

## SUMMARY

Mediator catalysis reduction of nitrogen dioxide / Polianichko Oleksandra,  
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Explanatory note: 106 p., 13 Figs, 5 Tables, 112 references.

Nitrogen dioxide is a toxic gas which is produced in many industrial processes and photochemical emissions in large cities. Development of new methods of contaminant monitoring is an important factor in the development of environmental action. The main problem of the definition of  $\text{NO}_2$  at 1ppm is the presence of in the air with higher potential/ This oxidant is atmospheric oxygen which concentration reaches to 210,000 ppm. It was suggested to use selective mediator catalysis for accelerating the reduction of  $\text{NO}_2$ . It was thermodynamic analysed and selected bromide-bromine system that is able to reduce only  $\text{NO}_2$  in an acidic, which is necessary to compensate the growing pH during reduction of  $\text{NO}_2$ . It was designed the original dispensing system for air mixing to study the kinetics of  $\text{NO}_2$  reduction. In this system, the concentration of  $\text{NO}_2$  is set by thermal decomposition of  $\text{Mn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ , its drop was previously weighed. It was found that  $\text{NO}_2$  reduction on platinised titanium in solution 5 m LiBr selectively accelerated compared with reduction of oxygen for several orders at  $E \leq 0,75\text{V}$ . An optimal reduction range is  $0,3 \leq E \leq 0,6\text{V}$ . When significance reaching  $E < 0,3$  it is accelerated an unwanted direct oxygen reduction on platinum, while it is  $E > 0,6\text{V}$  the process slows and it stops at  $E > 0,8$  B the reduction of bromine to bromide. Mechanism of course includes two stages. The first stage is an irreversible chemical reaction homogeneous prior  $\text{NO}_2$  with bromide to formation bromine. The second stage is a reversible cathodic reduction bromide to bromine on platinum. It was offer an assumption that the selectivity of the chosen mediator system to  $\text{NO}_2$  in the background of  $\text{O}_2$  could be explained by two phenomena. First, the first stage is irreversible. Second, a possible mechanism of radical course similar to the mechanism of well known reaction of mixture HCl and  $\text{HNO}_3$  with noble metals. It was designed platinised titanium electrode (for saving platinum) and bromine-bromide mediator which may be the basis for development of electrochemical systems for monitoring  $\text{NO}_2$  in the air.

**Keywords:** NITROGEN DIOXIDE, MEDIATOR CATALYSIS, HOMOGENEOUS CHEMICAL IRREVERSIBLE STAGE, REVERSIBLE ELECTROCHEMICAL STAGE, RADICAL MECHANISM OF CHEMICAL STAGE.