

SH/SS interchange which is necessary for the release of set in hot water⁶. In this way, thiol-blocking and oxidizing agents stabilize extended polypeptide chains which would not otherwise contribute to useful set. Speakman⁷ has shown that extended fibres may be set by reduction with thioglycollate solutions, followed by treatment with dinitrofluorobenzene. We believe that dinitrofluorobenzene enhances set by inhibiting SH/SS interchange in the same way as other thiol-blocking reagents.

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Rapid Ozone Determination Near an Accelerator

BEAMS of fast electrons in air generate ozone in quantities that may present health hazards. In laboratories using such beams, for example for radiation chemistry, large-capacity ventilators are therefore installed to keep the ozone level low and to remove remaining ozone rapidly after the beam has been stopped. To check the efficiency of the ventilating system an almost instantaneous method of ozone measurement is called for. We have developed such a method by making use of the chemiluminescence of ozone in contact with ethylene.

A current of 1 l./min of the air to be analysed is introduced into a small-volume mixing device (Fig. 1) where it meets a stream of 1 l./h of ethylene. The light emitted is measured with a photomultiplier tube (EMI 9558; 150 μ amp/1 m). For determining the photomultiplier output both d.c. current measurement and pulse counting were tried. When a d.c. tube voltmeter (Hewlett and Packard 425 A) was used for measuring the mean photomultiplier

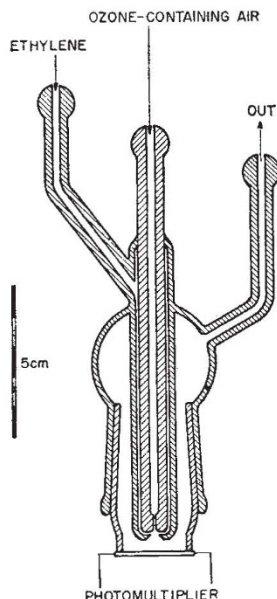


Fig. 1. Mixing device for determination of ozone by luminescence

current, background noise corresponded to the effect of 0.05 p.p.m. ozone.

Pulse-counting equipment performed marginally better with a background amounting to 0.03 p.p.m. ozone. The pulses from the photomultiplier are fed, via an emitter follower, a linear pulse amplifier and a discriminator, to a rate meter and a recording potentiometer.

To calibrate the instrument, the count rates of the luminescence detector, which is insensitive to NO₂, were compared with the ozone concentrations determined chemically over 1-h periods, for air taken from the target room of the van de Graaff accelerator.

Total oxidant values, measured by the commonly used neutral KI method¹, were corrected for the NO₂ present, as measured by a colorimetric method². The accelerator was run at 3 MeV and various beam currents.

The results are shown in Table 1.

Table 1. CALIBRATION OF LUMINESCENCE METHOD

Beam current (μ amp)	Luminescence (net c.p.s.)	Ozone (p.p.m.)
100	320	0.3
350	905	0.8
600	1,595	1.4
900	2,400	2.2

Table 2. DISAPPEARANCE OF OZONE FROM TARGET ROOM

Time (min)	With ventilation		Without ventilation	
	Time (min)	Ozone (p.p.m.)	Time (min)	Ozone (p.p.m.)
0	2.0		0	3.8
1	0.46		5	1.10
2	0.36		10	0.74
3	0.18		20	0.36
4	0.10		30	0.19
5	0.08		40	0.09
6	<0.05		50	0.05

The air samples were taken through 10 openings in a 1-m tube positioned parallel to the window of the electron accelerator tube, 70 cm below it and 35 cm to the side. With only one sample opening the detector responded wildly, owing to a tendency of the ozone to drift towards the ventilation openings in small clouds.

The method has been applied for the purpose for which it was designed: to check the efficiency of the ventilation system in the target room. Table 2 shows the disappearance of ozone after stopping the beam current (900 μ amp, 3-MeV electrons), as determined from the luminescence.

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Ground State of Zirconium Monoxide from Neon Matrix Investigations at 4° K

OUR recent work on the spectroscopy of the TaO molecule trapped in solid neon at 4° K has helped in the establishment of a ²Δ_r ground state for that molecule¹. The unique advantage of absorption studies at 4° K is that all transitions occur from the zero-point vibrational level of the lowest electronic state. Because of the long-held view that TiO and ZrO both have ³Δ_r ground states² and because of their relative importance in stellar spectra, a similar examination has been made of these molecules. We have thereby established that ZrO has a singlet ground state and conclude from theory that it is probably ¹Σ⁺.

The experimental evidence for this conclusion is the following: (1) The A bands of ZrO, observed in emission by Afaf³, and examined more recently by Uhler and Åkerlind⁴, appear strongly in the absorption spectra of neon matrices at 4° K. The bands have been identified by the latter authors as either a ¹Σ⁻Σ or a ¹Δ⁻Δ transition. The (0,0) band of Zr¹⁶O appears in the gas at 3682 Å and ΔG_{1/2} = 836.9 cm⁻¹; in a neon matrix at 4° K the