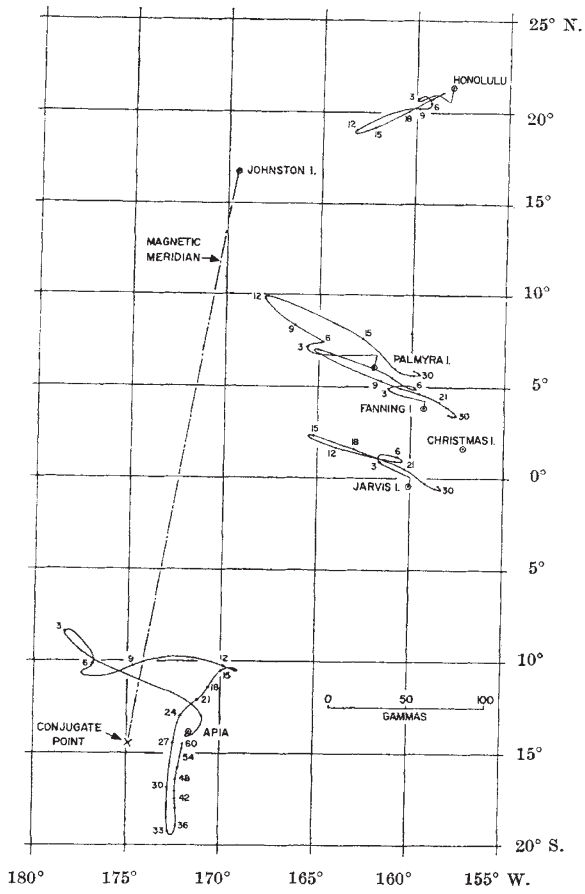

Fig. 4. Vector diagrams of the disturbance in the horizontal plane for the Johnston Island explosion of August 1, 1958. The small figures indicate the time in minutes after the event

explanation of the magnetic phenomena is to be expected; it is probable that several distinctly separate mechanisms are involved.

R. G. Mason*
M. J. Vitousek

Scripps Institution of Oceanography,
La Jolla, California. April 30.

* Also of the Geophysics Department, Imperial College of Science and Technology, London.

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CHEMISTRY

Carrier Gas and Sensitivity in Gas Chromatography

A recent article[1] takes issue with the "popular belief that the use of hydrogen or helium as the carrier gas in gas chromatography gives the highest sensitivity with a thermal conductivity detector, because the difference in thermal conductivity between organic vapours and hydrogen or helium is greater than for any other carrier gas". The article goes on to show that, for methane and ethane at least, the sensitivities are considerably higher with carrier gases that have a lower thermal conductivity.

The communication by Dr. Ray, however, treats the special case where the bridge current of the detector is held constant. In practice, not the bridge current, but the filament temperature is held constant. Under these conditions, helium is nearly ten times as sensitive as argon.

A standard C_4 hydrocarbon mixture was analysed on the same gas chromatographic column under the same condition with both helium and argon as carrier gases, while holding the bridge current constant at 150 m.amp. Values of the sensitivity parameter[2] (S-values) were calculated for the entire mixture; the S-value for argon was 252, for helium 300. *Ad hoc* experiments show that the filament temperature will be the same with helium as a carrier gas, operating with a bridge current of 350 m.amp., as with nitrogen or carbon dioxide as carrier gas with a bridge current of 150 m.amp.; argon is in the same range as nitrogen or carbon dioxide. The S-value for C_4 hydrocarbons in helium, with a bridge current of 350 m.amp., is approximately 3,000. In argon, a bridge current of this magnitude would cause the filament to burn out. The S-values obtained at the same filament temperature closely check the differences that would be expected for argon and helium based on the differences of their thermal conductivities and the thermal conductivities of hydrocarbon vapours; helium is 3,480, argon 398, and n-butane 322.

E. M. Fredericks
M. Dimbat
F. H. Stross

Shell Development Co.,
Emeryville Laboratories,
Emeryville,
California.

[1] Ray, N. H., *Nature*, **182**, 1663 (1958).
[2] Dimbat, M., Porter, P. E., and Stross, F. H., *Anal. Chem.*, **28**, 290 (1956).

While it is true that a higher sensitivity can be obtained by using a higher bridge current, it is not usually possible to do this with commercial gas chromatography instruments, because manufacturers wisely limit the supply voltage to a level at which the katharometer filaments do not fuse in air or nitrogen. Even with home-made instruments the bridge supply voltage may be a limiting factor, since to maintain the same filament temperature in helium as in argon the voltage must be increased nearly three times.

N. H. Ray

Imperial Chemical Industries, Ltd.,
Alkali Division,
Winnington,
Northwich.

Measurement of Intergranular Diffusion in a Silicate System: Iron in Forsterite

Many geochemists and petrologists[1] concerned with the role of solid state diffusion in material transfer in silicate systems have noted the possibility that grain boundaries and dislocations might act as avenues for relatively rapid movement of the diffusing ions. Studies on metal systems are usually cited as evidence for this phenomenon. We wish to report some preliminary measurements on a silicate system where grain boundary diffusion seems to predominate in diffusive transfer.

The system used for the study was polycrystalline forsterite (magnesium orthosilicate) with ferrous ion as the diffusing material. Pellets were prepared