

PS16.02.10 FRACTAL CRYSTALLIZATION OF BILE COMPONENTS AND ITS ROLE IN THE FORMATION OF GALLSTONES. Hanitkevych Ya., Dyakiv V., Malinich S., Turchak R. Grushevskogo St. 4, Lviv State University, Faculty of Geology 290005, Lviv, Ukraina

The analysis of our research results and reference data show that, during the crystallization of the components of human bile, fractal structures diverse in size, appearance and fractal dimension are frequently formed. In this work it is experimentally shown that the formation of fractal structures takes place on different levels of aggregation of solid phases, which are crystallized from bile: molecular, crystallite and modular, on each of which the scale recurrence (space heredity) of morphological features of the previous level takes place.

On the molecular level branched fractals in gallstones are displayed in characteristic chained structural motifs of crystal lattices of monohydrate and anhydrous cholesterol. X-dislocation in the confocal texture of aggregate cholesterol crystallites is confirmed by X-ray topographical studies of gallstones, which are actually fractals on the crystallite level.

It is experimentally shown that the crystallization of the components of bile on a solid substrate is accompanied by the formation of fractal patterns represented by skeletal forms of the growth of halite, which clearly differs in form, size and external symmetry, for testing bile with various concentrations of dissolved phases. Fractal formations are particularly well observed on the modular level: in flat sections of gallstones of the radial-fibrous microstructure and "mulberry" type.

Thus, if the formation of cholesterol gallstones is considered in a certain evolutionary series heterogeneous origin - dislocated growth - fractal crystallization - adsorption of pigments and inorganic compounds - recrystallization, then it may be assumed that fractal crystallization plays a leading role in the processes of formation of stones in bile.

PS16.02.11 CRYSTALLOGENESIS OF DISSIPATIVE STRUCTURES. Petrovsky V.A., Troshev S.A., Maltsev A.S., Shilova O.Yu.; Pechorskaya st. 58, Syktyvkar, 167005, Russia.

Entropy of "crystal-medium" system is a sum of entropy of subsystems: solution, frontier layer and crystal. During crystal growth entropies are changing constantly. According to minimum of production of entropy principle the velocity of change of system entropy aspires to minimum at given thermo-dynamical parameters. Under isothermal conditions it leads to the appearance of crystallogenic solution exfoliation (CSE). The velocity of crystal growth after definite transitional period becomes stable. The presence of admixture in solution leads to "poisoning" of growing surface. It affects production of entropy in the system (as a rule, the velocity of growth decreases). The change of exogenous factors affects inflow of external entropy into system and leads to new state of current equilibrium (periodic damped vibrations of concentration field in the frontier layer, stabilization and destruction CSE, change mass-transfer mechanism, velocity of growth etc.). As a result in crystal-forming system spatial-time dissipative structures appear on different levels (in solution volume, frontier layer and crystal matrix of individual).

PS16.02.12 EXPERIMENTAL AND NUMERICAL MODELLING OF THE CRYSTAL GROWTH IN POROUS MEDIA. V.I. Rakin, Institute of Geology, Komi Sci. Cent. RASci, Syktyvkar

Crystallization experiments with calcium tartrate and calcium iodate in silica gels with holographic interference control showed that seed formation and crystal growth go through two stages which is supported by numerical modelling of crystal formation in gels by the method of difference equations. At the first stage, when substance is abundant, crystal growth is limited by surface processes (kinetically controlled regime). At the second stage, when substance is scarce, seed formation and crystal growth are limited by diffusion within the volume of the porous medium (diffusional regime). This regularity is most clearly demonstrated by the data on the rates of seed formation.

The numerical model involves parameters and conditions characteristic for the experiment with calcium iodate. The model deals with one-dimensional diffusion. Rates of seed formation and crystal growth are represented as a linear dependence. Nonlinearity is inherent in the law of substance diffusion. Only such nonlinearity is introduced in the model.

Certain conditions of the numerical experiment yielded structures similar to Liesegang bands which are also observed in the physical experiment.

PS16.02.13 GENESIS OF NATURAL DIAMONDS ACCORDING TO THE DATA OF EXPERIMENTAL INVESTIGATIONS. Samoilovich M.I., Petrovsky V.A., Shilov Yu.A., Pechorskaya St. 58 Syktyvkar, 167005, Russia.

The presence of inclusion of silicate minerals itself in natural diamonds does not guarantee that the growth of the crystals took place in silicate melt so long as the latter could fulfil the functions of surroundings. The many types of inclusions in diamonds are iron- and nickel-containing minerals (metals) which transformation in sulphurous and oxide compounds is the result of their following evolution.

Nitrogen admixture is rounded up growing crystal, but in the consequence in the result of such solid solution complexes form beginning from some nitrogen atoms (often with carbon vacancies) and including lamellar accumulations-platelets consisting of tens and hundreds of nitrogen atoms. Main part of natural diamonds passed the process of thermobaric treatment, i.e. annealing at high pressure and temperature (possible in interim nidus, but P, T-parameters are less than the growing ones).

In nature diamonds grown like synthetic ones i.e. surrounded thin film of melt consisting of mainly iron, nickel, manganese, cobalt and partly chromium. The main demands to such metals which are dissolvents of carbon, consist of absence of stable carbide and good enough carbon dissolubility.