

THE DETERMINATION OF VANADIUM IN CRUDE OIL

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Vanadium is one of the most abundant trace metals in crude oil. The catalysts used in some refining processes can be poisoned by this metal. During the industrial combustion of crude oil the vanadium derivated can be ejected into the atmosphere and thus contribute to harmful physiological effects. Therefore it is important to determine the vanadium content of the crude oil, before its utilization in industrial processes.

The vanadium content of the crude oil (produced by "Naftagas" in Novi Sad) was determined by the neutron activation method. The crude oil sample of mass $m_s = 0.7002(5)$ g was irradiated ten minutes, together with a standard which contained $m_o = 722(2)$ μ g of vanadium, in a neutron flux of 10^{13} n/cm²·s. The activity of the isotope ^{52}V ($T_{1/2} = 3.76$ min), produced by the reaction $^{51}\text{V}(n,\gamma)^{52}\text{V}$, in the sample and in the standard were measured by the means of a Ge(Li) detector. The mass of the vanadium in the sample m_v was calculated from the formula

$$m_v = m_o \frac{N_s}{N_o} \frac{e^{-\lambda t'_s} - e^{-\lambda t''_s}}{e^{-\lambda t'_o} - e^{-\lambda t''_o}}$$

where N_s and N_o present the areas of the full absorption peaks of the gamma rays of 1434,3 keV, emitted from the sample and standard respectively, measured in the period from t' to t'' after the end of the irradiation.

For the measured sample we obtained the result:

$$\frac{m_v}{m_s} = 1.85(14) \text{ ppm}$$

According to our measurements the vanadium content of the crude oil investigated is very low, near to the lower limit of the reported ¹⁾ vanadium concentrations in heavy fractions of native petroleum.

REFERENCES

1. T. F. Yen: *The role of the trace Metals in Petroleum*, Ann Arbor Sci., Michigan 1975 pp. 167..