

Tips on Recipe Formulation for the Exam

General:

There is one recipe question on every exam. It usually reads: “Provide a complete all- grain recipe for a _____, listing ingredients and procedure. Give volume and initial and final gravities. Explain why the recipe fits the style.”

Your score on this question depends mostly on showing you know what’s important, not on the actual numbers you write down. If you can name the right ingredients and procedure, you will do well.

Any style is fair game, but a handful of mainstream styles are the most common: German pilsner, Bohemian pilsner, weizen, doppelbock.

First, stop and think about the style and its history. Think about where it originated, what the water is like there, what malts are used, and whether hops are important. Do they use infusion or decoction mashing? Is it an ale or a lager? Are there any special taste characteristics that you can link to ingredients (like roastiness = roasted barley or chocolate malt)?

Keep it simple. You might be able to brew an elegant beer using 6 different malts, but that’s mostly fine-tuning. You will not lose points for a simple but workable recipe. Almost any style can be brewed using no more than 2-3 malts. The only reason to use more than one variety of hops is if you want to use a high-alpha variety for bittering and a different one for flavor; even that can often be avoided.

Ingredients:

Think about the four German Reinheitsgebot ingredients: malt, water, hops, and yeast. Be sure to mention all four of these.

Malt:

Start with the base malt that makes up most of the grain bill. You don’t need to specify the brand, just give a generic type: pale, pilsner, chocolate, etc. Use pale malt as the base for all British styles and American ales (not lagers). Use pilsner malt as the base for most German styles and for American lagers. Belgian brewers use pilsner malt for the lightest beers (tripels and strong golden) and pale malt for the dark ones.

The following styles have a mixture of base malts: German wheat styles use 60% malted wheat, the rest is pilsner malt; Berliner weisse is the same except the wheat malt content is only 40%. Belgian lambics are 40% unmalted wheat, the rest pale or pilsner malt; wits are the same except the unmalted wheat content is only 50% and there may also be 5% oats.

Specialty malts are used for three main reasons: color, roastiness/toastiness, and caramel/sweetness.

Remember that German brewers do not use much caramel malt, and they use Munich malt as almost their only source of color and roast/toast, So most German non-wheat styles can be made from only pilsner and Munich malt. Exceptions are Vienna (Vienna malt instead of Munich); schwartzbier (black patent malt); and Bohemian pilsner (which can use caramel malt). Light-colored German wheats use no specialty malts, but dunkelweizen and weizenbock need Munich malt for color.

British brewers use caramel malts for body and flavor in almost all beers, especially in brown ales where they are the highlighted ingredient. Porters will have mainly chocolate malt, but possibly also some caramel malt. Stouts have mainly unmalted barley, but possibly some chocolate or caramel malt.

Belgian brewers use caramel malts in all but the Lambic and wit styles, but the palest styles might use only very light caramel malts like cara-pils. Dark Belgian beers are not roasty, so their color comes from black patent malt, dark candy sugar, or, often, dark brewers caramel (this is not caramel malt—it's caramelized sugar, the same stuff that gives color to Coca-Cola). An exception is Belgian dubbel, which is allowed to have a very small roast character from chocolate malt.

Specialty malts are usually about 10% of the total grain bill, almost never more than 20%.

Water:

If there is a specific mineral characteristic associated with the style, mention it. For example, “high-carbonate water for stouts, or “soft water for Bohemian pilsner. It's a plus if you mention what mineral you might add to adjust the water; for example, “add 1 teaspoon gypsum to increase calcium and sulfate” for pale ales and bitters.

Hops:

Think about the bittering and the hop flavor/aroma separately. Bittering is simple math: choose a hop and use it for a 60 minute boil (30% utilization) to get the IBU's you want—remember the formula. You'll need to know very approximate alpha acid percentages for a few kinds of bittering hops. Hop flavor can be done with an addition in the last 10 minutes which will add only a small amount to the bittering (you can calculate this too, but it doesn't matter much). Dry hopping is routinely used to boost the aroma only in the bitter, pale ale, and barleywine styles.

Be sure to specify hop varieties appropriate for the style. Bohemian pilsners should only use Saaz hops. Altbiers need Spalt hops. All other German styles can use Hallertauer Hersbrucker, but you can use Tettnang also; and you can do the bittering (not the flavoring) with Northern Brewer if you want. For British styles, Kent Goldings or Fuggles work for all. Belgians do not generally like hop flavor and use Fuggles, Styrian Goldings, and Northern Brewer for bittering. American ale styles can use these or their US analogues, but often use Cascade, Centennial, Chinook, or Columbus (don't use any of these 4 “C's” in European styles).

Yeast:

You must specify lager vs. ale yeast. Just a few distinctions are sufficient: “German lager yeast”, “Bohemian lager yeast”, “German weizen yeast”, “Belgian ale yeast”, “British ale yeast”, etc.

Mashing Procedure:

For all ales, including German non-wheat ales (alt/kolsch), use an infusion mash. For German/Bohemian lagers and wheat beers, use a decoction mash; if you write an infusion mash recipe for these, it might cost you a point or so. Infusion mashes are easy: generally 1 step plus mashout. For non-wheat beers you can skip the 122F protein rest, especially if you mention that it’s not needed anymore since modern pale ale malts are well-modified. Use a single 152F mash for less malty styles, and 158F for maltier styles. Mash out at 170F.

For decoction mashes, a good scheme is: start at 122F protein rest temp. Remove 1/3 of the mash, heat it to 152-158F for starch conversion, then boil it for 20 minutes. Pour this back into the main mash, raising its temperature to about 149F. Let this convert for 20 mm, then remove 1/3 of the mash, heat it to 158F for final conversion, then boil it for 20 mm. Pour back into the main mash to raise its temp to 158F. Let this convert, then mash out at 170F as in an infusion mash.

Fermentation:

Mostly, you need to remember whether it is an ale or a lager. Ales should usually be fermented around 68F. Lagers should be fermented in the 50’s initially and dropped to the 40’s to finish.

Justification:

Remember, the question really does ask you for justification. Just a couple of sentences will do. What they’re looking for is for you to link the process and ingredients to the final flavor and aroma characteristics. For example: “porter: dark, very roasty, medium-high bitterness; calls for chocolate malt and 20-40 IBU of bittering hops”.

The numbers:

Don’t get carried away here; you can be very approximate and still get a good score. First, specify how many gallons you’re making: let’s assume 5.

Second, specify original and final gravities. OG depends on the style; you have to know this. For almost every style, attenuation is about 75%, so the FG is 3/4 of the way between the OG and 1.000. So if OG is 1.044, FG will be 1.011. Add back a few points for Scottish ales, which tend to be only 70% attenuated.

Third, decide the number of pounds of grain. The key factor is “efficiency”: point- gallons per pound. Homebrewers typically get 25-35 point-gallons per pound, depending on equipment and technique. You should assume a value and stick with it; 30 is a good number. To make it obvious,

tell the grader what you're using: "Assuming efficiency of 30 point-gallons per pound." The number of pounds of grain you will need is:

$$\text{pounds} = \text{points} \times \text{gallons} / \text{efficiency}$$

"Points" refers to the OG, in 100ths of a specific gravity unit over 1.000; for example a 1.044 original gravity is 44 points. To brew 5 gallons of a 1.044 00 beer with an efficiency of 30, you need:

$$44 \text{ points} \times 5 \text{ gal} / 30 \text{ efficiency} = 7.33 \text{ pounds}$$

Fourth, write out the grain bill. Take the number of pounds you've decided on and divide it up between the different grains. Specialty grains are usually 10-20% of the total, no more.

Fifth, specify the bittering hops and boil time to get the IBU's you want. Remember the formula for IBU's is:

$$\text{IBU} = \frac{(\text{ounces hops}) \times (\% \text{ AA}) \times (\% \text{ utilization}) \times 0.75}{(\text{gallons wort})}$$

Reversed, for formulation of a 5 gallon recipe with a 60 minute hop boil (30% utilization) this means:

$$\text{ounces hops} = \frac{(\text{IBU}) \times (5 \text{ gallons})}{(\% \text{ AA}) \times (30\% \text{ utilization}) \times 0.75}$$

So, if your hops are Kent Goldings at 4% alpha acid and you want to have 35 IBU, you need:

$$\frac{35 \text{ IBU} \times 5 \text{ gal}}{4\% \text{ AA} \times 30\% \text{ utilization} \times .75} = 1.94 \text{ ounces of hops}$$

Sixth, specify the amounts of any flavoring and aroma hops. Typically these would be about 0.5-1.0 ounces, and used in the last 10-20 minutes of the boil, or as dry hops.