

THE THERMAL DECOMPOSITION OF HCOONa IN PRESENCE OF NaOH

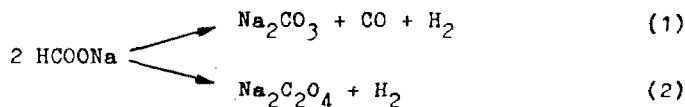
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ABSTRACT

The run of the thermal decomposition of sodium formate in sodium formate - sodium hydroxide system has been examined thermoanalytically.

It has been found that sodium hydroxide being the reagent quantitatively reacting with sodium formate, keeps as the catalyst of the reaction of the thermal decomposition of sodium formate to sodium oxalate and that the selectivity of its catalytic action decreases if the concentration of oxygen in the atmosphere increases.

The solid products of the thermal decomposition of sodium formate there are sodium carbonate and sodium oxalate:



As the last-mentioned product usually is the desirable one the selectivity related to sodium oxalate is the well-founded characterization of the process

$$S = \frac{n_{f2}}{n_{of}} \quad (3)$$

where n_{f2} is the number of sodium formate moles reacting according to the reaction (2), n_{of} is the initial (and under nonisothermal conditions also total) number of sodium formate moles. Let's characterize the composition of the mixture of sodium hydroxide and sodium formate by

$$a = \frac{n_{oh}}{n_{of}} \quad (4)$$

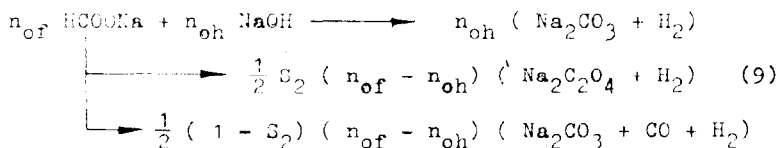
of the thermal decomposition of sodium formate to sodium oxalate (in the highest degree selective).

The dependence (5) maybe, in general, rewritten as:

$$S = S_2 (1 - a) \quad (5.a)$$

where S_2 is the selectivity relating to the amount of sodium formate not reacting with sodium hydroxide ($n_{of} - n_{oh}$). Under oxygen-free atmosphere $S_2 = 1$ and it is independent of the heating rate (from 0.5 to 100 deg/min).

When the atmosphere contains oxygen the thermal decomposition process running in the sodium formate - sodium hydroxide system is (at nonisothermal conditions) two-stage one. The resolution of stages observed increases when the heating rate decreases. The dependence of the selectivity of the process on the initial mixture composition (similarly to the case of oxygen-free atmospheres) is linear but $S_2 < 1$ and this value decreases when the concentration of oxygen increases and/or the heating rate decreases. The reaction scheme is then:



The ascertainment that under atmospheres containing oxygen $S_2 < 1$ means, that the catalytic selectivity of sodium hydroxide, which at this case keeps also as the catalyst of the thermal decomposition of sodium formate to sodium oxalate, is reduced by the oxygen action.