

RESEARCH REGARDING RESIDUAL SULPHATE SOLUTIONS

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Abstract: The technology using the sulphate cellulose from coniferous wood allow for the lignin solubilization, polymer witch exist in chemical composition of wood. The sulphate cellulose purification realized by diffusion process, with industrial water, process which has as a result residual water with alkalilignine pollutant hardly biodegradable. The abatement residual water pollution degree process reported of the Alkalilignine precipitation in acid medium realized with chorine hydride. After lignin separations residual water can be reused in normal biological depuration, excluding primary and second existing steps.

Keywords: sulphate, lignin, biodegradable.

1. INTRODUCTION

The abatement pollution degree method developed in monitoring activity of Siret river on Vrancea county section, allowed the exactly pollution mixture calculation which represent a danger for surface water quality.

The working scheme, figure no.1 of technological conditions from industrial activity of Vrancart Adjud, permit technological phases recuperation with implication on technological water became residual water finally.

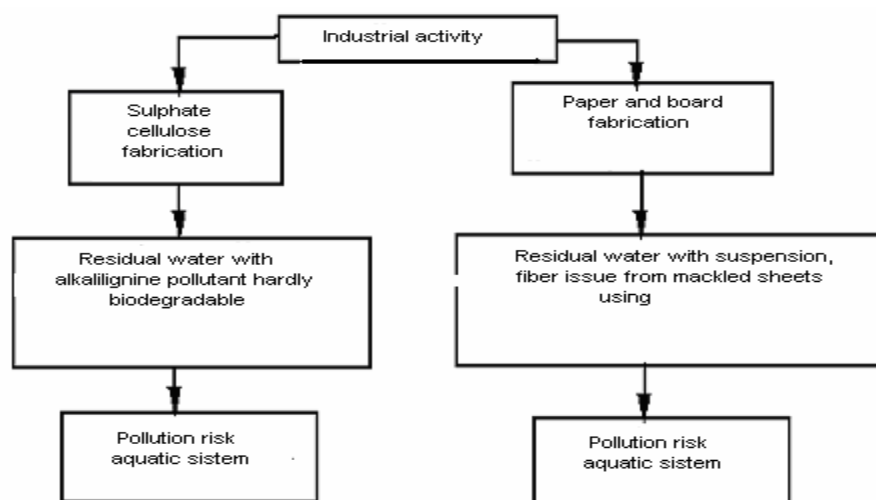


Fig. 1 Technological scheme of industrial activities of Vrancart Adjud

Considering the principal activity: cellulose activity, paper and boxboard fabrication was researched the pollution degree abatement. In research programmer the residual water pollution abatement activities results in S.A Vrancart Adjud unity. The researches related the principal pollutant lignin abatement threw the precipitation in acid medium, acid medium being realized with chorine hydride treatment.

2. MATERIALS AND METHODS

For the sulphate residual solutions decoloration, especially lignin compounds separation for valorification, in first version was used the precipitation proceeding with chorine hydride.



The research programmer was concepted using mathematical methods in central rotator compounds two system order, with four independent variables, as we can see:

- HCl quantity reported at process conditions, with $\rho = 1.19 \text{ g/cmc}$
- temperature, 0°C
- pH
- time, minutes

For the proceeding characterization was chose the efficiency and of residual sulphate solution decoloration degree were used conditional qualitative variables in experimental programmer as is following:

- color (aspect), photometrical extinction
- CCOMn
- Constant grounds at 105°C

For the determination of these variables were used standard analytical methods for: CCOMn and constant grounds at 105°C . In table 1.1 are designed the precipitation reaction parameters influences on these conditional variables take its study:

↪ colour ,	brawn dark – black
↪ pH	14
↪ photometrical absorption units %	6.5
↪ CCOMn mg/L	80.000
↪ Constant grounds at 105°C mg/L	80
↪ Constant grounds organic substances content	90%
↪ Temperature	20°C

The precipitation with chorine hydride was realized with technical chorine hydride, with 72 % concentration, and practical activities were reported to chemical pure chorine hydride with 1.19 g/cmc .

Table 1.

Experimental conditions					
Independent variables	Variation coverage				
HCl (g/100 ml solution) x_1	-2	-1	0	1	2
Temperature ($^\circ\text{C}$) x_2	1	3	5	7	9
pH x_3	10	15	20	25	30
Time (minute) x_4	14	12	10	8	6
	8	10	12	14	16

Table 2.

Nr. crt.	Conditional variables	Regression equations
		Regression equations
1	Y_1 – color value Photometrical extinction	$Y_1 = 10 + 3 x_1 + 0.28 x_2 - 3.44 x_4 + 0.7 x_1 x_2 + 1.2 x_1 x_3 + 2.2 x_2 x_3$
2	Y_2 – CCOMn content	$Y_2 = 5000 + 0.7 x_1 - 0.81 x_2 + 0.71 x_3 - 1.5 x_4 + 3.2 x_1 x_1 + 5.3 x_2 x_2 + 7.9 x_3 x_3$
3	Y_3 – constant grounds at 105°C	$Y_3 = 12 + 4.1 x_1 + 7.1 x_2 + 6.5 x_3 + 0.7 x_4$

Using the method of particularity of regression equation rented in table no. 1.2 can be represented the influence of precipitation reaction parameters above of almost all the conditional variables studies.

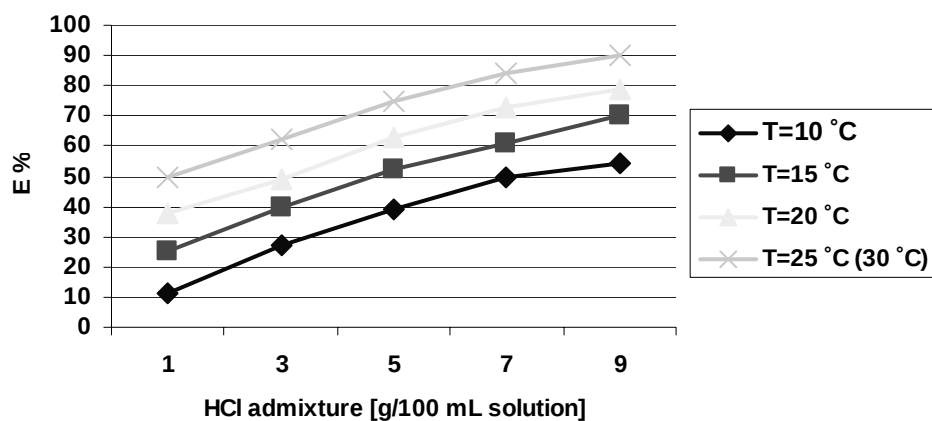


Fig. 2. HCl admixture influence and reaction temperature on color index photometrical extinction, pH and time are constant in central coverage

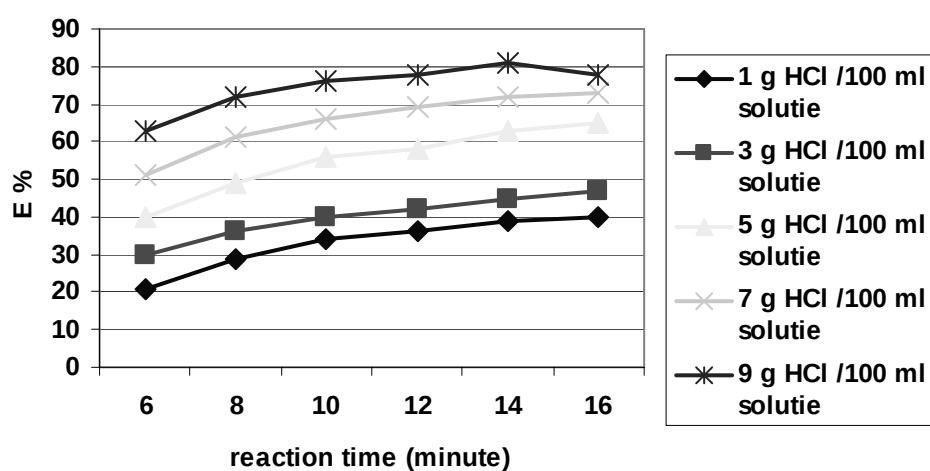


Fig. 3 Reaction time influence and HCl admixture on color index with values maintenance for temperature and pH in central coverage

The brown dark elimination was realized with maintenance over 85% reaction conditions; the HCl admixture 5 – 7g /100 ml solution, time 10 – 12 minute and temperature 20°C.

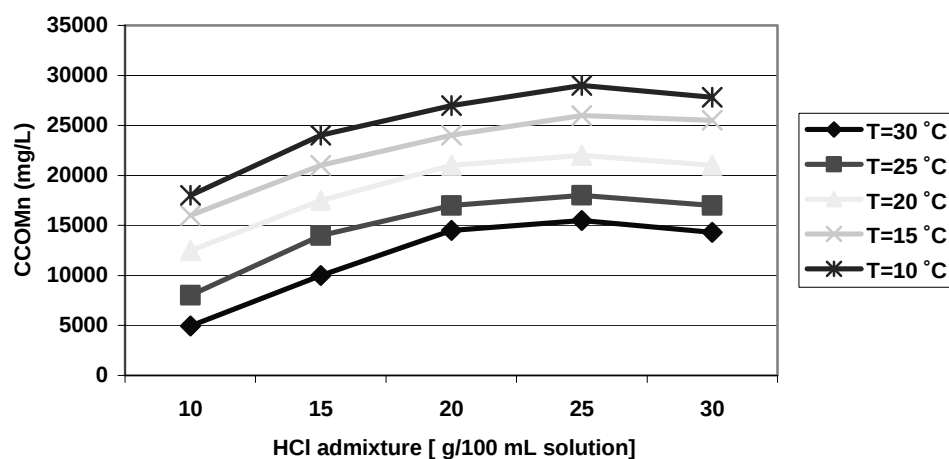


Fig. 4. HCl admixture influence and reaction temperature on CCo- Mn, with constant values maintenance for pH and time in central coverage

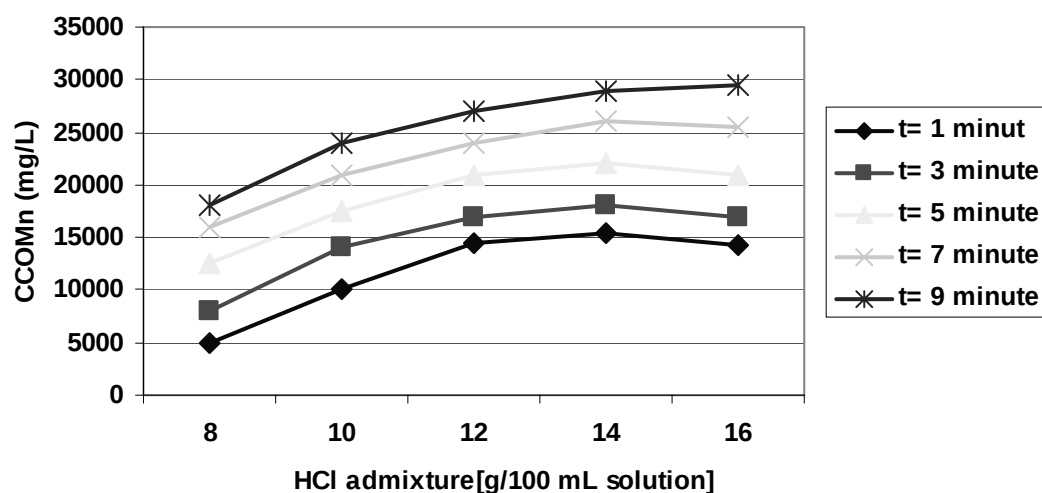


Fig. 5. HCl admixture influence and reaction duration on CCO-Mn content with constant values maintenance for temperature and pH in central coverage

The treatment with chorine hydride is technical solution for lignin precipitation from residual solution in this condition on 85 – 90 %, therefore the simultaneous realization discoloration process with the lignin extraction possibilities concerning its utilization.

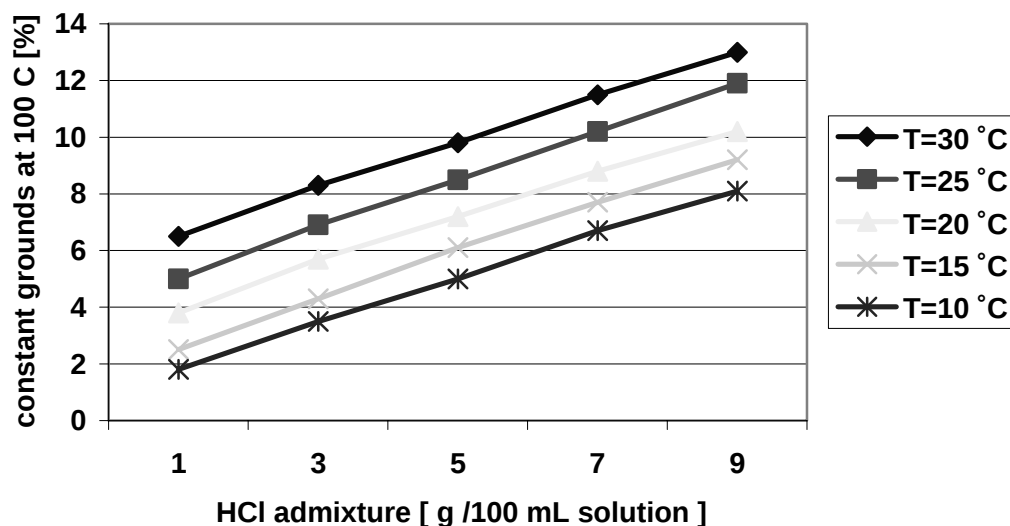


Fig. 6. HCl admixture influence and temperature at 100°C with constant values maintenance for pH and reaction duration in central coverage

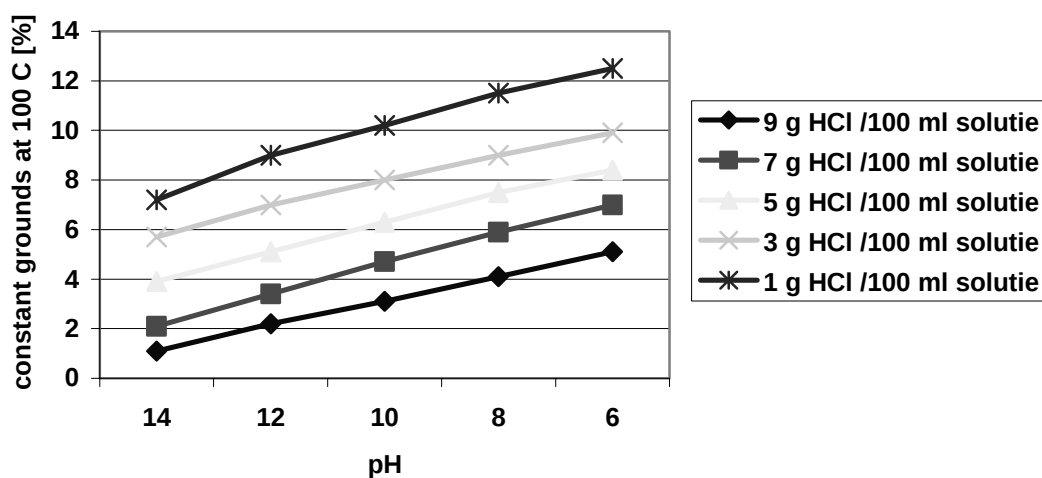


Fig. 7. HCl admixture influence and pH on constant grounds content at 100°C with values maintenance for temperature and reaction time in central coverage

From researching analyze results we have few aspects concerning lignin precipitation with chorine hydride: discoloration degree increase in mean time with chorine hydride admixture, temperature and reaction time, optimal and economic conditions being:

- ↙ HCl admixture g / 100 ml solution 5 – 7 g
- ↙ reaction temperature 20 – 25 °C
- ↙ reaction time 12 – 14 minute

For verify experimental programmer and principal technological conditions, HCl admixture 7 %, duration 14 minute, temperature 25°C, was apply next techniques:

- ➔ chorine hydride consumption determination varying with reaction time
- ➔ efficiency values determination
- ➔ lignin precipitated quantity determinate with organic substances from constant grounds at 100°C
- ➔ threw CCOMn method decrease consumption determined

In precipitation process the HCl consumption is 6-g/ 100 ml residual solution, produced in 12 minute, after this time the consumption is constant, defining the final organic substances consumption from system.

The quantitative residual solution analysis after organic substances decantation this quality and continuation conclusion depollution process in biological station, rented in table no. 3.

Table 3.

Residual solution quality after precipitation	
Qualitative notes for residual solution	Values
Color – alb – with yellow color reflex photometric extinction (%)	85
Organic substances from constant grounds at 100°C (%)	10
Oxygen consumption content CCO-Mn (mg/L)	21.000
CBO ₅ (mg/L)	510
pH (pH units)	6.02

4. CONCLUSIONS

Was appreciating pollution degree threw precipitation proceeding quality with HCl:

- ➔ oxygen chemical consumption reduction CCOMn 75%;
- ➔ hardly biodegradable compounds of system reduction, lignin and its 90%.

After a decantation and drying at 100°C by the analysis and investigation at precipitate was confirmed few:

- ➔ constant grounds at 100°C % , 92 %, witch 90% represent organic substances
- ➔ pH extract for 10 g precipitate at 100 ml water 6.02 values
- ➔ humidity 8%

The experimental programmer realized in this stage, allowed a research concerning lignin separation and necessary test for it valorification. After lignin separation as precipitate, residual water could be reuse in biological normal circuit depuration, excluding in these conditions primary and second extant in the classic circuit depuration.

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