GENETIC GROUPS OF METEORITES BASED ON OXYGEN ISOTOPES

MARAKUSHEV, A.A., CHAPLYGIN, O.V. and BOBROV A.V. Moscow State University, Faculty of Geology, Moscow, Russia

Our model suggests the magmatic nature of meteorites; the main types of them - chondrites and primitive achondrites - were formed inside their parent protoplanets under the hydrogen influence of their fluid envelopes. The hydrogen pressure was the main factor of liquid immiscibility that formed the chondritic structure according to the reaction: Mg1.7Fe $0.3SiO_4$ + $0.3H_2$ = ($0.7Mg_2SiO_4$ + $0.3MgSiO_3$) + (0.3Fe + $0.3H_2O$) or initial melt = silicate chondrules + matrix. This reaction takes into account the concentration of H_2O in the chondrite matrix which determines their distinguishing into the chondrule-rich and H_2O-rich matrix chondrites: in the row of the ordinary chondrites (LL-L-H) - (R-H_2O), in the row of carbonaceous chondrites (C3-Ure) - (C2-C1-H_2O). This reaction also reflects the role of hydrogen as the main factor of evolution of chondrite magmatism resulting in the formation of H_2O molecules which extract heavy oxygen isotopes from chondrite melts together with the decrease of an oxidizing degree of metals. The main stages of the evolution may be indicated by the following groups of chondrites and primitive achondrites: (LL-L-H) - (F-E) - (C3-Ure). Consolidation of chondrites preceeded the explosive destruction of their planets into asteroids and terminated in the different regime which resulted from the loss of fluid envelopes by parental protoplanets. It was characterized by a normal mass-fractionation of oxygen isotopes between the minerals and volcanic glass. The same regime occurred during the stratification of satellites of the Solar system planets (including the Moon) and parental planets of achondrites (Dio-Euc, Sh-Nk, I-Pal), outer envelopes of the terrestrial planets, and volcanic processes on them.