



# Fundamental Investigation of QA/QC for Industrial Birch Bark Processing

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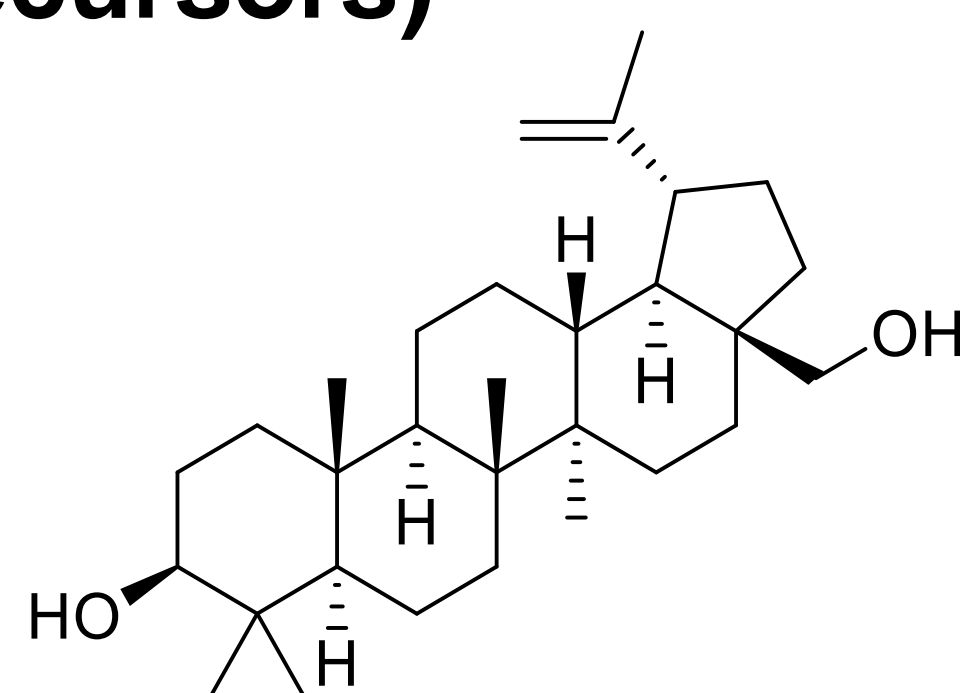
## Background

Birch bark is an inexpensive and renewable natural resource that can be used as starting material for value added products such as pharmaceutically active betulin and other bark derived products. Efficient and reliable processing improvement of the bark is required to extract higher amounts of these valuable compounds

## Bark for pharmaceutical products:

- 1) Betulin and betulinic acid (**anti-inflammatory, anti-cancer compounds or precursors**)

The chemical structure of betulin.



- 2) Traditional Mi'kmaq skin medicine made from birch bark:



## Project 1: Effects of different layers of birch bark:

### FT-IR layer analysis on all 4 obtained birch bark layers

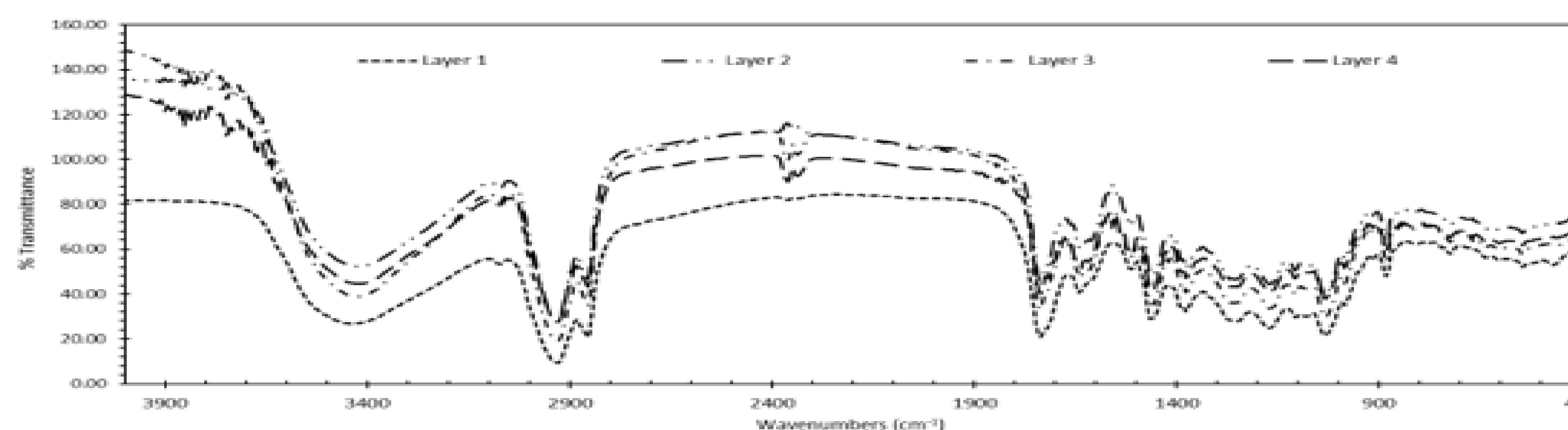


Figure 11. IR analysis of outer bark layers (1, 2, 3 & 4) samples.

**Research on the bark layers of birch allows us to develop efficient, large-scale, value-added processing improvements of bark.**

## Project 2: Effects of particle size of ground birch bark:

### TGA: TGA of 100 mesh and 1,000 mesh particle size on outer bark.

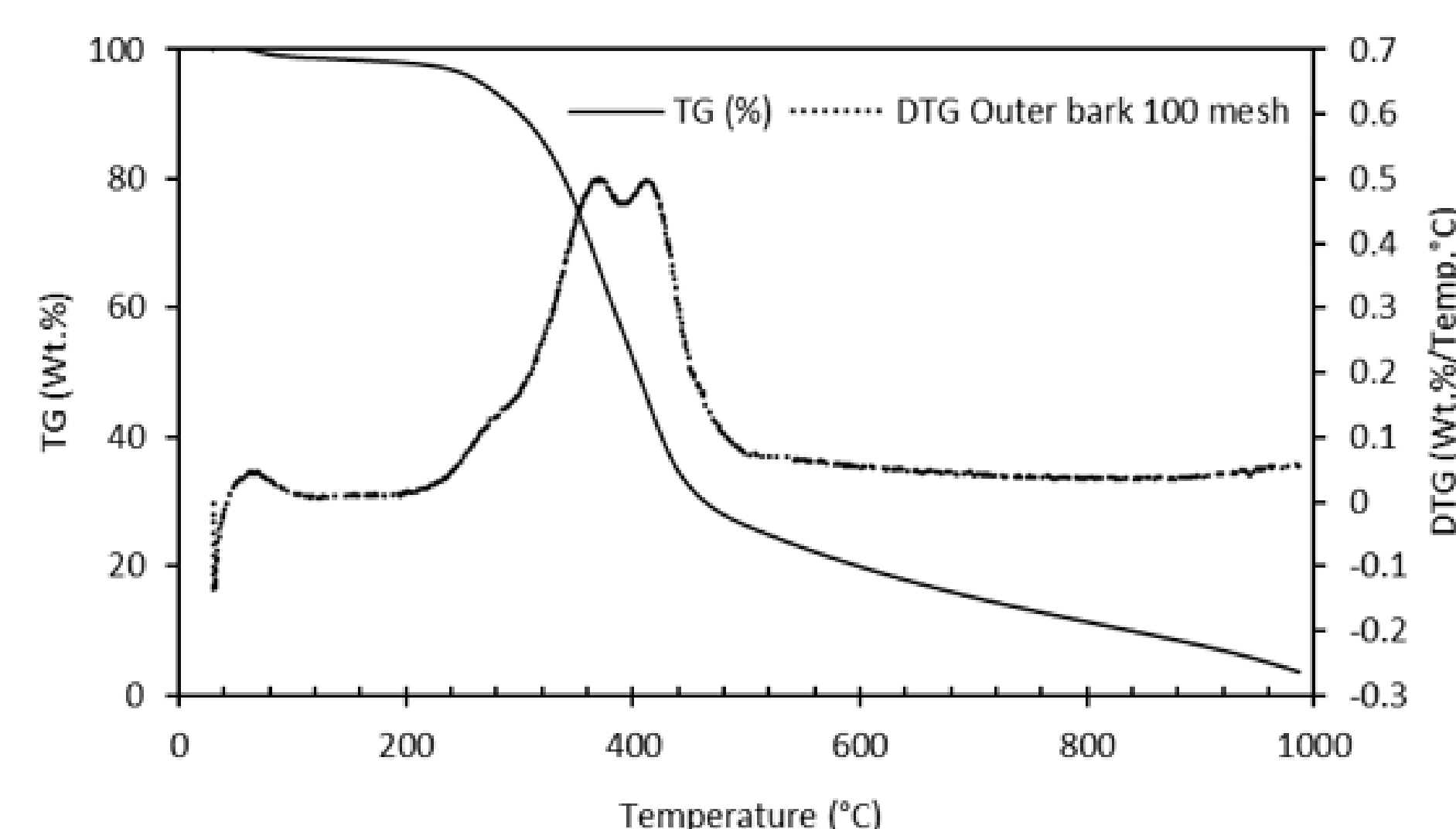


Figure 2. TG and DTG analysis of outer bark (100 mesh).

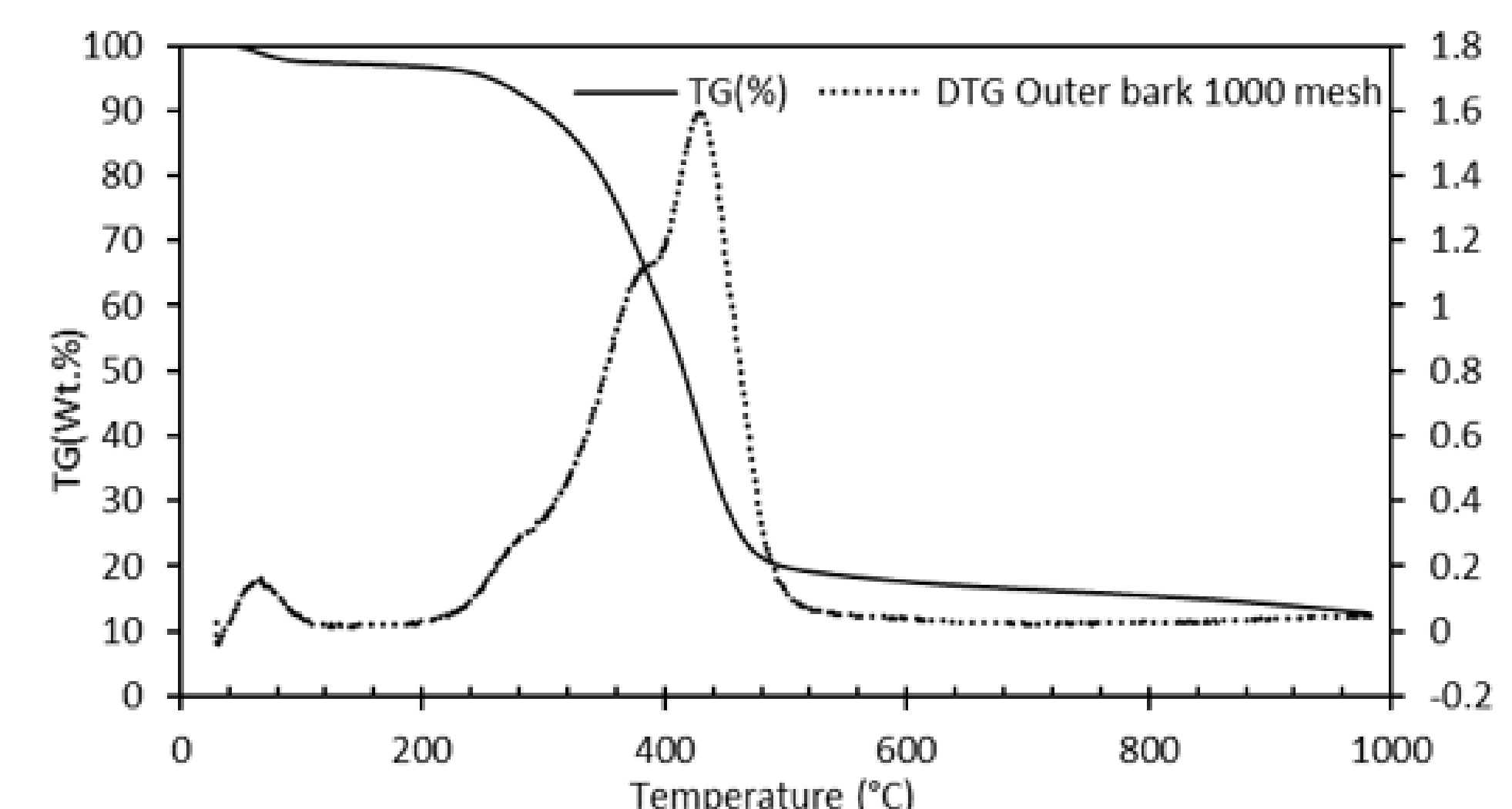


Figure 3. TG and DTG analysis of outer bark (1000 mesh).

## Soxhlet Solvent Extraction of Ground Bark:

- Yields obtained are greater than many studies.
- Can be explained by the usage of a 1000 mesh ball mill.
- Increases the sample size, accounting for the higher yields as well as better TGA and IR analysis.
- Extraction process is very cost-efficient and environmentally friendly.
- a great amount of betulin can be extracted with high purity (87%).



## Outcomes:

- Finding #1: For a better processing strategy of birch bark, for consistent products layer one should be removed before being processed through the ball mill.
- Data from TGA and IR analysis, has led to the conclusion that layers 4 and 2 are good for processing, while layer 1 shows signs of weather/deterioration.

## Issue 1: Lack of research on the layers of birch bark:

- The 4 different bark layers have different functions and need to be analyzed.
- IR analysis was used to understand the bark structural and functional groups.

## Issue 2: Lack of research on the particle size of birch bark

- There is little information about the specifics of particle size for processing of the birch bark

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