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FibreZyme[®] LBL CONC Product #915

(Considerations in applications for Pulp and Paper Processing: Wood Pulp Bleaching and Biorefining)

I. INTRODUCTION:

FibreZyme LBL CONC is a concentrated liquid cellulase/hemicellulase (carbohydrase enzyme) preparation that will selectively modify cellulose and hemicellulose components of virgin and recycled pulps. The product is designed for use on Kraft cooked hardwood and softwood pulps to help improve the bleaching and refining efficiencies. **FibreZyme LBL CONC** is a stable cellulase/hemicellulase complex operating within a broad range of pH (5.5 to 8.0) and temperature 25°C to 70°C (77°F to 158°F).

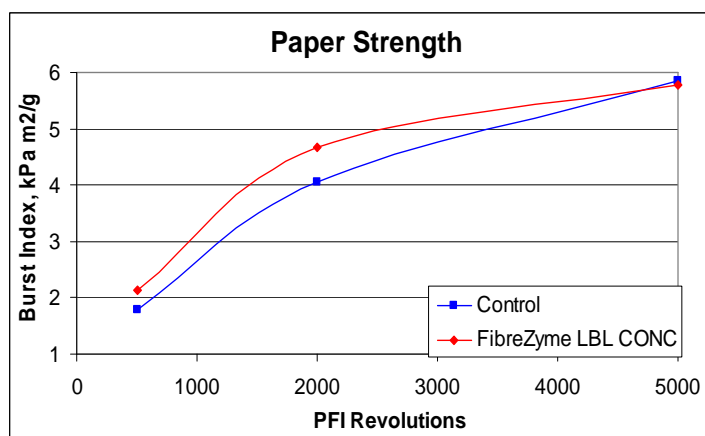
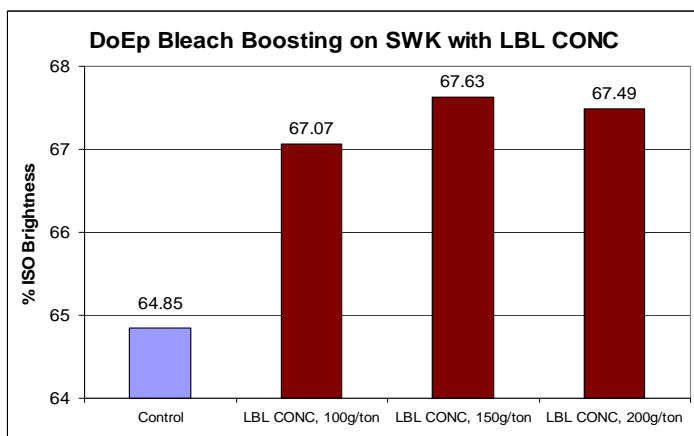
II. PHYSICAL PROPERTIES:

Appearance: Medium to dark amber liquid (Note that color does not affect or reflect activity.)
Odor: Slight fermentation odor
pH (as is): 4.5 ± 0.5
Density: 1.15-1.25

III. PRODUCT CAPABILITIES:

When run as directed in this bulletin, and with support from your Dyadic International (USA), Inc. sales/technical representative, **FibreZyme LBL CONC** can be utilized to accomplish the following:

1. Facilitate the bleaching of kraft, soda and sulfite pulps which allows for reduced ClO₂, caustic and peroxide chemical usages of up to 30% in the bleaching plant.
2. Enhance strength properties including, but not limited to, tensile and burst strength
3. Increase paper machine speed and production rates
4. Reduce refining energy requirements
5. Enhance furnish drainage rates
6. Increase inter-fiber bonding strength through fibrillation avoiding fiber breakage
7. Improve paper/board formation and quality.



IV. PROCESSING CONDITIONS: GENERAL

FibreZyme LBL CONC will function within a pH range of 5.5 to 8.5 making the product adaptable to most existing pulping and paper making processes.

FibreZyme LBL CONC will function from 25°C to 70°C (77°F to 158°F). Higher operating temperature results in higher enzymatic activity providing lower enzyme dosage for such applications.

V. RECOMMENDATIONS FOR USAGE:

1. **FibreZyme LBL CONC** is typically added at a dosage between 50 to 200 grams/ton (metric ton) of dry pulp. Dosage will depend on the process temperature, pH and retention times, as well as furnish composition. The enzyme is dosed at the brown stock storage prior to bleaching or other suitable pulp storage chests.

2. **FibreZyme LBL CONC** is formulated to be dosed automatically via a dosage pump.

VI. STORAGE CONDITIONS / ACTIVITY:

FibreZyme LBL CONC retains more than 90% activity after four months when stored at 25°C (77°F) out of direct sunlight and in the original, closed container. **FibreZyme LBL CONC** also retains more than 90% activity after 1 month when stored at 38°C (100°F). Do not allow to freeze.

VII. INACTIVATION:

FibreZyme LBL CONC can be inactivated by raising pH above 11.0, temperature above 71°C (160°F), or a combination of the two. In the pulp and paper process, **FibreZyme LBL CONC** is inactivated in the dryers at the paper machine. No residual enzymatic activity will be found in the manufactured paper.

VIII. PACKAGING:

FibreZyme LBL CONC is available in 25 kg, 240 kg polyethylene drums and 1,200 kg tote bins.

IX. TECHNICAL SERVICE:

Information covering specific applications for this product is available from your Dyadic International, Inc. distributor and/or representative. We will work with you to enhance processes and solve problems, in addition to assisting you in achieving the end result desired. Contact your distributor and/or representative if you have any questions, comments, or require any additional assistance.

Nothing disclosed is to be construed as a recommendation to use the described product in violation of any patents. The information presented is believed to be accurate. However, said information and products are offered without warranty or guarantee, except as to the composition and purity stated herein as the ultimate conditions of use and variability of the materials treated is beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale. The goods described herein are sold as is and with all faults. The seller specifically disclaims all warranties in connection with the sale of the goods, both expressed and implied, including, without limitation, the warranties of merchantability and fitness for any particular purpose, as those terms are defined in the uniform commercial code of Florida. The seller shall not be liable for any incidental or consequential damages whatsoever.