

**The TURBISCAN *On line* is able to follow flocculation phenomena in real time, with a high acquisition frequency (0.1 s). It enables to compare the effects of flocculating agents properties on the efficiency of the process.**

**RESULTS**

Figure 1, we can see that the backscattering is decreasing as a function of time. It corresponds to the particles flocculation (particle size increase) due to the introduction of flocculating agent.

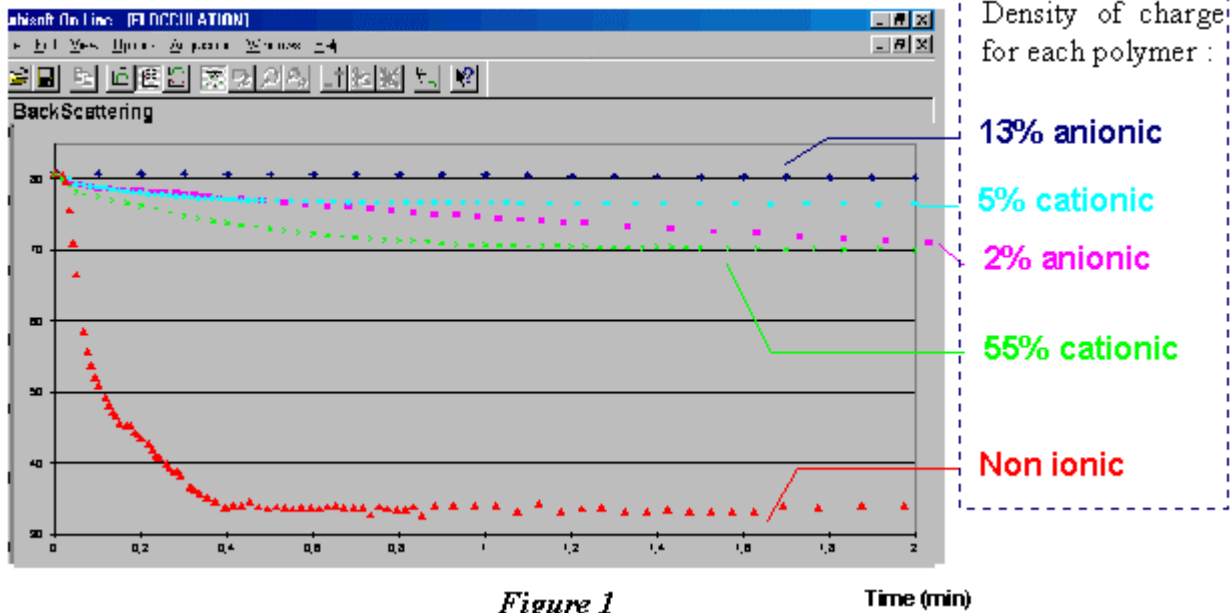
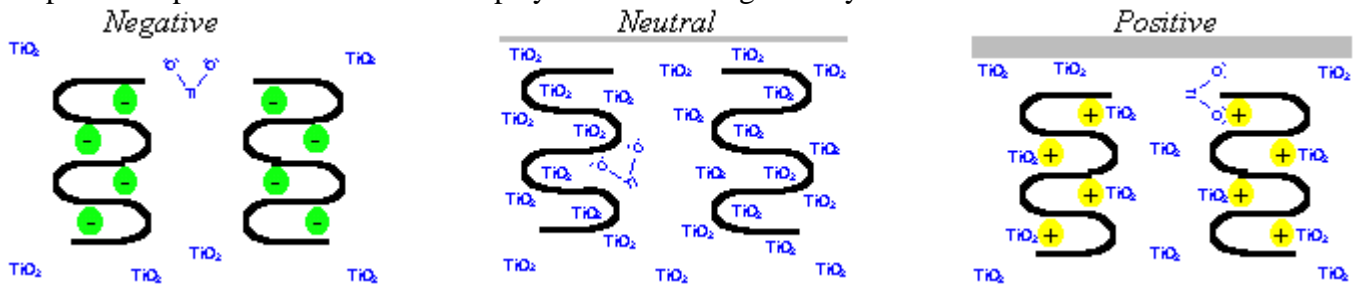


Figure 1

Time (min)

The process depends on the nature of the polymer and its charge density:



The more dense in negative charges the polymer is, the greater the repulsion of the polar titanium dioxide particles is. The negatively charged polymer avoids flocculation of titanium dioxide.

Lots of particles can enter in the reactive area of the polymer and link with it on the polar amid function (Van der Waals links). The non charged polymer acts as a flocculating agent (big floc sizes).

It is a flocculation by *inter-particles cross linking*

The more dense in positive charges the polymer is, the greater the attraction of the polar titanium dioxide particles is.

It is a flocculation by *charge neutralisation*.

To compare the initial speed of flocculation as a function of the nature and the density of charge, we calculate the slopes of kinetics (on 24 seconds : *Table 1*)

The best flocculation of titanium dioxide appears with the neutral polymer. Some traces of anionic charges on the polymer reduce considerably the aggregation process.

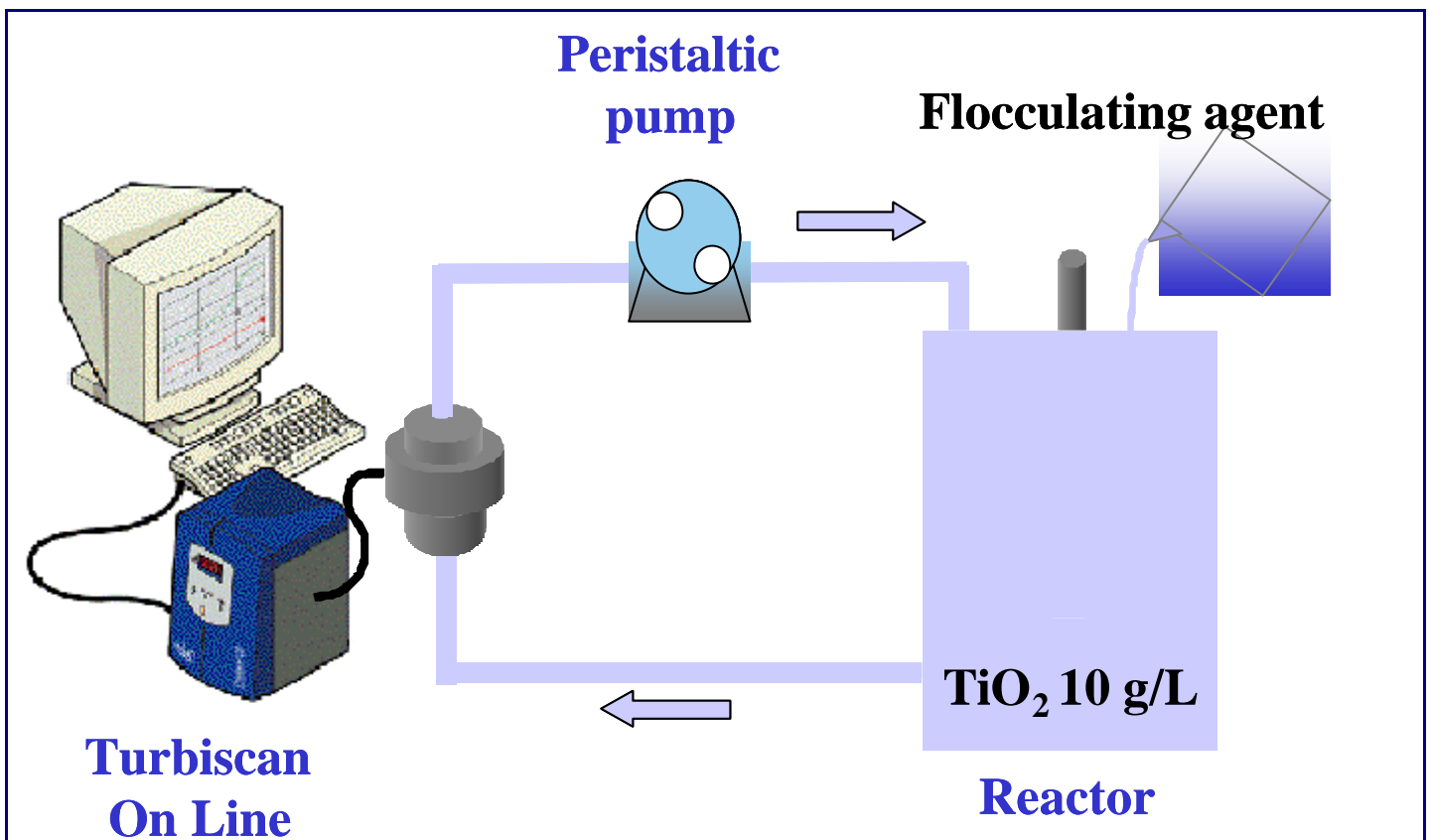
Nature of the global charge	Percentage of charge	Initial flocculation speed (deltaBS/min)
negative	13%	- 0.4
negative	2%	- 6.2
neutral	0%	- 105.0
positive	5%	- 12.1
positive	55%	- 18.9

Table 1

**CONCLUSION**

### Charge Effect of Flocculating Agents on the Flocculation Efficiency

#### EXPERIMENT SCHEMA



Several experiments are made by introducing different flocculating agents in a suspension of titanium dioxide at 10 g/l.

These flocculating agents were acrylamid derivatives which contain more or less ionic copolymers :

- × acrylic acid for an anionic polymer,
- × dimethyl-aminoethyl acrylate for a cationic polymer.

For each flocculating agents, the **TURBISCAN On line** follows the evolution of the backscattering light intensity in real time. The time  $T_0$  corresponds to the moment when we introduce the flocculating agent.