

## DISCUSSION

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*R. A. Critchell<sup>1</sup> (written discussion)*—You state in your paper that, when applying the nuclear magnetic resonance technique to determine asphalt content, you first obtain a measure of hydrogen atoms in the sample. In your presentation, you said that you successfully used this technique to determine the asphalt contents in asphalt-saturated organic felts. How can you do this when the organic felt material also contains hydrogen atoms?

*W. P. Irwin (author's closure)*—It is possible to perform this measurement because of the difference in the NMR resonance signals of the asphalt and organic felt. At the temperature of measurement, 80°C, the asphalt shows a narrow resonance of about 0.25 gauss, typical of a liquid. The organic felt, being a solid, shows a broad resonance of about 10 gauss. (See Fig. 4.)

When the sample contains a mixture of solid and liquid material—in this case, of asphalt and felt—it is usually possible to find a gate width that gives optimum separation of the two materials. The experimental parameter of a gate width of 1.5 gauss was found to be a small, essentially constant proportion of the total sample signal. (Refer to the section titled Determination of Percent Saturation of Saturated Felts.)

This ability to separate the resonance signals of liquid and solid materials enables the NMR method to be applied for analysis of the asphalt content in asphalt-saturated organic felts. Other NMR methods, such as those for the oil content of oil-bearing seeds and the total fat content in chocolate or other foodstuffs, make use of this property also.

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