

BeerXML

**An XML Standard
for the Exchange of
Brewing Data**

Version 2.01

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Introduction

Purpose

This document presents a standard methodology for the free exchange of structured brewing data including, but not limited to, the distribution of craft-brew recipes. The format for storing properties about grains, adjuncts, hops, yeast cultures, beer styles, mashing schedules and region-specific water profiles are all outlined within individual schemas as collections of finely detailed record sets. The recipe schema has been explicitly designed to contain only a minimal subset of the data necessary to accurately recreate the intent of the recipe contributor.

If ever there is a discrepancy between information found in this document and in the XML Schema Description (XSD) files, the information in the XSD files will be assumed correct. Please notify us to make any necessary updates or clarifications to this document.

Files

The BeerXML 2.0 distribution should contain the following XSD files:

```
BeerXML.xsd
grain.xsd
hops.xsd
mash.xsd
measureable_units.xsd
misc.xsd
recipes.xsd
style.xsd
water.xsd
yeast.xsd
```

General

Brewing data will follow the XML 1.0 standard as a basis. To be compliant the program must be able to import and export the required tags, recognize the data formats and units, and follow basic XML conventions. In addition the program must support parsing of the optional tags that have “No” in the Required column.

In an attempt to maintain good style each new tag should be placed on a separate line, with the start and end of the tag surrounding the data. Tags starting and ending a record will be placed on their own line (please see examples). XML Comments are an exception to this guideline.

XML Considerations

File Extension

The file extension “.xml” should be used for all BeerXML data files. For example, a recipe file might be named “recipes.xml”. The file extension “.xsd” will be used for all BeerXML schema definition files.

Comments

Comments may be embedded per the XML standard, but all comments must be ignored by importing programs. The following line is a sample XML comment

```
<!-- This is a comment line in the XML format -->
```

Special Characters

The exporting and importing programs should recognize and translate the normal XML special character codes if they appear as characters embedded in any of the data strings. These special characters include:

<i>Character</i>	<i>XML Code</i>
&	&
<	<
>	>
“	"
‘	'

XML Header

Per the XML standard, all files are required to begin with the following header as the first line:

```
<?xml version="1.0" encoding="UTF-8"?>
```

Non-Standard Tags

Per this standard, the importing program may ignore any XML data file not conforming to the BeerXML Schema. Only validated, well-formed BeerXML 2.0 content should be guaranteed to successfully work.

Elementary Segments

XSD File Content Overview

<i>File</i>	<i>Content</i>
BeerXML.xsd	Provides the <BeerXML> wrapper that associates a version with a BeerXML record set for each valid input data file.
measureable_units.xsd	Isolates the list of accepted units for all measured and calculated values.
style.xsd	Defines the format for beer style record sets and for beer style references used in a BeerXML recipe.
grain.xsd	Defines the format for fermentable record sets and for fermentable items used in a BeerXML recipe.
hops.xsd	Defines the format for hop variety record sets and for hop additions used in a BeerXML recipe.
misc.xsd	Defines the format for adjunct ingredient record sets and for adjunct ingredients used in a BeerXML recipe.
yeast.xsd	Defines the format for yeast culture record sets and for yeast additions used in a BeerXML recipe.
water.xsd	Defines the format for regional water record sets and for water additions used in a BeerXML recipe.
mash.xsd	Defines the format for the mash procedure that contains one or more mash steps.
recipes.xsd	Provides the schema that composes style, grain, hops, misc, yeast, water and mash formats to form the basis of a BeerXML recipe.

Version

All BeerXML files have a required <version> tag that denotes the version of the BeerXML standard used when the file was created. All version elements should be set to the value of 2.01 for this version of the standard. If a non-backward compatible change is required for the standard, the left side of the decimal will be incremented. Any backward compatible changes made to the standard will cause the value to the right of the decimal to be incremented. It is our intent that future versions of the standard will be backward compatible with the older versions, but the <version> tag allows newer programs to check for a higher version of the standard or perform conversions if required.

Data Formats

- **Record Set** – A special tag that starts a particular set of data. Each record set provides a rich description of the information in the file. For example an XML table that consists of a set of mash procedures might start with a `<procedure>` tag to denote that this is the start of a set of mash procedures. After the last record, a `</procedure>` tag would be used.

- **Record** - Denotes a tag that starts or ends a particular record -- for example "hop" might start a hops record or "fermentable" might start a fermentable record.

- **Percentage** - Denotes a percentage - all percentages are expressed as percent out of 100- for example 10.4% is written as "10.4" and not "0.104"

- **List** - The data has only a fixed number of values that are selected from the list in the description table for the tag. These items are case sensitive, and no other values are allowed.

- **Text** - The data is free format text. For multi-line entries, line breaks will be preserved where possible and the text may be truncated on import if the text is too long for the importing program to store. Multi-line entries may be split with either a new line character [0x0A] (Unix format) or a carriage return – new line combination [0x0D][0x0A] (DOS format). Importing programs should accept either.

- **Boolean** - May be either true or false in lowercase letters. A default value should be specified for optional fields - the default is used only if the value is not present.

- **Integer** - An integer number with no decimal point. May include negative values - examples include ...-3, -2, -1, 0, 1, 2, 3,...

- **Floating Point** - A floating point number, usually expressed in its simplest form with a decimal point as in "1.2", "0.004", etc...

Units

Any valid measured or estimated unit value must be preserved in a BeerXML file as the native unit type of that specific value. If it is necessary to display the value as a different unit type, then it is the responsibility of the importing or exporting program to convert to and from any of the units listed below if needed. Please see the `measureable_units.xsd` file for further information.

The general format of the XML element with a value and associated unit type will be:

```
<element_name measurement_type="native_type">  
  decimal_value  
</element_name>
```

where `measurement_type` is one of mass, volume, degrees, length, pressure, duration, scale (for color) or density.

Mass Unit Type

One of the following:

mg	(SI milligrams)
gm	(SI grams)
kg	(SI kilograms)
lb	(US pounds)
oz	(US ounces)

Example: `<amount_as_weight mass="oz">0.5</amount_as_weight>`

Volume Unit Type

One of the following:

mL	(SI milliliter)
L	(SI Liter)
tsp	(US teaspoon)
tbsp	(US tablespoon)
ozfl	(US fluid ounce)
cup	(US Cup)
pt	(US Pint)
qt	(US Quart)
gal	(US Gallon)
bbl	(US Barrel)
iozfl	(UK fluid ounce)
ipt	(UK Pint)
iqt	(UK Quart)
igal	(UK Gallon)
ibbl	(UK Barrel)

Example: `<amount volume="qt">10.24</amount>`

Temperature Unit Type

One of the following:

C	(SI Celcius)
F	(US Farenheit)

Example: `<infuse_temperature degrees="F">165.9</infuse_temperature>`

Time Unit Type

One of the following:

sec (second)
min (minute)
hr (hour)
day
week
month
year

Example: `<step_time duration="min">10</step_time>`

Density Unit Type

One of the following:

sg (Significant Gravity)
plato (degrees Plato)

Example: `<original_gravity density="sg">1.047</original_gravity>`

Pressure Unit Type

One of the following:

kPa (SI kilopascals)
psi (US pounds per square inch)
bar (UK pressure)

Example: `<keg_co2 pressure="psi">13.2</keg_co2>`

Color Unit Type

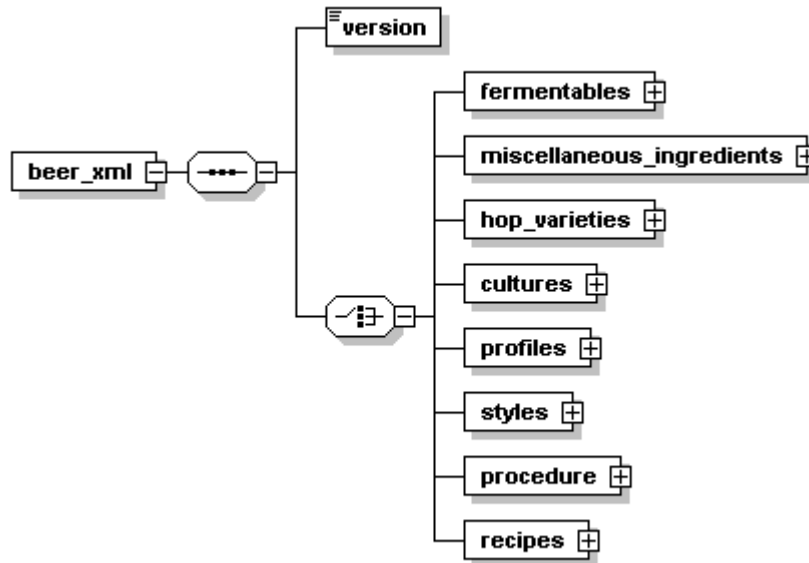
One of the following:

EBC (European Brewing Convention)
L (Lovibond - equivalent to SRM - used for malts)
SRM (Standard Reference Method - replaced Lovibond for finished beer)

Example: `<color scale="L">3.2</color>`

BeerXML Record Sets

Record sets provide a description of the data records referenced from a recipe that may be imported and exported as separate XML tables. The only record set embedded in its entirety into the recipe is the Mash Procedure. For all others, a minimal set of attributes that can uniquely identify a specific item replace the reference to the record set.



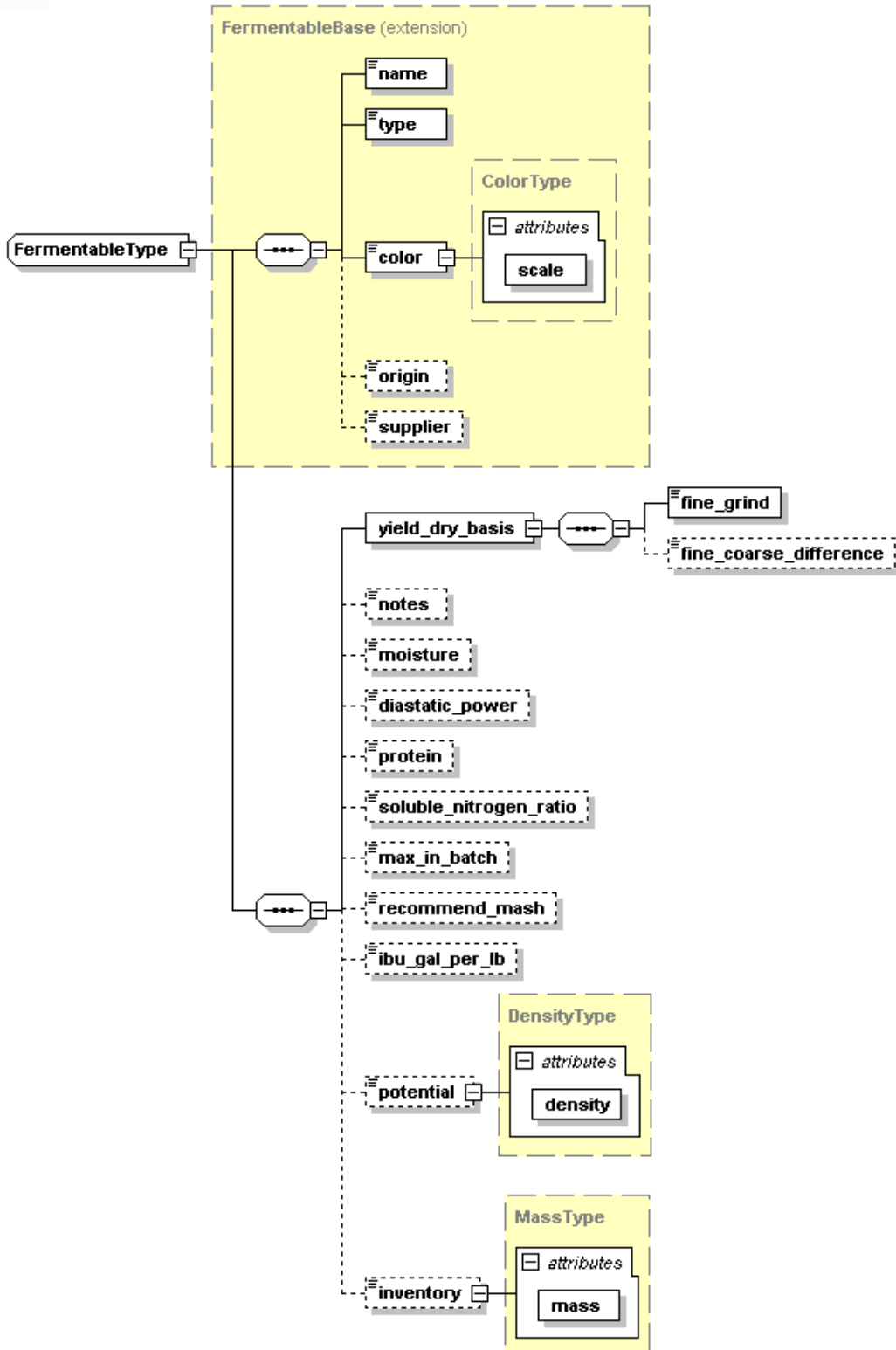
Data tag	Format	Description
fermentables	Record Set	Encloses a set of one or more fermentable records
miscellaneous_ingredients	Record Set	Encloses a set of one or more miscellaneous (adjunct) records
hop_varieties	Record Set	Encloses a set of one or more hop records
cultures	Record Set	Encloses a set of one or more yeast records
profiles	Record Set	Encloses a set of one or more water records
styles	Record Set	Encloses a set of one or more beer style records
procedure	Record Set	Used for a set of one or more mash profiles
recipes	Record Set	Encloses one or more recipe records

Example: A set of 2 hops

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <hop_varieties>
    <hop>
      <!-- hop 1 fields here -->
    </hop>
    <hop>
      <!-- hop 2 fields here -->
    </hop>
  </hop_varieties>
</beer_xml>
```

Fermentables

The term "fermentable" encompasses all fermentable items that substantially contribute to the wort gravity including extracts, grains, sugars, honey and fruits.



Data tag	Required	Format	Description
fermentable	Yes	Record	Starts a fermentable ingredient record -- any of the below tags may be included within the <fermentables>... </fermentables> record tags.
name	Yes	Text	Name of the fermentable item.
type	Yes	List	May be "grain", "sugar", "extract", "dry extract" or "adjunct". Extract refers to liquid extract.
color	Yes	Floating Point (color)	The color of the item in Lovibond Units (SRM for liquid extracts).
fine_grind	Yes	Percent	Percent dry yield (fine grain) for the grain, or the raw yield by weight if this is an extract adjunct or sugar.
fine_coarse_diffence	No	Percent	Percent difference between the coarse grain yield and fine grain yield. Only appropriate for a "Grain" or "Adjunct" type, otherwise this value is ignored.
origin	No	Text	Country or place of origin
supplier	No	Text	Supplier of the grain/extract/sugar
notes	No	Text	Textual noted describing this ingredient and its use. May be multi-line.
moisture	No	Percent	Percent moisture in the grain. Only appropriate for a "Grain" or "Adjunct" type, otherwise this value is ignored.
diastatic_power	No	Floating Point	The diastatic power of the grain as measured in "Lintner" units. Only appropriate for a "grain" or "adjunct" type, otherwise this value is ignored.
protein	No	Percent	The percent protein in the grain. Only appropriate for a "grain" or "adjunct" type, otherwise this value is ignored.
max_in_batch	No	Percent	The recommended maximum percentage (by weight) this ingredient should represent in a batch of beer.
recommend_mash	No	Boolean	true if it is recommended the grain be mashed, false if it can be steeped. A value of true is only appropriate for a "grain" or "adjunct" types. The default value is false. Note that this does NOT indicate whether the grain is mashed or not – it is only a recommendation used in recipe formulation.
ibu_gal_per_lb	No	Floating Point	For hopped extracts only - an estimate of the number of IBUs per pound of extract in a gallon of water. To convert to IBUs we multiply this number by the

			"amount" field (in pounds) and divide by the number of gallons in the batch. Based on a sixty minute boil. Only suitable for use with an "extract" type, otherwise this value is ignored.
potential	No	Floating Point (Density)	The potential yield of the fermentable ingredient. For example "1.036" or "1.040" might be valid potentials.
inventory	No	Floating Point (Mass)	The amount of this ingredient currently in stock.

Example Fermentable Record with required fields only:

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <fermentables>
    <fermentable>
      <name>Pale 2-row Malt</name>
      <type>grain</type>
      <color scale="L">3.0</color>
      <yield_dry_basis>
        <fine_grind>73.4</fine_grind>
      </yield_dry_basis>
    </fermentable>
  </fermentables>
</beer_xml>
```

Example Hopped Extract:

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <fermentables>
    <fermentable>
      <name>Fustons Hopped Amber</name>
      <type>extract</type>
      <color scale="L">13</color>
      <yield_dry_basis>
        <fine_grind>78.0</fine_grind>
      </yield_dry_basis>
      <notes>Hopped amber extract suitable as a base for english
ales.</notes>
      <ibu_gal_per_lb>16.6</ibu_gal_per_lb>
    </fermentable>
  </fermentables>
</beer_xml>
```

Sample Crystal Malt Specialty Grain with all applicable fields:

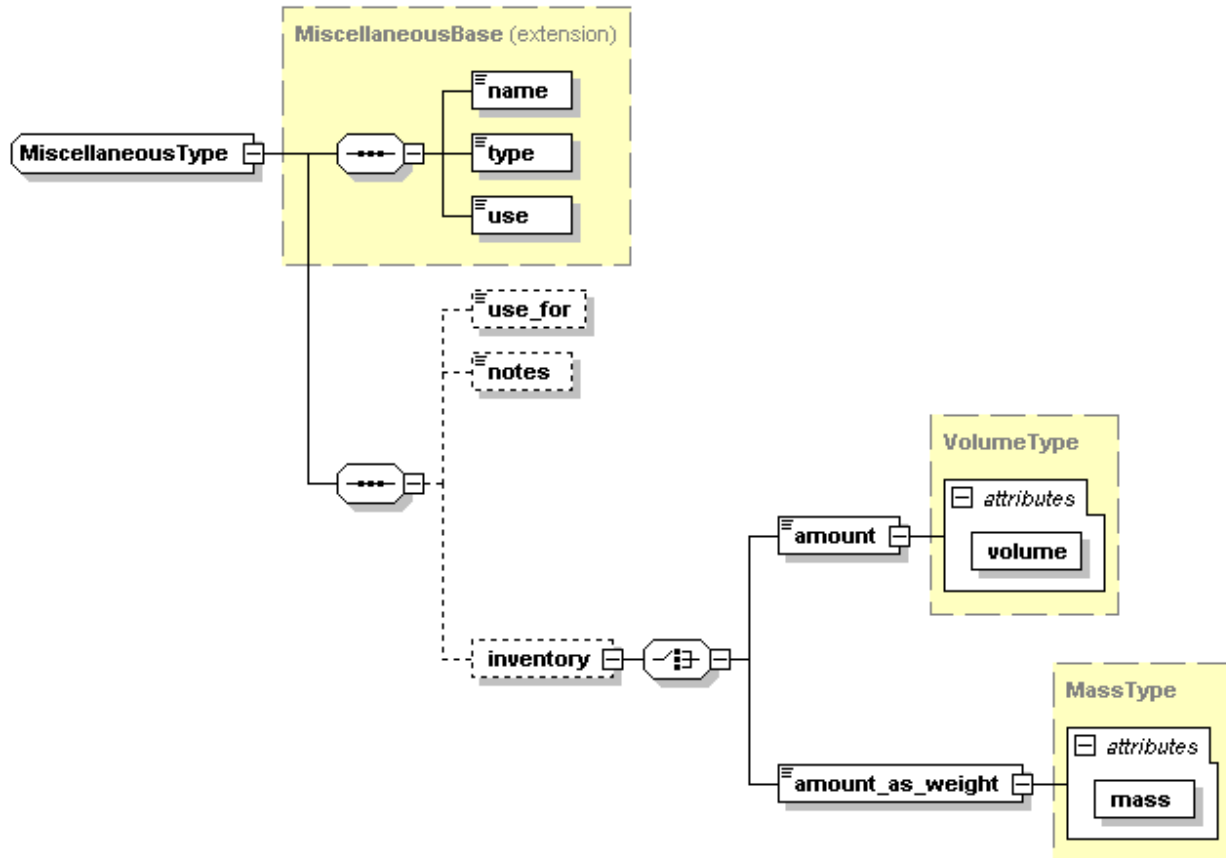
```

<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <fermentables>
    <fermentable>
      <name>Crystal 40 L</name>
      <type>grain</type>
      <color scale="L">40.0</color>
      <origin>United Kingdom</origin>
      <supplier>Fussybrewer Malting</supplier>
      <yield_dry_basis>
        <fine_grind>74.0</fine_grind>
        <fine_coarse_difference>1.5</fine_coarse_difference>
      </yield_dry_basis>
      <notes>Darker crystal malt.
Adds body and improves head retention.
Also called caramel malt.</notes>
      <moisture>4.0</moisture>
      <diastatic_power>0.0</diastatic_power>
      <protein>13.2</protein>
      <max_in_batch>10.0</max_in_batch>
      <recommend_mash>false</recommend_mash>
    </fermentable>
  </fermentables>
</beer_xml>

```

Miscellaneous Ingredients

Encompasses all non-fermentable miscellaneous ingredients (adjuncts) that are not hops or yeast and do not significantly change the gravity of the beer. For example: spices, clarifying agents, water treatments, etc...



Data tag	Required	Format	Description
miscellaneous	Yes	Record	Starts a miscellaneous ingredient record -- any of the below tags may be included within the <miscellaneous>... </miscellaneous> record tags.
name	Yes	Text	Name of the miscellaneous item.
type	Yes	List	May be "spice", "fining", "water agent", "herb", "flavor" or "other"
use	Yes	List	May be "boil", "mash", "primary", "secondary", "bottling"
use_for	No	Text	Short description of what the ingredient is used for in text
notes	No	Text	Detailed notes on the item including usage. May be multi-line.
inventory	No	Element	Amounts of miscellaneous ingredient

			currently in stock, measured by volume or by weight
amount		Floating Point (Volume)	The volume amount of this miscellaneous ingredient currently in stock.
amount_as_weight		Floating Point (Mass)	The weight amount of this miscellaneous ingredient currently in stock.

Example: Irish Moss with minimal fields

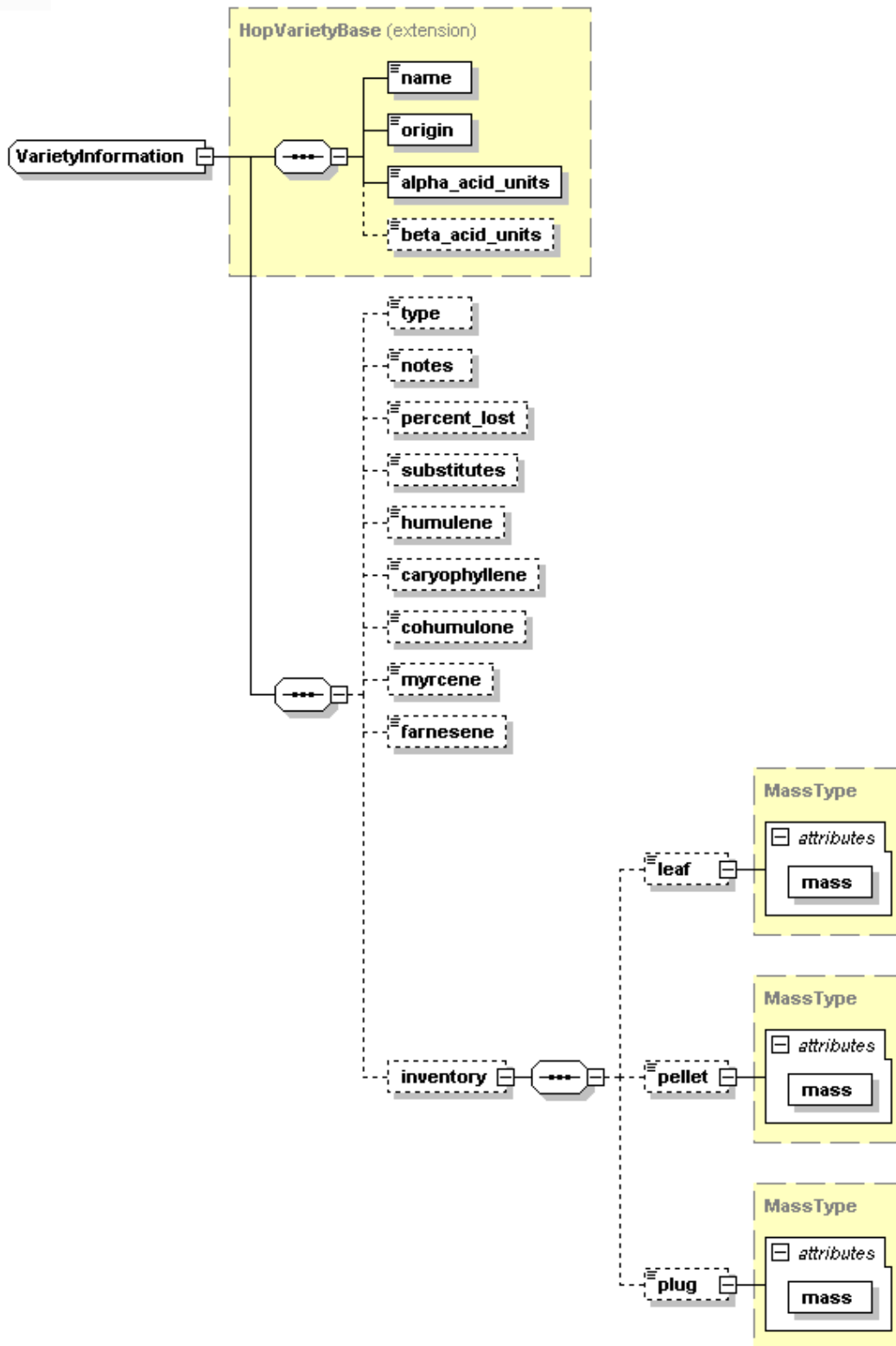
```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <miscellaneous_ingredients>
    <miscellaneous>
      <name>Irish Moss</name>
      <type>fining</type>
      <use>boil</use>
    </miscellaneous>
  </miscellaneous_ingredients>
</beer_xml>
```

Example: Coriander Spice with a typical set of fields

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <miscellaneous_ingredients>
    <miscellaneous>
      <name>Coriander</name>
      <type>spice</type>
      <use>boil</use>
      <use_for>Belgian Wit Spice</use_for>
      <notes>Used in Belgian Wit, Whites, and Holiday ales. Very good when
used in light wheat ales. Often used with Bitter Orange Peel. Crack open
seeds and add at the end of the boil to extract aroma and flavor.</notes>
    </miscellaneous>
  </miscellaneous_ingredients>
</beer_xml>
```


Hop Varieties

Records that identify and catalog the specific characteristics of a particular hop variety. Supports inventory of separate quantities of leaf, pellet and plug hops for a given variety.



Data tag	Required	Format	Description
hop	Yes	Record	Starts a hops ingredient record -- any of the below tags may be included within the <hop>...</hop> record tags.
name	Yes	Text	Name of the hops
origin	Yes	Text	Country of origin for the hop variety
alpha_acid_units	Yes	Percentage	Percent alpha of hops - for example "5.5" represents 5.5% alpha
beta_acid_units	No	Percentage	Hop beta percentage - for example "4.4" denotes 4.4 % beta
type	No	List	May be "bittering", "aroma" or "both"
notes	No	Text	Textual notes about the hops, usage, substitutes. May be a multiline entry.
percent_lost	No	Percentage	Defined as the percentage of hop alpha lost in 6 months of storage. See Hop Stability Index for more information.
substitutes	No	Text	Alternate hop varieties that can be used in place of this hop variety
humulene	No	Percent	Humulene level in percent.
caryophyllene	No	Percent	Caryophyllene level in percent.
cohumulone	No	Percent	Cohumulone level in percent
myrcene	No	Percent	Myrcene level in percent

Example with required fields only:

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <hop_varieties>
    <hop>
      <name>Cascade</name>
      <origin>US</origin>
      <alpha_acid_units>5.50</alpha_acid_units>
    </hop>
  </hop_varieties>
</beer_xml>
```

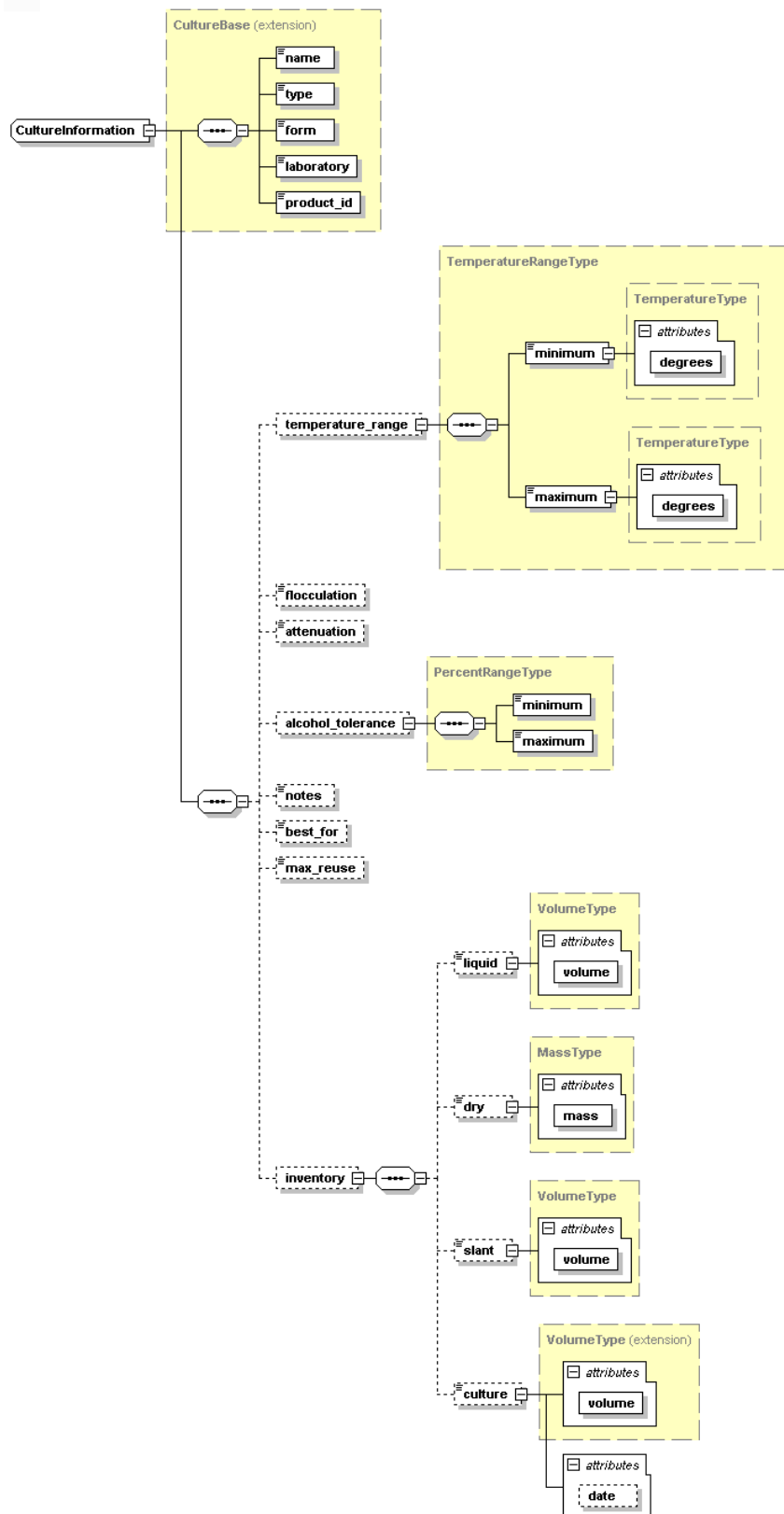
Example Hop Record with All Fields:

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <hop_varieties>
    <hop>
      <name>Super Hops</name>
      <origin>Planet Krypton</origin>
      <alpha_acid_units>4.5</alpha_acid_units>
```

```
<beta_acid_units>5.5 </beta_acid_units>
<type>bittering</type>
<notes>This hop is a really cool hops - you can use it for anything.
It leaps over buildings in a single bound, is faster than
a speeding bullet and makes really bitter beer.</notes>
<percent_lost>30</percent_lost>
<substitutes>Goldings, Fuggles, Super Alpha</substitutes>
<humulene>2.34</humulene>
<caryophyllene>1.23</caryophyllene>
<cohumulone>13.2</cohumulone>
<myrcene>24.4</myrcene>
<inventory>
  <leaf mass="oz">2.0</leaf>
  <pellet mass="oz">0.5</pellet>
  <plug mass="oz">0.0</plug>
</inventory>
</hop>
</hop_varieties>
</beer_xml>
```

Yeast Cultures

The term "yeast" encompasses all yeasts, including dry yeast, liquid yeast and yeast starters.



Data tag	Required	Format	Description
yeast	Yes	Record	Starts a yeast ingredient record -- any of the below tags may be included within the <yeast>... </yeast> record tags.
name	Yes	Text	Name of the yeast.
type	Yes	List	May be “ale”, “lager”, “wheat”, “wine” or “champagne”
form	Yes	List	May be “liquid”, “dry”, “slant” or “culture”
laboratory	Yes	Text	The name of the laboratory that produced the yeast.
product_id	Yes	Text	The manufacturer’s product ID label or number that identifies this particular strain of yeast.
temperature_range	No	Element	Contains the minimum and maximum recommended temperature range for this yeast culture.
minimum		Temperature	The minimum recommended temperature for fermenting this yeast strain in degrees Celsius.
maximum		Temperature	The maximum recommended temperature for fermenting this yeast strain in Celsius.
flocculation	No	List	May be “low”, “medium”, “high” or “very high”
attenuation	No	Percent	Average attenuation for this yeast strain.
notes	No	Text	Notes on this yeast strain. May be a multi-line entry.
best_for	No	Text	Styles or types of beer this yeast strain is best suited for.
max_reuse	No	Integer	Recommended of times this yeast can be reused (recultured from a previous batch)
inventory	No	Element	Amounts of liquid, dry, slant and cultured yeast

			currently in stock.
liquid		Floating Point (Volume)	Amount of liquid yeast currently in stock
dry		Floating Point (Mass)	Amount of dry yeast currently in stock
slant		Floating Point (Volume)	Amount of slant yeast currently in stock
culture		Floating Point (Volume)	Amount of cultured yeast currently in stock

Example: Yeast with required fields only

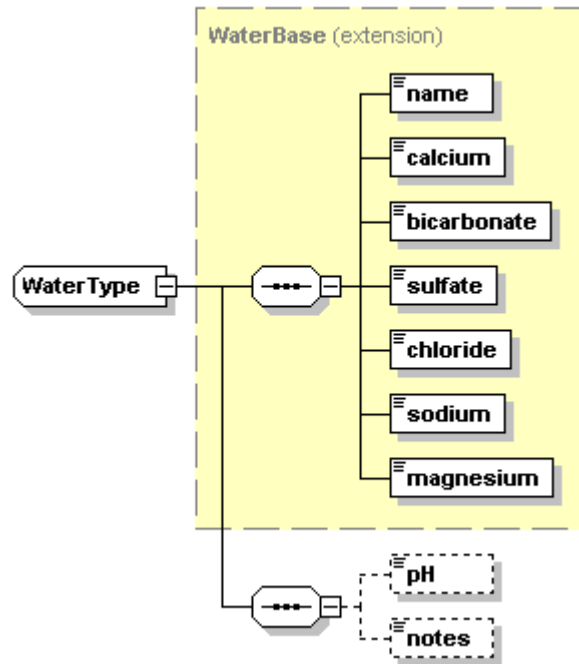
```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <cultures>
    <yeast>
      <name>Ole English Ale Yeast</name>
      <type>ale</type>
      <form>liquid</form>
      <laboratory/>
      <product_id/>
    </yeast>
  </cultures>
</beer_xml>
```

Example: Yeast with more popular fields

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <cultures>
    <yeast>
      <name>German Ale</name>
      <type>ale</type>
      <form>liquid</form>
      <laboratory>Wyeast Labs</laboratory>
      <product_id>1007</product_id>
      <temperature_range>
        <minimum degrees="C">12.8</minimum>
        <maximum degrees="C">20.0</maximum>
      </temperature_range>
      <flocculation>low</flocculation>
      <attenuation>75.0</attenuation>
      <notes>Crisp dry flavor with a hint of mild flavor.
Great for many continental ales.</notes>
      <best_for>German Ales, Alts, Kolsch, Dry Stouts</best_for>
    </yeast>
  </cultures>
</beer_xml>
```

Water Profiles

Though not strictly required for recipes, the water profile allows supporting programs to record the region-specific water parameters used for brewing a particular batch of beer.



Data tag	Required	Format	Description
water	Yes	Record	Starts a water profile record -- any of the below tags may be included within the <water>...</water> record tags.
name	Yes	Text	Name of the water profile – usually the city and country of the water profile.
calcium	Yes	Floating Point	The amount of calcium (Ca) in parts per million.
bicarbonate	Yes	Floating Point	The amount of bicarbonate (HCO ₃) in parts per million.
sulfate	Yes	Floating Point	The amount of Sulfate (SO ₄) in parts per million.
chloride	Yes	Floating Point	The amount of Chloride (Cl) in parts per million.
sodium	Yes	Floating Point	The amount of Sodium (Na) in parts per million.
magnesium	Yes	Floating Point	The amount of Magnesium (Mg) in parts per million.
pH	No	Floating Point	The pH of the water.

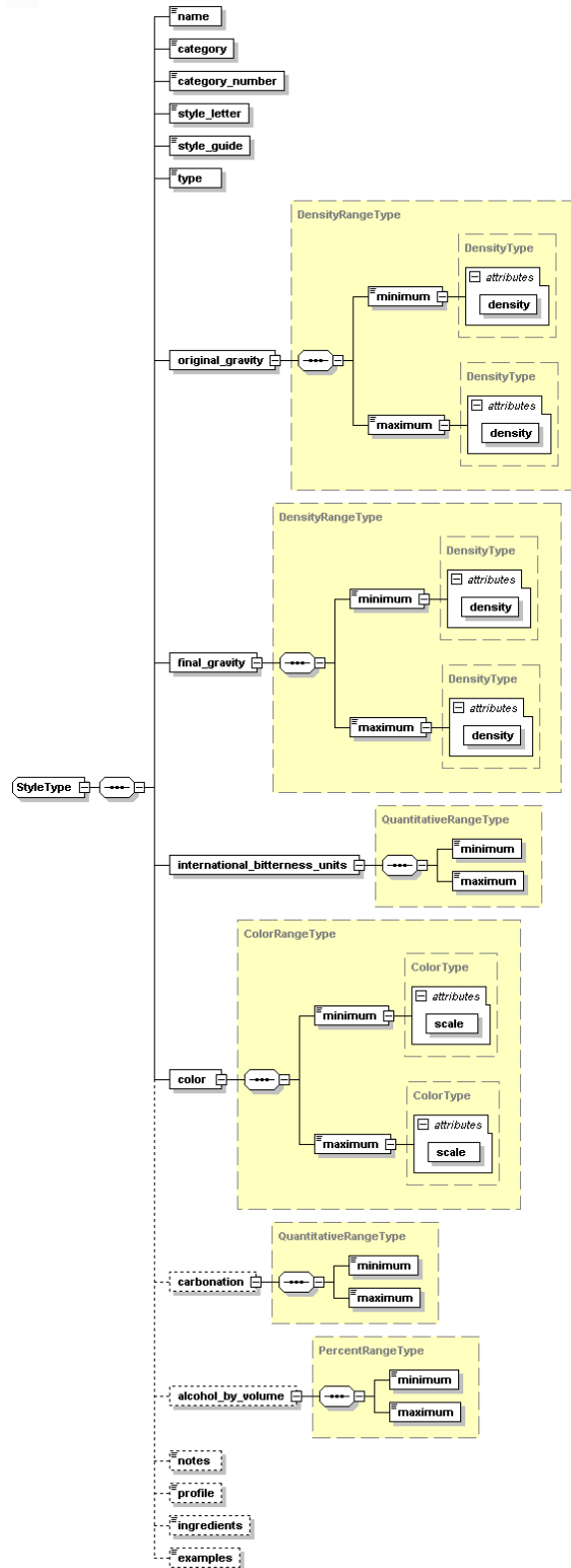
notes	No	Text	Notes about the water profile. May be multi-line.
--------------	----	------	---

Example: A Sample Water Profile

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <profiles>
    <water>
      <name>Burton on Trent, UK</name>
      <calcium>295.0</calcium>
      <bicarbonate>300.0</bicarbonate>
      <sulfate>725.0</sulfate>
      <chloride>25.0</chloride>
      <sodium>55.0</sodium> <magnesium>45.0</magnesium>
      <pH>8.0</pH>
      <notes>Use for distinctive pale ales strongly hopped. Very hard water
accentuates the hops flavor. Example: Bass Ale</notes>
    </water>
  </profiles>
</beer_xml>
```

Styles

The beer style may be from the BJCP style guide, Australian, UK or local style guides. Generally a recipe is designed to one style.



Data tag	Required	Format	Description
style	Yes	Record	Starts a style record -- any of the below tags may be included within the <style>... </style> record tags.
name	Yes	Text	Name of the style profile – usually this is the specific name of the style – for example “Scottish Wee Heavy Ale” and not the Category which in this case might be “Scottish Ale”
category	Yes	Text	Category that this style belongs to – usually associated with a group of styles such as “English Ales” or “Americian Lagers”.
category_number	Yes	Text	Number or identifier associated with this style category. For example in the BJCP style guide, the “American Lager” category has a category number of “1”.
style_letter	Yes	Text	The specific style number or subcategory letter associated with this particular style. For example in the BJCP style guide, an American Standard Lager would be style letter “A” under the main category. Letters should be upper case.
style_guide	Yes	Text	The name of the style guide that this particular style or category belongs to. For example “BJCP” might denote the BJCP style guide, and “AHA” would be used for the AHA style guide.
type	Yes	List	May be “lager”, “ale”, “mead”, “wheat”, “mixed” or “cider”. Defines the type of beverage associated with this category.
original_gravity	Yes	Element	The range of acceptable original gravity for the style.
minimum		Density	The minimum specific

			gravity allowable for the style. For example “1.040” might be a reasonable minimum for a Pale Ale.
maximum		Density	The maximum specific gravity allowable for the style.
final_gravity	Yes	Element	The range of acceptable final gravity for the style.
minimum		Density	The minimum final gravity allowable for the style.
maximum		Density	The maximum final gravity allowable for the style.
international_bitterness_units	Yes	Element	The range of bitterness for this style.
minimum		IBUs	The recommended minimum bitterness for this style as measured in International Bitterness Units (IBUs)
maximum		IBUs	The recommended maximum bitterness for this style as measured in International Bitterness Units (IBUs)
color	Yes	Element	The range of color for this beer style.
minimum		Color	The minimum recommended color
maximum		Color	The maximum recommended color.
carbonation	No	Element	Range of carbonation for this beer style.
minimum		Volumes of CO ₂	Minimum recommended carbonation for this style in volumes of CO ₂
maximum		Volumes of CO ₂	The maximum recommended carbonation for this style in volumes of CO ₂
alcohol_by_volume	No	Element	The range of alcohol by volume for this beer style.
minimum		Percent	The minimum recommended alcohol by volume as a percentage.
maximum	No	Percent	The maximum recommended alcohol by volume as a percentage.
notes	No	Text	Description of the style, history
profile	No	Text	Flavor and aroma profile for

			this style
ingredients	No	Text	Suggested ingredients for this style
examples	No	Text	Example beers of this style.

Example: Bohemian Pilsner

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <styles>
    <style>
      <name>Bohemian Pilsner</name>
      <category>European Pale Ale</category>
      <category_number>2</category_number>
      <style_letter>A</style_letter>
      <style_guide>BJCP</style_guide>
      <type>lager</type>
      <original_gravity>
        <minimum density="sg">1.044</minimum>
        <maximum density="sg">1.056</maximum>
      </original_gravity>
      <final_gravity>
        <minimum density="sg">1.013</minimum>
        <maximum density="sg">1.017</maximum>
      </final_gravity>
      <international_bitterness_units>
        <minimum>35.0</minimum>
        <maximum>45.0</maximum>
      </international_bitterness_units>
      <color>
        <minimum scale="SRM">3.0</minimum>
        <maximum scale="SRM">5.0</maximum>
      </color>
      <notes>Famous beer of Pilsen, Czech republic. Light to medium body
with some sweetness. Saaz hop flavor and aroma with no lingering
bitterness.</notes>
    </style>
  </styles>
</beer_xml>
```

Example: Dry Irish Stout with all fields

```
<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <styles>
    <style>
      <name>Dry Stout</name>
      <category>Stout</category>
      <category_number>16</category_number>
      <style_letter>A</style_letter>
      <style_guide>BJCP</style_guide>
      <type>ale</type>
      <original_gravity>
        <minimum density="sg">1.035</minimum>
```

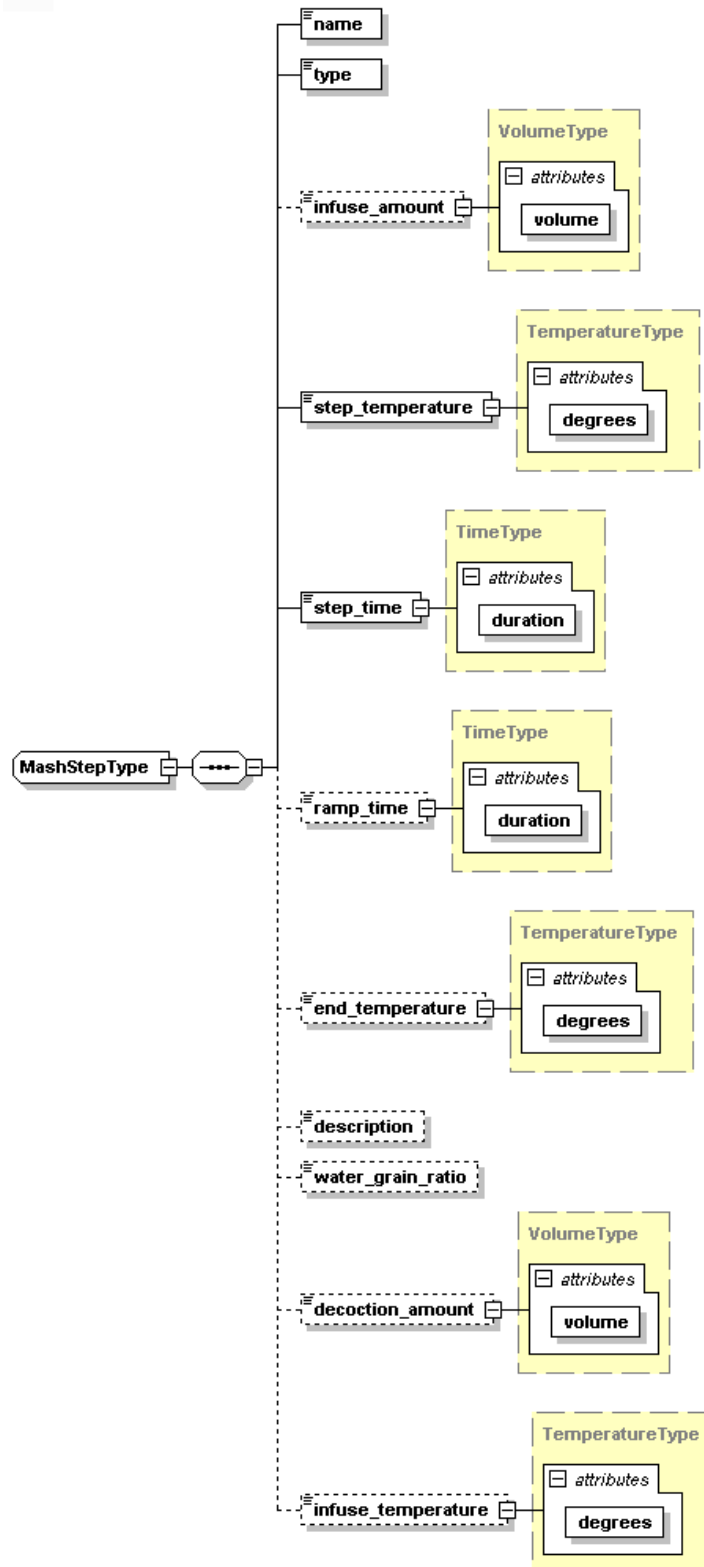
```

    <maximum density="sg">1.050</maximum>
  </original_gravity>
  <final_gravity>
    <minimum density="sg">1.007</minimum>
    <maximum density="sg">1.011</maximum>
  </final_gravity>
  <international_bitterness_units>
    <minimum>30.0</minimum>
    <maximum>50.0</maximum>
  </international_bitterness_units>
  <color>
    <minimum scale="SRM">35.0</minimum>
    <maximum scale="SRM">200.0</maximum>
  </color>
  <carbonation>
    <minimum>1.6</minimum>
    <maximum>2.1</maximum>
  </carbonation>
  <alcohol_by_volume>
    <minimum>3.2</minimum>
    <maximum>5.5</maximum>
  </alcohol_by_volume>
  <notes>Famous Irish Stout. Dry, roasted, almost coffee like flavor.
Often soured with pasteurized sour beer.</notes>
  <profile>Full body perception due to flaked barley, though starting
gravity may be low. Dry roasted flavor.</profile>
  <ingredients>Made with black barley and flaked barley, Hard water.
Irish Ale Yeast.</ingredients>
  <examples>Guinness</examples>
</style>
</styles>
</beer_xml>

```

Mash Step

A mash step is an internal record used within a mash profile to denote a separate step in a multi-step mash. A mash step is not intended for use outside of a mash profile.



Data tag	Required	Format	Description
step	Yes	Record	Starts a mash step record -- any of the below tags may be included within the <step>...</step> record tags.
name	Yes	Text	Name of the mash step – usually descriptive text such as “Dough In” or “Conversion”
type	Yes	List	May be “infusion”, “temperature” or “decoction” depending on the type of step. Infusion denotes adding hot water, temperature denotes heating with an outside heat source, and decoction denotes drawing off some mash for boiling.
infuse_amount	Conditional	Volume	The volume of water to infuse in this step. Required only for infusion steps, though one may also add water for temperature mash steps. One should not have an infusion amount for decoction steps.
step_temperature	Yes	Temperature	The target temperature for this step.
step_time	Yes	Time	The duration to spend at this step – i.e. the amount of time we are to hold this particular step temperature.
ramp_time	No	Time	The amount of time to achieve the desired step temperature – useful particularly for temperature mashes where it may take some time to achieve the step temperature.
end_temperature	No	Temperature	The expected temperature the mash falls to after a long mash step.
description	No	Text	Textual description of this step such as “Infuse 4.5 gal of water at 170 F” – may be either generated by the program or input by the user.
water_grain_ratio	No	Text	The total ratio of water to grain for this step AFTER the infusion, expressed in units based on the <infuse_amount>. Note this value must be consistent with the required infusion amount and amounts added in earlier steps and

			is only relevant as part of a < mash > profile.
decoction_amount	No	Text	Calculated volume of mash to decoction. Only applicable for a decoction step.
infuse_temperature	No	Text	The calculated infusion temperature based on the current step, grain, and other settings. Applicable only for an infusion step.

Example: Infusion Step add 5 liters – 68 C for 70 minutes

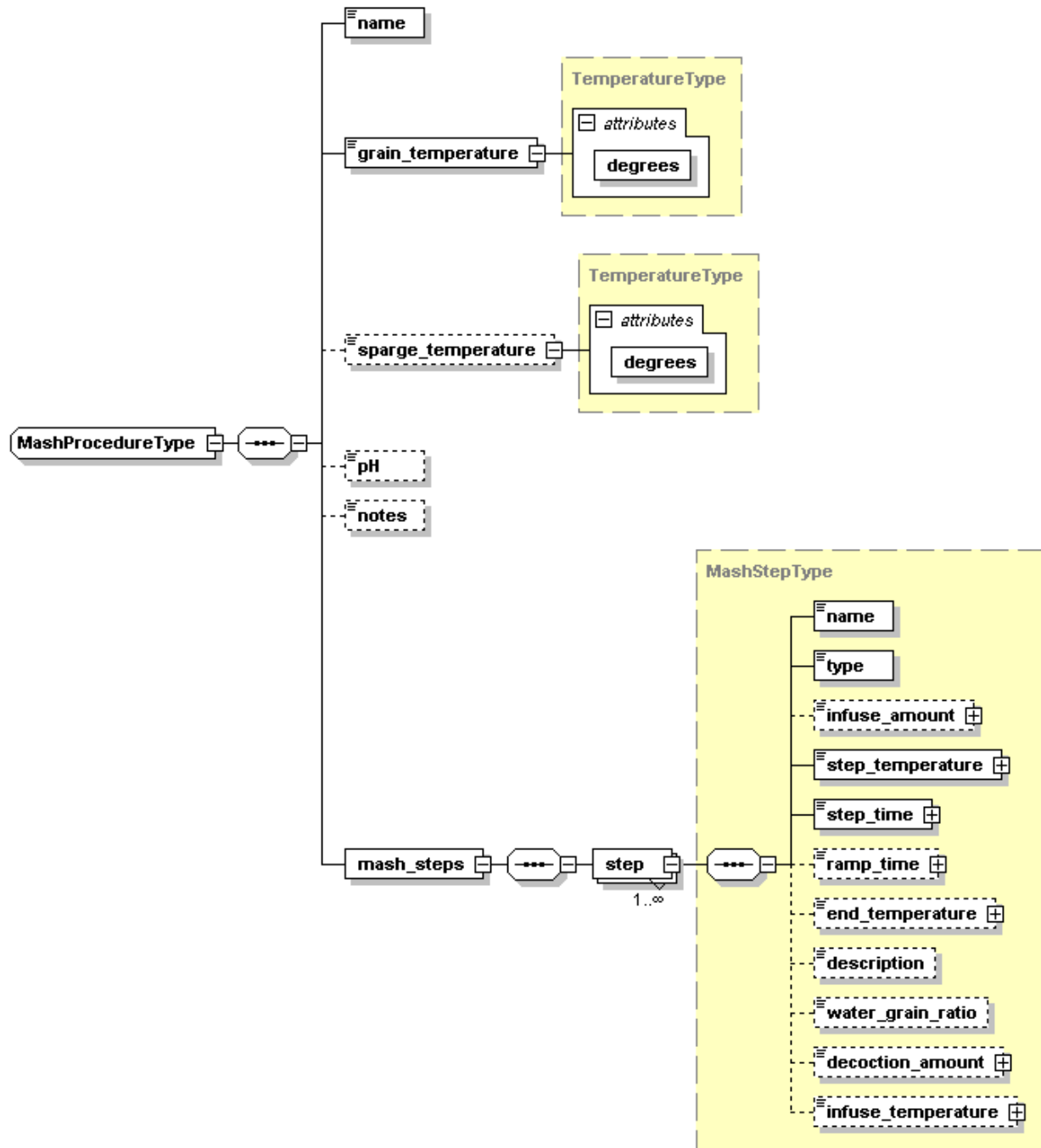
```
<step>
  <name>Conversion step</name>
  <type>infusion</type>
  <infuse_amount volume="L">5.0</infuse_amount>
  <step_temperature degrees="C">68.0</step_temperature>
  <step_time duration="min">70.0</step_time>
  <infuse_temperature degrees="C">85.0</infuse_temperature >
</step>
```

Example: Decoction Step – 68C for 90 minutes

```
<step>
  <name>Conversion Decoction</name>
  <type>decoction</type>
  <step_temperature degrees="C">68.0</step_temperature>
  <step_time duration="min">90.0</step_time>
  <decoction_amount volume="L">1.2</decoction_amount >
</step>
```

Mash Profile

A mash profile is a record used either within a recipe or outside the recipe to precisely specify the mash method used. The record consists of some informational items followed by a `<mash_steps>` record that contains the actual mash steps.



Data tag	Required	Format	Description
mash	Yes	Record	Starts a MASH profile record. All items below should appear between the <mash>...</mash> elements.
name	Yes	Text	Name of the mash profile.
grain_temperature	Yes	Temperature	The temperature of the grain before adding it to the mash.
sparge_temperature	No	Temperature	Temperature of the sparge water used.
pH	No	Floating Point	pH of the sparge.
notes	No	Text	Notes associated with this profile – may be multi-line.
mash_steps	Yes	Record Set	Record set that starts the list of <step> records. All mash step records should appear between the <mash_steps> ... </mash_steps> pair.

Sample Single Step Infusion Mash

```

<mash>
  <name>Single Step Infusion, 68 C</name>
  <grain_temperature degrees="C">22.0</grain_temperature>
  <mash_steps>
    <step>
      <name>Conversion Step, 68C </name>
      <type>infusion</type>
      <infuse_amount volume="L">10.0</infuse_amount>
      <step_temperature degrees="C">68.0</step_temperature>
      <step_time duration="min">60.0</step_time>
    </step>
  </mash_steps>
</mash>

```

Sample Two Step Temperature Mash

```

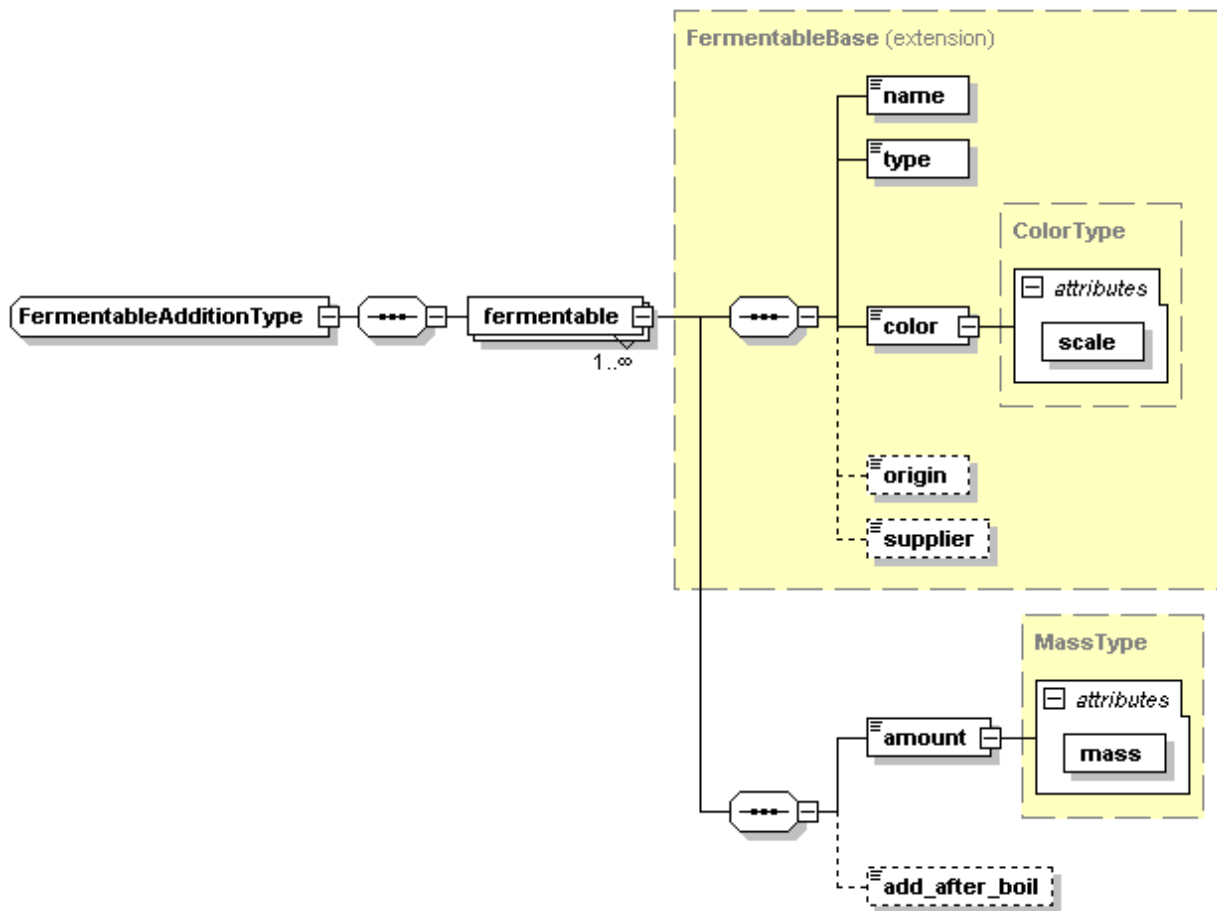
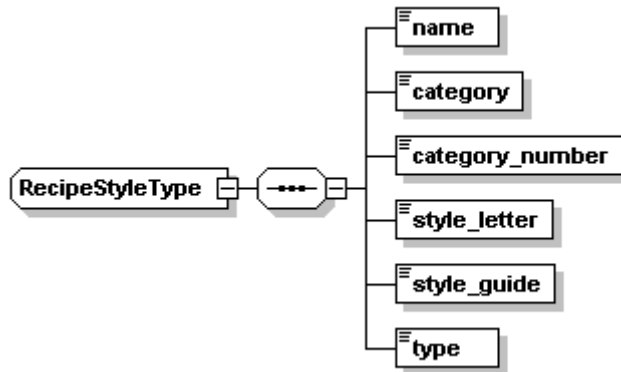
<mash>
  <name>Two Step Temperature, 68C </name>
  <grain_temperature degrees="C">22.0</grain_temperature>
  <tun_temperature degrees="C">22.0</tun_temperature>
  <sparge_temperature degrees="C">78.0</sparge_temperature>
  <mash_steps>
    <step>
      <name>Protein Rest</name>
      <type>temperature</type>
      <infuse_amount volume="L">15.0</infuse_amount>
      <step_temperature degrees="C">49.0</step_temperature>
      <step_time duration="min">20.0</step_time>
      <ramp_time duration="min">10.0</ramp_time>
    </step>
    <step>
      <name>Conversion Step, 68 C</name>

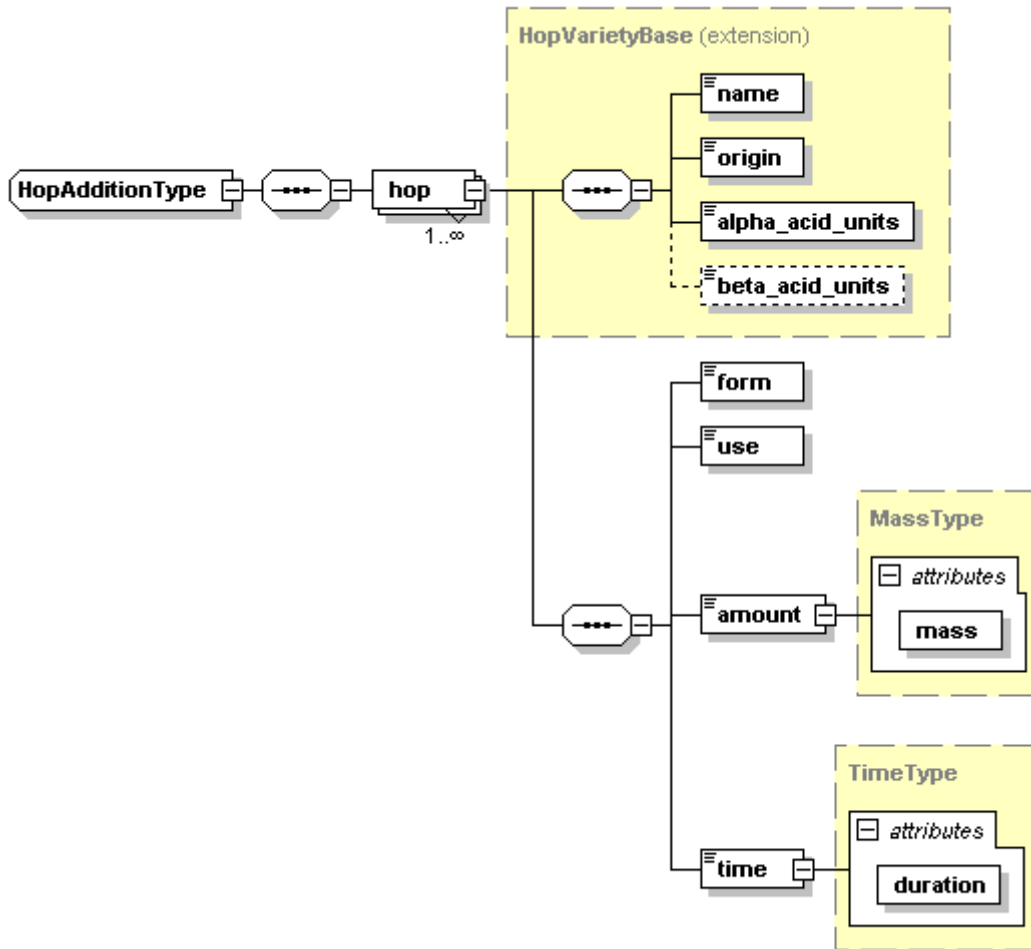
```

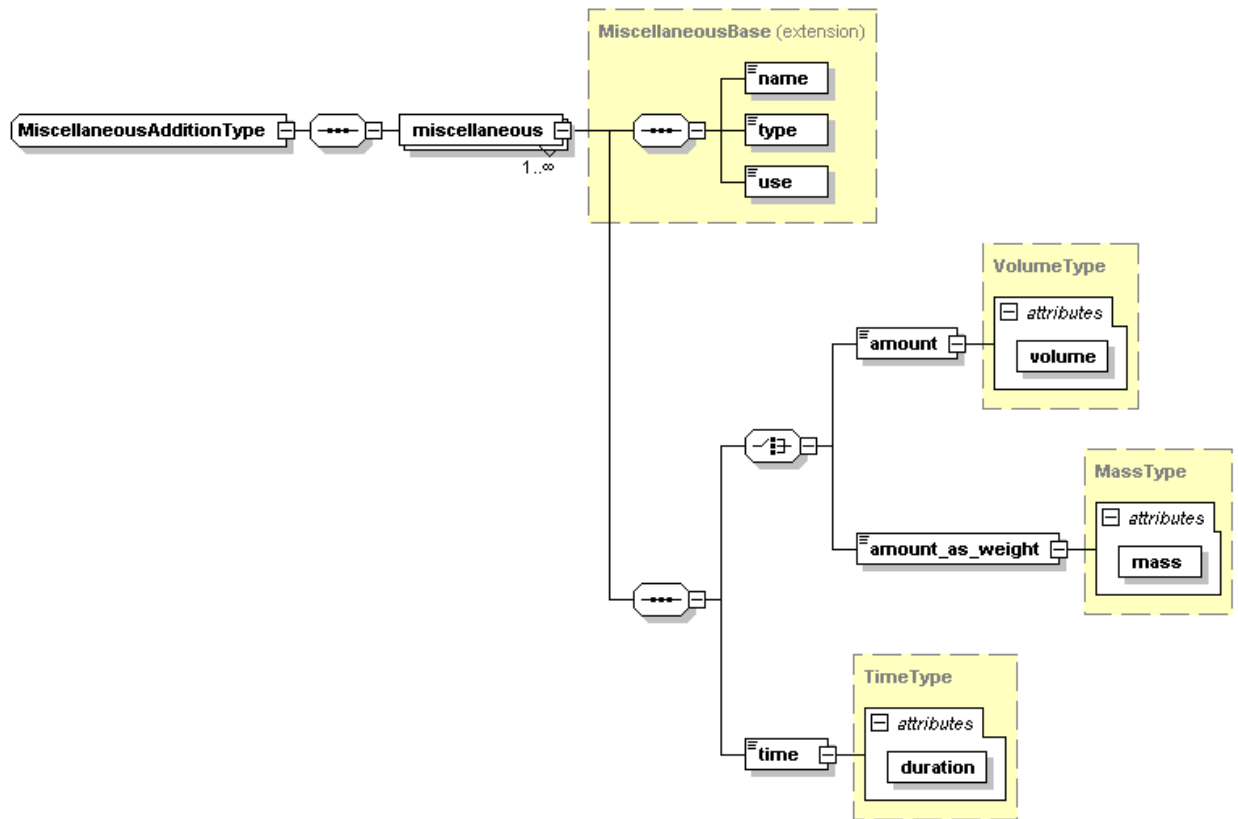
```
        <type>Temperature</type>
        <step_temperature degrees="C">68.0</step_temperature>
    <ramp_time duration="min">20.0</ramp_time>
    <step_time duration="min">60.0</step_time>
</step>
</mash_steps>
</mash>
```

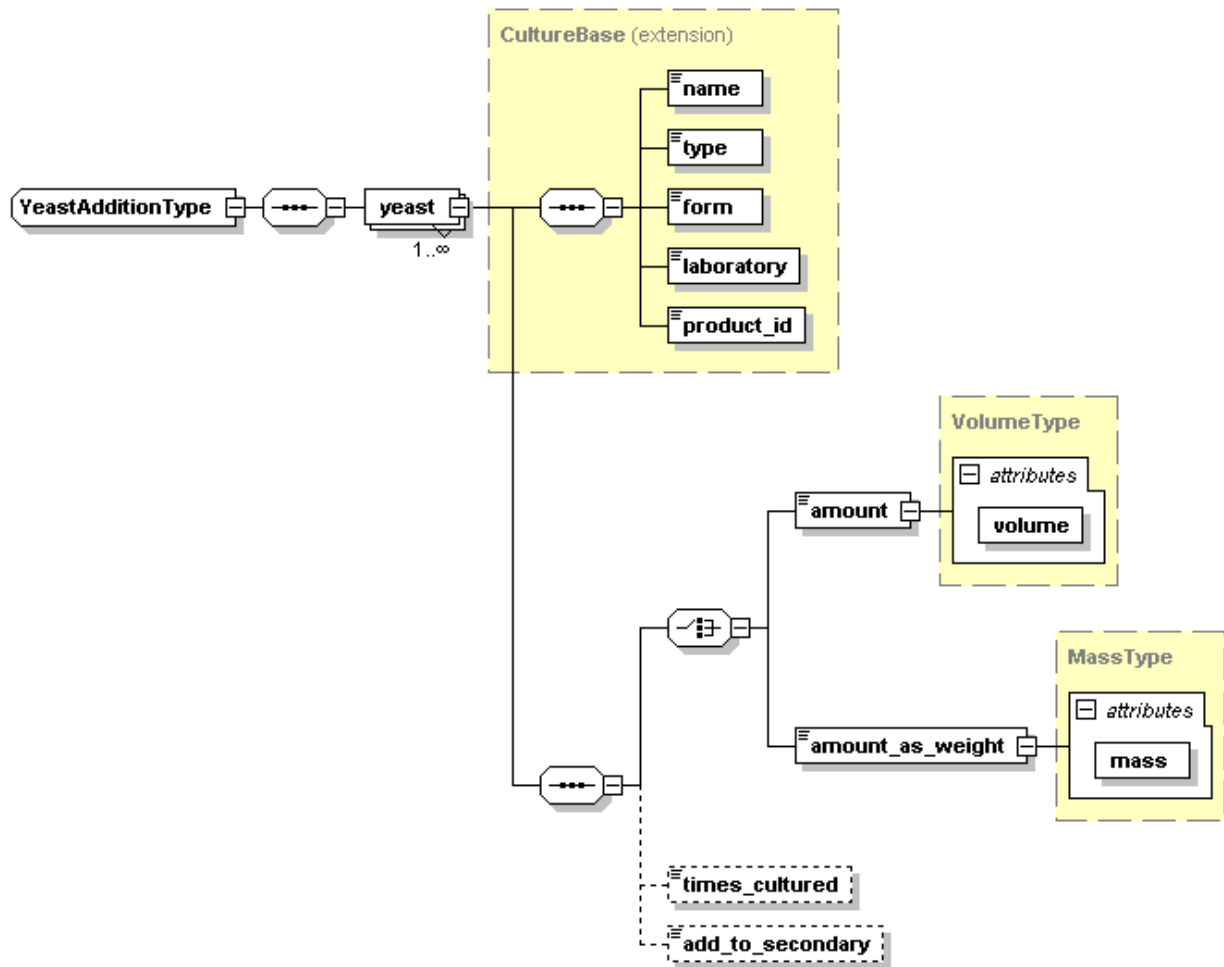
Recipe Elements

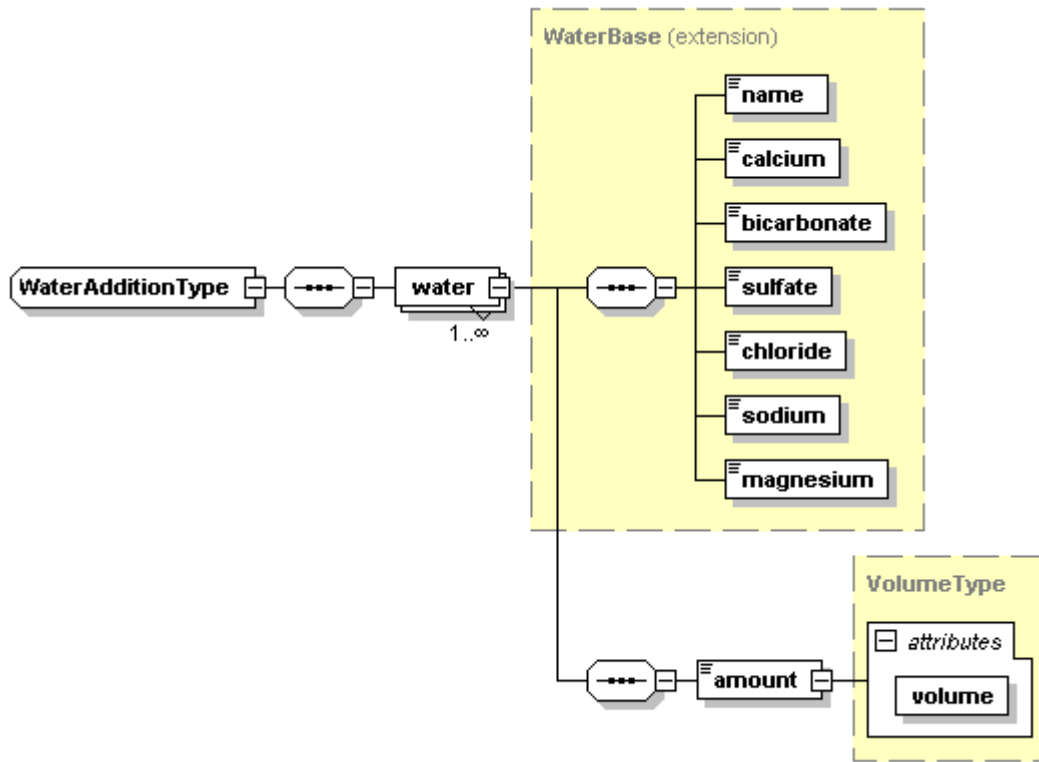
The following subelements were created exclusively for uniquely defining subsets of record sets that appear as a part of a recipe. The exhaustive collection of data tags for each of the subelements listed in this section can be found under the recipe listing.





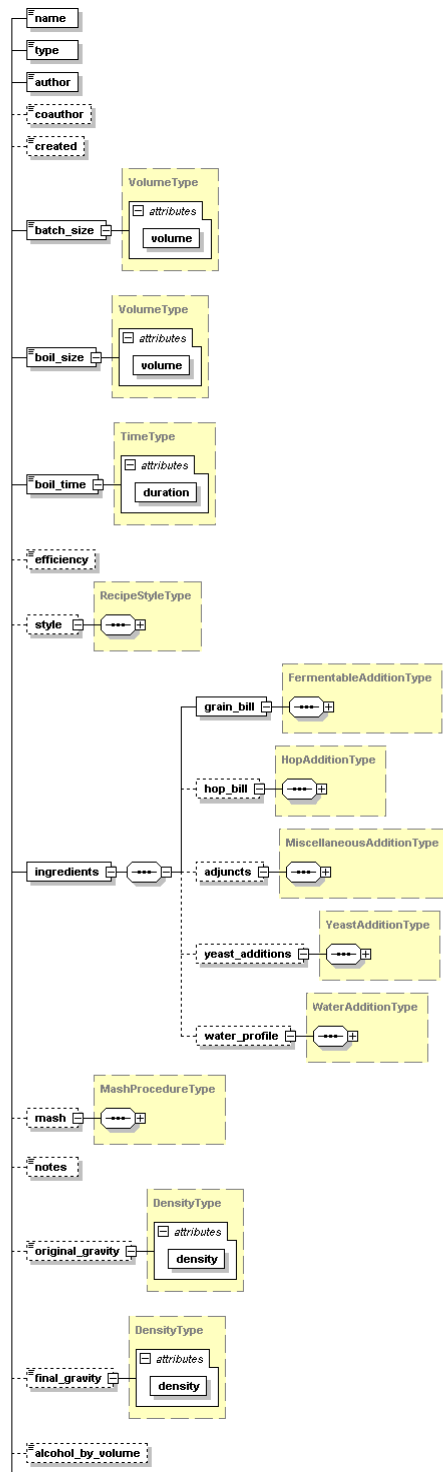


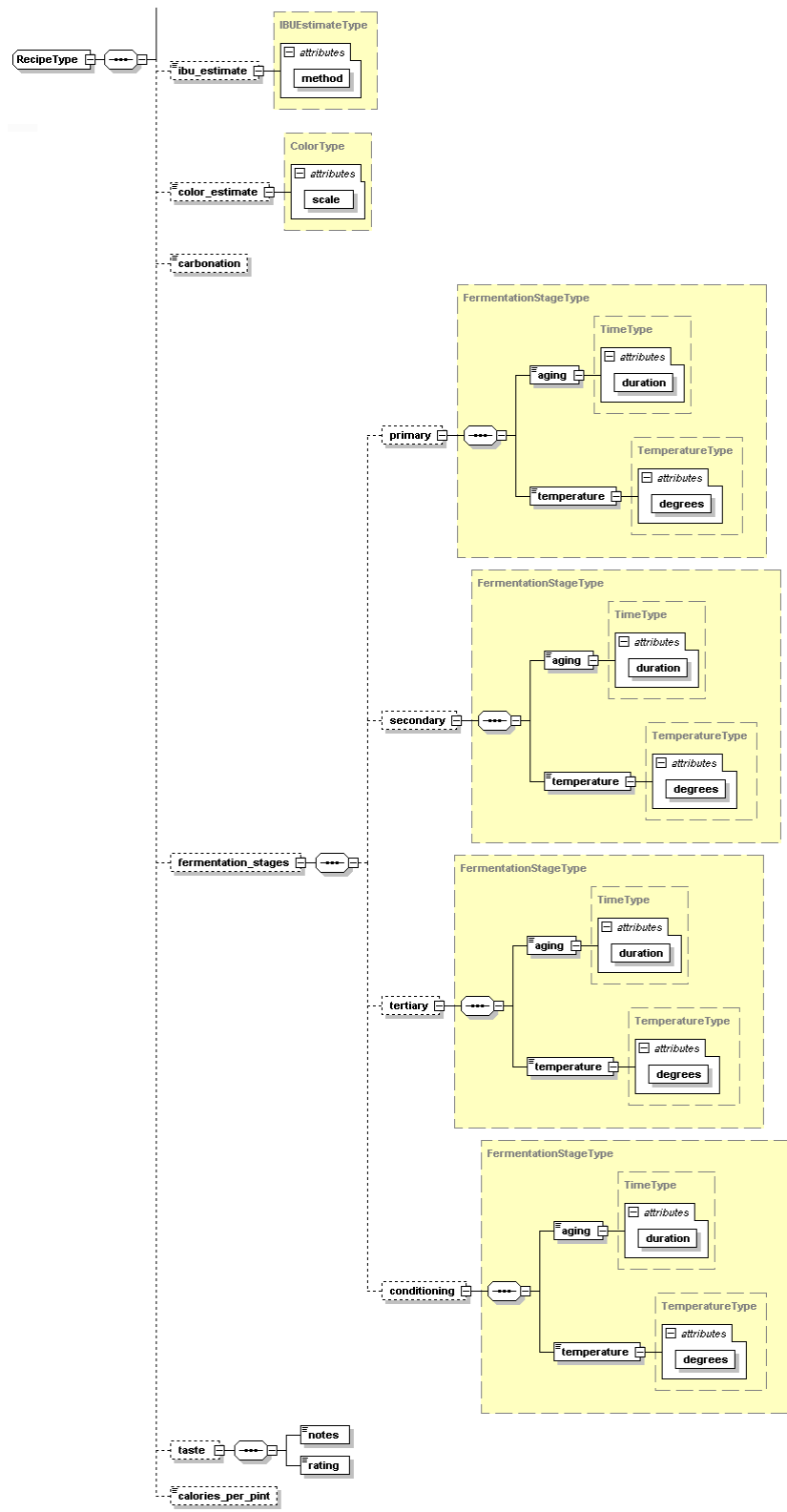




Recipe

A recipe record stores the sum of information necessary to create a single recipe. A recipe record uses a subset of record information from some of the other previously described record formats to specify ingredients and other data.





Data tag	Required	Format	Description
recipe	Yes	Record	Encloses a BeerXML Recipe.
name	Yes	Text	Name of the recipe.

type	Yes	List	May be one of “extract”, “partial mash” or “all grain”
brewer	Yes	Text	Name of the brewer
assistant_brewer	No	Text	Optional name of the assistant brewer
brewing_date	No	Date	Date brewed in a easily recognizable Year-Month-Day format such as “2004-12-03”.
batch_size	Yes	Volume	Target size of the finished batch.
boil_size	Yes	Volume	Starting size for the main boil of the wort.
boil_time	Yes	Time	The total time to boil the wort.
efficiency	Conditional	Percentage	The percent brewhouse efficiency used for estimating the starting gravity of the beer. Not required for “extract” recipes, but is required for “partial mash” and “all grain” recipes.
style	No	Element	Contains all subelements necessary to indicate the beer style of this recipe
name		Text	Name of the style profile – usually this is the specific name of the style – for example “Scottish Wee Heavy Ale” and not the Category which in this case might be “Scottish Ale”
category		Text	Category that this style belongs to – usually associated with a group of styles such as “English Ales” or “Americian Lagers”.
category_number		Text	Number or identifier associated with this style category. For example in the BJCP style guide, the “American Lager” category has a category number of “1”.
style_letter		Text	The specific style number

			or subcategory letter associated with this particular style. For example in the BJCP style guide, an American Standard Lager would be style letter “A” under the main category. Letters should be upper case.
style_guide		Text	The name of the style guide that this particular style or category belongs to. For example “BJCP” might denote the BJCP style guide, and “AHA” would be used for the AHA style guide.
type		List	May be “lager”, “ale”, “mead”, “wheat”, “mixed” or “cider”. Defines the type of beverage associated with this category.
ingredients	Yes	Element	Contains a sequence of all ingredient elements used in the recipe, namely the fermentables, hops, adjuncts, and yeast.
grain_bill	Yes	Element	A collection of fermentable ingredients to be used in this recipe.
fermentable	Yes	Element	Association between an ingredient item and the amount to be added.
item	Yes	Element	Fermentable item
name	Yes	Text	Name of the fermentable item.
type	Yes	List	May be “grain”, “sugar”, “extract”, “dry extract” or “adjunct”. Extract refers to liquid extract.
color	Yes	Floating Point (color)	The color of the fermentable item.
origin	No	Text	Country or place of origin
supplier	No	Text	Supplier of the grain/extract/sugar
amount	Yes	Mass	The quantity of this fermentable item to be added.

add_after_boil	No	Boolean	May be true if this item is normally added after the boil. The default value is false since most grains are added during the mash or boil.
hop_bill	No	Element	A collection of hop varieties to be used in this recipe.
hop	Yes	Element	Association between a hop variety, the amount to be added, and the duration of the addition.
variety	Yes	Element	Describes the hop variety for this addition.
name	Yes	Text	Name of the hops
origin	Yes	Text	Country of origin for the hop variety
alpha_acid_units	Yes	Percentage	Percent alpha of hops - for example "5.5" represents 5.5% alpha
beta_acid_units	No	Percentage	Hop beta percentage - for example "4.4" denotes 4.4 % beta
form	Yes	List	May be "pellet", "plug" or "leaf"
use	Yes	List	May be "boil", "dry hop", "mash", "first wort" or "aroma". Note that "aroma" and "dry Hop" do not contribute to the bitterness of the beer while the others do. Aroma hops are added after the boil and do not contribute substantially to beer bitterness.
amount	Yes	Mass	The quantity of this hop variety to be added.
time	Yes	Time	Meaning is dependent on the "use" field. For "boil" this is the boil time. For "mash" this is the mash time. For "first wort" this is the boil time. For "aroma" this is the steep time. For "dry hop" this is the amount of time to dry hop.

adjuncts	No	Element	A collection of miscellaneous ingredients to be used in this recipe.
miscellaneous	Yes	Element	Association between an adjunct ingredient, the amount to be added, and the duration of the addition.
item	Yes	Element	Miscellaneous item.
name	Yes	Text	Name of the miscellaneous item.
type	Yes	List	May be “spice”, “fining”, “water agent”, “herb”, “flavor” or “other”
use	Yes	List	May be “boil”, “mash”, “primary”, “secondary”, “bottling”
amount	Yes	Volume	The quantity (volume) of this adjunct to be added.
amount_as_weight	Yes	Mass	The quantity (weight) of this adjunct to be added.
time	Yes	Time	Amount of time the miscellaneous ingredient was boiled, steeped, mashed, etc.
yeast_additions	Yes	Element	A collection of yeast cultures to be used in this recipe.
yeast	Yes	Element	Association between a yeast culture and the amount to be added.
culture	Yes	Element	Yeast culture record information.
name	Yes	Text	Name of the yeast.
type	Yes	List	May be “ale”, “lager”, “wheat”, “wine” or “champagne”
form	Yes	List	May be “liquid”, “dry”, “slant” or “culture”
laboratory	No	Text	The name of the laboratory that produced the yeast.
product_id	No	Text	The manufacturer’s product ID label or number that identifies this particular strain of yeast.
amount	Yes	Volume	The quantity (volume) of this yeast culture to be added.

amount_as_weight	Yes	Mass	The quantity (weight) of this dry yeast culture to be added.
times_cultured	No	Integer	Number of times this yeast has been reused as a harvested culture. This number should be zero if this is a product directly from the manufacturer.
add_to_secondary	No	Boolean	Flag denoting that this yeast was added for a secondary (or later) fermentation as opposed to the primary fermentation. Useful if one uses two or more yeast strains for a single brew (eg: Lambic). Default value is false.
water	No	Element	A region-specific water profile for reproducing the recipe to style.
name	Yes	Text	Name of the water profile – usually the city and country of the water profile.
calcium	Yes	Floating Point	The amount of calcium (Ca) in parts per million.
bicarbonate	Yes	Floating Point	The amount of bicarbonate (HCO ₃) in parts per million.
sulfate	Yes	Floating Point	The amount of Sulfate (SO ₄) in parts per million.
chloride	Yes	Floating Point	The amount of Chloride (Cl) in parts per million.
sodium	Yes	Floating Point	The amount of Sodium (Na) in parts per million.
magnesium	Yes	Floating Point	The amount of Magnesium (Mg) in parts per million.
mash	Yes	Mash Profile	A mash profile record containing one or more mash steps. NOTE: No Mash record is needed for “Extract” type brews.
notes	No	Text	Notes associated with this recipe – may be multiline.
original_gravity	No	Density	The measured original (pre-fermentation) specific gravity of the beer.

final_gravity	No	Density	The measured final gravity of the finished beer.
alcohol_by_volume	No	Percent	Actual alcohol by volume calculated from the original_gravity and final_gravity measured.
international_bitterness_units	No	Floating Point	The estimated bitterness level of the beer in IBUs
ibu_method	No	List	May be "Rager", "Tinseth", "Garetz" or "Other" corresponding to the method/equation used to estimate IBUs for this recipe.
carbonation	No	Volumes of CO ₂	Floating point value corresponding to the target volumes of CO ₂ used to carbonate this beer.
fermentation_stages	No	Element	Contains a collection of fermentation stages used.
primary	No	Element	The duration and average temperature during primary fermentation.
aging	Yes	Time	Time spent in the primary
temperature	Yes	Temperature	Temperature for the primary fermentation.
secondary	No	Element	The duration and average temperature during secondary fermentation.
aging	Yes	Time	Time spent in the secondary.
temperature	Yes	Temperature	Temperature for the secondary fermentation.
tertiary	No	Element	The duration and average temperature during tertiary fermentation.
aging	Yes	Time	Time spent in the third fermenter.
temperature	Yes	Temperature	Temperature in the tertiary fermenter.
conditioning	No	Element	The duration and average temperature during bottle/keg conditioning
aging	Yes	Time	The time to age the beer after bottling.
temperature	Yes	Temperature	Temperature for aging the beer after bottling.
taste	No	Element	The notes and score of this

			recipe based on taste.
notes	Yes	Text	Tasting notes – may be multi-line.
rating	Yes	Floating Point	Number between zero and 50.0 denoting the taste rating – corresponds to the 50 point BJCP rating system.
calories_per_pint	No	Floating Point	Calorie estimate based on the measured starting and ending gravity. Note that calories should be quoted in “Cal” or kilocalories which is the normal dietary measure (i.e. a beer is usually in the range of 100-250 calories per 12 oz). Example “<calories_per_pint>180</calories_per_pint>”

Sample Complete Recipe File in XML - Dry Stout

```

<?xml version="1.0" encoding="UTF-8"?>
<beer_xml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="BeerXML.xsd">
  <version>2.01</version>
  <recipes>
    <recipe>
      <name>Dry Stout</name>
      <type>all grain</type>
      <author>Brad Smith</author>
      <created>2004-01-03</created>
      <batch_size volume="gal">5.0</batch_size>
      <boil_size volume="gal">5.5</boil_size>
      <boil_time duration="min">60.0</boil_time>
      <efficiency>72.0</efficiency>

      <style>
        <name>Dry Stout</name>
        <category>Stout</category>
        <category_number>16</category_number>
        <style_letter>A</style_letter>
        <style_guide>BJCP</style_guide>
        <type>ale</type>
      </style>

      <ingredients>
        <grain_bill>
          <fermentable>
            <name>Pale Malt (2 Row) UK</name>
            <type>grain</type>

```

```

    <color scale="L">3.0</color>
    <origin>United Kingdom</origin>
    <amount mass="lb">5.0</amount>
    <add_after_boil>>false</add_after_boil>
</fermentable>
<fermentable>
  <name>Barley, Flaked</name>
  <type>grain</type>
  <color scale="L">2.0</color>
  <origin>United Kingdom</origin>
  <amount mass="lb">2.0</amount>
  <add_after_boil>>false</add_after_boil>
</fermentable>
<fermentable>
  <name>Black Barley</name>
  <type>grain</type>
  <color scale="L">500.0</color>
  <origin>United Kingdom</origin>
  <amount mass="lb">1.0</amount>
  <add_after_boil>>false</add_after_boil>
</fermentable>
</grain_bill>
<hop_bill>
  <hop>
    <name>Goldings, East Kent</name>
    <origin>United Kingdom</origin>
    <alpha_acid_units>5.00</alpha_acid_units>
    <form>leaf</form>
    <use>boil</use>
    <amount mass="oz">2.5</amount>
    <time duration="min">60.0</time>
  </hop>
</hop_bill>
<adjuncts>
  <miscellaneous>
    <name>Irish Moss</name>
    <type>fining</type>
    <use>boil</use>
    <amount volume="tsp">0.25</amount>
    <time duration="min">15.0</time>
  </miscellaneous>
</adjuncts>
<yeast_additions>
  <yeast>
    <name>Irish Ale</name>
    <type>ale</type>
    <form>liquid</form>
    <laboratory>Wyeast Labs</laboratory>
    <product_id>1084</product_id>
    <amount volume="mL">250.0</amount>
  </yeast>
</yeast_additions>
<water_profile>
  <water>
    <name>Burton On Trent, UK</name>
    <calcium>295.0</calcium>
    <bicarbonate>300.0</bicarbonate>
    <sulfate>725.0</sulfate>
    <chloride>25.0</chloride>
    <sodium>55.0</sodium>

```

```

        <magnesium>45.0</magnesium>
        <amount volume="gal">5.5</amount>
    </water>
</water_profile>
</ingredients>

<mash>
    <name>Single Step Infusion, 68 C</name>
    <grain_temperature degrees="C">22.0</grain_temperature>
    <mash_steps>
        <step>
            <name>Conversion Step, 68C </name>
            <type>infusion</type>
            <infuse_amount volume="L">10.0</infuse_amount>
            <step_temperature degrees="C">68.0</step_temperature>
            <step_time duration="min">60.0</step_time>
        </step>
    </mash_steps>
</mash>

<notes/>

<original_gravity density="sg">1.036</original_gravity>
<final_gravity density="sg">1.012</final_gravity>
<carbonation>2.1</carbonation>

<fermentation_stages>
    <conditioning>
        <aging duration="day">24</aging>
        <temperature degrees="C">17.0</temperature>
    </conditioning>
</fermentation_stages>

<taste>
    <notes>Nice dry Irish stout with a warm body but low starting gravity
much like the famous drafts.</notes>
    <rating>41.0</rating>
</taste>

</recipe>
</recipes>
</beer_xml>

```