King's Munich IPA - #145

Description See Brew.XLS

Based very loosely on #139, just a simple IPA, but Munich I based, due to $0.20/lb pre-milled, from John Bleichert, with dry Safale US-05 yeast. Lower O.G., 10% table sugar, to try and keep it dry. Makes 6 gal, 107 IBU (calculated), 6.8% (v/v) alcohol, and 225 calories in 12 oz.

Brew (Brew day takes ~8.5hr, see page 2 for mashing details)

1) Yeast, 2 packs Safale US-05, rehydrate*
2) **Treat Mash Water**, 5 gm. (1.3 tsp.) Gypsum & 2 gm. Epsom Salts (0.4 tsp.) into mash at dough in, based on 4.7 gal. mash & 4.3 gal. sparge (4.6 gm. & 1.8 gm. in sparge). Drew 17 gal. C filtered H_2O, w/ 1 Campden tab, night before. See Palmer XLS, & EZ-Water, with 2% Acidulated malt. 108 ppm Ca, 15 ppm Mg, 201 ppm SO_4, 60 ppm Cl, 49 ppm Na, SO_4/Cl = 3.3. 9 gal. in brew pot night before.
3) **Grain Bill** (14.8 lb total grain, assum 69% extraction efficiency for 1.064, after yeast & sugar add (+10pts)
   14.5 lb.. Munich I (6L) 1/3 lb. Acidulated (2%) 1.5 lb. Cane Sugar (10%) $4 grain !!

4) **Mash-In** – 1x infusion, 146-151°F, use 1.25 qt./lb., heat to 173°F for 4.7 gal of 161°F strike, hold 50 min. (this one was 161°F strike, got 151 to 147°F, for 46min.). pH = 5.35, 16 min. into mash.
5) **Mash-Out** - Add 3 gal. of near boiling, actual 3.5 gal., got 160°F, re-circulate 5 to 10 min. Collect 7 ½ gal. This time collected 9 gal.
   Target = 1.054, should get S.G = **1.044 before boil** (+11 pt. for 1.5 lb. sugar, -1 pt for yeast). I got 11.6 Brix = 1.047 which should boil to 1.058, ended up O.G. = 1.057, 1 pt low, so added 1 qt. H_2O & later, 1.5 lb. cane sugar = +10 pt., to get 1.065. pH = 5.3 into brew pot.

6) **Boil Adds** (75 min. total boil of full volume, should end up at 6.2 gal., got 7). Hops not in bags.

4 oz. **Magnum pellets (10.1%)**	**50** min. boil left
1 teaspoon **Irish Moss** & ½ **Zn** tablet & 3 tsp **YN**	**17** min. boil left
Put **wort cooler** in *** Get whirlpool set up ***	**15** min. boil left
2 oz. **Centennial, whole (~7.4%, 2012)**	**3** min. boil left
0.6 oz. **CTZ, whole (~10%, 2012)**	**3** min. boil left

7) **Whirlpool for** 1 min., then 43 min. to cool wort (immersion chiller w/ice) to 59°F , reheated to 66F
8) **Transfer** to 2x 5 gal. carboys, 1.5 min. vigorous pure O_2, add blow-offs. pH = 5.3
9) **Pitch yeast** (2 packs US-05, good foamy).

Fermentation

1) 12 days in **primary** @60°F 1 day with thermostat and heater, then gradually increased to 66°F, 4 days in added 1.5 lb. sugar, 6 days in, at 66-68°F, held for 4 days, then heat off, 6 days at ~60°F.
2) **Kegged** 5/7/15 (2.0 hr), dry hop with 2 oz whole Citra & 2 oz. Centennial (?) in 4.8 gal keg, also got 1.1 gal. in another keg. Set for __ days in Brewery, then hops out, no oak, added 2 oz. CTZ for ___ days, then rack to clean keg Got 6.0 gal. pH = 4.45 Denny dry hops with CTZ.
3) 1.065 to 1.015 is 77% apparent attenuation, Good, Munich + table sugar cancelled.

Results 

Brewed 4/19/15, got 80% grain extraction, ___ aroma, high bitterness, OK Munich malt flavor & body, low sweetness. ___ color and clarity after __ week. Need _____.

Pete Kirkgasser says for an IPA, to use 2 lb. Munich, 1lb. Victory and 1 lb. 45L, nothing higher. Columbus for bitterness, and Centennial for 30 min. 3 oz., 1 each of those and 1 of Cascade for dry hop.

*Rehydrate Dry Yeast

Per John Palmer pg 72. Warm **11.5 gm**. yeast pack to RT. Prepare **115 ml** of sterile H_2O at **105°F**. Sprinkle yeast onto H_2O surface, wait **15 min.** Stir into a cream, wait **15 min., should foam up.** Adjust temperature to within **15°F** of wort, pitch.