

# TETRA ISO-EXTRACT (TETRA)

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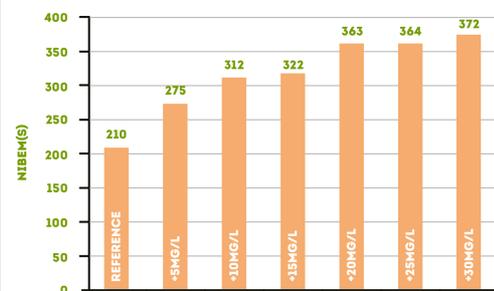
## OVERVIEW

- A pure, aqueous solution of the potassium salts of tetrahydro-iso-alpha acids produced entirely from CO<sub>2</sub> hop extract.
- Will greatly enhance beer foam when used as a post fermentation replacement for a proportion of the normal bittering.
- In the absence of normal alpha and iso-alpha acids, Tetra will give virtually complete protection against development of light-struck flavors.
- Tetra should provide 1.0 to 1.7 times the perceived (tasteable) bitterness as compared to the same BU level from traditional hopping. The actual figure depends on the details of its use and also on the type of beer. Therefore, the target level for beer BU must be determined in preliminary tests to achieve the correct degree of sensory bitterness.

PROPERTIES	
APPEARANCE	A homogeneous, yellow to amber, clear aqueous solution; mobile and free flowing at all normal storage and use temperatures. Miscible with demineralized water and alcohol.
UTILISATION	Utilization of Tetra in final beer can be between 60 – 80% depending on the time and efficiency of dosing.
LIGHT STABILITY	Tetra will only provide protection from light-struck flavor in the complete absence of normal iso-alpha acids. Tetra can be used in conjunction with Reduced Iso- Extract to achieve light stability, improved foam and balanced bitterness.
FOAM ENHANCEMENT	Tetra enhances both foam retention and cling. Noticeable foam improvement can often be achieved with as little as 3 – 5 BU's of Tetra in beer.
BITTERNESS	Tetra should provide 1.0 to 1.7 times the perceived (tasteable) bitterness as compared to the same BU level from traditional hopping. The actual figure depends on the details of its use and also on the type of beer. Therefore, the target level for beer BU must be determined in preliminary tests to achieve the correct degree of sensory bitterness.
QUALITY	All products are produced in plants accredited to internationally accepted quality standards.
PACKAGING	Tetra is normally packaged into 20 kg pails.

QUICK SPECS	
DESCRIPTION	A yellow to amber colored, aqueous solution of the potassium salts of tetrahydro-iso-alpha acids
CONCENTRATION	9.0 ± 0.5% (w/w) of tetrahydro-iso-alpha acids by HPLC (or 10.0 ± 0.5% (w/w) by UV spectrophotometric analysis)
PH	9.5 (± 1.0)
VISCOSITY	2 – 6 mPas (at 20 °C / 68 °F)
DENSITY	1.017 (± 0.005) g/ml – concentration by HPLC (1.015 g/ml – UV Spectrophotometric)
SOLUBILITY	Soluble in pH adjusted, demineralized water

## NIBEM RESULTS SHOWING FOAM IMPROVEMENT USING TETRA



VICTORIA (HEAD OFFICE)  
**(03) 9872 6811**

WESTERN AUSTRALIA  
**(08) 9395 7399**

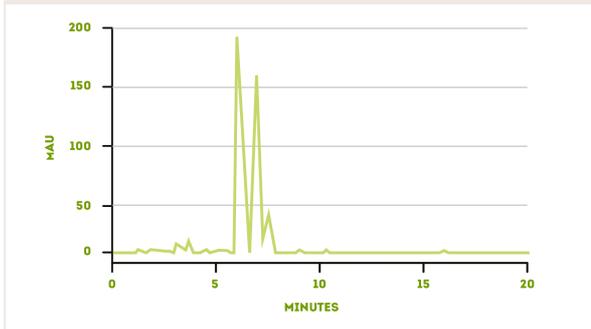
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PRODUCT USE	
Typically added after fermentation and before final filtration.	
<b>DOSAGE</b>	Dosage is calculated based on the product concentration and an assumed utilization of say 70%. Trials at the brewery will determine the correct dosage of Tetra. (Remember that Tetra will give about 1.0 to 1.7 times the perceived bitterness of iso- alpha acids derived from traditional hop sources). Tetra should not be left in dosing lines at low temperatures. Lines and dosing pump should be flushed with warm, slightly alkaline, demineralized water or ethanol to clean.
<b>ADDITION</b>	We recommend dosing Tetra undiluted to the center of the beer stream during at least 70% of the beer transfer, preferably before final filtration and after any gravity adjustment. An accurate, high pressure, dosing pump is required ensuring vigorous injection into the beer stream. Tetra can be injected at ambient temperature. If dilution is necessary, always add Tetra to demineralized water to achieve a dilution; adjust pH to 10 – 11 using KOH.
<b>FOR LIGHT STABLE BEER</b>	It is essential that no other sources of non-reduced iso-alpha acids be inadvertently introduced into the wort or beer. Therefore it is essential to: <ul style="list-style-type: none"> <li>• Avoid contamination from equipment surfaces that have been in contact with normal iso-alpha acids.</li> <li>• Never pitch wort with yeast that has been in contact with normal alpha or iso-alpha acids.</li> <li>• If beta extracts are used as kettle additives, ensure that they are light stable.</li> </ul>
<b>STORAGE</b>	Tetra should be stored in unopened containers at 5 – 15°C (41 – 59°F). Avoid exposure to sunlight and use up any opened containers as soon as possible.
<b>BEST BEFORE</b>	Stable 2 years from date of production under the recommended storage conditions.

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## ANALYTICAL METHODS

<b>CONCENTRATIONS OF TETRAHYDRO-ISO- ALPHA ACIDS IN PRODUCT</b>	The concentration of tetrahydro-iso-alpha acids can be determined by UV Spectrophotometric analysis or by HPLC using the current ICS standard according to the EBC 7.9 method.
<b>CONCENTRATIONS OF TETRAHYDRO-ISO- ALPHA ACIDS IN BEER</b>	The concentration of tetrahydro-iso-alpha acids in beer is determined by the ASBC or EBC BU analytical method or by HPLC. The BU analytical result can be adjusted by a factor of 1.0–1.7 to compensate for the higher perceived bitterness of the tetrahydro-iso-alpha acids.
<b>LIGHT STABILITY TEST</b>	Light stability of Tetra brewed beers, packaged in either clear or green glass bottles, can be tested by placing bottles in sunlight or next to a fluorescent light for 2 - 6 hours. Beer can be checked organoleptically for lightstruck flavors.
<b>FOAM STABILITY AND CLING TEST</b>	Beers produced with Tetra usually show dramatically improved foam stability and cling. We recommend using a 'pour' beer test for foam stability. This test most accurately reflects how the customer observes beer foam.



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