the amount of bomb debris sampled. The approximate contribution of artificial beryllium-7 can be easily evaluated by measuring strontium-89.

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Spectral Analysis of Light emitted from an Oxide-coated Cathode during Thermionic Emission

It has been known for many years[1–5] that when high current densities are drawn from vacuum tubes containing oxide-coated cathodes a green glow may be observed in the anode-cathode interspace. This discharge has been attributed to the presence of ionized barium and its occurrence has lent weight to the theory, now generally held, that the result of the process of activation of an oxide-coated cathode is to provide a stoichiometric excess of barium in the oxide lattice.

Debiesse and Champeix[3] have made a careful spectrographic examination of the light emitted by cathodes coated with barium oxide, with strontium oxide and with the mixed oxide (BaSr)O. They identify a number of spectral lines due to singly- and doubly-ionized barium and strontium in the wave-length range 4300–5600 Å. Some lines in the hydrogen spectrum were also observed. It is the purpose of this communication to report the observation of some relatively intense lines in the wave-length range 4000–4300 Å.

Commercial *6X5GT* diodes were used in the present work. Light from the central portion of the cathode, visible in the gap between the two anodes, was focused on the slit of a Hilger constant-deviation spectrograph. With the cathode heater operated at 6·3 V. (cathode temperature about 1,100° K.) and zero emission current density a continuous spectrum was obtained; if a high emission current density (of the order of 0·5 amp. cm.$^{-2}$) was drawn a blue-green discharge extended through the tube and a line spectrum was found to be superimposed on the continuous spectrum. Exposures of about 1 hr. were necessary to obtain measurable images on *HP3* plates. Lines of the hydrogen spectrum, although present initially, disappeared after a few hours operation, probably due to the gettering action of the discharge. The following permanent lines were observed and identified :

5536 Å., Ba I; 4934 Å., Ba II; 4607 Å., Sr I; 4554 Å., Ba II; 4227 Å., Ca I; 4216 Å., Sr II; 4131 Å., Ba II; 4078 Å., Sr II.

Relatively intense lines are underlined. Observation of the four lines below 4500 Å. has not been reported previously.

The operation of the diodes at such high current densities is not conducive to long cathode life. On one occasion the cathode disintegrated with some violence during an exposure, and the spectrum was found to show, in addition to the lines given above, a band structure attributed to the cathode material in molecular form.

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METALLURGY

Young's Modulus of Hot-worked Pyrolytic Graphite

In a recent note[1], results were presented on the tensile properties and structural changes for pyrolytic graphite hot worked at 2,750° C. and tested over the range room temperature to 2,200° C. This communication presents hitherto unreported results on the room temperature Young's modulus in the direction of the basal planes after various amounts of hot working.

The pyrolytic graphite used was produced by High Temperature Materials Inc. from CP methane by deposition at 2,110° C. on a synthetic graphite substrate. The as-deposited material had a density of approximately 2·20 gm./c.c.

Hot working was accomplished by applying a tensile stress to the test specimen so as to deform it the desired amount, in the direction of the basal planes. For the room temperature tests, the load was applied in the direction of the basal planes. Metal foil gauges were glued along the edges of the basal planes of the specimen gauge section to provide an accurate strain determination in the room temperature tests. The output from these gauges was linear with strain to approximately 1 per cent total strain.

Engineering stress–strain curves for as-deposited and hot-worked specimens are given in Fig. 1. The as-deposited specimens fractured in the normal manner, that is, near the centre of the gauge section. The hot-worked specimens, on the other hand, failed in the shoulder where the hot working is not so marked as in the gauge section. Young's modulus values calculated from the slopes of these curves are given in Table 1.

The modulus for pyrolytic graphite is observed to increase markedly with an increase in the amount of hot working. The two values for the as-deposited material agree quite well with values reported by others[2,3]. The modulus of 81·2 million lb./in.^{2} after 16 per cent hot working is comparable with values obtained at room temperature and at some elevated

Table 1. Room Temperature Young's Modulus in the Basal Plane Direction for Hot-worked Pyrolytic Graphite. Lot 170

Hot-worked elongation at 2,750° C. (per cent)	Young's modulus (lb./in.^{2} × 10^6)
None	2·3
None	2·7
5	7·5
7	7·9
16	81·2