



Technology Brief
Carbon Dioxide as a Pasteurization Aid
CCTEC D-2674

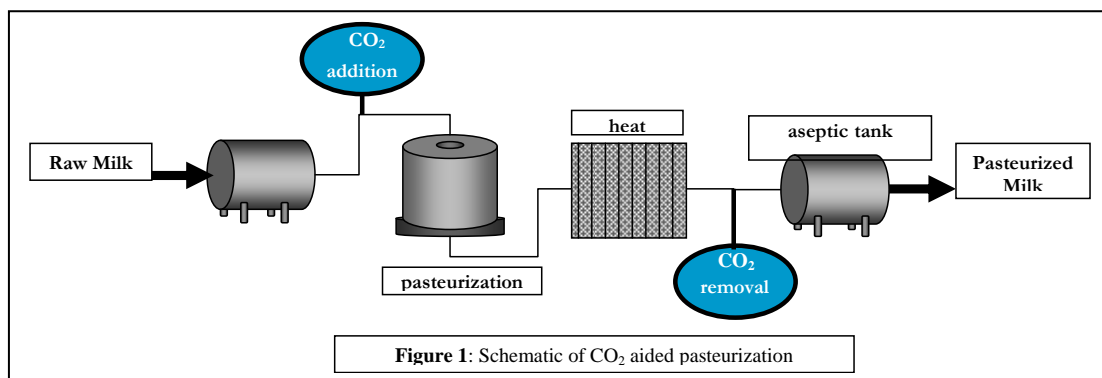
INVENTION SUMMARY: An important goal in pasteurization is to assure food safety and improve shelf life while maintaining the quality of the product and minimizing product damage. This technology reaches that goal by introducing a method of pasteurization that uses carbon dioxide (CO₂) and its interaction with heat to enhance the efficacy of thermal pasteurization.

POTENTIAL COMMERCIAL APPLICATIONS:

- This technique can be used for the pasteurization of milk and dairy products.
- Pasteurization of new and existing “fresh” fruit juices and pasteurization of minimally processed vegetable pastes, jams and preserves are made possible through this technique.
- Pasteurization increases product shelf life, minimizes losses due to in-process spoilage and increases savings.

ADVANTAGES:

- Less damage is done to the product using this technique of pasteurization, so the product has improved taste, smell, appearance, and nutritional value compared to products of other pasteurization methods.
- Heating costs can be reduced.
- The CO₂ can be removed after pasteurization, so the finished product will not have any additives.
- CO₂ improves the efficacy of the pasteurization process, resulting in fewer bacteria in the final product and therefore longer product shelf life.



TECHNICAL MERITS:

- The procedure carefully and efficiently measures the amount of CO₂ that is already present in the raw milk and then adds additional CO₂ to achieve an optimal concentration for bacterial inhibition.
- The CO₂ can be added to the liquid prior to, or simultaneously with, thermal inactivation.

- The addition of CO₂ to solution changes its pH and has been shown to extend the lag phase of common Gram negative psychotrophic spoilage and pathogenic organisms, such as *Pseudomonas fluorescens* and *Listeria monocytogenes*.
- The additional CO₂ is removed by drawing a mild vacuum on the solution.

INVENTORS: [Joseph H. Hotchkiss](#) and Christopher R. Loss

PATENT STATUS: U.S. Patent Number [7,041,327](#)

PUBLICATIONS:

- “[Effects of Carbon Dioxide on Bacterial Growth Parameters in Milk as Measured by Conductivity.](#)” J.D. Martin, B. G. Werner, J. H. Hotchkiss. *Journal of Dairy Science*, 86, 1932-1940 (2003).
- “[Impact of CO₂ Addition to Milk on Selected Analytical Testing Methods.](#)” Y. Ma, D.M. Barbano, J.H. Hotchkiss, S. Murphy, and J. M. Lynch. *Journal of Dairy Science*, 84, 1959-1968 (2001).

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