Introduction By Sergeev's definition the nanochemistry is a science field connected with obtaining and studying of physical-chemical properties of particles having sizes of nanometer scale. Let's note that according to this definition polymers synthesis is automatically a nanochemistry part as far as according to the Melikhov's classification polymeric macromolecules (more precisely macromolecular coils) belong to nanoparticles and polymeric sols and gels – to nanosystems. Catalysis on nanoparticles is one of the most important sections of nanochemistry. The majority of catalytic systems are nanosystems. At heterogeneous catalysis the active substance is tried to deposit on carrier in nanoparticles form in order to increase their specific surface. At homogeneous catalysis active substance molecules have often in them selves nanometer sizes. The most favourable conditions for homogeneous catalysis are created when reagent molecules are adsorbed rapidly by nanoparticles and are desorbed slowly but have high surface mobility and, consequently, high reaction rate on the surface and at the reaction molecules of such structure are formed at which desorption rate is increased sharply. If these conditions are realized in nanosystem with larger probability than in macrosystem, then nanocatalyst has the raising activity that was observed for many systems. In the connection such questions arise as adsorption and desorption rate, surface mobility of molecules and characteristics frequency of reagents interaction acts depend on the size, molecular relief and composition of nanoparticles and the carrier. The presence paper purpose it the application of fractal analysis for description of polymerization kinetics in nanofiller presence. Results and Discussion In previous parts of the article the solid-state imidization reactions were represented [1] and the interfacial interactions problems were considered [2]. As it is known [3, 4], a macromolecular coil in various polymer's states (solution, melt, solid phase) presents itself the fractal object characterized by fractal (Hausdorff) dimension Df. Specific feature of fractal objects is the distribution of their mass in space: the density r of such object changes at its radius R variation as follows [5]: , (1) where rdens is the density of material, which consists of fractal object in dense packing assumption, a is a lower linear scale of object fractal behaviour, d is the dimension of Euclidean space, in which fractal is considered (it is obvious, that in our case d=3). From the equation (1) r decrease at Df reduction follows, since it's always Df 1/N [17]. For Witten-Sander clusters the value is scaled as follows [17]: , (15) where the exponent g varies within the limits 0.5-0.8 [17]. One of the fractal analysis merits is a clear definition of limiting values of its main characteristics – fractal dimensions. So, the value dsurf changes within the limits 2£dsurf 3 [20]. At dsurf =2.0 the value N=0.1´105 relative units and according to the Fig. 4 plot maximal value Sc=1.65. At maximal for real solids dimension dsurf=2.95 [21] N=7.94´105 of relative units and according to Fig. 4 plot Sc®0. This means that at such conditions trans-2-butene conversion degree goes to zero. It was found out dsurf increase results to the decrease of trans-2-butene and cis-2-butene general conversion degree. This is explained by the fact that the formed in synthesis process polymeric chain has finite

rigidity and consists of statistical segments of finite length. In virtue of this circumstance it can not "repeat" the growing catalyst surface roughness at d_{surf} increase and "perceive" it as still smoother surface. In this case the effective fractal dimension of montmorillonite surface d_{surf}^{ef} is determined as follows [22]: , (16) within the interval $d_{surf}=2.0-2.5$ and according to the equation (16) [2] (at $d_{surf}^{ef} =d_{surf}$ and $d_{surf}= d_{surf}^{0}$) – within the interval 2.5-3.0. For the studied catalysts the values $d_{surf}=2.637-2.776$. In Fig. 5 the dependence $Q(d_{surf}^{ef})$ is adduced, which turns out to be linear and is extrapolated to $Q=0$ at $d_{surf}^{ef} =2.0$ (or $d_{surf} =3.0$) and to $Q=0$ at $d_{surf}^{ef} =d_{surf} =2.5$. Thus, the combined consideration of Figs. 4 and 5 allows to assume the catalyst optimal value d_{surf}, which is equal to 2.5. At this d_{surf} magnitude $Q =1.0$ and $Sc=1.54$, i.e. close to maximal value Sc for montmorillonite in the considered reaction. Fig. 5 - The dependence of general conversion degree Q on effective fractal dimension d_{surf}^{ef} of catalyst surface for Namontmorillonite (1) and Camontmorillonite (2) [16] Hence, the results stated above demonstrated the important role of catalyst (montmorillonite) surface fractal geometry in its catalytic properties definition [16]. Polymerization in situ (together with a filler) is often applied as a method for receiving nanocomposites. In paper [23] matrix epoxy polymer cross-linking process both in nanofiller (Na^+- montmorillonite) presence and without it was studied within the framework of a strange (anomalous) diffusion conception [24]. A nanocomposites epoxy polymer/Na^+montmorillonite (EP/MMT) cross-linking was made at temperatures 353, 373 and 393K, cross-linking of EP – at 393K [25]. Let's remind the main postulates of a strange (anomalous) diffusion conception. As it is known [24], in general case diffusion processes are described according to the equation: , (17) where $\langle r^2(t) \rangle$ is mean-square displacement of a particle during time t. If the exponent $a=1$ then the relationship (17) describes classical diffusion and if $a \neq 1$ – strange (anomalous) diffusion. Depending on concrete value a persistent (superdiffusive, 1