Express-method for definition of the mercury occurrence modes

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Mercury (Hg)-containing systems in the natural and technogenic objects have been studied by fairly many specialists as geochemists, ecologists, analysts and medicine researches for the many decades. Mercury is an important component of the mineral raw, and its microamount in the different natural formations (minerals, ores, rocks, natural waters, gases, oil, etc.) allow us to use it as an indicative element in the geochemical search of deposits, as well as revealing of ore substance genesis. Besides, a special attention is paid to the mercury as one of the most dangerous environmental element-contaminant.

However, while the problem of mercury gross definition is solved, opposite, the definition problem of small amount of mercury modes in the studied substances is a hard yet. Firstly, it is stipulated by a variety of mercury modes related to physical and chemical specifics of mercury and its combinations and, probably, not quite high resolution of the analytical methods.

Mineralogical method, method of phase chemical analysis and thermic evaporation (vozgonka') method are the base ones for revealing of mercury localisations forms. Chemical method is based on a consequent extraction of the mercury with the help of selective solvents.

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We present a direct operative method of receiving of thermic extraction spectrum under continuous linear — step-by-step heating on the sample (without sample preparation). This method is based on the sample temperature scanning with a future detecting of the atomic mercury by the Zeeman atomic absorption spectrometer. A 50 mg sample is heated up to 100–800°C and fixed during 1 minute every 100°C for receiving a full mercury escape. Time and temperature of the heating could be changed relating to a task formulated. Full analysis time is 10 minute. Measuring results are automatically recorded, and could be transformed in the different formats for a future processing.

Our method is characterised by the following preferences:

1) a sample analysis without a preliminary sample preparation despite the different mercury content in the sample,

2) a possibility for regulation of time and temperature of mercury vapour escape,

3) a graphic monitor screen form of the results revealed (a thermic spectrum of the mercury escape),

4) express analysis and its selectivity in case of absence of a gold sorbent in an instrument.

Interpretation of the data received are following:

Amount of the mercury escape maximums (thermoforms) linearly corresponds to amount of the mercury modes in the sample. We suppose to mark three main groups of the mercury thermoforms:

1 — low-temperature thermoform — up to 300°C,

2 — middle-temperature one — from 300 till 500°C,

3 — high-temperature one — from 500 till 800°C.

And these thermoforms correspond to the following modes of the mercury occurrence in the samples studied:

1 — elementary, sorbed (both chemically and physically), oxides, fluorides and sulphates of mercury,

2 — mercury sulphides (cinnabar, metacinnabarite),

3 — isomorphic mercury in sulphides.