THE USE OF ZEOLITE FOR ADSORPTION PURIFICATION OF THE LEATHER MANUFACTURING WATERS AT THE ELECTRIC DISCHARGE INFLUENCE

M.A. GASANOV
Institute of Physics of National Academy of Sciences of Azerbaijan,
Az-1143, H. Javid av., 33

The investigation results of the purification process of manufacturing waters of leather -processing with the application of the electro-discharge influence are given in the paper.

The optimal mode of the absorbing purification of manufacturing waters with the help of the zeolite of the trend NaM_{Tb}, activated by the influence of the electric discharge of the barrier type has been revealed.

The suggested method can be interest for the manufactures of the leather -processing.

The scientific-technological progress and connected with it the large scale of the industrial human activity led to the big positive transformations in the world, to the creation of the strong industrial and agricultural potentials, to the wide development of all kinds of transport, to irrigation and melioration of big ground areas, to the creation of the systems of the artificial climate.

Moreover, the state of the environment has been worsened. The pollution of the atmosphere, basins and soil by the solid, liquid and gaseous wastes achieves huge sizes, the exhaustion of the irreplaceable natural resources and firstly of the minerals and sweet water takes place [1].

That's why the nature protection from the pollution has become the one of the important global problems.

The intensive use of the waters of the different sources in the industry for the technical use and also the discharge of the waste waters in the nature basins needs the maximal their purification from the different harmful impurities.

It is need to note, that manufacturing waters of the different plant facilities are very different by the compositions, containing different impurities. In the result of this, it is impossible to suggest some universal purification methods, providing the satisfactory purity of the cleanable waters of the different compositions.

There are several methods for the purification of the manufacturing waters: physico-chemical, biological, mechanical and others.

The physico-chemical methods of the purification are: coagulation, flotation, absorption, ion exchange, extraction, rectification, crystallization, desorption and others. These methods are used for the removal of the thin-dispersed suspended particles (solid and liquid), soluble gases, mineral and organic substances from the manufacturing waters. The choice of this or that purification method (or several methods) is carried out taking into account sanitary and technological demands, making to purified manufacturing waters with the purpose of their further use, and also taking into account the quantity of manufacturing waters and pollution concentration in them, the presence of the needed material and energetical resources and process economy [2,3].

The investigation results of the purification processes of manufacturing waters of the leather manufacture with the application of the absorption method are described in the given paper.

In the paper the zeolite by the trend NaM_{Tb} is used in the capacity of the absorbents. The activation with the application of the electric discharge of the barrier type was carried out with the goal of increase of the zeolite absorption capability.

It had been established earlier zeolites absorb very effectively the impurities from the hydrocarbon liquids, they reveal the barrier role in respect of some mineral oil: xylene, toluene, benzol, phenol and others after electric-discharge activation [4-7].

At the electric-discharge activation the filter cycle increases, but water flow on the ablution of the filtering layer decreases. The decrease of the drop rate of the filtering velocity at the repeated cycles has been also established.

The thermal treatment of the zeolite absorbents of the trend NaM_{Tb} at 800°C with the pumping during five hours was carried out on the preparatory step of the investigations. Further the samples of the absorbents were treated by the electric-discharge activation. The electric-discharge activation of the absorbents was carried out in the special discharge camera, the construction of which allowed to excite the electric charge of the barrier type in the interelectrode space.

The treatment by the barrier charge was carried out at the alternating voltage 17 kV, discharge current 100 mA, time duration of the treatment was 30 minutes.

The principal electric schema is presented in the fig.1.

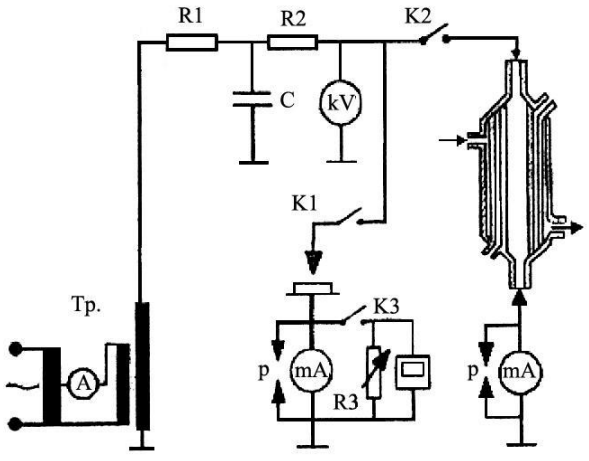

Fig.1

After discharge treatment the zeolite absorbents of the trend NaM_{Tb} were putted in the special glassy reactor and the tests of manufacturing water of the leather manufacture were gone through them.

The technological schema of the experiment carrying out is presented in the fig.2.

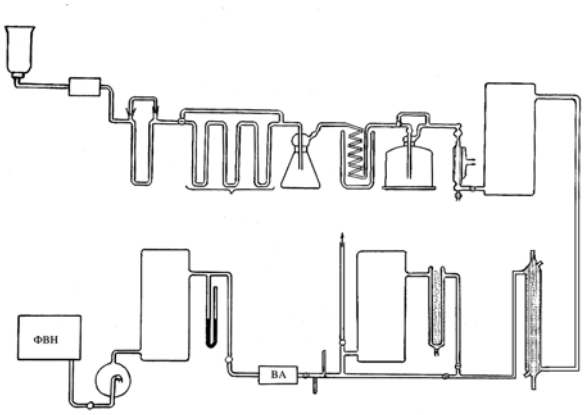

Fig. 2.

After carrying out of the purification processes, each water test with the test of the initial (crude) water was treated by the chemical analysis.

The results of the carrying out of the investigations are presented in the table. From the comparison of the data analysis follows, that content of such impurities as and others has been decreased significantly in the result of the purification.

Thus, it is established, that application of the influence of the barrier discharge at these conditions also increases significantly the efficiency of the absorbing purification of the given manufacturing waters.

The suggested method presents itself the perspective technology of the purification of manufacturing waters of leather -processing.

Table 1.

The results of the chemical analysis of the water tests from the impurities.

Name of indexes	Measurement units	Impurity content in water		
		Initial	Crude	Electro-redused NaM_{Tb}
pH (hydrogen ion exponent)	Un	12,5	12,05	11,8
Electric conductivity mS/sm	mg/l	46400	40800	35600
TDS (total dissolved solids)	Ppm (mg/l)	40600	35000	3000
Σ_{ion} Mineralization	mg/l	43188		
Dry residue (105%)	mg/l	42425	39040	38210
Dry residue (150%)	mg/l	36875	33882	22000
Thick residue (600%)	mg/l	25285	23120	20700
PPPcalcination %	mg/l	40,4	40,8	39,8
PPP losses	mg/l	43,4	39	25
Turbidity (optical density)	un/cm	3,8	2,5	0
HCO_3^-	mg/l	18,4	16	0
CO_3^{2-}	mg/l	6000	444	354
OH–	mg/l	272	170	100
Ca^{2+}	mg/l	521	60	40
Na^+	mg/l	17377	14851	13220
NH_4^+	mg/l	875	212,7	0
$NaHCO_3$	mg/l	10388	5000	100
Na_2CO_3	mg/l	10388	5000	100
NaOH	mg/l	196	170	80
$Ca(OH)_2$	mg/l	592,6	200	0
NH_4Cl	mg/l	2598,2	1234,8	0
Sera compounds, oxidated by iodine (on H_2S)	mg/l	32846	2846,7	0
$\sum H_2S + HS^- + S^{2-}$	mg/l	6166	4831	4250
S^{2-}	mg/l	809	282	221
HS^-	mg/l	5499	5240	461
PO_4^{3-}	mg/l	130	130	70
Chlorides, Cl-	mg/l	90000	5261	4885
Na_2S	mg/l	167,45	100	50
SiO_3^{2-}	mg/l	8048	7349	10

[1] *F. Meynk, G. Shtogg, G. Kolshuter*. «Ochistka promishlennikh stochnikh vod». Leningrad.1963 p.535-555 (in Russian).
[2] *Yu.I. Tarasevich, F.D. Ovcharenko*. Adsorbent, ikh polucheniye, svoystva i primeneniye.1976 p.848 pod.red. M.M. Dubinina. (in Russian).
[3] *V.A. Proskuryakov, L.I. Shmidt.* Ochistka stochnikh vod v khimicheskoy promishlennosti. L. Khimiya, 1977, p.464. (in Russian).
[4] *Ch.M. Dzhuvarli, A.A. Buniyatzade, K.B. Kurbanov, M.A. Gasanov i dr*. Elektronnaya obrabotka materialov. 1992, №1, p.43-45. (in Russian)
[5] *A.M. Gashimov, K.Kh. Dzhalalob, E.V. Dmitriyev, R.N. Mekhtizade.* Elektronnaya obrabotka materialov. 2000, №4, c.57-58. (in Russian)
[6] *A.M. Gashimov, K.B. Kurbanov, M.A. Gasanov, I.G. Zakiyeva*. Izv. NAN Azerb.Resp. ser. fiz.-tekh.i matem nauk 2004, №2, p.81-83.
[7] *M.A. Gasanov*. Power engineering problems. Baku, 2004, №3, p. 58-61.

M.Ə. Həsənov

ARAKƏSMƏLİ QAZBOŞALMASININ TƏSİRİ ŞƏRAİTİNDƏ DƏRİ, SƏNAYE TULLANTI SULARININ SEOLİTDƏ TƏMİZLƏNMƏSİ

Məqalədə dəri sənaye tullantı sularının aşqarlardan təmizlənməsinə dair tədqiqatlardan alınmış nəticələr şərh edilmişdir. Göstərilmişdir ki, arakəsməli elektrik qaz boşalmasında aktivləşdirilmiş NaM_{Tb} markalı sintetik seolitdən keçirilən dəri sənaye tullantı sularının təmizlənməsinin optimal nəticələri müəyyənləşdirilmişdir.

М.А. Гасанов

ИСПОЛЬЗОВАНИЕ ЦЕОЛИТА ДЛЯ АДСОРБЦИОННОЙ ОЧИСТКИ КОЖЕВЕННЫХ ПРОИЗВОДСТВЕННЫХ СТОЧНЫХ ВОД ПРИ ВОЗДЕЙСТВИИ ЭЛЕКТРИЧЕСКИХ РАЗРЯДОВ

В статье приводятся результаты исследований процесса очистки сточных вод кожевенного производства с применением электроразрядного воздействия.

Выявлен оптимальный режим адсорбционной очистки сточных вод с помощью цеолитов марки NaM_{Tb} , активированного воздействием на них электрического разряда барьерного вида.

Предложенный метод может представлять интерес для предприятий кожевенного производства.

Received: 23.02.05