Determination of SO_4^{2-} microquantity in carbonate rocks and formations

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Annotation

In order to determine the sulfates in carbonate rocks and formations (limestones, stalactites, corals, coating etc.), due to their small content (0.01-0.3%) it is necessary to use the high-sensitivity methods. Turbidimetric method is the most acceptable from this viewpoint.

Based on the optimum content of SO_4^{2-} (50-150 μg in 5.0 ml) in the analysis volume the sample weight has to be within the limits of 0.1-0.5g. Its direct determination in the hydrochloric acid solution gives us the overstated results. This fact can be explained by the increase of $BaSO_4$ suspension's optical density in the presence of Ca^{2+}.

Solution of the task in hand is possible through Ca^{2+} masking, removal or via taking into account its effect on the optical density of $BaSO_4$ suspension.

The carried out studies show that turbidimetric determination of SO_4^{2-} in carbonate rocks and formations has to be conducted against the background of Ca^{2+}. The task is simplified by the circumstance that Ca^{2+} content in the analyzed objects is virtually constant and is close to the theoretical value (≈40%). When selecting the background concentrations of Ca^{2+}, we have to take in account that the optical density of $BaSO_4$ suspension is relatively stable in the analysis volume (5 ml) in the presense of 40-60 mg of Ca^{2+}.

Thus, the turbidimetric method for determination of sulfates' micro- and ultramicroquantities in carbonate rocks and formations is developed. The method accuracy is checked by addition technique (see Table). The relative error of determination is less than 5%.

Table. Sulfates content in carbonate rocks and formations (%)

Object	Direct determination	Addition technique
Limestone	0.045	0.043
Stalactite (Atoni cave)	0.022	0.021
Stalactite (Tuzi cave)	0.030	0.032
Coral (Pacific Ocean)	0.47	0.46
Travertine (min. source „Vedza-deda“, Khevsureti)	0.057	0.060