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Correlation evaluation of the acoustic emission's method the tool of exo solvation kinetik's research

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The process of induction of acoustic emission's signals which accompanies the solvation, is difficult enough and can't be interpreted by one mechanism.

In the case of heterogeneous process acoustic waves, for example, by crystals dissolution, the nature of generation is described partially in works/1-5/. The given description can't be considered full as, the generation of acoustic emission's signals should be added to the described mechanisms of acoustic emission / 1,3,5/ and we can do it due to occluded gases release and the wetting of crystals surface in the initial stage. In the case of liquid substrate solvation, we observe the homogeneous process in which the interaction bainder is absolutely not defined.

Despite the mentioned complexities, the method of acoustic emission should be accepted to be interesting for due to it's salvation the process research high informativity and universality, allowing to register the processes which are passing in the solution or in the melt both of electrolytes, and nonelectroletys.

In connection with the above-stated, the purpose of the present work is the attempt of the metrological evaluation of the acoustic emission method's applicability for process research solvation in the conditions of invariable solvent and variable quantity of dissolved substance.

We'll examine the change evolution of the total the acoustic emission signals' count wich is going on during some period. The acoustic emission activity (the for derivative of the total count by time) has unstable character in the initial stage of the crystal dissolution process. It's a result of the simultaneous superposition of the afor-mentioned phenomena: the wetting of the crystals surface, occluded gases release and dissolution process proper (pic.1). Approximately 1 minute later after the beginning of the dissolution, the activity is defined basically by one factor –the reduction of a surface of of crystal dissolution. The activity of acoustic emission signals *dN/dt* is naturally decreasing and it's proportional to the speed of salt dissolution:

$$dN/dt = Kv \quad (1)$$

where K - Proportionality ratio the speed of salt crystals' dissolution; *v* - Salt crystals' dissolution speed, g/s.

The activity *dN/dt* acoustic emission signals, is naturally proportional to the speed of weight change:

$$dN/dt = K\,m/t \quad (2)$$

Dividing variables and integrating the equation 2, we receive the equation of the total count of acoustic emission signals:

$$N = Km\,Ln\,t - C \quad (3)$$

We used for the determination of the method's error the crystals of salt NiSO4 with invariable weight and the temperature and properties of solvent were also invariable (as solvent was used the distilled water).

In agreement with the given data we can confirm: in

TABLE 1 : The interrelation between the crystals' guantity and the pulses' amount.

Number of crystals	The equation of the interrelation	The correlation ratio with the experimental data
1 crystal	120,8 Ln x – 173	0,922
2 crystal	284,7Ln x – 613,6	0,964
4 crystal	394,7Ln x – 619,8	0,980
8 crystal	361,1Ln x – 346,8	0,986
32 crystal	564,8Ln x – 879,6	0,967

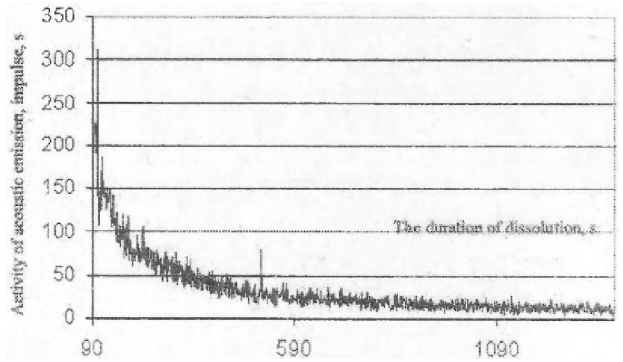

Figure 1 : Changes in the activity of acoustic emission signals the dissolution of crystals NiSO4

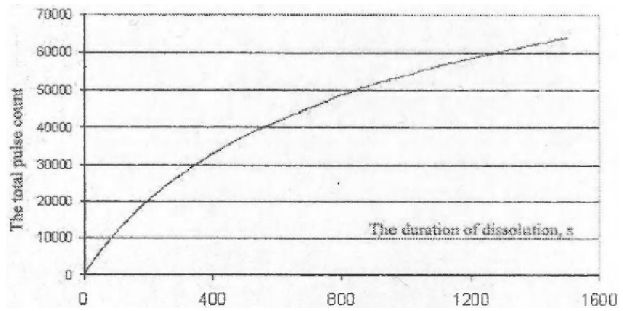

Figure 2 : Change in the total pulse count of acoustic emission during the dissolution of crystals

spite of the fact that all registered parameters of the acoustic emission reflect objectively the dissolution process and the value of data spread doesn't make it possible form to use such acoustic emission parameters as «The time of incresse», "Duration", "Amplitude" and «Energy of signals» for the quantitative evolution of the dissolved substance's weight.

The most reliable acoustic emission parameter which can be used for a quantitative evaluation of the dissolved substance's is weight «the Total account» of signals. By using this parameter the real' value of physical quantity of the total account of signals above a measurement error. However, it should be noted that, in this case the method error is rather high. Nevertheless, the detected method error for the given kind of electrolyte makes it still possible to identify reliably no more than 0,01 g in the quantity of dissolved substance by difference 1 l. One of the reasons of the detected can be error the divergence of the size of crystals' surface identical weight: the crystal with the broken symmetry obulously arger and vague surface, were dissolved equally with the crystals with the identical weight.

The influence of the surface size on the quantity of inducible signals exceeds the limits of the conducted investigation and reguires the futher.

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