Computer

Aided

Recipe

Design

This document will hopefully help people to design their own beer, wine, cider, cocktails & jam recipes, most of the mathematics will be performed by the free "YoBrew Calc's v1.7" which can be downloaded via this link Free Beer & Wine Calculators. The calculators are available in the Microsoft Office (.XLS, these files can also be opened/saved in Microsoft Office 2010 etc.), the other "office" suites such as Ashampoo "PlanMaker" & "LibreOffice" etc, should work without too many problems.

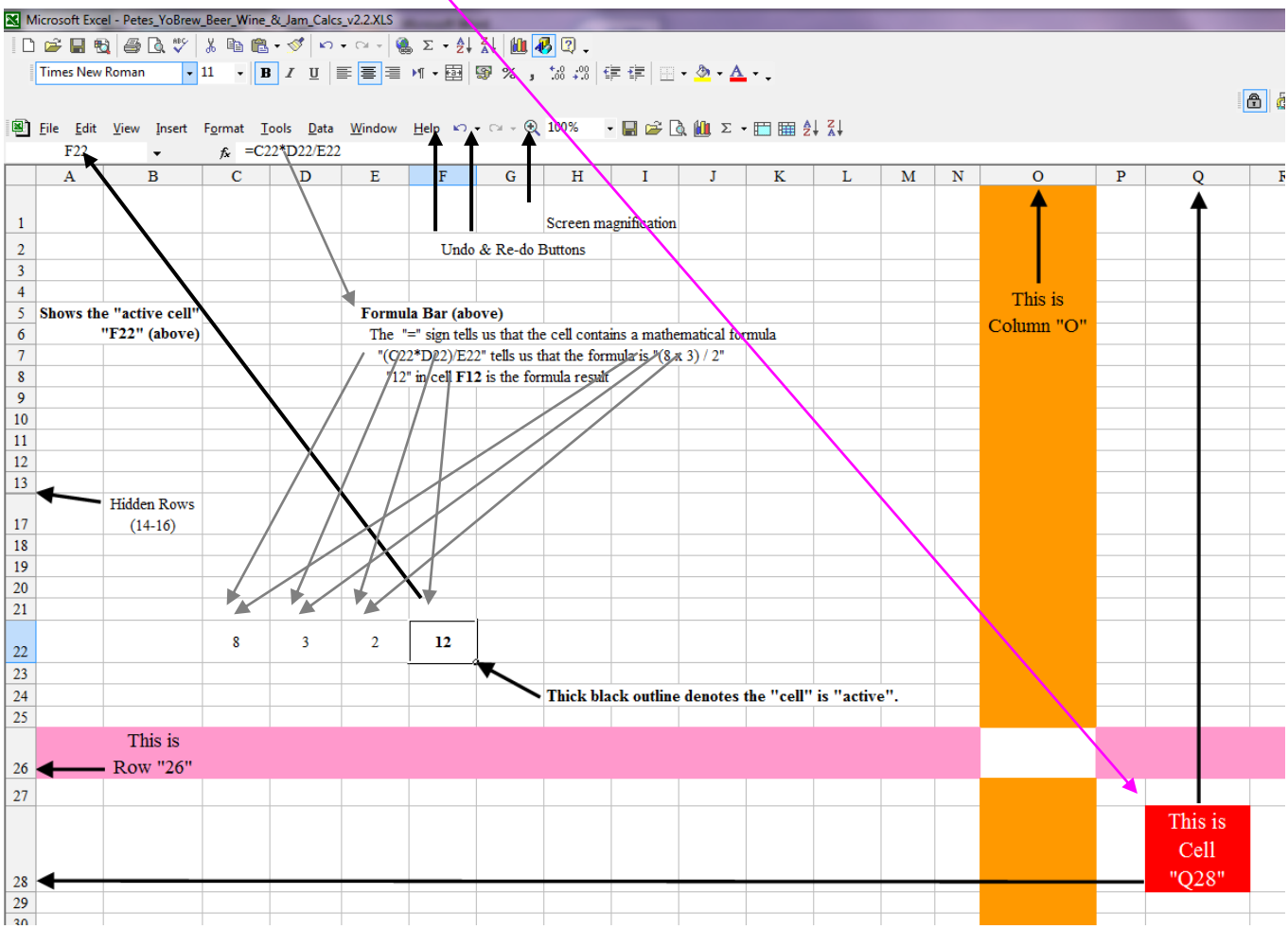
NOTE:- These are just examples of recipe design, DO NOT assume that they will give drinkable results!

Versions 1.7 of the calculators are used.

SPREADSHEET NOTES

A spreadsheet is simply a grid made up of re-sizeable (horizontal) rows numbered "1, 2, 3, …" etc. & (vertical) columns lettered "A, B, C, ….., AA, AB, …" etc. Each rectangle or CELL has its own "Map reference" i. e. Q28, where Q refers to the relevant column & 28 to the relevant row. The cells can be used to store numbers, letters &, most importantly, they are able to perform mathematical functions (sums - i.e. add-ups, takeaways, timeses, guzinta's* etc.). Luckily all we have to do is insert or delete numbers, once we have altered a cell, just press the return or enter keys, or click the left mouse button (LMB) & the change takes place.

The screenshot below hopefully explains some of the above terms.



* Guzinta - for those of you who are not mathematically/technically minded, 3 guzinta 15 five times!

www.petespintpot.co.uk

WINE RECIPE DESIGN

Notes/Assumptions:-

- Version 1.7 of the "Wine Calc's" are used.
- The calculators cannot tell you if the final product is good, bad or indifferent, it can only give approximate parameters.
- Approximately 5g or1 tsp of Bentonite can be used at the start of fermentation to help clear the wine.
- Fermentation increases acidity by about 1.5%.
- The calculator figures shown in grey can be largely ignored.
- "Easy-to-use" quantities will be used where possible; i. e. fruit juices will be used from 1 litre Tetra Paks.

Here are some typical guidelines for several wine styles; they are not by any means "fixed".

	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	BB	BC	BD
1	SOME TYPICAL WINE PARAMETERS (If used, treat as a rough guide only, the figures below are VERY arbitrary). Adapted from "Must" by Professor Gerry Fowles.																
2	WINE TYPE	DRY WHITE		DRY RED		ROSÉ		SWEET WHITE		SWEET RED		DESSERT (FRUIT)	DESSERT (PORT)				
3																	
4	% ALC ABV	10-13		11-13		11-12		12-15		13-18		17-20	17-20	Many good wines could possibly not fit within these limits, but beware of any recipes displaying vast differences.			
5	% ACID	0.50-0.70		0.50-0.65		0.60-0.75		0.50-0.75		0.40-0.65		0.55-0.65	0.40-0.50				
6	% TANNIN	<0.04		0.09-0.3		0.04-0.09		<0.04		0.15-0.3		0.2-0.3	0.2-0.3				
7	STYLE	Dry		Med. Dry		Med.		Med. Sweet		Sweet		Dessert					
8	Ingredient:	Notes	% Sugar	% Acid	% Tannin	% "Carbs"	% Pectin	Mineral/Vit. mg/100g N (nit)	K (pot)	B1	B3	B5	B6	Main Acid	The "Main Acid" is expressed as the equivalent amount of tartaric acid.		
9																	

CRANBERRY CLASSIC & GRAPPLE ROSÉ WINE

This is a good recipe to start because of its simplicity. Many recipes call for 3 litres of juice & that will be our starting point. Please note, just because this wine is relativity easy to make does not mean it is rubbish, far from it!

It is best to state with a clean sheet, literally & you will notice cell G5 is not zero; that is because fermentation produces some acidity.
Enter the name of the wine in cell G3 & the finished quantity of the wine, in our case 4.5 litres (six 750ml bottles) is entered into cell D7.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1									Pete's Wine & Cider Calculator				
2	1-4-17												
3		SUMMARY FOR THE FINISHED WINE				Name:-	CRANBERRY CLASSIC & GRAPPLE ROSÉ						
4			O. G.	1000		ALCOHOL	0.0	% ABV	(OR, after priming with 0.00g sugar per 750ml bottle, 0.0% ABV)				
5			F. G. (Before sweetening)	1000		ACIDITY	0.15	% (expressed in terms of the tartaric equivalent)					
6			F. G. (After sweetening)	1000		TANNIN	0.00	%					
7			Volume (finished/effective starting)	4.5	/4.70 litres	STYLE	Medium dry / 2						
8			The latter figure includes left-over pulp, "wastage" & an										
9			allowance for any sweetening/priming sugars used.										

Fermentation always causes losses, in this case through dead yeast cells & liquid losses through siphoning etc. This general wastage is assumed to be 200ml & unless a new figure is entered in cell K57. That is why that cell E7 is nominally "4.7".

Now for the recipe. Using 1 litre (1000ml) each of supermarket apple juice, Cranberry Classic supermarket & red grape juice into cells. E116, E117 & in cell E119).

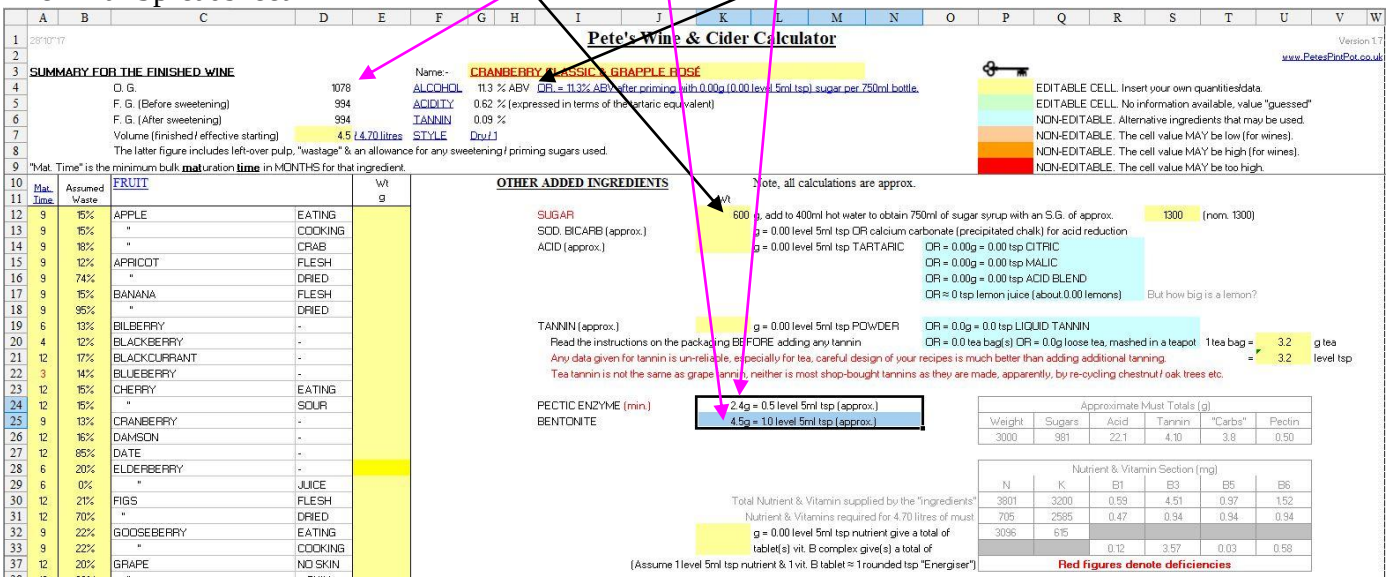
114	Mat. Time	Assumed Waste	JUICES		Vol	Sugar
115			(Check labels for sugar & preservatives)		ml	g / 100ml
116	3	0%	APPLE	-	1000	11
117	3	0%	CRANBERRY	-	1000	11.5
118	3	0%	GRAPE	WHITE		15.6
119	3	0%	"	RED	1000	15.6
120	3	0%	GRAPEFRUIT	-		9

In according with the information from the juice boxes, the sugar content of these is 11, 11.5 & 15.6g per 100ml respectively, so we can put this in the relevant cells (F116, F117 & in cell F119) & enter
Ensure that column E, rows 13-141 are otherwise left blank.

The % ABV (G4) is only 4.3 & I like my wines (personally) to be in the 11 – 11.5% range. In order to raise this, the OG (D4) must be increased by adding other substances. You will observe that the acidity (G5) & tannin (G6) are all in the same area as the table at the top of the page. Sugar only increases gravity, nothing else, so, I will try adding 500g to cell K12. Now cell D4 reads 1070 & G4 reads 10.1%.

Making the sugar content 600g raises the Original Gravity to (D4) 1078 & the alcohol to 11.3% ABV (cell G4).
Pectic needs to be added to stop pectin hazes forming (cell K24), one tsp added at the start should be sufficient. One tsp Bentonite MAY be added (cell K25) to help clear the wine.

The Final Spreadsheet

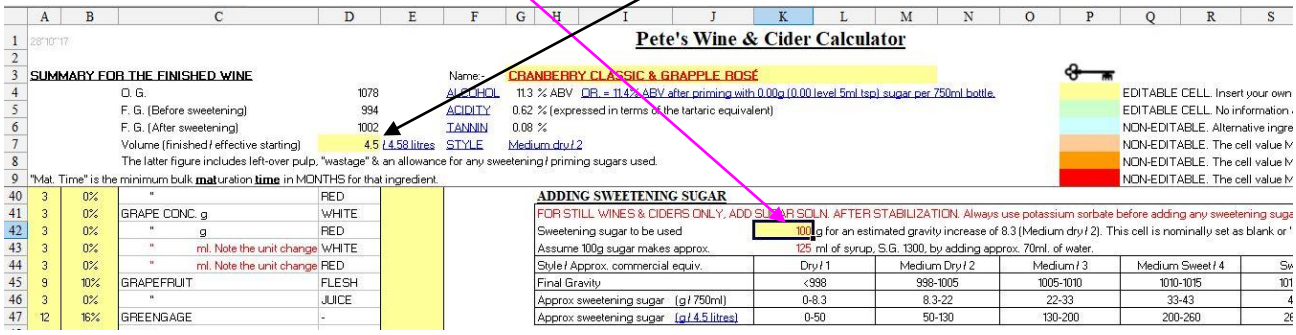


SWEET CRANBERRY CLASSIC & GRAPPLE ROSÉ WINE

Sweet wines can be made by at least four different ways.

1. Stop the fermentation when the wine reaches the desired gravity by adding potassium sorbate.
2. Sweeten the finished wine by using a propriety sweetener such as Xylitol.
3. When the must gravity falls to about 1005 or so, feed it with sugar. Repeat the process 'til you get the sweetness required & the must fermentation ceases.
4. Ferment the wine to dryness & add potassium sorbate. Then use the YoBrew calc's "Wine Calc" cell K42.

The addition of 100g sugar to cell K42 raises the FG to 1002, making the wine medium dry. When sweetening sugar is used, the volumes are automatically adjusted.



It is far better to design sweet wines rather than sweeten a finished dry wine as the Calc's allow for the sweetening sugar added as a syrup.

IMPORTANT:- Always add potassium sorbate (stabiliser) after racking & before adding any sweetening sugar, this prevents possible dangerous secondary fermentation in the bottle.

CIDER RECIPE DESIGN

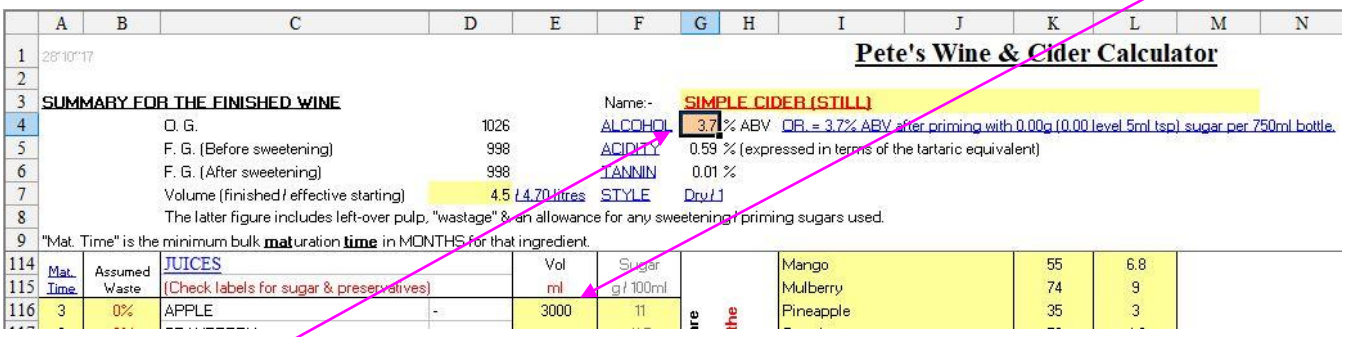
By definition Cyder is made from pure apple juice & Cider from apple juice, water, sugar etc. The easiest way to make cider is from a kit but these can be very variable in quality, some can be almost as bad as the highly commercial industrial stuff sold to-day which can contain all sorts of colourings, artificial sweeteners & other assorted chemicals.
Incidentally, the "budget" cider kits appear to use malt extract, it could be possibly cheaper &/or give a sweeter taste.

Notes/Assumptions:-

- Cider uses the version 1.7 of the "Wine Calc's".
- Calculators cannot tell you if the final product is good, bad or indifferent, it can only give approximate parameters
- Fermentation increases acidity by about 1.5%.
- A mixture of different apple juices is generally believed to give better results than a single variety – do a tour of your local shops/supermarkets buying a 1 litre Tetra-Pak from each. Any wine or beer yeast may be used but Champagne is best in theory as gives smaller & more solid deposits in the bottle.
- All ciders will be dry, artificial sweeteners such as Saccharin or preferably proper wine sweeteners may be added.

SIMPLE CIDER (STILL)

Again, for 4.5 litres bottled cider. 3 litres (3000ml) apple juice for example is entered into cell E116 (supermarket type, no added chemicals or sugar & avoid anything with the word "drink" in their name).



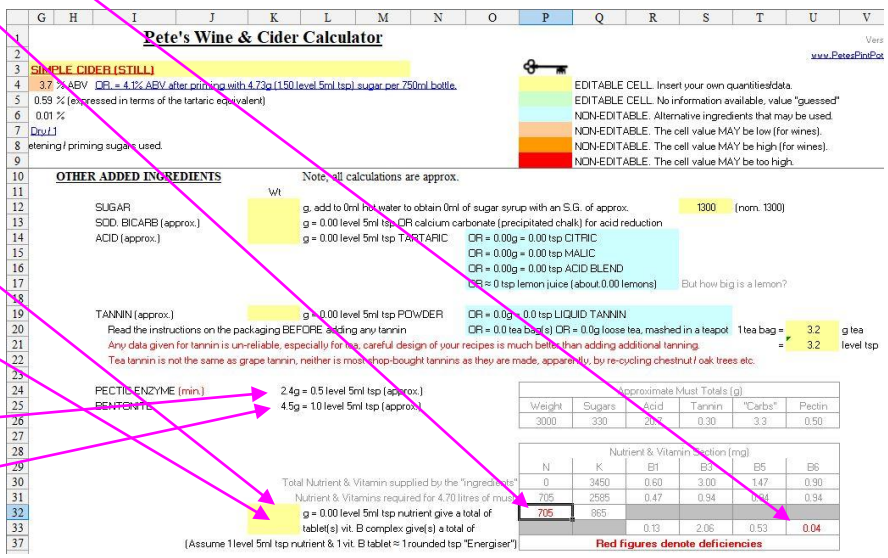
This gives 3.7% ABV but it could be made higher by adding sugar to cell K12, e.g. just 25g would give a modest increase of 0.3%.

Note the RED figures in cells P32 & U33, this is caused by the cider being light in nutrients & the vitamin B6.

Approx. 4.5ml (1 tsp) of nutrient can be added cell K32 to correct this deficit.

The slight vitamin problem can be ignored or half of a Vit. B complex tablet added to K33.

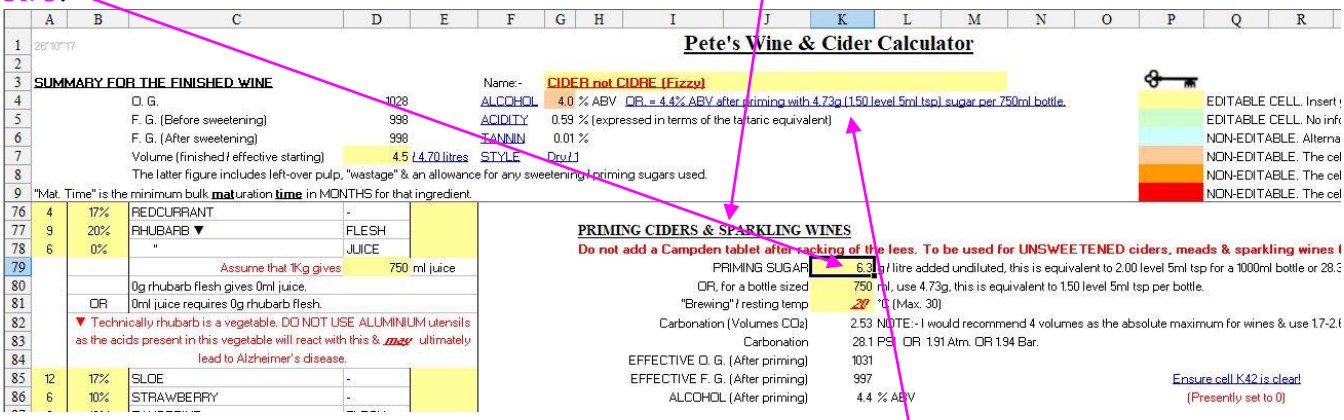
Approx. ½ - 1 tsp of pectic enzyme is also required (cell K24). Also 1 tsp of Bentonite *may* be added to help clear the wine (K25).



CIDER not CIDRE (Fizzy)

Priming a live beer, wine or cider etc. gives it some "fizz". Over priming can be very dangerous, especially if glass bottles are used, so, ensure the bottles are sound & capable of standing pressure. Most beers & ciders are primed with one or two level 5ml tsp per litre, this work out about 1.7-2.5 volumes of CO_2, this equates to about 17-28 psi.

Still using the Simple Cider above, we can progress to cell H77, "PRIMING CIDERS & SPARKLING WINES" section. So, if we like our very drinks fizzy, we can enter 6.3g (max. = 2 level 5ml tsp) in cell K79.



Note that the alcohol (after priming) goes up from 4% to 4.4% (cells I4-N4). The acidity & the tannin levels are not affected.

A Few Possible Variations

Some of the apple juice could be replaced by pear juice, replacing it all would make "Perry". Unfortunately I have no reliable information regarding pear juice & so it is not included in the spreadsheet but normally the apple juice is replaced by an equal amount of pear juice. I have even seen recipes containing both juices.

Petals from an aromatic, fully opened rose, picked on a good sunny day, can be added around day 4, giving a little subtlety to the bouquet & flavour, elderflowers can also be used, but be careful as they are very strongly flavoured & can easily become over-powering.

A Mallard quacking up!

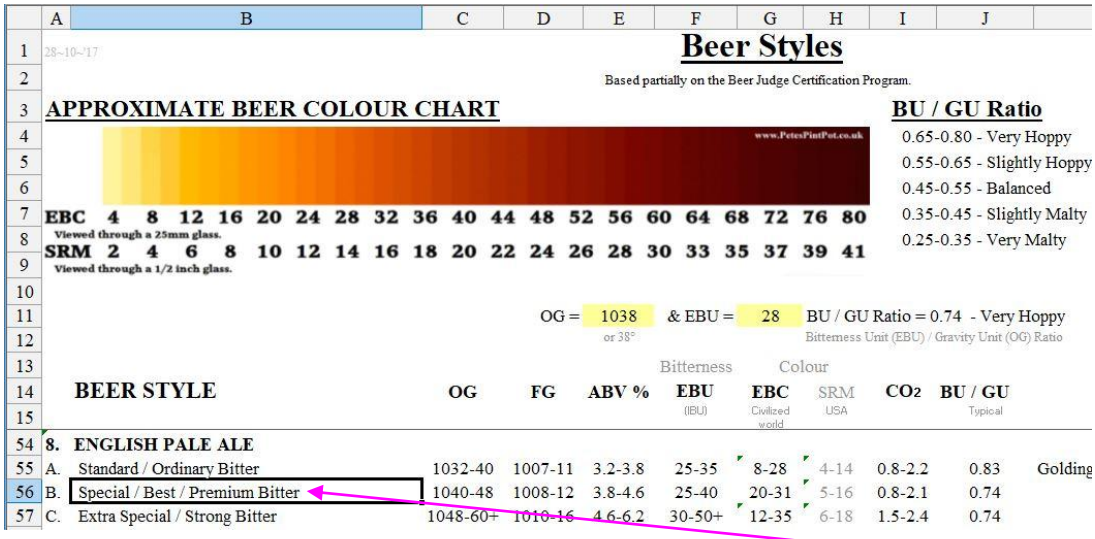
BEER RECIPE DESIGN

The beer calculator can entail some messing around to get the required result, so, to quote a wall known saying, patience is a virtue.

Notes/Assumptions:-

- Cider uses the version 1.7 of the "Beer Calc's" ("Extract Calc" page).
- Calculators cannot tell you if the final product is good, bad or indifferent, they can only give approximate parameters.
- The calculator figures shown in grey can be largely ignored.

I suppose the first step in any recipe design is to choose a beer style from the … err "Beer Styles" page; this defines all most beer styles. I would hate to think how many traditional British beers fail to fit into their allocated category but at least a guideline is available. For this example I decided on Special/Best/Premium Bitter (B56 etc.)



Beer Styles

Based partially on the Beer Judge Certification Program.

APPROXIMATE BEER COLOUR CHART

EBC 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 (Viewed through a 25mm glass.)

SRM 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 33 35 37 39 41 (Viewed through a 1/2 inch glass.)

BU / GU Ratio

0.65-0.80 - Very Hoppy
0.55-0.65 - Slightly Hoppy
0.45-0.55 - Balanced
0.35-0.45 - Slightly Malty
0.25-0.35 - Very Malty

OG = 1038 (or 38°) & EBU = 28 BU / GU Ratio = 0.74 - Very Hoppy (Bitterness Unit (EBU) / Gravity Unit (OG) Ratio)

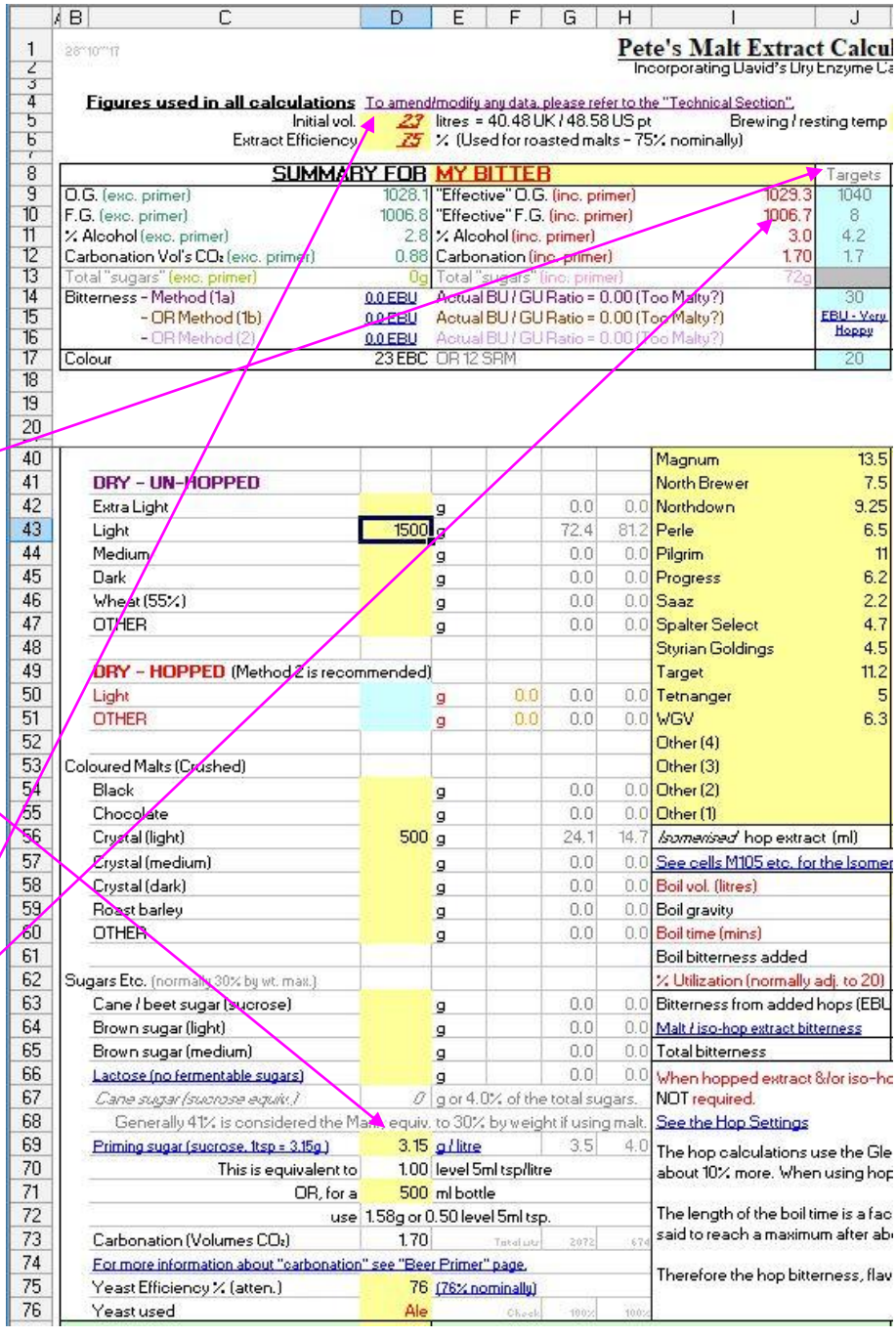
BEER STYLE	OG	FG	ABV %	Bitterness EBU (IBU)	Colour EBC (Civilized world)	SRM (USA)	CO_2	BU / GU (Typical)	
8. ENGLISH PALE ALE									
A. Standard / Ordinary Bitter	1032-40	1007-11	3.2-3.8	25-35	8-28	4-14	0.8-2.2	0.83	Golding
B. Special / Best / Premium Bitter	1040-48	1008-12	3.8-4.6	25-40	20-31	5-16	0.8-2.1	0.74	
C. Extra Special / Strong Bitter	1048-60+	1010-16	4.6-6.2	30-50+	12-35	6-18	1.5-2.4	0.74	

MY BITTER

From my friendly neighbourhood home brew shop, I buy three 500g bags of light dry malt extract (DME), a 500g bag crushed crystal malt (I have assumed this to be "light"), 50g of (typical British) Challenger hops (the packet is marked "7.5% Alpha Acid" or similar) & a sachet of Ale yeast. Using the "Extract Calc" the malt quantities are entered accordingly, note the "Targets" cells (J9-J17) are there just as a reminder, *if* used.

Note that cell D69 (Priming sugar – used at the bottling stage) is set at 3.15g (or 1 level 5ml tsp) per litre, a good starting point, its effect can be seen in cells I9-I12.

Ignoring the hop/bitterness figures for now, the results are nothing like the BJCP figures at the top of the page. Starting with the O.G. (Original Gravity after priming- cell I9), this can be increased by increasing the malts, adding sugar or decreasing our volume. Cell D5 shows that we are initially making 23 litres or about 40.5UK pints, if we reduce this to 17 litres then our gravity will



Pete's Malt Extract Calcul

Incorporating David's Dry Enzyme Ca

Figures used in all calculations To amend/modify any data, please refer to the "Technical Section".

Initial vol. 23 litres = 40.48 UK / 48.58 US pt Brewing / resting temp

Extract Efficiency 75 % (Used for roasted malts - 75% nominally)

SUMMARY FOR MY BITTER				Targets
O.G. (exc. primer)	1028.1	"Effective" O.G. (inc. primer)	1029.3	1040
F.G. (exc. primer)	1006.8	"Effective" F.G. (inc. primer)	1006.7	8
% Alcohol (exc. primer)	2.8	% Alcohol (inc. primer)	3.0	4.2
Carbonation Vol's CO_2 (exc. primer)	0.88	Carbonation (inc. primer)	1.70	1.7
Total "sugars" (exc. primer)	0g	Total "sugars" (inc. primer)	72g	
Bitterness - Method (1a)	0.0 EBU	Actual BU / GU Ratio = 0.00 (Too Malty?)		30
- OR Method (1b)	0.0 EBU	Actual BU / GU Ratio = 0.00 (Too Malty?)		EBU - Very Hoppy
- OR Method (2)	0.0 EBU	Actual BU / GU Ratio = 0.00 (Too Malty?)		
Colour	23 EBC	OR 12 SRM		20

DRY - UN-HOPPED						
Extra Light		g		0.0	0.0	
Light	1500	g		72.4	81.2	
Medium		g		0.0	0.0	
Dark		g		0.0	0.0	
Wheat (55%)		g		0.0	0.0	
OTHER		g		0.0	0.0	
DRY - HOPPED (Method 2 is recommended)						
Light		g	0.0	0.0	0.0	
OTHER		g	0.0	0.0	0.0	
Coloured Malts (Crushed)						
Black		g		0.0	0.0	
Chocolate		g		0.0	0.0	
Crystal (light)	500	g		24.1	14.7	
Crystal (medium)		g		0.0	0.0	
Crystal (dark)		g		0.0	0.0	
Roast barley		g		0.0	0.0	
OTHER		g		0.0	0.0	
Sugars Etc. (normally 30% by wt. max.)						
Cane / beet sugar (sucrose)		g		0.0	0.0	
Brown sugar (light)		g		0.0	0.0	
Brown sugar (medium)		g		0.0	0.0	
Lactose (no fermentable sugars)		g		0.0	0.0	
Cane sugar (sucrose equiv.)	0	g or 4.0% of the total sugars.				
Generally 41% is considered the Max. equiv. to 30% by weight if using malt.						
Priming sugar (sucrose, 1tsp = 3.15g)	3.15	g / litre		3.5	4.0	
This is equivalent to	1.00	level 5ml tsp/litre				
OR, for a	500	ml bottle				
use	1.58g or 0.50	level 5ml tsp.				
Carbonation (Volumes CO_2)	1.70					
For more information about "carbonation" see "Beer Primer" page.						
Yeast Efficiency % (atten.)	76	(76% nominally)				
Yeast used	Ale					

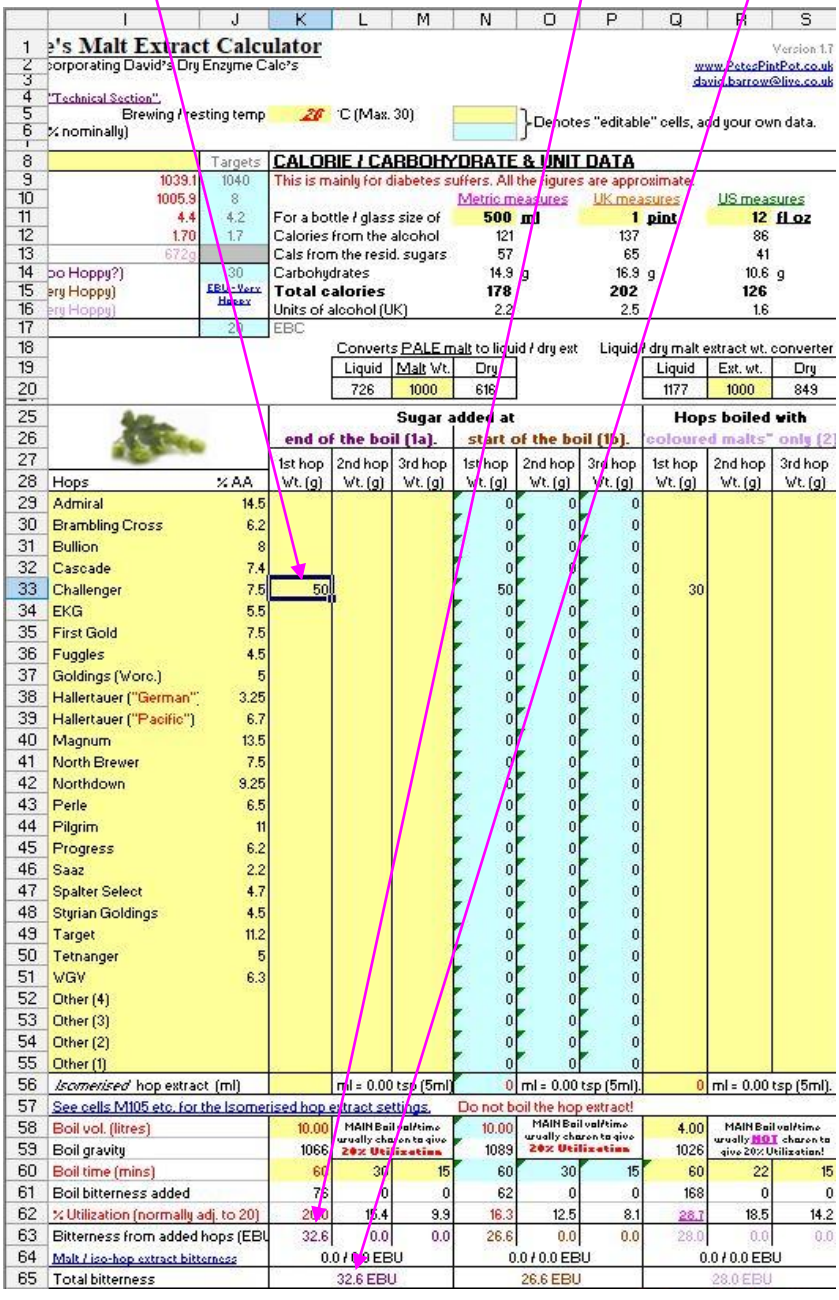
Magnum	13.5
North Brewer	7.5
Northdown	9.25
Perle	6.5
Pilgrim	11
Progress	6.2
Saaz	2.2
Spalter Select	4.7
Styrian Goldings	4.5
Target	11.2
Tetnanger	5
WGV	6.3
Other (4)	
Other (3)	
Other (2)	
Other (1)	
Isomerised hop extract (ml)	
See cells M105 etc. for the Isomer	
Boil vol. (litres)	
Boil gravity	
Boil time (mins)	
Boil bitterness added	
% Utilization (normally adj. to 20)	
Bitterness from added hops (EBU	
Malt / iso-hop extract bitterness	
Total bitterness	
When hopped extract &/or iso-hc	
NOT required.	
See the Hop Settings	
The hop calculations use the Gle	
about 10% more. When using hop	
The length of the boil time is a fac	
said to reach a maximum after ab	
Therefore the hop bitterness, flav	

increase to about 1040, perfectly acceptable but we want to keep the volume at 23 litres. The “Colour” (cell D17) is acceptable at 23EBC (European Brewing Convention), we could alter the crystal malt (D56), but this will also affect our OG & thus the alcohol content. We now have to concentrate on the alcohol (I11) but we could try 1000g “Cane sugar” in cell D63, the calculator now estimates 5.3% ABV in cell I11, this is a little too high for the style. The % ABV can be reduced to 4.4 if we set D63 to 600g.

If we decide that this is near enough for us then we can concentrate on the “Bitterness”. There are three ways of calculating bitterness, using slightly thee different brewing methods, they appear under cells K29-S55. 80

METHOD 1a.
The sugar is added after the boil. (This means that any sugars will be added to the fermenter - NOT the boiler.)

In cell K33 we enter our Challenger hop weight of 50g. Cell L65 gives us the bitterness of 32.6EBU (European Bitterness Units), but only IF cell K62 reads “20”% utilization this is set by cells K58 & K60 (the boil volume & boil time). This figure is inside the limits of 25-40 EBU. To alter the bitterness we could add more hops (cell K25), alternatively we could amend the boil vol. (K58) or the boil time (K60).



Note:- 20% hop utilization is not essential but the “norm” for most recipes.

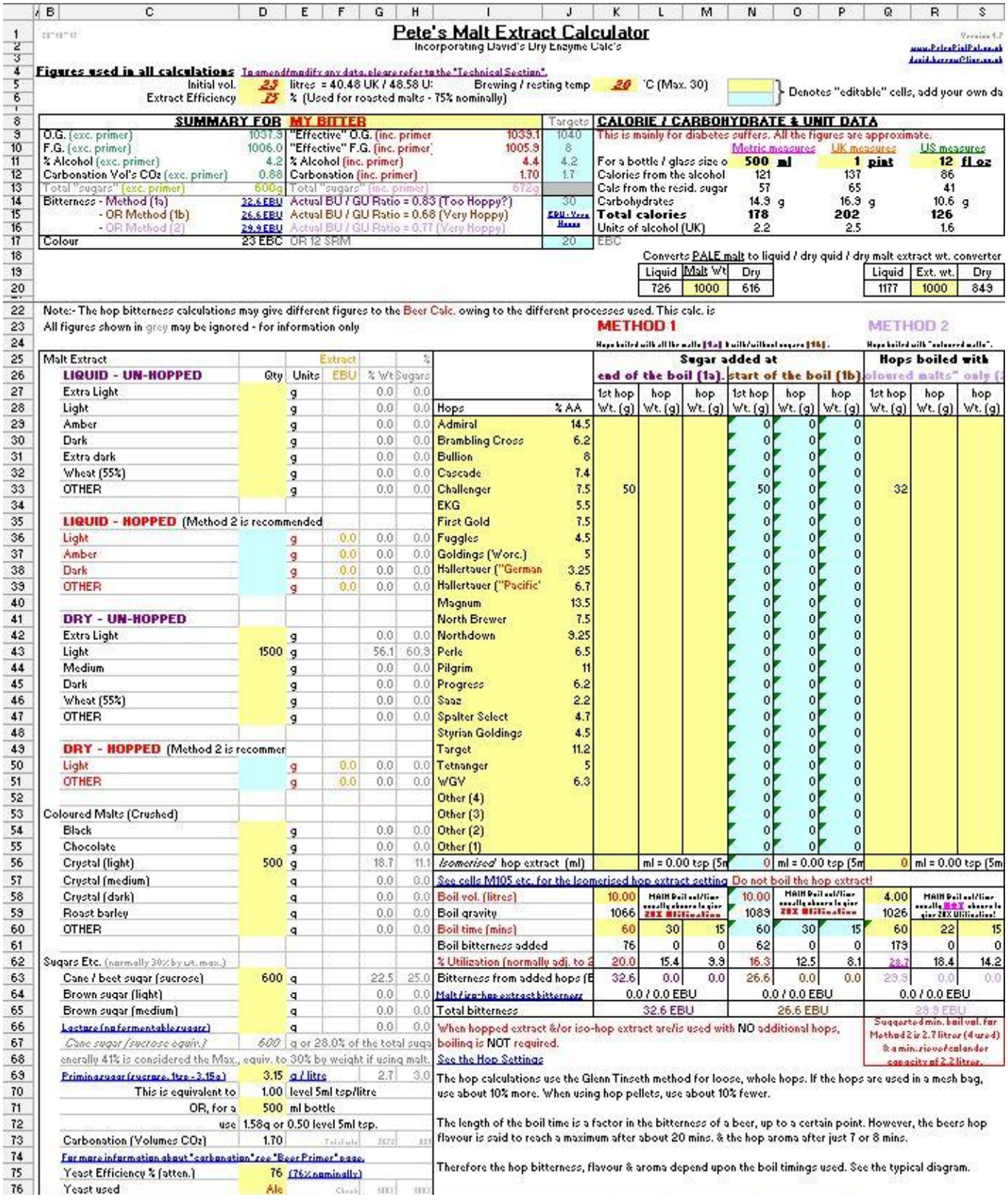
METHOD 1b.
The sugar added at start of boil. (This means that any sugars will be added to the boiler - before the boil commences.)

When hop data is entered using “1a” it is automatically transferred to “1b” unless it is over-written. For “sugarless” (exc. the priming sugar) recipes the calculations are the same. Adding sugar decreases the hop utilization (N62) & hence reduces the bitterness (O65). This method is widely used as the “normal” of brewing &, once again, cells N58 & N61 can be set to give a utilization of about 20 (N62).

METHOD 2.
NO sugar or malt extract added to the boil. (This means that any sugars & malt extract will be added directly to the fermenter, only the “Coloured Malts” - cells D54 to D60 &, of course, the hops will be boiled.)
In cell Q33, enter the hop weight of 50g. With the boil vol & boil times set as per the example 1a, cell R65 gives us the bitterness of 56.1EBU which is very high for the style.

When using “Method 2”, I don't care what value the % Utilization (cell Q62) is set, I adjust the other relevant parameters to get "reasonable" figures & proceed from there. This method saves time, energy & resources &, ultimately, money, it also produces better beers! I think that reducing hops in cell Q33 to 32g, the boil vol. (Q58) to 5 litres & the boil time (Q60) to 60 mins, is a reasonable compromise resulting in about 32EBU.

The Final Spreadsheet



Pete's Malt Extract Calculator

Incorporating David's Dry Enzyme Calc's

Figures used in all calculations: To amend/modify any data, please refer to the "Technical Section".

Initial vol. 23 litres = 40.48 UK / 48.58 U.S. Brewing / resting temp 20 °C (Max. 30)

Extract Efficiency 75 % (Used for roasted malts - 75% nominally)

} Denotes "editable" cells, add your own da

SUMMARY FOR MY BITTER				Targets
O.G. (exc. primer)	1037.3	"Effective" O.G. (inc. primer	1039.1	1040
F.G. (exc. primer)	1006.0	"Effective" F.G. (inc. primer	1005.9	8
% Alcohol (exc. primer)	4.2	% Alcohol (inc. primer)	4.4	4.2
Carbonation Vol's CO2 (exc. primer)	0.88	Carbonation (inc. primer)	1.70	1.7
Total "sugars" (exc. primer)	600g	Total "sugars" (inc. primer)	672g	
Bitterness - Method (1a)	32.6 EBU	Actual BU / GU Ratio = 0.83 (Too Hoppy?)		30
- OR Method (1b)	26.6 EBU	Actual BU / GU Ratio = 0.68 (Very Hoppy)		EBU - Very Hoppy
- OR Method (2)	29.9 EBU	Actual BU / GU Ratio = 0.77 (Very Hoppy)		
Colour	23 EBC	OR 12 SRM		20 EBC

CALORIE / CARBOHYDRATE & UNIT DATA

This is mainly for diabetes suffers. All the figures are approximate.

	Metric measures	UK measures	US measures
For a bottle / glass size o	500 ml	1 pint	12 fl oz
Calories from the alcohol	121	137	86
Cals from the resid. sugar	57	65	41
Carbohydrates	14.3 g	16.3 g	10.6 g
Total calories	**178**	**202**	**126**
Units of alcohol (UK)	2.2	2.5	1.6

Converts PALE malt to liquid / dry quid / dry malt extract wt. converter

Liquid	Malt Wt	Dry
726	1000	616

Liquid	Ext. wt.	Dry
1177	1000	849

Note:- The hop bitterness calculations may give different figures to the Beer Calc. owing to the different processes used. This calc. is

All figures shown in grey may be ignored - for information only

METHOD 1 — Hops boiled with all the malts [1a] & with/without sugars [1b].

METHOD 2 — Hops boiled with "coloured malts".

Malt Extract	Qty	Units	Extract EBU	% Wt	% Sugars
LIQUID - UN-HOPPED					
Extra Light		g		0.0	0.0
Light		g		0.0	0.0
Amber		g		0.0	0.0
Dark		g		0.0	0.0
Extra dark		g		0.0	0.0
Wheat (55%)		g		0.0	0.0
OTHER		g		0.0	0.0
LIQUID - HOPPED (Method 2 is recommended					
Light		g	0.0	0.0	0.0
Amber		g	0.0	0.0	0.0
Dark		g	0.0	0.0	0.0
OTHER		g	0.0	0.0	0.0
DRY - UN-HOPPED					
Extra Light		g		0.0	0.0
Light	1500	g		56.1	60.9
Medium		g		0.0	0.0
Dark		g		0.0	0.0
Wheat (55%)		g		0.0	0.0
OTHER		g		0.0	0.0
DRY - HOPPED (Method 2 is recommer					
Light		g	0.0	0.0	0.0
OTHER		g	0.0	0.0	0.0
Coloured Malts (Crushed)					
Black		g		0.0	0.0
Chocolate		g		0.0	0.0
Crystal (light)	500	g		18.7	11.1
Crystal (medium)		g		0.0	0.0
Crystal (dark)		g		0.0	0.0
Roast barley		g		0.0	0.0
OTHER		g		0.0	0.0
Sugars Etc. (normally 30% by wt. max.)					
Cane / beet sugar (sucrose)	600	g		22.5	25.0
Brown sugar (light)		g		0.0	0.0
Brown sugar (medium)		g		0.0	0.0
Lactose (unfermentable sugars)		g		0.0	0.0
Cane sugar / sucrose equiv.)	600	g or 28.0% of the total sugs			
enerally 41% is considered the Max., equiv. to 30% by weight if using malt.					
Priming sugar (sucrose, 1tsp - 3.15g)	3.15	g / litre		2.7	3.0
This is equivalent to	1.00	level 5ml tsp/litre			
OR, for a	500	ml bottle			
use	1.58g or 0.50 level 5ml tsp.				
Carbonation (Volumes CO2)	1.70				
For more information about "carbonation" see "Beer Primer" page.					
Yeast Efficiency % (atten.)	76	(76% nominally)			
Yeast used	Ale				

Hops	% AA	Sugar added at end of the boil (1a) 1st hop Wt. (g)	hop Wt. (g)	hop Wt. (g)	Sugar added at start of the boil (1b) 1st hop Wt. (g)	hop Wt. (g)	hop Wt. (g)	Hops boiled with "coloured malts" only (2 1st hop Wt. (g)	hop Wt. (g)	hop Wt. (g)
Admiral	14.5				0	0	0			
Brambling Cross	6.2				0	0	0			
Bullion	8				0	0	0			
Cascade	7.4				0	0	0			
Challenger	7.5	50			50	0	0	32		
EKG	5.5				0	0	0			
First Gold	7.5				0	0	0			
Fuggles	4.5				0	0	0			
Goldings (Worc.)	5				0	0	0			
Hallertauer ("German	3.25				0	0	0			
Hallertauer ("Pacific'	6.7				0	0	0			
Magnum	13.5				0	0	0			
North Brewer	7.5				0	0	0			
Northdown	9.25				0	0	0			
Perle	6.5				0	0	0			
Pilgrim	11				0	0	0			
Progress	6.2				0	0	0			
Saaz	2.2				0	0	0			
Spalter Select	4.7				0	0	0			
Styrian Goldings	4.5				0	0	0			
Target	11.2				0	0	0			
Tetnanger	5				0	0	0			
WGV	6.3				0	0	0			
Other (4)					0	0	0			
Other (3)					0	0	0			
Other (2)					0	0	0			
Other (1)					0	0	0			
Isomerised hop extract (ml)			ml = 0.00 tsp (5m		0	ml = 0.00 tsp (5m		0	ml = 0.00 tsp (5m	
See cells M105 etc. for the Isomerised hop extract setting. Do not boil the hop extract!										
Boil vol. (litres)		10.00	MAIN Boil vol/liter usually shown to give 28X Utilisation		10.00	MAIN Boil vol/liter usually shown to give 28X Utilisation		4.00	MAIN Boil vol/liter usually 28X shown to give 28X Utilisation!	
Boil gravity		1066			1089			1026		
Boil time (mins)		60	30	15	60	30	15	60	22	15
Boil bitterness added		76	0	0	62	0	0	173	0	0
% Utilisation (normally adj. to 2		20.0	15.4	9.9	16.3	12.5	8.1	28.7	18.4	14.2
Bitterness from added hops (B		32.6	0.0	0.0	26.6	0.0	0.0	29.9	0.0	0.0
Malt / iso-hop extract bitterness		0.0 / 0.0 EBU			0.0 / 0.0 EBU			0.0 / 0.0 EBU		
Total bitterness		32.6 EBU			26.6 EBU			29.9 EBU		

When hopped extract &/or iso-hop extract are/is used with NO additional hops, boiling is NOT required.

Suggested min. boil vol. for Method 2 is 2.7 litres (4 used) & a min. sieve/colander capacity of 2.2 litres.

See the Hop Settings

The hop calculations use the Glenn Tinseth method for loose, whole hops. If the hops are used in a mesh bag, use about 10% more. When using hop pellets, use about 10% fewer.

The length of the boil time is a factor in the bitterness of a beer, up to a certain point. However, the beers hop flavour is said to reach a maximum after about 20 mins. & the hop aroma after just 7 or 8 mins.

Therefore the hop bitterness, flavour & aroma depend upon the boil timings used. See the typical diagram.

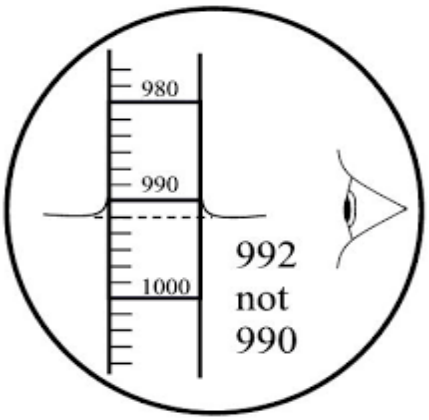
Use whichever “hop method” you choose.

I personally always choose “Method 2”.

GENERAL INFO.

The Specific Gravity (S. G.) of a liquid, as measured by a hydrometer, is the ratio between the weight of a liquid compared to the weight of an equal volume of water. 1 litre of water (@ 20°C & normal atmospheric pressure) weighs 1 Kg & its S. G. is 1 Kg/1 litre = 1 or, as normally denoted, 1000 or 1.000 or 0 Brewers degrees, I have adopted 1000 for this article. If a liquid has a S. G. of say 1040 then it is heavier than water & 1 litre would weigh 1.040 Kg or 1040 g (at this point you will probably be highly delighted that I've adopted Metric & not Imperial, or even worse, U. S. units!). Similarly a liquid whose S. G. is 993 is lighter than water, 1 litre weighing 0.993 Kg or 993 g.

Original Gravity (O. G.) is the gravity (S. G.) of a liquid before fermentation; Final Gravity (F. G.) is the gravity (S. G.) after fermentation. Gravity drop is the difference between these two gravities, & the ABV (alcohol by volume) is approximately equal to Gravity drop/7.45 (the number 7.45 is variable depending on the Original Gravity of the brew – around 1080, 7.6 is a more accurate figure to use for beers & ciders around the 1040 mark).



Note:- The hydrometer is described as having magical properties by Dave Line as the scale always faces away from you! The hydrometer is usually made of glass & consists of a cylindrical stem & a bulb weighted with lead shot or similar, to make it float upright.

The scale is read from the bottom of the meniscus.

Working out the % ABV.

To calculate the alcohol level you need to know both the Original Gravity (OG) & the Final Gravity (FG) of the liquid in question.

An approximate method.

% ABV = (OG - FG) / 7.54 (See the ADDENDUM, table – "O.G. Divider" column)

Example: If a cider has an OG of 1068 & an FG of 996 then its alcohol content is:-

% ABV = (1068 – 996) / 7.54 = (72) / 7.54 = 9.55% ABV (strong stuff!)

The figure of "7.54" is fairly arbitrary, only correct for an SG of 1055 but I consider this to be "near enough" estimation, suitable for beer, wine & ciders. For beer & ciders only, a figure of 7.6 is more accurate, based on an OG of 1040, for wines & meads only use 7.45, based on an OG of 1080. Different people use differing numbers, just about all are acceptable.

A more accurate method

% ABV = (OG - FG) / (7.75 - (3 x (OG - 1000) / 800))

(Note: The "1000" is subtracted as plain water has a gravity of 1000.)

Example: If a beer has an OG of 1068 & an FG of 1012 then its alcohol content is:-

% ABV = (1068 – 1012) / (7.75 - (3 x (1068 – 1000) / 800))

= (56) / (7.75 - (3 x (68) / 800)) = (56) / (7.75 - (0.255))

= (56) / (7.495)

= 7.47% ABV (again, a strong brew.)

ADDENDUM

The table shows the sugars which must be present in the wort/must to attain the required SG. These sugars can be fermentable, un-fermentable or both, wines contain mostly/all fermentable sugars & the table is reasonably accurate, but beer worts contain fairly large amounts of un-fermentable sugars which makes it much harder to predict the FG & so the "Beer % ABV (est.)" becomes very approximate. Malts also contain some semi-fermentable malts, which the yeast may/may not be converted into alcohol, this is put down to the "yeast efficiency" or "attenuation".

S.G.	Sugar g/litre	O.G. Divider	Wine % ABV (est.)	Beer % ABV (est.)
1000	0	7.75	0	0
1001	3	7.75	0.14	0.13
1002	5	7.74	0.28	0.26
1003	8	7.74	0.42	0.39
1004	11	7.74	0.56	0.51
1005	13	7.73	0.70	0.64
1010	27	7.71	1.40	1.29
1015	40	7.69	2.11	1.94
1020	53	7.68	2.81	2.59
1025	67	7.66	3.53	3.24
1030	80	7.64	4.24	3.90
1035	93	7.62	4.96	4.56
1040	107	7.60	5.68	5.23
1045	120	7.58	6.41	5.90
1050	133	7.56	7.14	6.57
1055	147	7.54	7.87	7.24
1060	160	7.53	8.61	7.92
1065	173	7.51	9.35	8.60
1070	187	7.49	10.10	9.29
1075	200	7.47	10.84	9.98
1080	213	7.45	11.60	10.67
1085	227	7.43	12.35	11.36
1090	240	7.41	13.11	12.06
1095	253	7.39	13.88	12.77
1100	267	7.38	14.64	13.47
1105	280	7.36	15.41	14.18
1110	293	7.34	16.19	14.89
1115	307	7.32	16.97	15.61
1120	320	7.30	17.75	16.33
1125	333	7.28	18.54	17.06

I you like & use "Pete's YoBrew Calc's", please donate a little bit extra to charity when you first pass a collection box.

Thank you!

The Battle of Duart Castle in the Isle of Mull, 16th Sept. 1445 (a quarter to 3!).