PRAYON

Phosphoric acid:

Production, importance of raw materials and recycling

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First results of the pilot tests

09/07/2019

Our Group

- Worldwide leader in phosphate chemistry
- More than 1400 jobs around the world

Our Group

Four 100% Prayon production plants around the world

Engis (head office) - Belgium

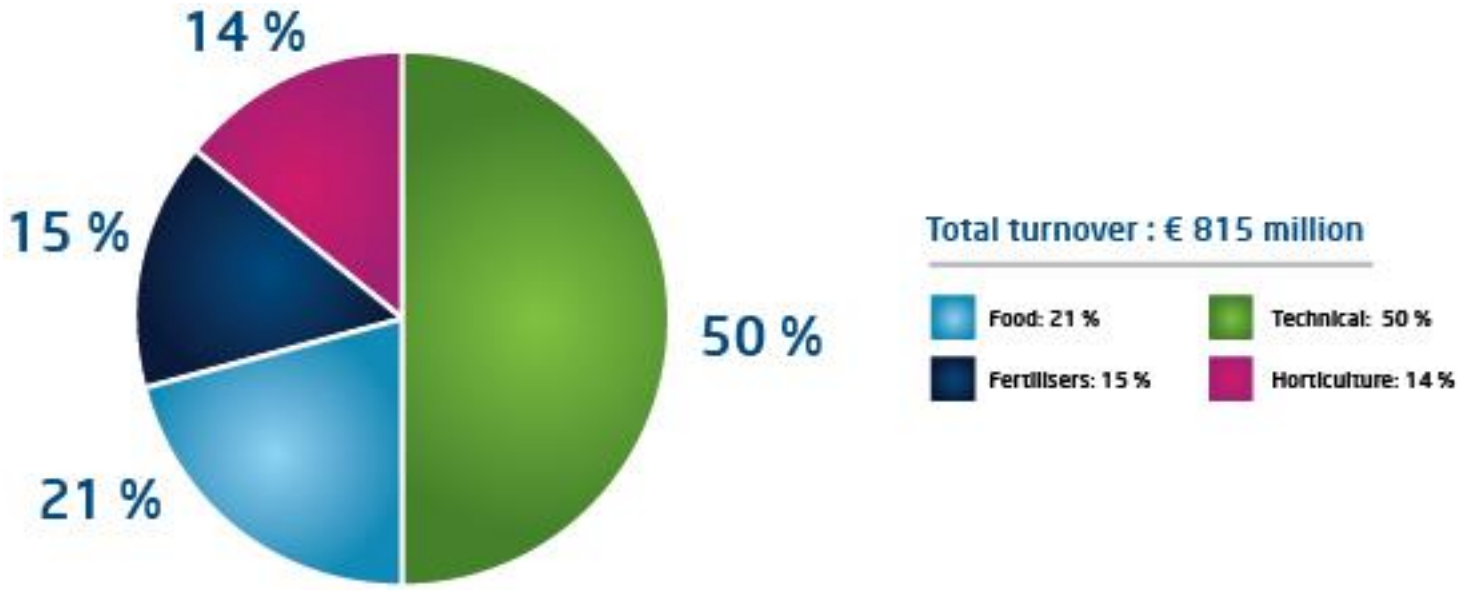
Puurs - Belgium

Les Roches de Condrieu - France

Augusta (Prayon Inc.) - USA

Our products

Markets in 2011



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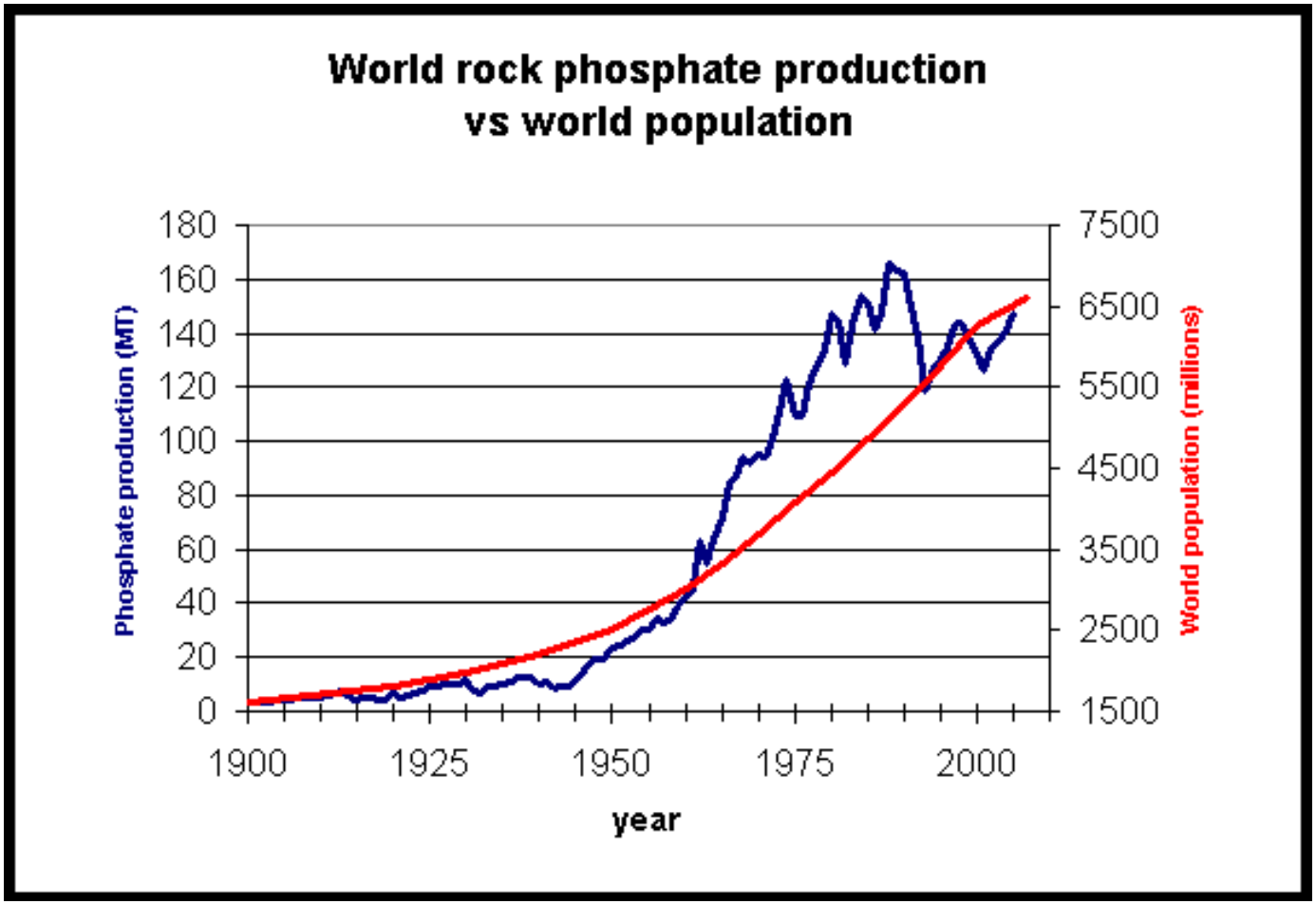
Resources and consumption

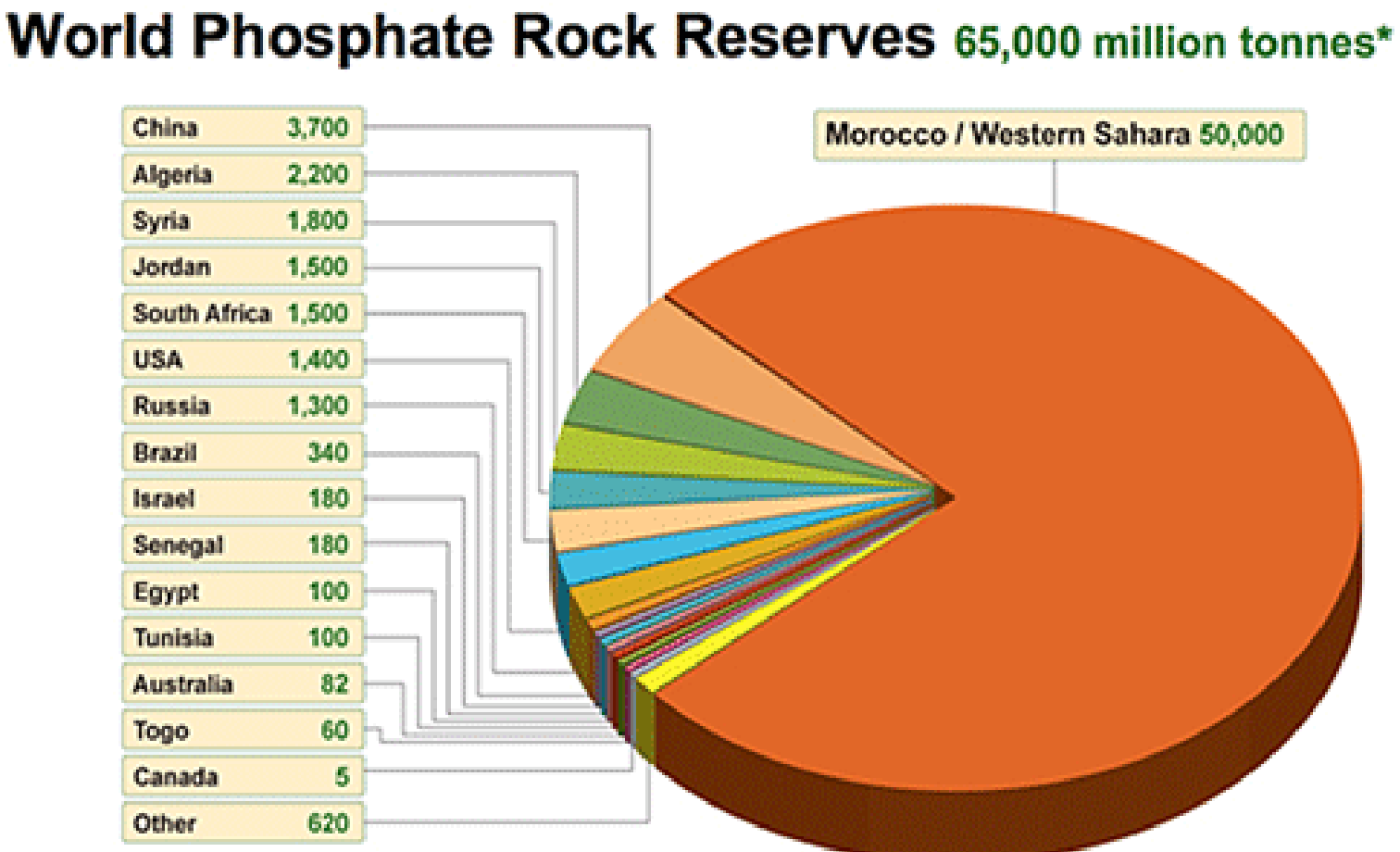
Phosphate and life

- ☑ Phosphorus is the 6th component of the human body. (after hydrogen, oxygen, carbon, nitrogen and calcium).
- ☑ Key elements of DNA, cells, bones and teeth, phosphates participate to numerous biological processes.
- ☑ Recommended daily amount: 700 mg (for an adult).
- ☑ There is no alternative compound to phosphorus.

Phosphate and life



Resources in the world



Source: world resources forum

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Production of phosphoric acid

Production process

- ☑ Wet process:
  - Widespread process,
  - Adapted to different qualities of phosphate rock,
  - Low energy consumption,
  - Additional treatment (solvent extraction…) needed to reach high purity.

- ☑ Thermical process:
  - Only fluoroapatite,
  - High energy consumption,
  - High purity.

Wet process

☑ Reactions (example of fluoroapatite):

$Ca_5 (PO_4)_3F + 5\ H_2SO_4 + 10\ H_2O$

$\rightarrow 3\ H_3PO_4 + 5\ CaSO_4.2H_2O + HF$

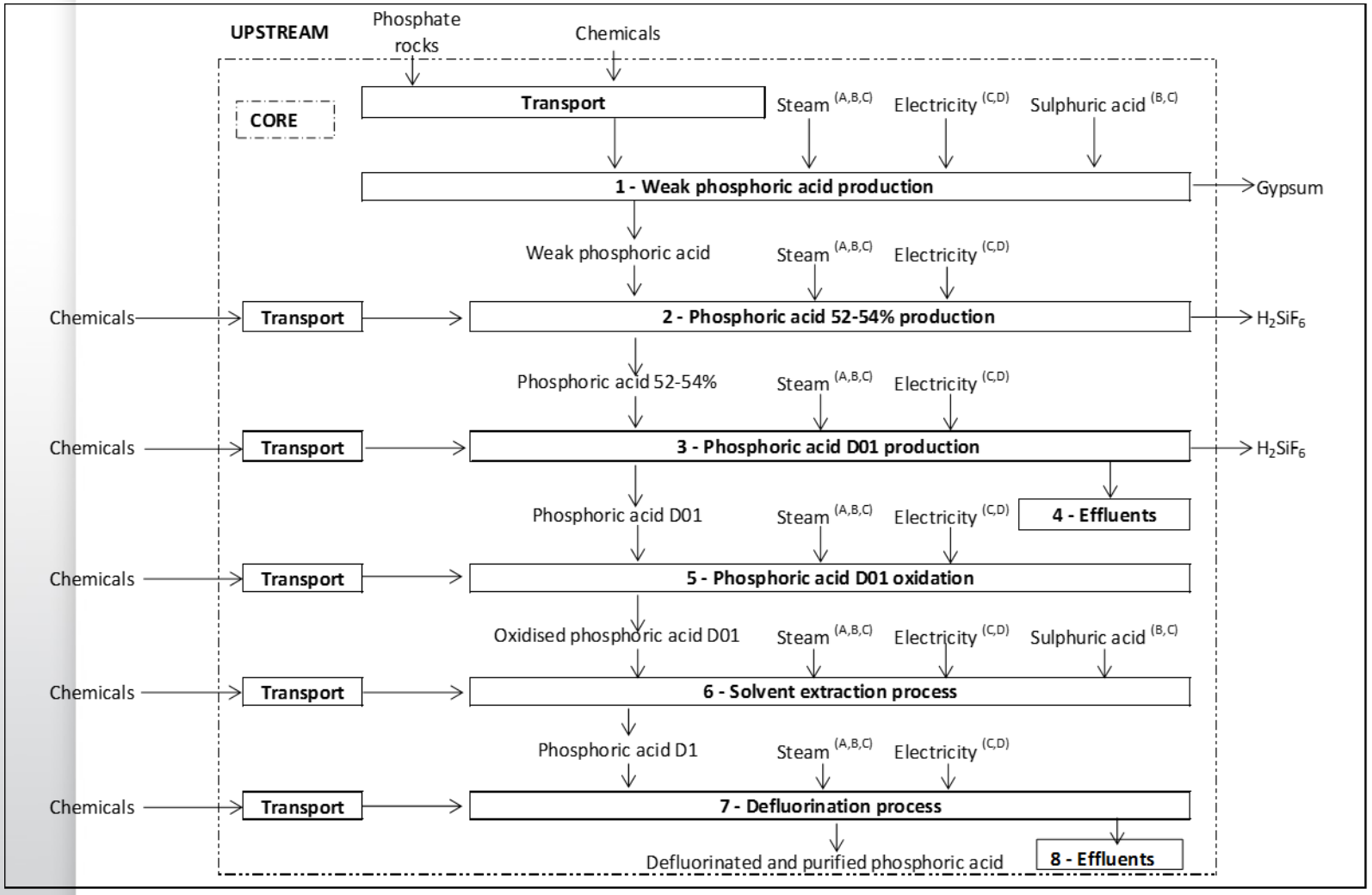
$6\ HF + SiO_2 \rightarrow H_2SiF_6 + 2\ H_2O$

☑ Production of 5 tons calcium sulphate (gypsum) per ton P_2O_5 :

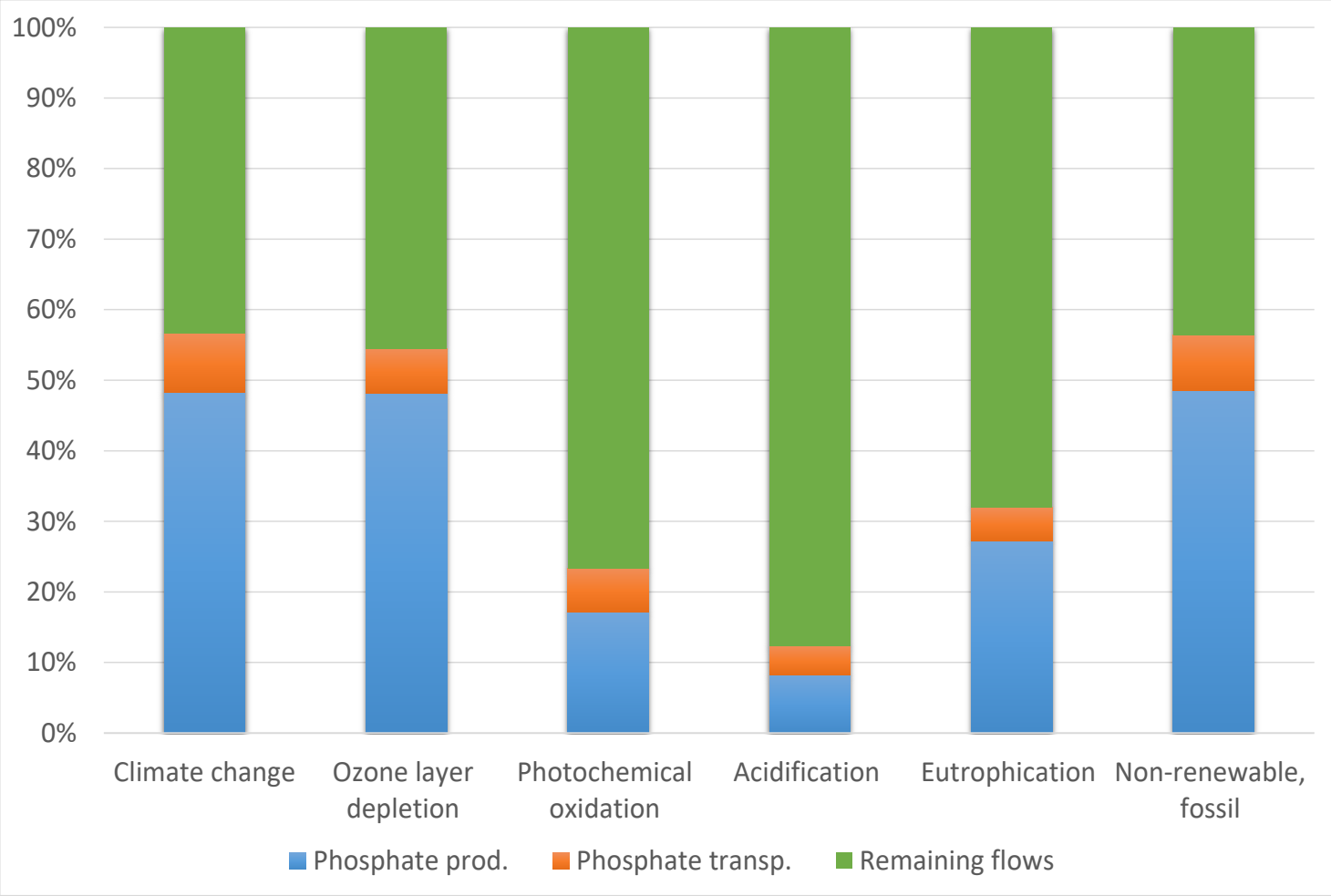
- Can be dihydrate, hemihydrate or anhydrite, depending on the operating conditions,
- Need for a valorization of this by-product (cement, plaster, agriculture,…).

Importance of raw materials and recycling

Life Cycle Assessment



Life cycle Assessment



Alternative raw materials

- ☑ Have to…
  - ☑ Meet process requirements
  - ☑ Respect food safety (impurities…)
  - ☑ Guarantee the quality of the gypsum

P_2O_5	> 25%
As	< 1 ppm
Cl	< 100 ppm
Na_2O	< 0,6%
Fe	< 0,7%
Si	< 3%
MgO	< 0,1%
Al_2O_3	< 0,7%
Ti	< 700 ppm
Total carbon	< 300 ppm

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First results of the pilot tests

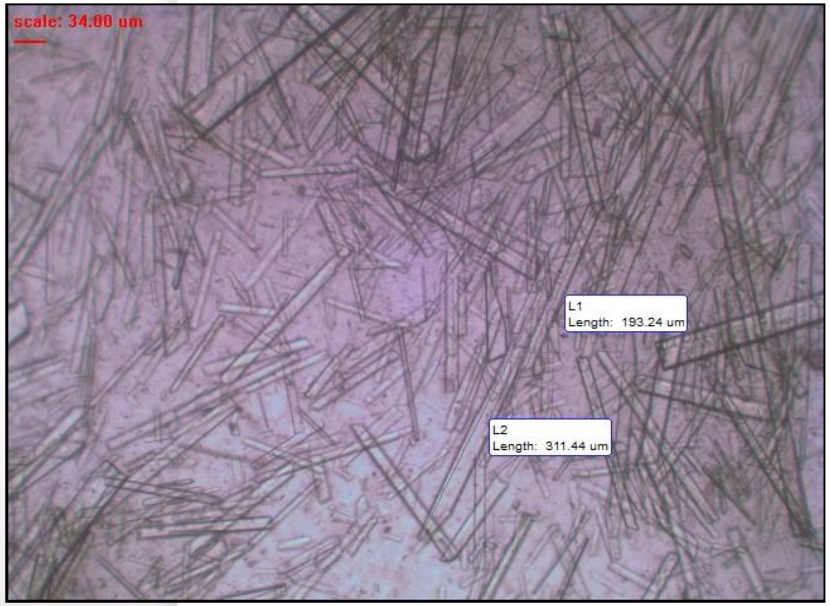
Raw materials

N° Labo	74481	124591
	14/08/2018	16/05/2019
Al2O3 %	0,0563	0,025
As ppm	0,318	11,31
C total %	5,36	3,81
CaO %	43,2	47,1
Cd ppm	1,71	0,584
Cl ppm	7890	495
CO2 %	1,83	3,52
F %	0,047	0,116
Fe2O3 %	0,312	0,137
K2O %	1,32	0,113
MgO %	0,472	0,653
Na2O %	0,119	0,063
NH4 ppm	1280	753
P2O5 T %	34,9	37,5
SiO2 %	0,123	0,112
SO3 %	1,07	0,711
TOC %	4,86	2,8

Quality of the acid

- ☑ Brown color
- ☑ TOC : 1600 ppm

Quality of the gypsum



Thank you for your attention

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