

# Modeling of the adsorption isotherm of a dye by montmorillonite

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## Abstract :

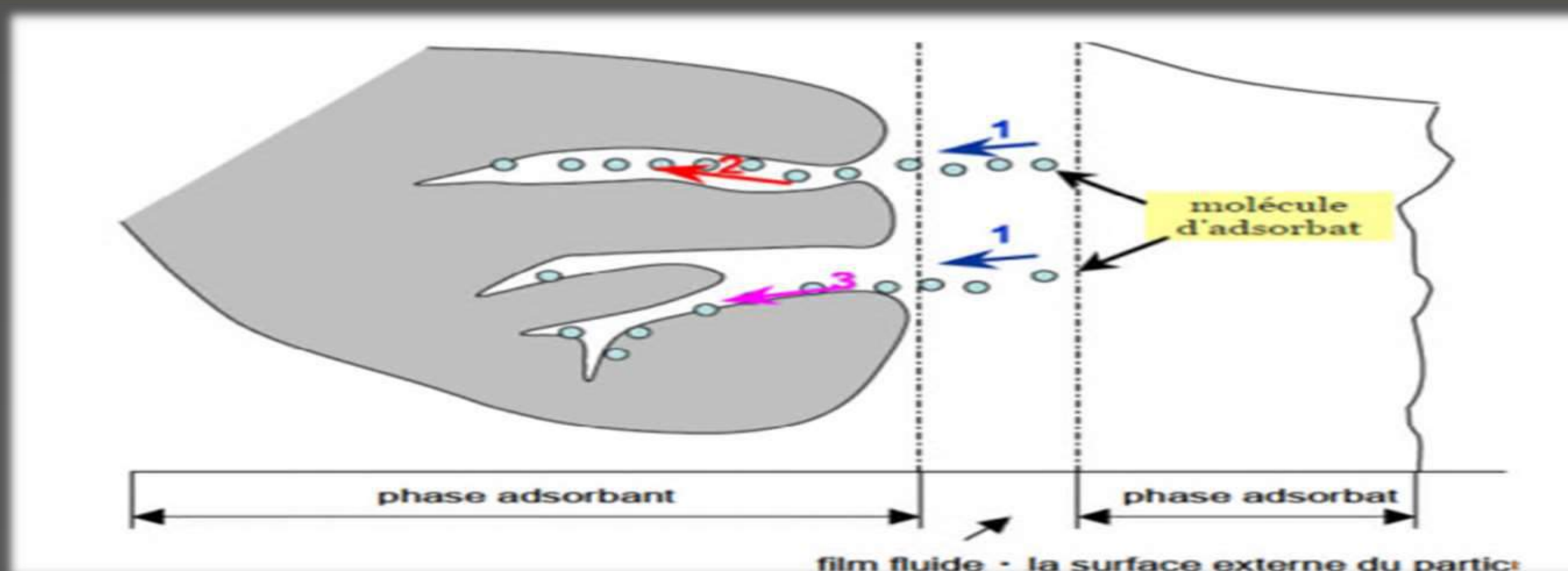
our work aim to study the adsorption of textile colorant by montmorillonite clay and study the optimal dose of clay and what's influent it.

## Introduction :

Pollution of water is probably as old as the settlement of humanity the industrial sector is a major factor of pollution especially the textile industry. Adsorption is a phenomenon that can manifest itself between the surface of a solid and the molecules of the surrounding medium. This phenomenon is used to retain unwanted molecules existing in a fluid. The aim of this work is to present the use of clay as a means of textile wastewater treatment and color adsorption. The adsorbent used in this study is natural clay from Maghnia  
Montmorillonite is a white clay, usually its density is 2.04. The most important property its cation exchange capacity, which varies from 100 to 150 milliequivalents per 100g of clay and its specific surface area (for Maghnia montmorillonite) of 90m<sup>2</sup> / g.

## Adsorption :

is a physico-chemical phenomenon by which a chemical species can accumulate on the surface of a solid. This is a process of the utmost importance as regards the behavior of both inorganic and organic substances in natural waters.



## Chemical adsorption:

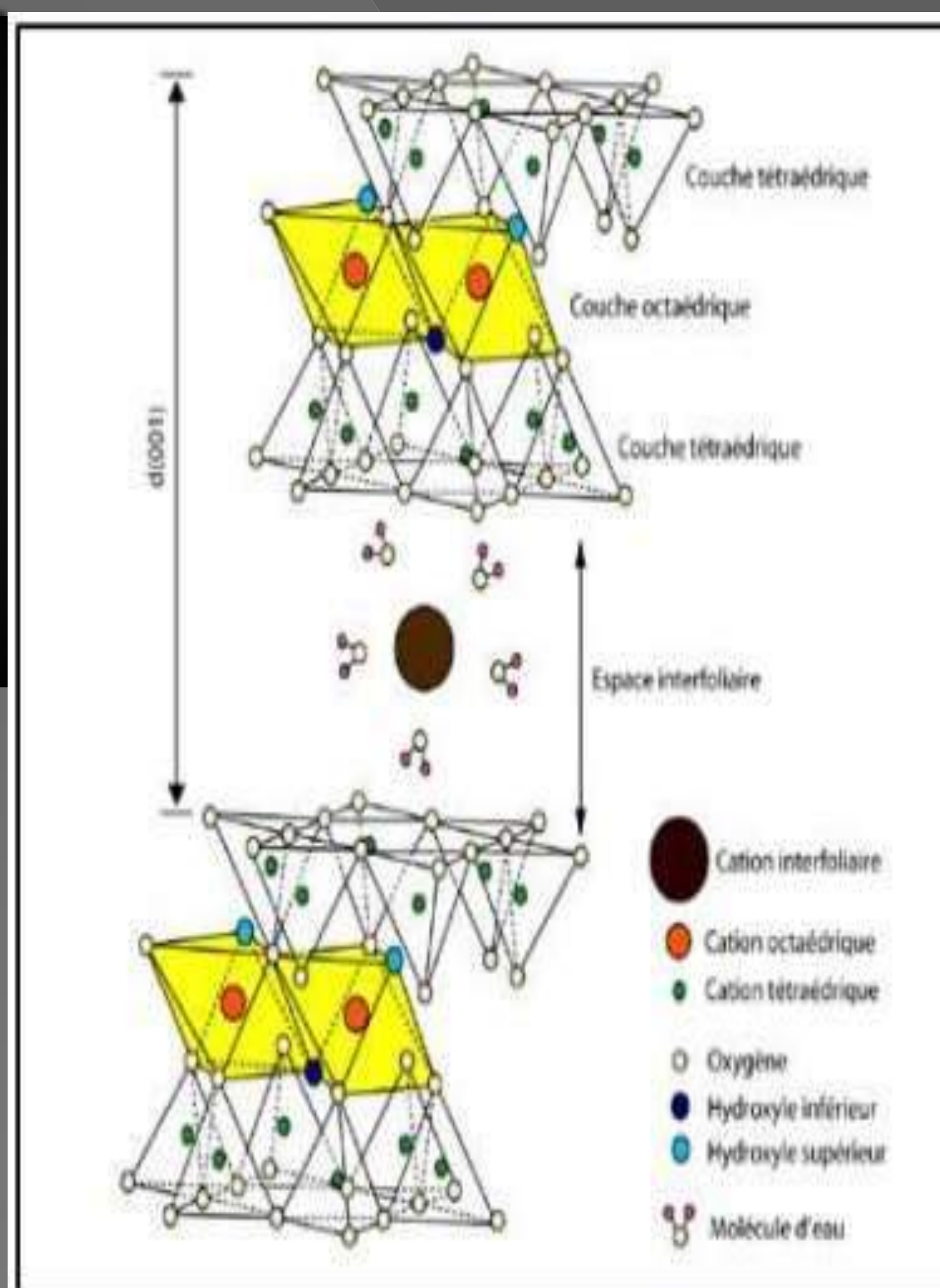
The chemisorptions is essentially the result of the establishment of ionic type bonds between the cations (or anions) of the adsorbate and the negative (or positive) charges of the surface of the adsorbent material.

## Physical adsorption:

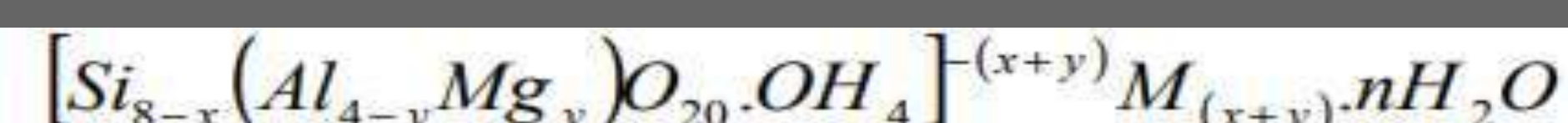
Adsorption is called physical when it is due to forces of physical interactions between the atoms, or groups of atoms of the solid and the adsorbate molecules. This type of adsorption is based on the mutual attraction of the adsorbent and adsorbate molecules under the action of Van Der Waals forces.

## Montmorillonite :

Of all the existing phyllosilicates, montmorillonite is one of the most widespread on the surface of the globe and the refore also widely used. It was discovered for the first time in 1847 near Montmorillon, in the department of Vienne (France). In Algeria, the most economically important bentonite deposits are in Oran (western Algeria). In particular, Maghnia quarry Hammam Boughrara) (with an estimated reserves of 1 million tones and Mostaganem (M'zila) with reserves of 2 million tones .



Consists of two layers of silicon-centered tetrahedral between which there an octahedral layer is centered on aluminum. Two layers are separated by the interlayer space whose thickness is of the order of 14Å, which thickness can vary according to the water content (9.8Å for a montmorillonite dried at C °110 )

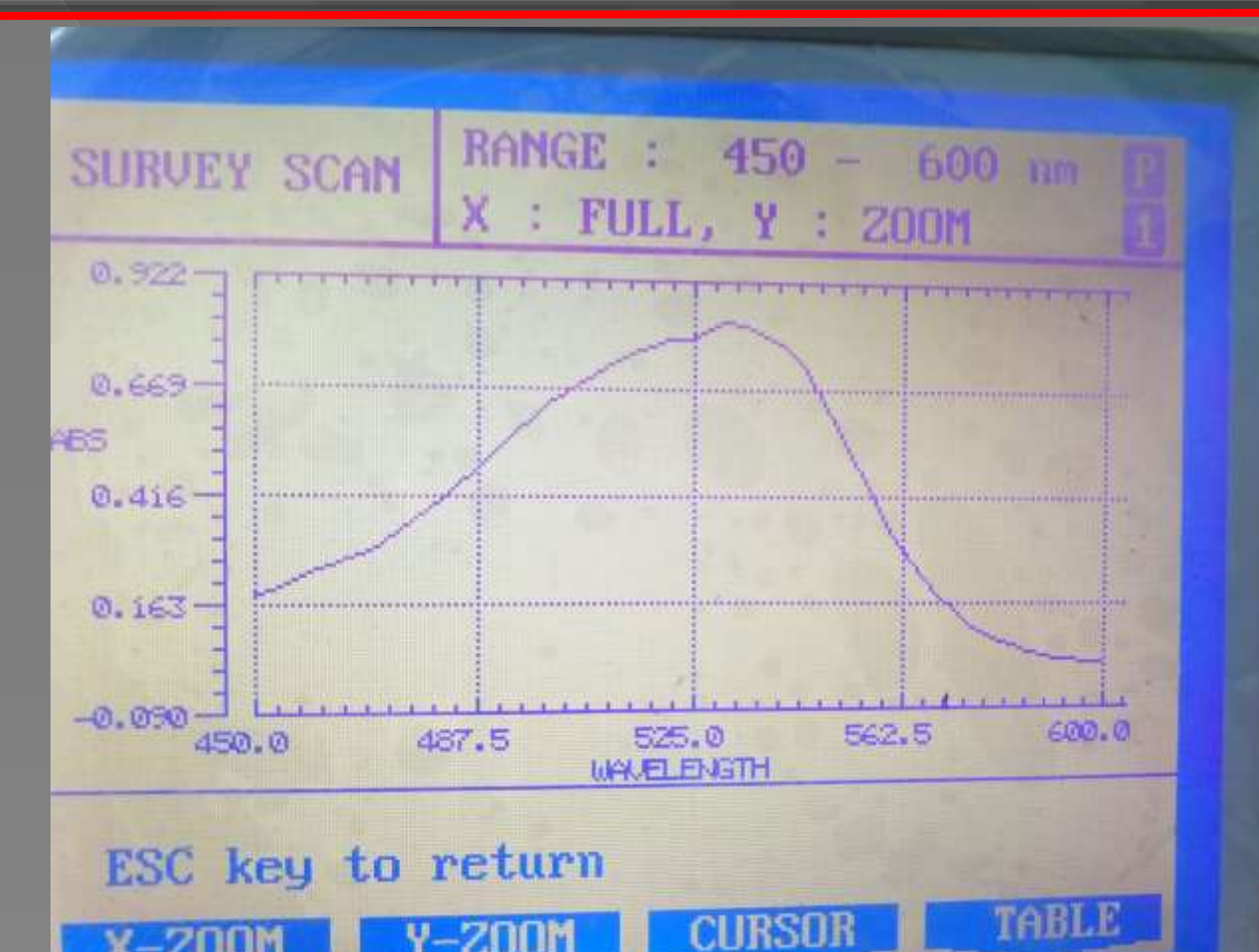


The complex in square brackets indicates: the macro anion that composes the leaflet  
M(x + y) : Is the exchangeable cation in the interfoliar space.  
y / 8: Is the proportion of Si atom substituted by tetrahedral Al.  
x / 4: Est la proportion d'Al dans la couche octaédrique substitué par Mg.



## Definition the dye :

The dye matter are an assembly of rosemary, auxochromic groups and conjugated aromatic structures (benzene rings, anthracene, perylene, etc.). These groups are capable of transforming white light in the visible spectrum from 380 to 750 nm, into colored light by reflection on a body, or by transmission or diffusion.



**Toxicological aspect dyes :**  
are compounds that are difficult to biodegrade by microorganisms, they are toxic and harmful to humans and animals.

Name commercial	Brut Formula	Type	Wight molar (g/mole)	$\lambda_{max}$ (nm)
Basic red Cl 18	C <sub>20</sub> H <sub>26</sub> N <sub>4</sub> O <sub>2</sub> Cl	cationic	389.5	530

## References

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M.A.SLASLI, «Modélisation de l'adsorption par les charbons microporeux: approchethéorique et expérimentale», Thèse de doctorat, l'université de Neuchâtel, (2002).  
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