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The Role of Silicates at Forming Covers of the Earth and Hypergenic Crust.

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ABSTRACT

On modern cosmo chemical material the main stages of formation of covers of Earth and polymetallic silicate crust from star substance are considered. Silicon-aluminum-oxygen radicals at all stages of formation of power covers (plasma, mantle and crust) are played a role of the accumulator and regulator of the thermal modes. The geo-bio-spheric birth of the monomeric isolated silicon tetrahedron $[SiO_4]^{4-}$ is shown and process of its polymerization in final and infinite forms of silicate substance is considered. Formation of $[SiO_4]^{4-}$ demands high power expanses and stabilization by its main cations each chemical act of polymerization or policondensation is connected with allocation of energy, atomic oxygen and oxides of the main metals. The assessment is given to a geospheric way of formation of a radical $[SiO_4]^{4-}$ on the planet Earth. Orthosilicates of iron (+II), the alkaline earth and alkaline metals and carbonyl (CO^{2+}) and proton (N^+) in a stone cover of Earth exist rather steadily in a nonequilibrium state a lot of energy which leads them to spontaneous transition to polymeric silicon dioxide and alumina with leads them to spontaneous transition to polymeric silicon dioxide, oxygen and methane. It is shown that at polymerization of a radical $[SiO_4]^{4-}$ transitional, rare-earth, radioactive and precious metals don't form chemical bonds and are concluded in emptiness of the friable radical of frame (SiO_2).

Keywords: Silicon-aluminum-oxygen radicals, geo-bio-spheric system, polymerization

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INTRODUCTION

At the beginning of the XX century V. Vernadsky [1] stated idea about developments of geo-bio-spheric systems of Earth and migration of chemical elements. On its representations the chemical composition of lithosphere “this isn’t something motionless, but on the contrary, continuously changing during geological time” Later authors of work [2], leaning on a huge data materials of analytical, physical and chemical properties of the most widespread types of silicate breeds of crust, taking into account their volume and areal prevalence, showed that during all geological history, there are identical changes of average structure of elements of a silicate cover of Earth natural coordinated, ordered, directed in time, generalizing, the chemical composition and properties of representative breeds, drew logical conclusions: about genetic distinction of silicate breeds, about decrease in intensity of a thermal stream of Earth, about growth of power of bark and role of tectonic breaks. Unfortunately, they didn’t provide proofs of genetic distinction of sedimentary breeds including aeration, destruction, attrition, their movement, formation of suspensions sedimentation, cementation, doesn’t give the grounds for the statement about their genetic difference and don’t testify about continuously changing structure of breeds. Genetic difference is possible only if the construction brick of these breeds $[SiO_4]^{4-}$ is given in the different ways.

The Earth difficult astrophysical object with the large thermonuclear reactor in which of nucleus of hydrogen and helium elements [3] are synthesized. On modern representations Earth consists of a number of the covers concentric enveloping each other. The steady thermodynamic state with a minimum for the T-R this level of free energy is inherent in each cover, submits to laws of quantum physics, i.e. transition from one cover to another is followed by allocation or absorption of energy, change of composition and structure. The sequence of events, obviously, specifies that formation of the previous stage of Earth serves as the base for construction on it of the following, and all system represents a pyramid in which the kept past forms a basis and a condition of the present. It is clear that Earth not the primitive blast furnace, however the events occurring in it in article will be compared to processes of industrial practice of operation of high-temperature furnaces.

Physical and chemical processes for each covers proceed in a certain time interval at temperatures: synthesis of nucleus – 100 million ^{0}C, high-temperature compressed plasma (electrons, nucleus of elements, chemical synthesis of elements) – 100000-10000 ^{0}C, physical condensations of radicals – 10000-2000 ^{0}C. The depth cloak is in a fluidized status at the expense of the monomeric silicon-oxygen tetrahedron connected to a proton (N^+) and a carbonyl (CO^{2+}) in neutral connection, and the upper cloak viscous, contains olivina and basalts. Iron, magnesium and calcium come to the upper cloak from two directions from a nuclear reactor and by migration from silicate cover. The Earth is extremely difficult and still up to the end not studied object.

Numerous cosmogonic hypotheses of different level of reliability of formation of solar system include the "star stage" with high temperature and pressure, with magnetic and gravitational compression accompanied with synthesis of nucleus of elements from star substance (hydrogen and helium). In laser thermonuclear synthesis are combines two opening of the XX century – thermonuclear responses and quantum generation of light. Holding and heat insulation of high-temperature plasma is reached by means of gravitational magnetic fields. In the compressed plasma occurs laser synthesis at high temperatures and pressures to form fan elements: oxygen, silicon, aluminum, iron, magnesium, calcium, potassium, carbon, nitrogen, sulfur, and rare metals, by composition including corresponding Clarke numbers of Earth. Process of synthesis of nucleus of elements the continuous and arranged. The nature learned to control thermonuclear synthesis and therefore in the Universe there is no chaos, and a certain order was set. Excess of energy of thermonuclear synthesis are spent for creation of systems in which energy collects in numerous chemical bonds. Newborn elements have openwork structure (electronic clouds) and are pushed out from the dense kernel in more cold layers of space bodies. As kernels of elements "put on" electron shells, come into the own those properties of chemical elements which are caused by their situation in periodic system of D. I. Mendeleyev. It is easy to note that in general prevalence of elements decreases with increase in sequence number. When forming geo-bio-sferic systems of Earth the leading role is assigned to oxygen, silicon, carbon and hydrogen. Space disasters in the Universe result of chemical, but not nuclear changes. For example, protuberances on the sun, eruption of volcanoes, burst of a fluidized melt from arc furnaces.

The figure 1 represent thermostatic energetically covers of Earth.

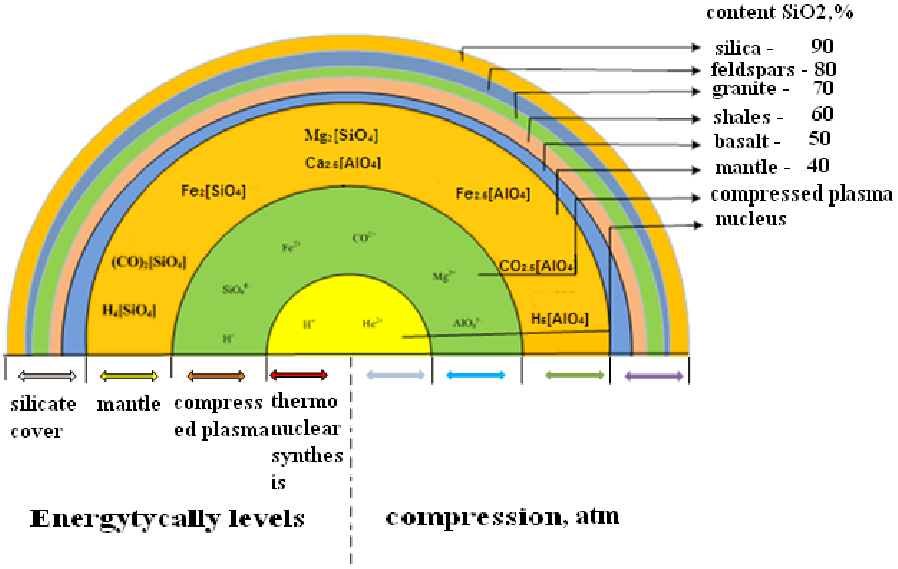


Figure 1: The planetary model of the Earth's energetically covers

The chemical composition from ancient young to ancient to young breeds shows sequential increase in the content of silicon, aluminum, potassium in case of sharp lowering of magnesium. Noteworthy that slates find precisely the same tendencies, as magmatic breeds, and on value of change of a chemical composition they are intermediate between basalts and granites, the place finds feldspar and silicon dioxide in a general series of differentiation of magmatic and sedimentary breeds.

In table 1 the composition of basic elements of a big and small circulation of silicate bark to which share more than 99,3% of mass and only 0,7% for rare metals fall is provided. Oxygen a basic element, its contents makes on mass 50%, and on volume – more than 92% of the planet Earth. It is necessary to pay attention to the low content of hydrogen if hydrogen the initial material for formation of Earth, it is necessary to assume that it either is spent, or incorrectly considered.

Table 1: The Chemical consist elements of big and small circulation

Elements of big circulation, **%**		Elements of small circulation	
Oxygen – 50 %			
Si	25,3	C	0,1
Al	7,5	H	1,0
Fe	5,08	N_2	0,1
Mg+ Ca	5,29	S	0,12
Na+K	5,03	P	0,15
Sum of elements Σ 99,30 %			

In endogenous the geospheric conditions the energy of thermonuclear synthesis of nucleus of elements from hydrogen and helium is partially spent for process, and partially used when forming radicals $[SiO_4]^{4-}$ and $[AlO_4]^{5-}$. The amount of synthesizable silicon, aluminum, and oxygen provides the operated course of thermonuclear process. Thus, silicon, aluminum and oxygen inhibit the spontaneous development of thermonuclear process. Surplus of these elements (is more exact than nucleus) is taken away from a reaction zone in the form of energetically saturated anions $[SiO_4]^{4-}$, $[AlO_4]^{5-}$. In the compressed high-temperature plasma anions are in balance with cations (a proton, a carbonyl $(CO)^{2+}$, magnesium, calcium, iron). In process of cooling of plasma the fluidized fusion consisting of the monomeric anions connected with gaseous cations (proton, carbonyl) in the form of steady connections is allocated: $H_4[SiO_4]$, $(CO)_2[SiO_4]$, $H_5[AlO_4]$, $(CO)_{2,5}[AlO_4]$. When cooling a crust there is a chemical process of an exchange of protons and carbonyl on ions of iron, magnesium, calcium to formation of basalt. In Earth subsoil at high-temperature and pressure transition of monomeric radicals to polymeric silicate bark is tightened for ages. Thus, “the star substance” – protons, and also part of synthesizable radicals $(CO)^{2+}$ are accumulates in silicate crust and deep layers of a stone cover.

In a mantle two covers –top, consisting of the melted basalt, and lower – fluidized-fusion at expense of a monomeric silicon-oxygen tetrahedron, connected with a proton (N^+) and a carbonyl $(CO)^{2+}$ in neutral connections of $H_4[SiO_4]$ and $(CO_2)SiO_4$. Periodically there are catastrophic emissions of substances on Earth surface. Chemical process of decontamination proceeds at temperature of 2200-1800 0C on the equation of reactions:

$H_4SiO_4+FeO=Fe_2SiO_4+2H_2O+Q$ (1)
$Fe_2SiO_4=Fe_2Si+2O_2$ (2)
$(CO_2)SiO_4+2MgO=Mg_2SiO_4+2CO+Q$ (3)
$2CO_2+2O_2=2CO$ (4)

With formation of basalt, water and carbon dioxide.

The geospheric system of formation of a silicate cover of Earth begins with formation of the monomeric tetrahedrons isolated the silicon-oxygen and their spontaneous polymerization throughout all geological history of the existence in three-dimensional infinite frame motives sequentially through slates, granites, field spars in silicon dioxide (SiO_2).

The diagram of polymerization of silicate radicals:

$$[SiO_4]^{4-} \rightarrow [Si_2O_7]^{6-} \rightarrow [Si_3O_9]^{8-} \rightarrow [Si_4O_{12}]^{11-} \rightarrow \cdots \rightarrow SiO_2 + O_2$$

The diagram of polymerization of silicate radicals:

$[AlO_4]^{5-} * [SiO_4]^{4-} \rightarrow$ $Al_2O_3 * 2SiO_2 \rightarrow K_2O * Al_2O_3 * 2SiO_2 \rightarrow$
living matter kaolinite alkali aluminosilicate

$\rightarrow Al_2O_3 * 3SiO_2(OH) * 10H_2O \rightarrow$ $Al_2O_3 * nSiO_2 \rightarrow SiO_2 + O_2 + Al_2O_3$
mica feldspar silica

The isolated monomeric silicon-oxygen radicals $[SiO_4]^{4-}$ is the oxygenated silicon with high excess energy, crust “antimatter” which passes into an inert radical of SiO_2 with release of oxygen and energy an reaction (5):

$[SiO_4]^{4-} = SiO_2 + O_2 + 4e + Q$ (5)

The nature learned to extinguish excess energy of disintegration of the radical in infinite polymeric communications of silicon dioxide and oxygen on reaction (5). Energy of each single act of polymerization is instantly distributed on elastic chains of communications of atoms of silicon through the general bridged atoms of oxygen, supplying each of them with scanty excess of energy that forces them to fluctuate in the X-ray range of frequencies with a little amplitude and, thus, utilizing it, supports a thermal stream of Earth.

In an individual look the radical isn’t allocated, and high-basic mineral forms of a monomeric silicon-oxygen tetrahedron with calcium, magnesium, iron are known: Ca_2SiO_4-bleaches, Mg_2SiO_4-forsterite, Fe_2SiO_4-fayalite and etc. Ways of formation $[SiO_4]^{4-}$ and duration of its existence aren’t studied.

Relationship of geo-bio-spheric systems when forming a lithosphere of Earth is given in figure 2. It is necessary to pay attention to various power sources – thermonuclear for a geosphere and solar for the biosphere. The leading role of a silicon-oxygen tetrahedron is reduced to accumulation of energy and regulation of the thermal modes of thermonuclear synthesis, high-temperature plasma, liquid melt (mantle) and silicate bark. In the first case stability of a radical $[SiO_4]^{4-}$ is provided with temperature, and in the second case in protoplasm biopolymer due to not thermal effect on a nanolevel of radiant energy it is similar to a rating in lasers. So, on the planet Earth realization under natural conditions highly – and low-temperature synthesis of a silicon-oxygen tetrahedron. In biospheric system it is possible to allocate: sun, biota and kerogen.

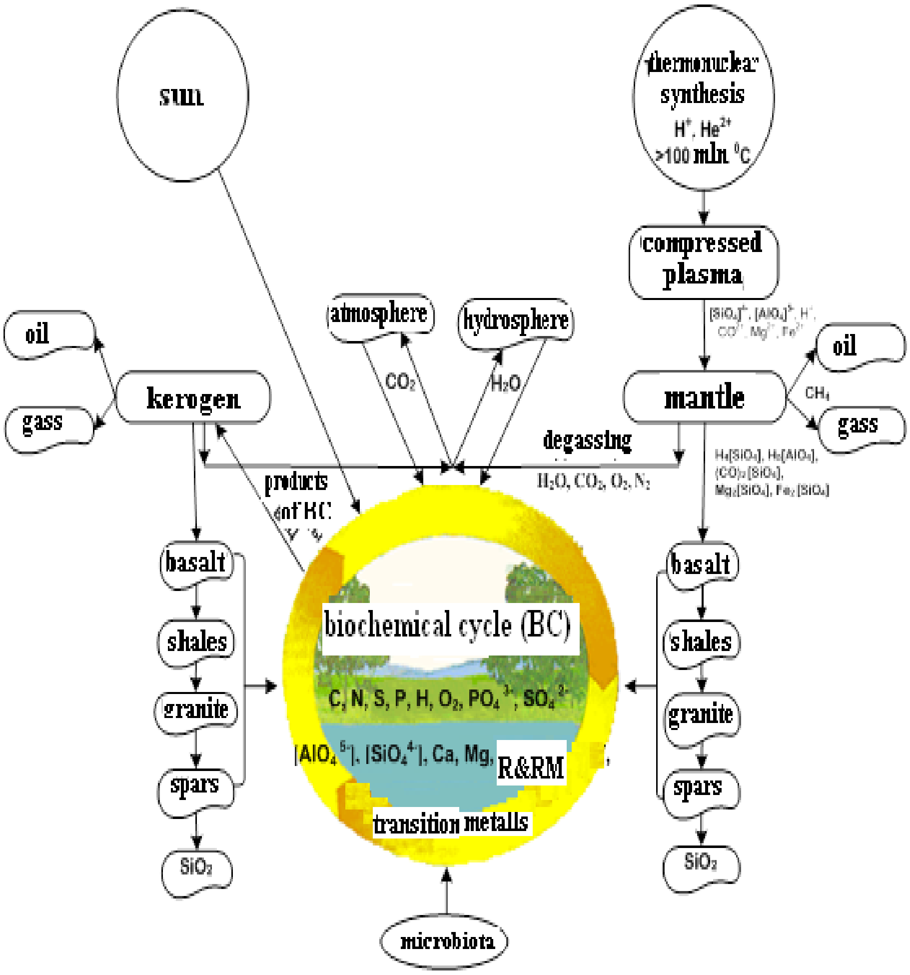


Figure 2: The relationship of geo-bio-spheric systems rat formation cloak of Earth

1. Plasma - $[SiO_4]^{4-}$,$[AlO_4]^{5-}$, H^+, CO^{2+}, Mg^{2+}, Fe^{2+}
2. Mantle - $H_4[SiO_4]$, $H_5[AlO_4]$, $(CO)_2[SiO_4]$, $(CO)_{2,5}[AlO_4]$, $Ca_2[SiO_4]$,
   $Fe_2[SiO_4]$, $Ca_{2,5}[AlO_4]$, $Fe_{2,5}[AlO_4]$
3. Degassing - $2\{H_4[SiO_4]\cdot H_5[AlO_4]\} \rightarrow Al_2O_3\cdot 2SiO_2 + \uparrow 9H_2O$
   $2\{(CO)_2[SiO_4]\cdot(CO)_{2,5}[AlO_4]\} \rightarrow Al_2O_3\cdot 2SiO_2 + \uparrow 9CO_2$
4. Basalt- $Ca_2[SiO_4]$, $Fe_2[SiO_4]$, $Ca_{2,5}[AlO_4]$, $Fe_{2,5}[AlO_4]$, $Al_2O_3\cdot 2SiO_2\cdot 2H_2O$,
   $Al_2O_3\cdot 2SiO_2$
5. Polymeration – $CaSiO_3$, $FeSiO_3$, $MgSiO_3$
   $2[Al_2O_3\cdot 2SiO_2\cdot 2H_2O] + 2Na^+ + 2HCO_3 \rightarrow Al_2O_3\cdot 4SiO_2\cdot 2H_2O +$
   $2NaAlO_2 + 3H_2O + 2CO_2 \rightarrow Al_2O_3\cdot 10SiO_2 + NaAlO_2 \rightarrow SiO_2$
   $2[Al_2O_3\cdot 4SiO_2\cdot 2H_2O] + 4NaHCO_3 = Na_2O\cdot Al_2O_3\cdot 6SiO_2 + 2SiO_2 + 2NaAlO_2 + 6H_2O +$
   $4CO_2$
   $Na_2O\cdot Al_2O_3\cdot 6SiO_2 = 6SiO_2 + 2NaAlO_2$
6. Kerogen – fermentation, cracking, sedimentary breeds.

The conducted researches of ranges of KRS of single crystals of Ca_2SiO_4 received in arc furnaces, and insoluble residuals of a rice peel in the course of heating up (300-1550 ^{0}C) registered the monotonic temperature broadening of the KRS lines up to the temperature of their melt. The polarized range of KRS testifies to existence of isolated $[SiO_4]^{4-}$ of groups both in crystals, and in a melt. To find distinctions in ranges of KRS it is high - and the low-temperature synthesis we didn't manage the silicon-oxygen of tetrahedrons yet.

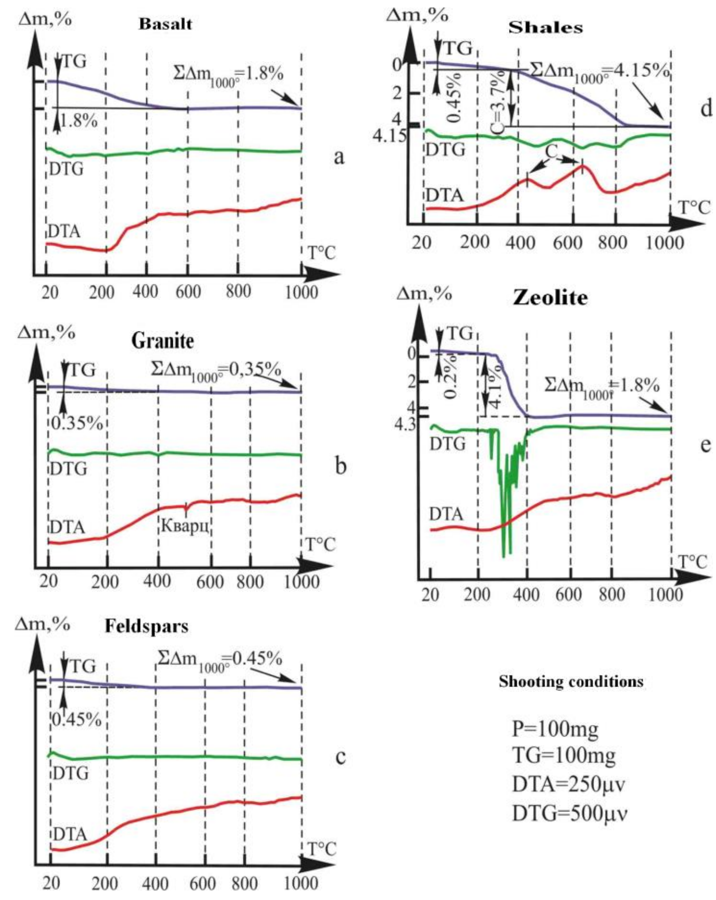
The second, at least important output, is reduced to pseudo-liquefaction of a melt. Experimentally it is shown that molecular hydrogen and carbon dioxide aren't dissolved in silicate melts [4]. Therefore, they can be only in chemically connected connections steady in case of high temperatures.

Radical particles of oxygen tetrahedrons of silicon, aluminum, titanium, vanadium form fluidized magma which got on lower energy level with ionized hydrogen or a carbonyl (CO2+), decays intensive release of gases on the equations of responses:

$$H_4[SiO_4] = SiO_2 + \uparrow 2H_2O \quad (8)$$
$$(CO_2)[SiO_4] = SiO_2 + 2C + O2 \quad (9)$$

From results of 2 table of distribution of rare-earth metals given in the table in the komatiites, basalts, slates, granites and field spars follows that rare-earth metals behave like aluminum. However is omorphically don't join in structure of silicate motive because of a strong chemical bond with orthophosphate anion.

Thermo gravimetric researches of all types of sedimentary silicate breeds (fig. 2) show long exothermal effect with simultaneous falling of weight of a sample. Convincing explanations for this paradox in technical literature aren't present. The analysis of a gas phase of the researched samples testifies to excretion, but not absorption of oxygen. The exothermal effect is explained heats pattern of the main breeds of a silicate jacket by reorganization of the structure, chemical transformations and energy liberation accumulated at the previous stages of formation of Earth.



Shooting conditions

P=100mg
TG=100mg
DTA=250μv
DTG=500μv

Figure 3: Thermo gravimetric researches of the most widespread types of breeds of silicate bark: basalt, slates, granite, zeolite, field spars

Table 2: Change of average content of rare-earth elements in silicate breeds of Earth crust, 10^{-4}%

Breed*	Sc	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y
3,8-3,4 billion years , AR_1															
1.Basalt	1,60	4,1	(0,52)**	2,2	0,68	0,28	0,87	0,14	(0,96)	(0,22)	0,59	0,10	0,60	0,11	5,6
2.Shales	5,16	12,8	1,7	7,7	2,22	0,74	2,60	0,44	2,60	0,69	1,52	0,25	1,48	0,25	15,8
3.Granite	17,1	38,9	(4,7)	17,1	3,26	1,00	3,30	0,49	2,60	0,65	1,98	(0,30)	1,93	0,32	14,0
4.Feldspar	32,0	62,2	7,3	26,0	4,83	1,27	3,81	0,59	2,61	0,57	1,52	0,22	1,32	0,25	16
3,4-2,5 billion years, AR_{2-3}															
1.Basalt	1,77	4,48	(0,69)	3,6	1,21	0,36	1,32	(0,25)	1,65	(0,36)	0,96	0,15	0,94	0,15	8,9
2.Shales	6,6	15,4	2,16	9,8	2,85	0,85	3,39	0,59	3,55	0,86	2,36	0,37	2,34	0,37	20
3.Granite	23,1	46,1	4,9	20,2	4,0	1,1	3,8	0,61	3,2	0,76	2,0	0,30	1,9	0,26	20
4.Feldspar	37,4	73,1	7,4	30,8	5,8	1,16	4,62	0,77	4,05	0,93	2,1	0,36	2,26	0,34	18
2,5-1,6 billion years , PR_1															
1.Basalt	2,5	7,0	(1,03)	5,1	1,8	0,69	(0,25)	0,36	(2,4)	0,55	(1,72)	(0,3)	1,74	0,24	15
2.Shales	10,7	22,2	3,0	12,7	3,0	0,87	3,39	0,63	3,0	0,72	2,1	0,31	1,82	0,31	24
3.Granite	27	55,2	6,6	23,4	4,3	1,1	3,8	0,58	3,2	0,68	2,1	0,31	1,9	0,3	20
4.Feldspar	50,3	110,5	10,2	49,0	8,91	1,35	4,62	1,18	6,20	1,43	3,62	0,52	3,59	0,57	27
1,6-0,55 billion years , PR_{2-3}															
1.Basalt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.Shales	46	38	4,4	17	5,4	1,60	6,4	0,86	5,8	1,29	3,5	0,55	2,7	0,42	25
3.Granite	34	74	8,7	30	6,3	1,51	5,6	1,00	5,3	1,17	3,1	0,48	2,6	0,46	31
4.Feldspar	60,7	115,6	(14,0)	50,9	9,6	1,58	7,9	1,44	9,04	1,91	5,5	0,82	5,15	0,74	48
0,55-0 billion years , Ph															
1.Basalt	0,80	1,6	(0,3)	2,01	1,36	0,64	2,7	0,43	3,1	0,72	1,86	0,26	1,5	0,21	16
2.Shales	15,4	35,5	4,3	17,5	4,5	1,43	5,4	0,79	4,5	0,97	2,66	0,41	2,25	0,42	24
3.Granite	33,0	66,0	8,0	31,0	6,6	1,41	5,6	1,00	4,6	1,17	3,2	0,51	2,7	0,50	29
4.Feldspar	31,8	63,0	8,0	31,7	7,1	1,05	6,6	1,12	6,0	1,28	3,34	0,51	3,01	0,51	26

TheAR1mostancientArchean,AR2-3-actuallyArchean,PR1-rannyProterozoic,PR2-3-pozdnyProterozoic,Ph-Phanerozoic

For concentration of rare and rare-earth elements in a melt of metal or slag the oxidation-reduction process (redox) is widely used [6]. A bright example for it specific release of rhenium from a cloak in gases on volcanoes of the Kuril grada [7]

The problem of the self-scattered metallurgical slags of ferroalloy and titanic production, is similar to transition of mantle to a stone silicate jacket of Earth, scope change of slag for 10-12% is marked. Transition to finite three-dimensional infinite frame connections is a chemical process which doesn't submit to the principle of the dense packing, and turns into friable, openwork structures with a wide range of emptiness.

CONCLUSION

The role the silicon-oxygen of radicals (silicate) at all stages of formation of energetic covers of Earth is shown: plasma, mantle and bark. The geochemical high-temperature method of formation of a monomeric silicon-oxygen tetrahedron [SiO4] 4-is considered. The conclusion that a silicon-oxygen tetrahedron $[SiO_4]^{4-}$ - the accumulator of energy and the regulator of the thermal modes of Earth is drawn: thermonuclear synthesis, chemistry of high-temperature plasma, a fluidized and viscous mantle and sequential polymerization monomeric in polymeric silicates of silicate bark. It is set that polymerization process the silicon-oxygen of radicals to silicon dioxide and alumina - chemical process. It is shown that rare and rare-earth metals aren't included into structure of silicon dioxide and alumina.

REFERENCES

[1] Vernadsky V. I. Ocherki geokhimii, M. L. of ONTI 1934,

[2] Ronov A.B., Bredanova N. V., Migdisova.A., Obshie tendency evolucii khimicheskogo sostava osadochnyh I magmaticheskih porod zemnoi kory, Geokhemiya. No. 2, 1988.

[3] Basov N.B., Lebo I.G., Rozanov A.B., Fizika lazernogo termoyadernogo sinteza., M, Knowledge, 1988.

[4] Persikov E.S., Bukhtiyarov P.G., Polskoy S.F., Chekhmir A.S., Vzaimideistviya vodoroda s magmaticheskimi rasplavami. M, Science, 1986, p. 48-69.

[5] Zavarzin G. A., Paleontologicheski zhurnal, 2003 No. 6, p. 16-24

[6] Kozlov VA., Karpov A.A., Vasin E.A., Shayakhmetova R.A. Theoriya osobennosti technology of complexnoi pererabotki titano-magnetitov, Russian Federation, Chemical technology, No. 2 volume 11, Str 96-106

[7] Kovolev S.G., Habibulin R.R., Lopikov V.V., Abdyukova G.M., Obshaya geologiya s osnovami gidrogelogii I geologii, Ufa, 2006, 406 str