Table 1. AIR CONTAMINANT ACTIVATION HISTORY

Sample No.	Air vol. (m^3)	Particu-late conc. ($\mu g/m^3$)	Activation sample weight (mg)	Activation date	Irradiation $\varPhi$th ($10^{11}/cm^2/sec$)	t (min)
1a	76·4	135	0·780	14/10/60	1·8 × 10^{-3}	30
1b	76·4	135	0·780	28/10/60	0·18	10
1c	76·4	135	0·780	16/11/60	0·18	10
1d	76·4	135	0·780	24/2/61	1·8	15
2a	59·1	2,000	14·2	17/11/61	0·72	10
2b	59·1	2,000	14·2	14/11/61	0·72	10
3	57·8	1,380	9·55	19/12/61	1·8	100
4	6·3	*	*	8/1/62	0·72	3
5	9·8	3,020	14·8	17/1/62	0·72	10
6	10·1	370	1·85	25/1/62	0·72	10

* No observation.

Table 2. HALF-LIFE ANALYSIS OF SAMPLES

Sample No.	Half-life of β activity*	Half-life of γ activity*	Isotope
1b, 1c, 1d	14·1 h		Sodium-24
	2·9 h		Manganese-56
	81·0 min		Barium-139
2	15·0 h	15·8 h	Sodium-24
	72·0 min	81·0 min	Barium-139
	19·5 min	25·0 min	Iodine-128 (?)
	3·3 min	2·8 min	Aluminium-28
4	13·6 h		Sodium-24
	44·0 min		Chlorine-38
	8·0 min		Magnesium-27
	3·3 min		Aluminium-28
5	14·3 h		Sodium-24
	42·0 min		Chlorine-38
	8·0 min		Magnesium-27
	3·5 min		Aluminium-28
	40·0 sec		Oxygen-19
6	15·0 h		Sodium-24
	72·0 min		Barium-139
	12·0 min		Magnesium-27
	3·3 min		Aluminium-28

* Typical estimated S.D. of half-life: 9 per cent

In order to investigate the γ-spectrum from the activated contaminants, sample No. 3 was irradiated for 100 min together with a filter paper control. Following the irradiation the γ-spectra of the sample and the control were measured with a 256-channel analyser. The results of this measurement are shown in Fig. 2. The principal activities in the corrected spectrum appear to be due to sodium-24 and manganese-56.

An obvious need in improving the sensitivity of the method is to use filter paper having the lowest possible content of constituents which activate and interfere with the sample determination. Accordingly, samples of Whatman No. 41 (0·00009 g of ash per piece), Whatman No. 42 (0·00006 g of ash per piece) and 'Millipore' were irradiated. The results indicated that Whatman No. 41 and 'Millipore' contained approximately equal constituents, while Whatman No. 42 contained only about 10 per cent equivalent constituents (in terms of the activation cross-section, $V\Sigma_{act}$). On this basis Whatman No. 42 would have been a better choice than Whatman No. 41 filter paper. The 'Millipore' paper has the advantage that it can be dried to a constant weight, thus permitting a quantitative correction for the activities due to the filter paper.

If one assumes the contaminant in sample No. 5 is concrete dust (1·80 weight per cent magnesium), then the observed 8-min activity may be attributed to 266 μg of magnesium. This value agrees very well with the value of 271 μg calculated from the observed activity after corrections are made for sample decay and counter efficiency. Similarly, for sample No. 2 one obtains 254 μg of magnesium (14·1 mg total × 1·80 weight per cent magnesium) as compared with 245 μg calculated from the measured activity.

We plan to improve the precision of the method as follows: (1) use radiochemical separation to aid in identification of specific elements; (2) use standards and standard carriers to ensure reproducible quantitative data.

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¹ Katz, M., et al., Anal. Chem., 30 (1958).

Bath-tub Vortex

WITH reference to Prof. A. H. Shapiro's recent communication[1] on the above subject, I venture to call attention to the fact that in 1908 the Austrian physicist, O. Turmlitz, described careful and effective experiments which demonstrated the effect of the rotation of the Earth on the outflow of water through a central aperture, in a paper entitled "Ein neuer physikalischer Beweis der Achsendrehung der Erde"[2].

I dealt at some length with the whole question of rotation at outflow in a lecture on "Whirlpools and Vortices"[3] given in 1938.

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¹ Shapiro, A. H., Nature, 196, 1080 (1962).
² Turmlitz, O., S.B. Akad. Wiss. Wien, Abt. IIa, 117, 819 (1908).
³ Andrade, E. N. da C., Proc. Roy. Inst., 29, 320 (1936).

CERAMICS

High-pressure Densification of Glass and the Effects of Shear

WHEN certain oxide glasses are temporarily compressed at high pressures, a large 'permanent' increase of density may occur when the pressure is released. For example, Bridgman and Simon[1] reported that the density of vitreous silica was increased 7 per cent after room temperature compression at 200 kilobars; below an apparent threshold pressure of about 100 kilobars, however, no densification was possible at room temperature. Roy and Cohen[2] afterwards reported that a density increase of 7 per cent was achieved at only 55 kilobars, and that from 20 to 160 kilobars densification of silica glass at room temperature was a linear function of pressure. Despite the unexplained large disparity between these results, it was proposed[2] that silica glass be used as a pressure calibrant for the range 10–200 kilobars. More recently, Christiansen, Kistler and Gogarty[3] furnished yet another different set of results. These and some results of the present work at room temperature are shown in Fig. 1. The results of Roy and Cohen which were presented as changes of refractive index have been converted to changes of density from a calibration obtained by us. The results of curves A, B, and C were all obtained on the opposed-anvil apparatus. Whereas Roy and Cohen used powdered glass, the samples of the other workers were in the form of thin glass disks. The results reported here were obtained on solid cylinders about 2 mm in diameter and 2 mm in height with a pyrophyllite–alumina cell in a 'belt' apparatus[4].

Bridgman[5] had questioned whether densification of glass was possible under pure hydrostatic condition without the co-operation of shear. In one experiment on soda glass in which densification of several per cent was first observed, this large increase was no longer possible after the cell design was altered to decrease shearing forces during compression. Christiansen et al.[3] have suggested that a larger degree of shear was possibly present in their experiment resulting in the disagreement with Bridgman's results. The very much higher densification reported by Roy and Cohen[2] is understandable in view of the powdered samples used. A greater degree of shear is expected when irregular particles in contact with one another undergo sliding motion on compression. A further cause may be due to localized heating arising from friction, since densification increases with increasing temperature at constant pressure.

In the present work, large differences are found in the densification of silica glass dependent on the degree of shear present. Thus, with an alumina container, the densification at 60 kilobars and 400° C for 2 min is 14 per