CLEANING UP SEWER WATERS FROM PRODUCTION OF ALKYLPHENOL ADDITIVES

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With the growth of alkylphenol additive production, the problem has arisen of cleaning up the sewer waters formed thereby, since these contain a considerable amount of phenols and hydrochloric acid and therefore cannot be dumped into a reservoir without appropriate preliminary treatment.

In the present article we give results of work on cleaning up sewer waters from production of the alkylphenol additive AzNII-TsIATIM-1 by the method of liquid-phase oxidation with pyrolusite.

The sewer waters in this process are formed at the stage of water-trapping a byproduct of the alkylation reaction—hydrogen chloride—and have the following properties:

- Chemical oxygen demand, mg/liter: 600-632
- Phenol (C₆H₅OH), mg/liter: 230-280
- Hydrochloric acid, mg/liter: 15,000-19,000
- Total sulfur, mg/liter: 1-4
- Petroleum products, mg/liter: 4.4-5.3
- pH: 0.9-1.0

From the data given it is plain that the sewer water is mainly contaminated with phenol and hydrochloric acid. Petroleum products and sulfur compounds are present in slight amounts.

In connection with the high hydrochloric acid content in this water, the use of the method of oxidation with pyrolusite seemed very expedient.

As we have shown in [1], hydrochloric acid is a catalyst which permits carrying out the process under rather mild conditions in oxidation of phenol with pyrolusite.

The oxidation conditions in all cases except experiments in which these or other parameters were finally established, were as follows:

- Temperature, deg C: 20
- Pyrolusite supplied (unactivated manganese ore TU-27-44), g/liter: 20
- Pyrolusite granule size, mm: 0.25
- Contact time, min: 60
- pH: 0.9-1.0
- Regime: Periodic

Results of the work are given in Figs. 1-4.

On the basis of the data obtained, the following optimum parameters were selected for cleaning up sewer water from production of additive AzNII-TsIATIM-1 by oxidation with pyrolusite:
Fig. 2. Change in phenol concentration (1) and in chemical oxygen demand (2) of water as a function of length of contact with pyrolusite.

Fig. 3. Change in phenol concentration as a function of experimental temperature.

Fig. 4. Change in phenol concentration (1) or chemical oxygen demand (2) as a function of pH.

Fig. 5. Technological scheme, in principle, for cleaning up sewer waters by oxidation with pyrolusite: 1) alkylation reactor; 2) condenser; 3) scrubber; 4) sewer water collector; 5) oxidizer reactor; 6) filter press; 7) neutralizer. Streams: I) steam-gas mixture; II) sewer water to cleanup; III) manganese ore to dump; IV) cleaned-up sewer water.