

**NEUTRON GAS PHYSICS RESEARCH AT THE INSTITUTE
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The advantages and limitations of the slowing down of epithermal neutrons and the thermal neutron reflection methods were compared for bulk hydrogen analysis. The principle of the neutron slowing down and the neutron reflection techniques can be found in several references [1, 2, 3, 4].

In both cases the same sample dimensions were used, i.e. a cylinder of 10 cm diameter and 8 cm height. It was found that the sensitivity of the slowing down method is higher by a factor of 20 in average (see Fig. 1) and the matrix effect can be neglected as compared to the neutron reflection technique.

The simultaneous application of the two methods makes the determination of the H content and the C/H atomic ratio possible. We also studied the effect of spatial distribution of hydrogen in the matrix to be investigated on the number of reflected neutrons.

Methods for bulk hydrogen analysis completed with the determination of C/H ratio were improved by prompt detection of thermal neutrons in both cases using BF₃ proportional counters. Results indicate not only the advantages in the routine use of the two methods but also their much higher sensitivities as compared to the activation technique used in our previous investigations. These results make the industrial applications also possible.

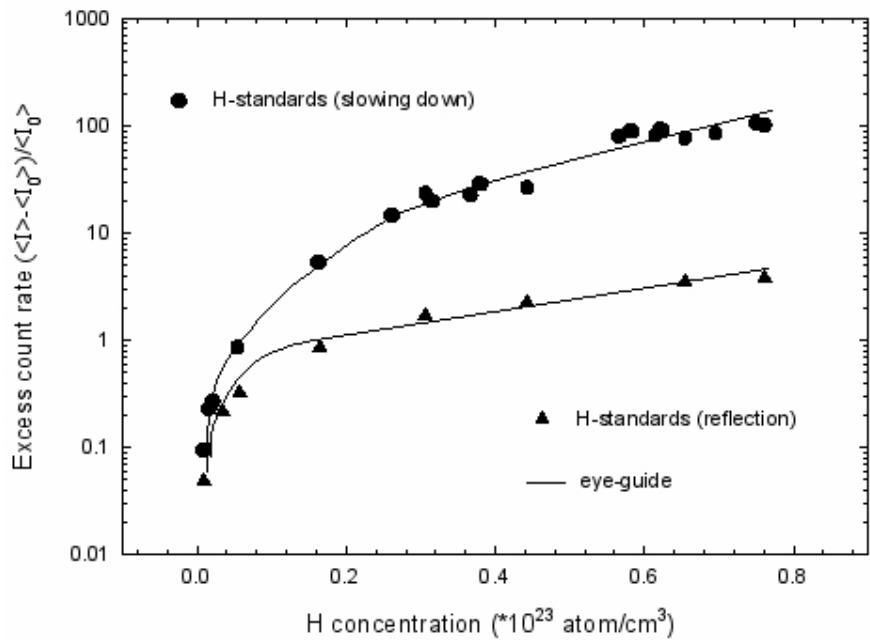


Figure 1: A comparison of the sensitivity of the neutron slowing down and reflection methods used for bulk hydrogen analysis.

References

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