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Carbon isotope composition in C-bearing species of the northwest of the Siberian platform

Victor Ryabov, Dina Semenova, and Victor Ponomarchuk
Institute of Geology and Mineralogy, Siberian Branch of RAS, Novosibirsk, Russian Federation (semenovadina@gmail.com)

The biggest Pt-Cu-Ni deposits of Norilsk-Talnach type are concentrated on the northwest of the Siberian platform. Different in scale, form and composition dispersed locations of C-bearing species (oil, bitumen, graphite, solid biogenic matter) are also found everywhere in the same region. Taking into account wide discussion about role of fluids (including hydrocarbon and organometallic compounds) in ore-forming processes, the numerous carbon isotope analyses (∼150 samples) of C-bearing species (oil, bitumen, graphite, coal, C-containing minerals and rocks) have been carried out in order to reveal different origins of carbon.
The δ^{13} values were determined using the Thermo Finnigan 253 mass spectrometer equipped with EA/TC + ConFlo III preparation unit. In special cases of smaller sample amount, the specially-constructed line in combination with the Finnigan Gas Bench II were used (Semenova D.V. et al., Geochim.Cosmochim. Acta., 2009. V. 73, is.1.P.A1193).
The values of carbon isotope composition of different C-containing phase in rocks and ores of the region have displayed wide variations of δ^{13} values from -14.8 to -34.8‰. The locations of liquid bitumens are represented like drip-liquid releases and effusions in amygdaloidal basalts and soakage in tuffs (-27-30‰).
The asphaltites in the region are more widespread than the liquid bitumen. The asphaltites are found in carbonate-clay sediments and volcanogenic rocks of different age from riphenian to trias. The bitumen in the carbonate-clay rocks are concentrated in caverns, forming veinlets and cement soaking of tectonic brecciaes in limestones. The δ^{13} values of bitumens from limestones of Upper Devonian are in range of -20.9 to -26.7‰, and in sapropelites of Lower Silurian is of -18‰. The bitumens in tuffelaves and tuffes sequences are found in the form of veinlets and filler of amygdales. Carbon isotope composition of asphaltites from veinlets in basalts varies from -21.7 to -30.8‰ with the tendency to decline upwards along the tuffes sequences. Fine-dispersed carbonaceous matter is found in pisolitic tuffas of paleovolcanoes. The δ^{13} values of carbonaceous matter vary from -19.4 to -21.8‰, and δ^{13} in amygdalstones are of -21.7 to -23.3‰. Newforming graphite is revealed in tie with the coal layers, found in intrusive traps and in ores with different composition. δ^{13} values of the coal are in range of -24.8-25.1‰, but get heavier to 22.5‰ in condition of carbonization.
There are locations of eruptive breccia with the debris of coal and graphites of different graphitization degree in the roofing parts of the intrusive traps (-22.3-23.4‰, and in the case of graphitization: -14.8‰).
The graphite layers located in the middle of metasomatites of nearist border Hightalnach intrusive are characterized by δ^{13} of -21.1-2.9‰. The carbonaceous matter of black serpentinites of theTalnach cuprous ores has δ^{13} values of -14.4-30.7‰, and for oil locations from impregnated sulfide ores 13 are of -27,8-30,5‰. For ores of native iron there is a tendency of weighting in carbon isotope composition in the following sequence: cohenite (-27.1-34.8‰) – graphite (-23,8-26,2‰) – antroksolite (-22,1-23,5‰).
The moste submitted datas is point to biogenic reservoir (∼-25‰). But in certain cases, the abiogenic origin of carbon (about -14‰) or the mixing of the two reservoirs are not excepted.