U.S. Patent No. 5,006,356

MAGNESOL®

HAZE-OUT®

For Chill-Proofing Beer

Proteins are a major component in beer which provide body and characteristic foam head. However, some proteins form insoluble colloidal complexes with tannins (polyphenols) called chill-haze. Beer consumers demand sparkling clear beer.

Presently, chill stabilization is accomplished through one of three methods; proteolytic enzymes, polyvinylpolypyrrolidone (PVPP), or silica-based adsorbents. Proteolytic enzymes are generally non-selective and modify all proteins including those responsible for foam retention. As a result, foam enhancers are often required to compensate for decreased foam stability. Since enzymes and foam enhancers are not removed by filtration, both are considered additives. PVPP removes the tannins responsible for chill-haze but may adversely affect the flavor profile of a beer. Silica-based adsorbents include xerogels, hydrogels, and silicates which remove haze-forming proteins by adsorption and subsequently removed by filtration.

CHILL STABILIZATION WITH *HAZE-OUT®*

MAGNESOL® *HAZE-OUT®* selectively adsorbs on the surface of its internal pores only those proteins responsible for the formation of chill-haze (Figure 1). This selectivity is accomplished by optimizing the pore diameter distribution. The pores in *HAZE-OUT®* particles are small enough to admit proteins that cause chill-haze, yet large enough to selectively exclude those proteins beneficial to foam stability (Figure 2). *HAZE-OUT®* does not remove hops bitterness or otherwise affect the flavor profile of beer.

The DALLAS Group has provided the chemical, pharmaceutical, food, and beverage industries its MAGNESOL® line of synthetic magnesium silicate adsorbents since 1973. MAGNESOL® has a reputation of quality and performance unsurpassed in adsorbent chemistry.

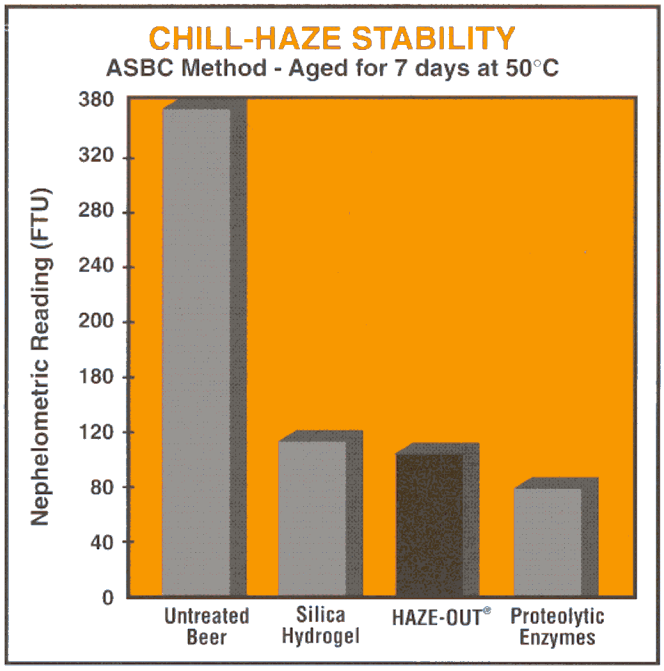


Figure 1

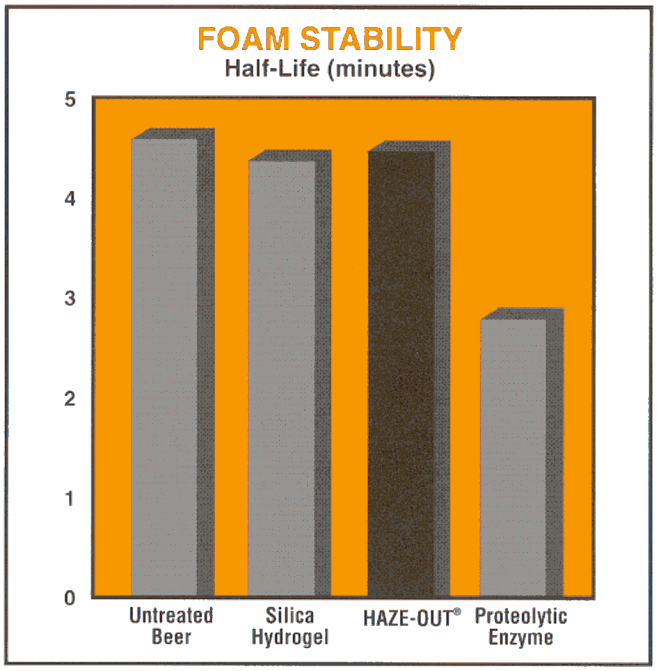


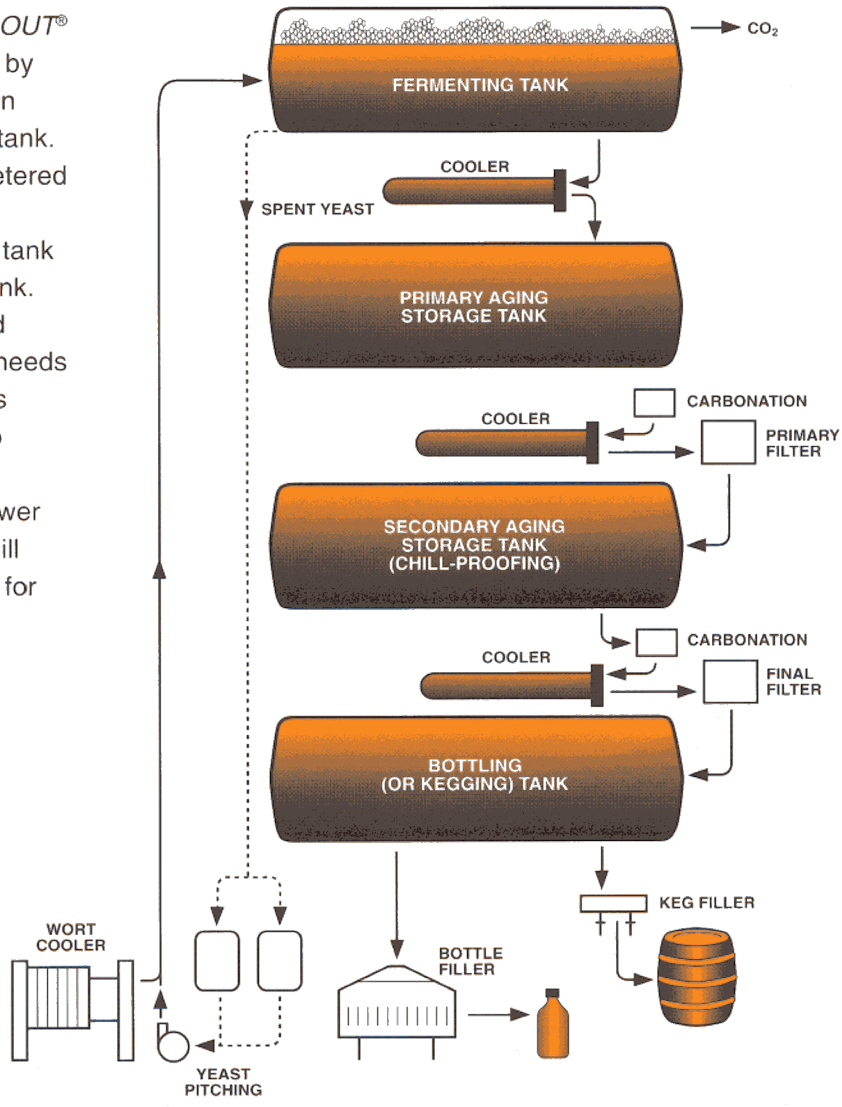
Figure 2

Figure 3 shows a typical brewing process. Chill-proofing with *HAZE-OUT*® is performed in the storage tank prior to final filtration. A small quantity of *HAZE-OUT*® (typically 7.5 -15.0 lb/100 bbl or 30-60 g/hL) is added to either ruh or primary filtered beer. The treated beer is then filtered and bottled or kegged.

HAZE-OUT® is effective in both batch and continuous systems. *HAZE-OUT*® is introduced to beer by first making a slurry in water in an agitated tank. The slurry is then metered into the beer during transfer to a storage tank or final filter surge tank. Unlike silica gels and PVPP, *HAZE-OUT*® needs no "swell time" and is immediately ready to perform.

Of course, the brewer must optimize the chill stabilization process for each beer. Optimization is achieved by adjusting the quantity of *HAZE-OUT*® used and the time in which it is in contact with the beer. A contact time of 20 minutes is commonly used although longer or shorter times may be used as warranted. MAGNESOL® *HAZE-OUT*® is easy-to-use, efficient, and cost-effective.

Figure 3



REGULATORY STATUS

HAZE-OUT® is amorphous (non-crystalline) structure and meets U.S. Food & Drug Administration requirements for food grade synthetic magnesium silicate as described in the Food Chemical Codex. Amorphous synthetic magnesium silicate is GRAS (generally recognized as safe).

DALLAS

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