

The application of mechanization for carbon analysis permitted the simultaneous analysis by one laboratory technician on four carbon or two sulphur devices and to coordinate this work with the preparation of crucibles by means of tempering. Productivity of the laboratory technician occupied with the determination of carbon and sulphur has increased by 40%.

In the preparation and wash rooms all laborious steps have also been mechanized. The supply of acids and chemicals to the second floor is accomplished by means of a special elevator. The carboys with acids and solutions are transported to the work stations on special carts. Solutions are dispensed from the carboys by means of compressed air. The dispensing of acids has been automatized and is performed in a special extraction cabinet by means of compressed air (Fig. 7). A special washing device for containers has been put into operation, utilizing warm water from the distillation stills producing distilled water.

A dispatch point has been created for coordination of the work and rapid transmission of results to the departments. It is equipped with a switchboard for connection with all rooms and the dispatchers of the departments by means of internal telephone.

The laboratory is equipped with glass blowing and electro-mechanical shops. Sulphur and carbon apparatus, combination and high temperature furnaces, titration and filtration devices, potentiometric devices, machines for sample preparation, installation of vacuum and air systems, and other equipment are designed and constructed in the laboratory shop.

All conditions for maintenance of sanitary standards have been created in the laboratory: ventilation of sufficient capacity for complete intake-exhaust has been provided; there is a dust collector for the polishing machine and vibratory grinder; locker rooms are equipped with individual lockers, showers, etc.

The new building of the chemical laboratory was put in operation at the end of 1961. At present express and marking inspection groups for iron and steel, a sulphur and sample group, research groups (analytical chemistry and spectral), preparation, inspection group, glass blowing and electromechanical shops operate in the laboratory.

APPLICATION OF POLAROGRAPHIC METHODS AT THE BERZNIKOV ANILINE DYE FACTORY

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The polarographic method is widely utilized in our factory laboratory for control of the production of aniline, dyestuff materials, accelerators for rubber vulcanization, waste water, and other products.

In the determination of the possibility of application of the polarographic method we govern ourselves by the following principles. We establish the presence of polarographically active groups in the molecule of the substance to be investigated or we introduce into the molecule polarographically active groups by means of nitrating, nitrosing, or haloidizing. We select conditions for reduction of the substance at the mercury drop cathode so as to obtain straight proportionality between the diffusion current and the concentration of the substance in the solution within a definite concentration interval. The methods developed are based on processes which take place at the electrolytic cathode. We do not as yet concern ourselves with polarography in the anodic region.

The polarographic determination of nitrobenzol in aniline has been adopted. In accordance with GOST (All-Union State Standard) 313-58 the nitrobenzol content in aniline of the first grade represents 0.04%, and in aniline of the second grade 0.06%. Control of nitrobenzol content is being maintained by means of the polarographic method.

The work is performed on a polarograph PVM-1 of the Leningrad "Geologorazvedka" factory. Nitrobenzol is reduced at the mercury drop cathode and produces, against a background of sulphuric acid with ethyl alcohol, a wave with $E_{\frac{1}{2}} = 0.4$ v. The relative error of the analysis $\sim 2\%$. The department laboratory performs 1500 to 1800 analyses per month.

The content of phenol and nitrobenzol in waste water is also controlled by polarographic means. In preparation the phenol is transformed into a polarographically active compound, by introducing into it a molecule of the nitro-group. Nitrophenol is reduced at the mercury drop cathode from water solution against weak alkaline background and gives a wave with $E_{\frac{1}{2}} = -0.45$ v.

A method for polarographic analysis of a rubber accelerator, sulphenamide Ts, has been developed. Investigation was performed on polarograph SGM-8. It was established that sulphenamide Ts is reduced at the mercury drop cathode and gives against a background of alcohol-acetone in pyridine a distinct two-step wave with $E_{\frac{1}{2}} = -0.9$ to -1.1 v. Linearity between substance concentration in the solution and diffusion current within concentration limits of 0.13-0.25 mg · mole/liter was established.

The content of altax in technical sulphenamide Ts was determined in accordance with a method developed at the Moscow rail factory. Altax is reduced at the mercury drop cathode against alcohol-acetone background in dichloroethane and gives a wave with $E_{\frac{1}{2}} = 0.4$ to -0.75 v. Polarographic analysis of sulphenamide Ts with determination of the main substance and altax content takes 50 minutes and is of satisfactory accuracy (see table).

Results of Analysis of Technical Sulphenamide Ts

Polarographic method		Chemical method
sulphenamide Ts, contents %	altax, contents %	sulphenamide Ts, contents %
97.85	1.4	99.14
96.27	3.8	97.8
95.2	4.76	96.9
96.24	3.45	97.5
97.2	2.56	98.6

In addition the polarographic determination of sulphenamide M (N-oxydiethylene-2-benzthiasolsulphenamide) in the technical product, determination of nitrodehydrothio-paratoluedene in the semifinished product of sulphur yellow, was developed. At present the method of isomer determination in technical dinitronaphthalene is being developed, based on chromatographic separation with subsequent polarographic quantitative determination of products given off.