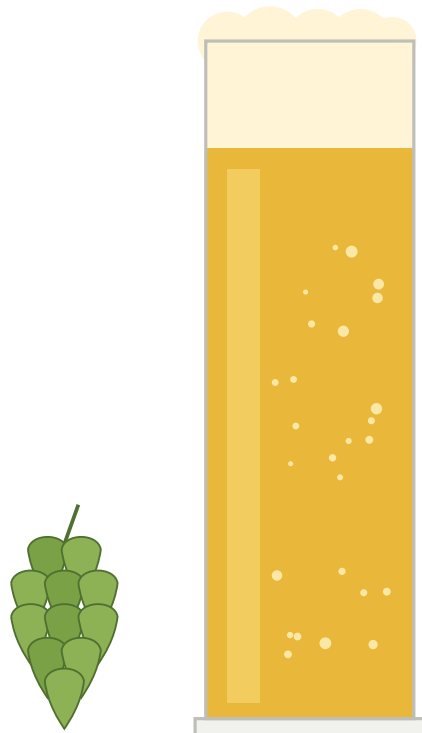
BREWING RECIPE BY CRISTIAN

WANGNER KÖLSCH

Top-fermented Kölsch · pale, mild, crisp

AT A GLANCE

Grain bill	15.72 lb Pilsner, Vienna and pale wheat malt
Hops	Tradition, Cascade in the whirlpool
Yeast	SafAle K-97, 23 g (1 sachet of 11.5 g per fermenter)
Water	Mash water 6.6 gal + sparge water 6.6 gal = 13.2 gal
Fermentation	64 °F, about 1–2 weeks
Bottling	Bottle conditioning, target 2.8 vol CO ₂



KEY FIGURES

8.5 gal

Batch size

1.053

Original gravity

5.2 %

Alcohol (approx.)

25

IBU

4

SRM

MY BREW

Brew no.

Brewed on

Bottled on

WANGNER KÖLSCH

Kölsch · Recipe by Cristian · 8.5 gal · OG 1.053 · approx. 5.2 % alcohol · 25 IBU · 4 SRM (8 EBC)

■ Ingredients and steps ■ Measure and record Before brewing: enter all known data in the Brauwerkstatt calculators.

INGREDIENTS

	Ingredient	Amount	Note
Grain bill	Pilsner malt	12.83 lb	81.6 %
	Vienna malt	1.61 lb	10.2 %
	Pale wheat malt	1.28 lb	8.1 %
	Total	15.72 lb	
Hops	Tradition (5.2 % α)	1.98 oz (56 g)	start of boil, 90 min
	Cascade (6.0 % α)	0.53 oz (15 g)	whirlpool
Yeast	SafAle K-97	2 sachets of 11.5 grams (about 2.7 grams per gallon)	
Finning	Irish moss	about 2–3 g	

WATER AND ADDITIONS

Addition	Amount
Water	Mash water 6.6 gal + sparge water 6.6 gal = 13.2 gal
Distilled water	According to your dilution (record below)
Campden tablet	1 tablet (0.44 g), only if you smell chlorine
Calcium chloride	Amount from the Brauwerkstatt calculator
Gypsum	Amount from the Brauwerkstatt calculator
Lactic acid 80 %	Amount from the Brauwerkstatt calculator
Priming sugar	Carbonation calculator, amount per bottle

MEASURE

What	How
Alkalinity	Measure yourself with a drop test
Calcium, magnesium, sulphate, chloride	Do not measure, take them from your water report
pH of water and mash	Digital pH meter or brewing test strips (pH 5.2–6.8)
Original gravity	Hydrometer or refractometer (correction in beer done by the calculator)
Iodine test	Iodine tincture from the pharmacy, on a white plate

MY WATER VALUES (RECORD)

Value	Target	Measured	After dilution	Re-measured	Source
Alkalinity	71–89 ppm as CaCO ₃	_____ ppm	_____ ppm	_____ ppm	Measured
pH water	6.5–8.0	_____	_____	_____	Measured
Calcium (Ca ²⁺)	50–150 ppm	_____ ppm	_____ ppm	–	Water report
Sulphate (SO ₄ ^{2–})	50–100 ppm	_____ ppm	_____ ppm	–	Water report
Chloride (Cl [–])	60–100 ppm	_____ ppm	_____ ppm	–	Water report
Magnesium (Mg ²⁺)	5–30 ppm	_____ ppm	_____ ppm	–	Water report
My dilution	Tap: ____ gal		Distilled: ____ gal	Share of tap: ____	

Diluting with distilled water (e.g. 50/50): mix half tap and half distilled water; all values are halved (alkalinity 303 ppm becomes 152 ppm). Enter the values from your water report (not halved) and the volumes in the Brauwasser calculator, it dilutes for you.

Helper table: substances in brewing water

WATER VALUES: EFFECT AND WHAT TO DO				
Value	Target	Effect in beer	Too low	Too high
Alkalinity	71-89 ppm as CaCO_3	Buffers acid and raises mash pH. Too much: harsh taste, scratchy hops.	No lactic acid needed. If too low after acid: add untreated tap water and measure again.	Add lactic acid. Above 268 ppm also dilute.
Calcium	50-150 ppm	Lowers mash pH, helps yeast and clarity. Too much: harsh.	Add calcium chloride or gypsum.	Dilute with distilled water.
Sulphate	50-100 ppm	Accentuates hop bitterness, drier beer.	Add a little gypsum (Kölsch: little sulphate).	Dilute with distilled water.
Chloride	60-100 ppm	Makes the beer fuller and rounder.	Add calcium chloride.	Dilute with distilled water.
Chlorine	no smell	Gives a medicinal taste.	Do nothing.	Add a Campden tablet or briefly boil the water.
pH water	6.5-8.0	Says little about mash pH; alkalinity matters more.	Do nothing, measure alkalinity and mash pH.	Do nothing, measure alkalinity and mash pH.
pH mash	5.4-5.5	Affects efficiency, taste and hop character.	5.2-5.4: do nothing. Below 5.2: add baking soda (1 g raises about 0.05 pH), measure again.	Add lactic acid as calculated and measure again.

BREWING TERMS	
Alkalinity	The bicarbonate content of the water, given in ppm as CaCO_3 . It buffers acid and raises mash pH.
General hardness (GH)	Calcium and magnesium in the water. Gypsum and calcium chloride raise it, while alkalinity stays the same.
Residual alkalinity (RA)	What is left of the acid buffer once calcium and magnesium work against it in the mash: $\text{RA} = \text{alkalinity} - (\text{Ca} / 1.4 + \text{Mg} / 1.7)$, all in ppm (alkalinity as CaCO_3). It shows how strongly the water raises mash pH overall.
Mash pH	pH of the mash 10-15 minutes after mashing in, measured at 68 °F. Usually aim for 5.4-5.5. It affects efficiency, clarity and how smooth the hop bitterness tastes.
Calcium chloride	Brewing salt that adds calcium and chloride. Chloride makes the beer fuller and rounder.
Gypsum	Calcium sulphate. Adds calcium and sulphate. Sulphate accentuates hop bitterness and makes the beer drier.
Lactic acid 80 %	Lowers alkalinity and pH. Added to the cold brewing water or, as a correction, to the mash. Corrosive, wear gloves.
Dilution	Mixing tap water with distilled water to lower values that are too high.
Mash water and sparge water	Mash water is used for mashing, sparge water is the 172 °F water used to rinse the grain bed.
Mashing in	Stirring the crushed malt into the warm water. Enzymes then convert starch into sugar.
Rest	Time at a set temperature during which specific enzymes work.
Iodine test	Test for remaining starch. If the sample no longer turns blue or purple, the starch is converted.
Mash out	Heating the mash to 172 °F. Enzymes stop and the mash becomes more fluid.
Lautering and spent grain	Lautering separates the wort from the solid malt husks, the spent grain, which acts as a filter.
Original gravity (OG)	Sugar content of the wort before fermentation, given as specific gravity (SG). It determines the later alcohol content. $\text{SG } 1.048 \approx 12 \text{ °P}$.
Final gravity (FG)	Sugar content after fermentation, as SG. Together with the original gravity it gives the alcohol content.
Attenuation	How much of the extract the yeast has fermented. Usually 70-85 %, depending on yeast and beer style.

Hydrometer	Floating instrument for measuring gravity, calibrated to a set temperature, often 60 °F or 68 °F.
Refractometer	Measures sugar content in °Brix from a few drops. For wort a correction factor of about 1.04 applies ($13.5\text{ °Bx} \approx \text{SG } 1.053$). After fermentation alcohol distorts the reading; the calculator corrects for it.
IBU	Measure of bitterness (International Bitterness Units). The site uses the Tinseth formula, including the whirlpool.
Whirlpool	Swirling the wort after the boil so trub collects in a cone in the middle. Whirlpool hops add lots of aroma and little bitterness.
Dry hopping	Adding hops to the fermenter. Adds aroma but no bitterness.
SRM / EBC	Measures of beer colour. SRM is used in the US, EBC in Europe. $\text{SRM} \approx \text{EBC} \div 1.97$. The higher, the darker.
Pitching	Adding the yeast to the chilled wort.
Carbonation	CO ₂ in the finished beer, given in volumes (1 volume $\approx 1.98\text{ g/l}$). In bottle conditioning the yeast produces it from a little priming sugar added at bottling.
All-in-one brewing system	One unit for mashing, lautering and boiling, usually with heater, pump and grain basket.
Pre-boil wort	The wort in the kettle before the boil, after lautering and sparging. Part of it evaporates during the boil.
Batch size	The finished wort after the boil that goes into the fermenter. The batch size in the recipes means this amount.
Ale and lager yeast	Ale yeast (ale, wheat beer, Kölsch) ferments at about 59–72 °F and gives fruity aromas. Lager yeast (lager, Helles, Pils) ferments cool at about 46–55 °F and tastes cleaner.
Diacetyl rest	For lagers, raise the temperature to 61–64 °F for 2 days at the end of fermentation. The yeast then cleans up diacetyl, which otherwise tastes of butter.
Ferulic acid rest	Short rest at about 113 °F for wheat beer. It boosts the typical clove aroma of wheat yeast.
Malt extract	Concentrated wort as syrup or powder. It skips mashing and lautering, ideal for a first beer.
Brewhouse efficiency	How much of the extract in the malt actually ends up in the wort. Usually 60–75 % on homebrew systems.
Specific gravity (SG)	Density of the wort compared with water (water = 1.000). Typical wort is around 1.040–1.060. Rule of thumb: the last two digits divided by 4 give roughly degrees Plato, so $1.048 \approx 12\text{ °P}$.
Brix (°Bx)	Unit shown by a refractometer for sugar content. For wort, °Bx divided by 1.04 gives the true value ($13.5\text{ °Bx} \approx \text{SG } 1.053$). After fermentation a correction is needed; the final-beer calculator does it for you.
Alpha acid (α)	The bittering compound in hops, given as a percentage on the pack. The higher it is, the more bitterness per gram. Bittering hops often have 10–15 %, aroma hops 3–7 %.
BU:GU	Ratio of bitterness (IBU) to gravity units (the last two digits of the SG). Around 0.5 tastes balanced, above 0.7 clearly bitter. The final-beer calculator shows it.
Isomerisation	During the boil the alpha acids in hops turn into soluble, bitter compounds. That is why hops boiled for a long time give a lot of bitterness, while late hops mainly give aroma.
Hop addition	When the hops go into the boil. Recipes give how long they still boil: 60 min for bitterness, 10–15 min for flavour, 0 min or whirlpool for aroma.
Pellets and whole hops	Hops come pressed into pellets or as whole dried cones. Pellets keep longer and give about 10 % more bitterness; whole cones are easier to strain off.
Base malt (Pilsner, Vienna, Munich)	Pale malt that makes up most of the grain bill and provides the sugar for fermentation. Pilsner malt is the palest; Vienna and Munich malt add more colour and malt flavour.
Crystal malt and roasted malt	Specialty malts used in small amounts. Crystal (caramel) malt adds sweetness, body and a reddish colour; roasted malt (e.g. roasted barley) adds dark colour and coffee or chocolate notes.
Milling (crushing)	Cracking the malt coarsely in a grain mill, not grinding it to flour. The husks should stay as intact as possible because they act as a filter when lautering. Many shops sell the malt already crushed.

Enzymes (alpha and beta amylase)	They convert starch into sugar during the mash. Beta amylase works best at 144–149 °F and makes very fermentable sugar (a drier beer); alpha amylase works at 158–162 °F and makes less fermentable sugar (more body).
Saccharification (conversion)	The part of the mash where starch turns into sugar, usually at 144–162 °F. The iodine test shows when it is complete.
Wort	The sugary liquid from mashing and lautering. Only after the yeast is added and ferments the sugar does it become beer.
Trub (hot and cold break)	Protein and hop residue that clumps together during the boil (hot break) and when cooling (cold break). Leave as much as possible in the kettle, for example with a whirlpool.
Irish moss	Dried red seaweed used as a fining. Add about 2 g ($\frac{1}{2}$ teaspoon) per 5 gal in the last 10–15 minutes of the boil. It helps proteins clump and settle.
Campden tablet	Potassium metabisulfite that removes chlorine and chloramine from tap water. One tablet treats about 20 gal: crush it, stir it in and wait 10–15 minutes. Only needed if the water smells of chlorine.
Wort chiller	Copper or stainless steel coil with cold water running through it. It cools the wort to pitching temperature in 20–30 minutes. Fast cooling protects against infection and gives a clearer beer.
Hop bag and grain bag	Fine mesh bags made of nylon or cotton. A hop bag keeps the hops together during the boil; a grain bag holds the malt when mashing in a pot (brew in a bag, BIAB).
Yeast	A single-celled fungus that turns the sugar in the wort into alcohol and carbon dioxide and adds a lot of flavour. Every yeast has its own temperature range.
Dry yeast and liquid yeast	Dry yeast keeps for a long time and is easy to use: sprinkle it on or rehydrate it briefly in water. Usually about 2–3 g per gallon for ales and 3–4.5 g per gallon for lagers. Liquid yeast comes in more strains but often needs a yeast starter.
Yeast starter	A small batch of wort in which liquid yeast multiplies 1–2 days before brew day, so fermentation starts faster and cleaner.
Airlock	Small valve in the fermenter lid, filled with water. It lets the CO ₂ from fermentation escape but keeps air and germs out. When it stops bubbling, fermentation is not necessarily finished; only the hydrometer tells you that.
Bottle conditioning	Fermentation in the sealed bottle after bottling. The yeast ferments the added priming sugar and produces the carbonation. Usually takes 2 weeks at 64–72 °F.
Priming sugar	Sugar (or wort) added at bottling so that carbonation forms in the bottle. The carbonation calculator shows the right amount. Too much can make bottles burst.
Table sugar and dextrose	Table sugar (sucrose) and dextrose (corn sugar) both work for priming. For the same carbonation you need about 10 % more dextrose. The carbonation calculator takes this into account.
Lagering (cold conditioning)	After fermentation the beer matures cold at 32–39 °F for a few weeks. It becomes clearer and smoother; especially important for lagers such as Helles or Pils.
Off-flavours	Unwanted flavours. Common ones are butter (diacetyl, fermentation too short), solvent (fermented too warm), cooked corn (DMS, lid on during the boil) and vinegar or sour (infection from poor hygiene).
DMS	Dimethyl sulphide, smells of cooked corn or vegetables. It comes mainly from Pilsner malt and boils off, so boil vigorously without a lid for at least 60 minutes.
Cleaning and sanitising	Clean first: remove dirt and deposits with a cleaner and a brush. Only then sanitise, because no sanitiser works properly on dirt.
Sanitisers (acid and quats)	Make clean equipment free of germs. Acid sanitisers such as Star San need no rinsing and suit everything after the boil. Quaternary ammonium (quat) sanitisers work more broadly but must be rinsed off thoroughly.
Scaling a recipe	A recipe can be scaled to any batch size. Malt, hops, water and yeast change in the same ratio; gravity, IBU, colour and temperatures stay the same. On this site the batch size calculator in every recipe does it for you.

1. Prepare the water

1	Clean and sanitise everything that touches the wort after the boil.	
2	Measure out 13.2 gal of water. If you dilute: 13.2 gal in total, including dilution water.	
3	MEASURE: alkalinity (drop test) and pH of the measured water. Note calcium, magnesium, sulphate and chloride from your water report under “My water values”.	Alkalinity: ____ ppm pH: ____
4	Only if you smell chlorine: crush 1 Campden tablet (0.44 g), stir into 13.2 gal, leave for 10–15 min.	
5	Calculate: open the Brauwasser calculator, enter your water values and volumes, check the targets and read off calcium chloride and gypsum. The calculator gives the lactic acid once you have measured alkalinity.	
6	Add: stir calcium chloride and gypsum into the cold water, measure alkalinity, then stir in the lactic acid (corrosive, wear gloves). Re-measure alkalinity and pH. If alkalinity is not on target, correct as the calculator shows under “If overdosed”.	Calcium chloride: ____ g Gypsum: ____ g Lactic acid: ____ ml Alkalinity after: ____ ppm
7	Split the water: mash water 6.6 gal, sparge water 6.6 gal kept separately.	

2. Mashing

8	Heat 6.6 gal mash water to 140 °F. Mash in 12.83 lb Pilsner, 1.61 lb Vienna and 1.28 lb pale wheat malt. Continue straight away.	
9	1st rest: 135 °F, 10 min.	
10	MEASURE: mash pH 10–15 min after mashing in (cool the sample to about 68 °F). Target 5.4–5.5. If needed, add lactic acid (amount from the calculator) and measure again.	pH: ____
11	2nd rest: 153 °F, 60 min.	
12	MEASURE: iodine test at the end of the rest. No blue or purple colour = starch converted. Otherwise extend the rest by 10–15 min and repeat.	Result: ____
13	Mash out: heat to 172 °F and hold for 10 min.	

3. Lautering

14	Rest 10–20 min. Then run off the wort slowly and sparge the grain with 6.6 gal water at 172 °F.	
15	MEASURE: pre-boil gravity with the hydrometer (sample at 68 °F). Purpose: check efficiency (recipe: 59 %) and the post-boil target (OG 1.053). Too low: boil longer. Too high: dilute with a little water.	SG: ____

4. Boil (90 min)

16	Bring the wort to the boil. From now on the clock runs: 0 min.	
17	At 0 min (start of boil): add 1.98 oz (56 g) Tradition, boil 90 min.	
18	After 80 min: add Irish moss (about 2–3 g, soaked beforehand).	
19	After 90 min: end the boil.	

5. Whirlpool

20	Cool the wort to about 176 °F. Add 0.53 oz (15 g) Cascade.	
21	Stir vigorously in a circle near the kettle wall with a sanitised spoon until everything rotates.	

22	Rest 15–20 min until the trub cone has formed in the middle.
----	--

6. Chill and pitch

23	MEASURE: original gravity, target OG 1.053, before splitting the wort. SG: ____
24	Run off the clear wort carefully without disturbing the trub cone: open the tap slowly, return the first runnings, let it flow evenly. Chill to 64 °F.
25	Split the wort 50/50 into 2 sanitised fermenters (about 4.2 gal each).
26	Aerate the wort well in both fermenters.
27	Pitch 1 sachet of SafAle K-97 (11.5 g) per fermenter, 23 grams in total (about 2.7 grams per gallon). Ferment at 64 °F.

7. Fermentation, conditioning, bottling

28	Primary fermentation about 1–2 weeks at 64 °F.
29	MEASURE: gravity every few days in both fermenters. Stable for 2–3 days = fermentation done. SG (fermenter 1 / 2) Sample 1: ____ / ____ Sample 2: ____ / ____ Sample 3: ____ / ____
30	No cold conditioning in the fermenter. Bottle straight after fermentation.
31	MEASURE: final gravity and pH before bottling. Enter final gravity in the final-beer calculator: it gives alcohol, IBU and EBC. Record the values below.
32	Bottling: target 2.8 volumes CO ₂ (5.5 g/l). Work out the priming sugar per bottle in the carbonation calculator.
33	Let the bottles condition at room temperature until carbonated (about 1–2 weeks).
34	Then store cold for 1–2 weeks or longer. Cold conditioning happens in the bottle.

FINAL BEER MEASUREMENTS

Measurement	Fermenter 1	Fermenter 2
Original gravity (before splitting)	_____ SG	
Final gravity (end of fermentation)	_____ SG	_____ SG
Alcohol (Brauwerkstatt calculator)	_____ % vol	_____ % vol
pH of the beer	_____	_____
IBU (Brauwerkstatt calculator)	_____	_____
EBC (Brauwerkstatt calculator)	_____	_____
Alcohol after carbonation (Brauwerkstatt calculator)	_____ % vol per bottle	