



The extraction and profile of Mimosa

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Although vegetable extract usage in leather manufacture has declined over the years, mainly due to the fall-off in demand for heavy veg leather, there is still a substantial use of the three main extracts, Mimosa (or Wattle/Acacia), Quebracho and Chestnut. Also, because of its good light fastness properties, Tara is experiencing an increase in demand for automotive upholstery leather. Strap and case leather tanned with vegetable extracts remains buoyant, and vegetable retanning of chrome leather has gained in importance with the swing to more 'natural' leathers.

Mimosa: a renewable resource

Mimosa extract is derived from the bark of the Black Wattle tree (*Acacia mearnsii*), a species of *Acacia* native to Australia. The species was introduced to South Africa about 125 years ago, initially by farmers as wind breaks and for shade protection for farm animals from the harsh African sun. Later, it was discovered that the bark contained high levels of tannin, which could be used for treating hides for leather production. This led to the tree being widely planted to produce tanning extract for the leather industry.

Black Wattle grows best in the cool, mist-belt regions of Southern and Central Africa at altitudes in excess of 1,100m above sea level. There are about 130,000 hectares of commercial Black Wattle plantations in South Africa grown by some 2,700 farmers. In Kenya there are no commercial plantations and bark is sourced from small rural growers and wood-lots while in Zimbabwe there is a single commercial grower with some 11,000ha of plantations.

In South Africa, as a renewable and thus sustainable resource, much of it comes from Forest Stewardship Certification (FSC) accredited farms. This further enhances mimosa as a 'green' product. And it is not only the bark of the Black Wattle tree that is much sought after. For every ton of bark harvested, there is also about five tons of utilisable timber produced.

These trees are normally felled when they are between eight and ten years old, and once the bark and timber have been removed from the site, the next crop is planted. This new crop is fertilised and weeded to ensure that growth is maximised.

As the tree is felled, the bark is removed and bundled. Minimising any delay from harvesting to processing at the factory ensures that tanning extract of the highest quality is produced. The manufacture of Mimosa Extract is shown in the schematic given in *Panel 1*.

The extract is first leached from the chopped bark, then passed through an evaporator to create a 'thick liquor'. This extract then passes on through a further moisture reduction stage to finish as solid extract or through a spray drier to end as a powder. Following a second pathway from the thick liquor tanks, the extract can be passed to a reaction vessel where chemical modifications can be made.

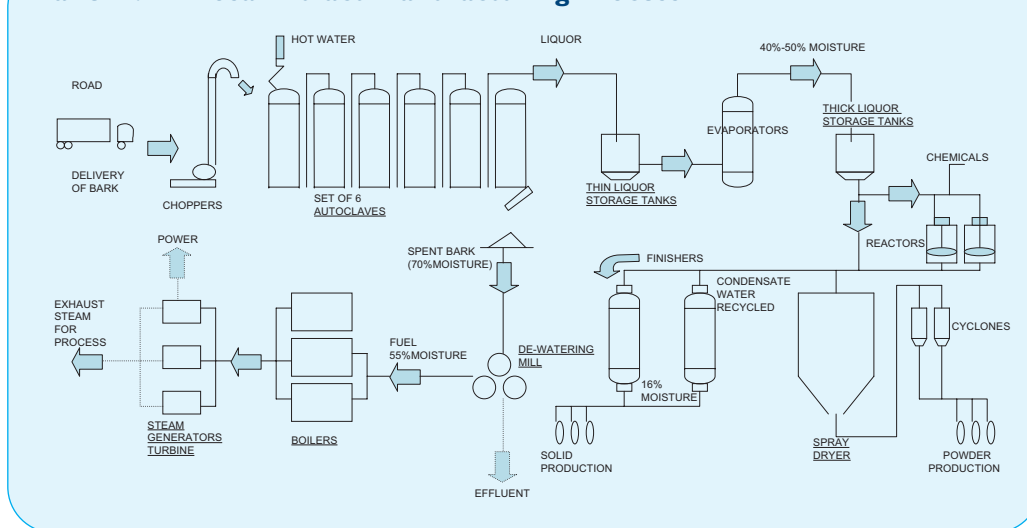
The characteristics of Mimosa

All commercially produced vegetable tanning extracts are a mixture of all matter leached from the bark during the extraction process. The tanner needs to know the tanning power of the extract that he purchases, and accordingly several methods of analysis have been developed. The official method of the Society of Leather Chemists and Technologies (SLTC) is most commonly used and the results of typical analysis of various vegetable extracts are displayed in *Panel 2*. The importance of an analytical profile is detailed as follows:

Tannins: The tannin content is obviously important, but the other analytical values provide the key to the tanning characteristics.

Non-Tannins: The non-tannins figure includes all the constituents other than tannins indicated in *Panel 2*. Many components of non-tannins are not determined during analysis, but those listed play vital roles in the tanning process.

Panel 1: Mimosa Extract Manufacturing Process





Panel 2: Analytical Data for some Tanning Extract Powders

	Mimosa ME	Treated Acacia	Quebracho	Soluble Quebracho	Chestnut	Sweetened Chestnut	Valonia	Myrabolam
% Tannins	68	67	70	72	70	67	63	60
% Non-Tannins	25	26	15	20	24	27	27	32
% Insolubles	0.6	0.4	8.0	0.3	0.2	0.1	2.8	1.7
% Moisture	6.4	6.6	7.0	7.7	5.8	5.9	7.2	6.3
% Ash	1.2	2.3	0.7	5.2	0.8	4.8		
pH	4.6	4.5	4.4	4.8	2.8	4.3	3.5	3.1
Acids	50	50	40	65	280	115	380	550
Salts	150	250	30	350	70	260	270	175
Red	1.2	1.1	3.2	4.5	3.0	2.8	1.6	1.0
Yellow	2.4	2.3	7.5	11.0	12.1	12.2	4.8	4.1

Notes: • Tannin analysis by SLTC method. • pH values of 50% BK solution. • Acids and salts mg. Eq./L 150° solution. • Lovibond tintometer readings.

Insolubles: The insolubles figure helps to predict whether heavy deposits of sludge are likely to build up in unheated tanning pits. However, it must be remembered that analyses are performed on a freshly prepared dilute (0.4%) tannin solution and the deposition of insoluble matter in tanning liquors over a long period of time is a very different matter.

pH: The natural pH of an extract affects the astringency or reactivity towards collagen or previously tanned stock.

Acids: This figure is a measure of the reserve of acidity in the extract, and is an additional factor in determining its astringency.

Salts: The salts contained in an extract have a direct bearing on its astringency and the salts content of tanned leather. The salts figure may also be an indication of whether or not the extract has been chemically treated during manufacture.

Ash: This is a measure of the mineral matter contained in the bark from which an untreated extract is manufactured. It can be an indication of chemical treatment during manufacture.

Colour: The Lovibond Tintometer method for the measurement of the colour of analytical solutions of tanning extracts is employed by all the commercial manufacturers of tanning extracts as a means of quality control. The colour of extracts is of prime importance as this affects the final leather colour. It is noted that the colour of extracts changes under different pH conditions.

Mimosa in tanning and retanning

There is a growing trend for leathers with a more natural (vegetable type) appearance, specifically in the leather goods market. There is also increasing pressure for so called eco-friendly methods of manufacture. Certain sectors of the automotive industry are increasing their requirements for chrome-free leathers. The following information outlines vegetable tanning techniques that can be applied to fancy goods, sole and automotive leathers.

MIMOSA TANNED CASE AND BELT LEATHER

This is a fairly standard process that is widely used to produce well-filled mellow leather. A fairly typical protected post lime wash and de-liming is followed by a standard bating but with 0.1% of formic acid incorporated to prevent over bating of the grain.

For rapid processing, the float is adjusted to 30%, before a typical mixed pickle to pH 4.0/4.5. Alternatively this may be as an all-formic pickle. This is followed with a light vegetable pretannage^[Legend 1], then the main tannage with a blend of products to give rapid penetration^[Legend 2], and a large moleculad agent to give good filling^[Legend 3]. After acidification and piling, the leather then progresses to samming, shaving and dyeing and fatliquoring.

MIMOSA TANNED SOLE LEATHER (LIRITAN PIT PROCESS)

The Liritan process was developed in South Africa and is recognised as the most rapid pit tanning process in use today. This process is based on a pretannage with Calgon or sodium hexametaphosphate, and an outline process is given as *Panel 3*.

In this process, the basic side chains are inactivated by the polyphosphates with an optimum chain length of 10–12 phosphate groups. The absence of salt in the combined pickle/pre-tanning stage provides the advantage that little neutral salts are carried over into the tanning pits. The purity of the circulator liquor is thus maintained.

The circulator liquors are kept warm (35°C), resulting in very rapid tannin penetration, a reduced accumulation of sludge, and good tannin fixation. The use of a polyphosphate pretannage also has the added advantage of sequestering any iron, giving uniformly light-coloured leather.

Mimosa extract is well suited to this method due to its low salt content. This ensures that the purity of the tanning liquors is easy to maintain, and little discharge of circulator liquors is necessary: hence a low level of pollution.

Panel 3: Liritan Trial Pack Sole Leather System

1st Day	Pickle	5.0% Calgon on liquor 2.0% Sulphuric Acid on limed mass End pH 2,8
2nd Day	Colour	25°Bk Mimosa ME liquor 1.0% Calgon on liquor
3rd to 11th Day	Circulator	100°Bk Mimosa ME liquor at 95°F (35°C) 1.0% Calgon on liquor Start pH3,6; end pH 3,3

Strength maintained by hanging bags of Mimosa in the pit and temperature maintained by circulating through a heating device.



CHROME-FREE AUTOMOTIVE UPHOLSTERY LEATHER

The hides in most cases are pre-tanned using a masked glutaraldehyde. This pretanning is essential to ensure the thermal stability needed for a subsequent shaving operation. The tanning then employs a combination of vegetable and synthetic tannins, but mainly vegetable, up to 20% on shaved weight.

The best vegetable tannins for this type of leather are Tara, because of its lightfastness and heat resistant properties, and Mimosa, because mainly of its ability to fill the leather without affecting softness. Mimosa products containing 100% natural tannin^[Legend 4] can be used alone on dark coloured (Black) chrome-free automotive leathers. This entirely unmodified product imparts a full mellow texture to the leather, with a tight grain and exceptional print retention and definition properties.

On pale shades, a 50:50 combination of Tara and Mimosa with higher lightfastness properties^[Legend 2] can be used. These complementary extracts can produce leathers that meet lightfastness and heat resistant specifications, and provide excellent softness, fineness and uniformity of grain.

Mimosa as a retanning agent

The use of vegetable extracts to retan chrome tanned leathers for all types of shoe upper leathers, and high tech uses such as waterproof leathers is well known. Important properties are imparted to these leathers including good filling and softness. Vegetable tanning agents improve buffability for corrected grain leathers, and assist print retention in finishing. For general use in retanning, the following points are considered important:

- Use a sequestering agent, such as EDTA, in the neutralising process. This helps to prevent grey/black discoloration from iron contamination.
- Use a buffered neutralising process, such as a combination of sodium formate and a neutralising syntan, say, to a pH of 4.5, to give an even cross-sectional pH. It is important not to over-neutralise the grain to avoid loose grain problems.
- Prior to retanning, pre-fatliquor with an anionic fatliquor. This reduces the cationic character of the leather, allowing for deeper tannin penetration and a tighter/stronger grain when carrying out heavy veg retanning.
- Add the vegetable extracts in two or more lots so as not to overload the grain with tannin. The use of a low astringent extract (Mimosa WS) at the start of retanning also helps in this regard.
- Use a cationic top fatliquor to lubricate the grain. 🌱

Legend:

Products by Forestal Mimosa/Mimosa Central Co-op

- (1) Mimosa WS
- (2) Mimosa FS
- (3) Mimosa RG
- (4) Mimosa ME

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