$Fe_3B_xP_{1-x}$ with variable composition ($0{\cdot}5 < x < 1$) has been found which exists with phosphorus content less than 1 atom per cent (unpublished work). The structure of this phase, based on a primitive tetragonal lattice, shows no obvious resemblance to the cementite structure, however.

A detailed report of this work, together with a structure determination of Ni_3B from single-crystal data, will soon be published in *Acta Chemica Scandinavica*.

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Amplitude of a Quartz Plate vibrating in Liquids

Some attempts have been made to measure the amplitude of a vibrating quartz crystal, but no method at present exists by which its absolute value in a liquid can be determined experimentally, although the amplitude can be calculated theoretically from the relation given by Vigoureux[1]:

$$a = \frac{2c_{11}Vd}{\pi c_1 \rho_c}$$

where c_{11} is the elastic modulus governing the thickness vibration of X-cut plate; d the change in thickness of the plate per volt ($2\mu\mu$m.); V the voltage applied; c_1 the velocity of sound in quartz and ρ_c the radiation resistance of the transmission medium.

The development of a thermosonic method in this laboratory has now enabled us to determine the amplitude of vibration. The principle of the method lies in evaluating the amplitude of the plane sound-wave at the source of the ultrasonic beam from the mean power of the sound from the formula[2]

$$P = 2\pi^2 \rho_c \xi^2 N^2 S$$

where N is the frequency; ξ the amplitude and S the area of source of sound. The mean power of the sound, P, is obtained from the relation[3]: $I = JH$, which involves the measurement of heat produced by a calorimetric method.

The amplitude of a quartz plate as determined from Vigoureux's formula and the amplitude of sound calculated from power measurements of the output of sound, carried out in this laboratory[4] for 1 V. input at about 5 Mc. are given in Table 1.

These results show that the agreement between the amplitudes of oscillation of the quartz and of sound is good. It is observed that the amplitude of the sound wave is always less than that of the quartz, the variation lying between 10 and 25 per cent. It is also noticed that the difference between the two amplitudes, albeit small, varies with the nature of the liquid used. It is likely that this variation is related to some property of the liquid or of the quartz crystal, although it may be due to experimental limitations.

Further investigations are in progress, and full details will be published elsewhere.

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Surface Hardness of Explosive Materials by Micro-indentation

The influence of adulterating grit on the impact and friction sensitivity of a number of explosives has been shown to be considerable[1]. It is generally agreed that grit sensitizers act through modification of conditions necessary to produce frictional hot-spots, and that this process is influenced to a large extent by the hardness of the grits. Although detailed hardness data are now available for many of the common grits[2], little or none exists for the explosives themselves.

The following technique, designed to follow the modifying effect of X-rays and light on the hardness of α-lead azide, makes such detailed information readily available in many instances. The apparatus used is the Cooke, Troughton and Simms micro-indentation hardness tester fitted to a Vickers projection microscope[3]. With this instrument, materials may be indented at known load with a diamond pyramidal indenter and the indentation measured. The Vickers hardness number is obtained from the ratio of load to indentation surface.

The crystals to be tested are readily mounted in suitable presentation by the following technique. A 'Perspex' plug, ½ in. deep and machined from a rod 1 in. in diameter, is softened on one face by a few minutes immersion in chloroform. This face is allowed to become tacky in a current of warm air and is then pressed squarely down on to the crystal sample carried on a glass plate. The plug is withdrawn

Table 1

Liquid	c (m./sec.)	ρ (gm./sec.^{3})	$\rho_c \times 10^{-3}$	Voltage	Ultrasonic output (watts)	$\xi \times 10^9$ (cm.)	$a \times 10^9$ (cm.)
Methyl alcohol	1,123	0·792	88·9	160	2·393	1·96	2·18
Acetone	1,192	0·792	94	158	1·626	1·59	2·06
Methyl ethyl ketone	1,207	0·805	97·2	94·5	0·579	1·56	1·99
Butyl alcohol (*n*)	1,268	0·810	103	165	1·514	1·40	1·88
Xylene (*m*)	1,340	0·863	116	158	1·364	1·31	1·67
Benzene	1,326	0·878	116	155	1·199	1·25	1·67
Chlorobenzene	1,291	1·107	143	162	1·308	1·13	1·36
Carbon tetrachloride	938	1·595	150	173	1·361	1·05	1·29
Glycerine	1,923	1·261	242	173	1·026	0·72	0·80