Direct Determination of Vanadium in Water Samples, Human Hairs, Vegetables, and Foods by Graphite Furnace Atomic Absorption Spectroscopy

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At present, the considerable attention was greatly paid to the determination of vanadium from the point of vanadium as a kind of biological nutrient element or one kind of industrial sources of pollution. In the paper, we employed graphite furnace AAS (GFAAS) method to determine directly the vanadium in samples, using optically controlled raising temperature combining with pyrolytic coating tube to atomize vanadium under the conditions of stable temperature for the determination of vanadium in samples. The various experimental conditions and effect factors for the determination of vanadium by graphite furnace atomic absorption spectroscopy (GFAAS) were discussed. The present study showed that when atomization took place under the conditions where the combinations of pyrolytic coating graphite tube and fast raising temperatures were used[1] and the temperatures were stable, the signal peak shapes could be improved and the sensitivities were enhanced and the memory effects were removed. The present method overcame the disadvantages in the literatures[2] that could not efficiently solved or systematically explained the problems, in which the signal tailing, low sensitivity and strong memory effect usually showed up during the determination of element of vanadium that hardly dissolves at high temperatures by GFAAS. Not only sensitivities but also the measurement reproducibilities for home-made PGT were obviously better than those for home-made FPGT[3]. The procedure established is accurate, reliable, saving time and easy to operate, avoiding the unsafe factors caused by the use of N_2O. It has a more powerful practical value. The vanadium in water samples, human hairs, vegetables and foods was directly determined by using the present method. The conclusions obtained in this paper are as follows: (1) By the use of optical control fast rising-temperature combined with pyrolytic coating graphite tubes over the range of stable atomization temperatures, the drawbacks, that the signals seriously tailed and the sensitivities were low and the memory effects were greater in the determination of high temperature difficult fusion element vanadium, were overcome. The atomization process was proposed. (2) As the sensitive and symmetric atomic absorption signals can be obtained, so the calculation with the use of peak highness can reach the same effect by using the calculation of the peak areas. (3) The present method can directly determine the vanadium in water samples, human hairs, vegetables and foods with satisfactory results.

References

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