head at 4045 A., degraded to shorter wave-lengths, is obtained. A similar but weaker band, at about 3670 A., is obtained when bromine is introduced into a methyl alcohol flame. The emitters of the bands are not known.

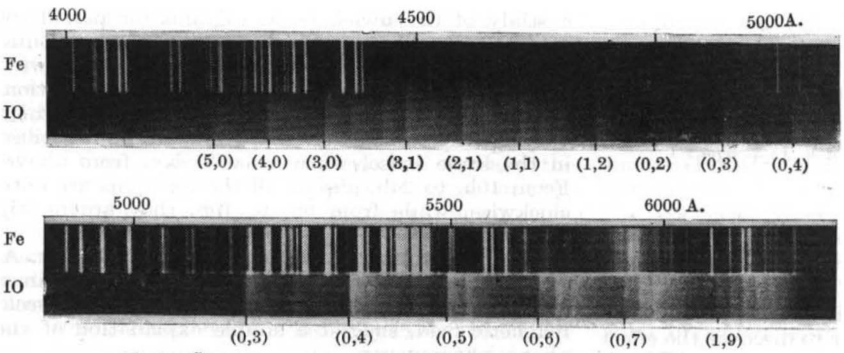

Fig. 1. SPECTRUM OF FLAME OF METHYL IODIDE PLUS HYDROGEN IN OXYGEN

v' \ v''	0	1	2	3	4	5	6	7	8	9	10	11	12
0	·	3	6	9	10	9	7	5	·	·	·	·	·
1	3	9	10	3	·	1	7	8	6	3	·	·	·
2	7	10	7	·	2	5	2	·	4	7	4	·	·
3	9	10	5	4?	3	·	1	4	·	·	·	4	·
4	7	6	·	2	·	·	·	·	·	2	·	·	3
5	5	·	·	·	·	·	·	·	·	·	·	·	·

Fig. 2

One of us (E. H. C.) is indebted to the director of the Department of Scientific and Industrial Research and Fire Offices' Committee Joint Fire Research Organisation for permission to publish this communication.

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Hydride and Deuteride Bands of Aluminium, Copper, Silver and Gold

AN investigation of the spectra mentioned above has been undertaken with a water-cooled hollow cathode of Schüler type with helium filling. The break-off in the CuH-band λ 4280 found by Schüler and Gollnow is unique, and does not appear in any of the spectra of the above-mentioned metals. The experimental results show that the interpretation given by Herzberg and Mundie is correct.

On long exposure at the lowest possible pressure (0·03 mm.), the AlH-band λ 4240 shows a very sharp break-off with $P(19)$ as the last line in the P branch.

A detailed account of these experiments is to be published elsewhere.

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Relation Between the Brunauer – Emmett – Teller and Harkins–Jura Isotherms

H. K. LIVINGSTON[1] has recently attempted to relate the Brunauer – Emmett – Teller and Harkins – Jura equations by means of the Gibbs adsorption isotherm for solid surfaces. However, he has only applied his method to one of the limiting conditions of the Brunauer – Emmett – Teller equation. We have extended this method to include the complete form of the equation, in order to direct attention to the great importance of the value of constant n in these relations.

The Harkins – Jura equation

$$\log p = B - A/v^2 \qquad (1)$$

(v is the volume of gas adsorbed at pressure p, A and B are constants) was obtained by substitution in the equation of state for condensed films:

$$\pi = b - a\sigma \qquad (2)$$

(where π is surface pressure, σ is area per molecule of adsorbate, and a and b are constants).

The Brunauer – Emmett – Teller equation may be expressed in the complete form:

$$v = \frac{v_m c.p}{p_0 - p} \cdot \frac{p_0{}^{n+1} - p_0.p^n(n+1) + n.p^{n+1}}{p_0{}^{n+1} + p.p_0{}^n(c-1) - c.p^{n+1}} \qquad (3)$$

or in two limiting forms:

$$n = 1\,;\ v = \frac{v_m c.p}{p_0 + c.p}\,;$$

$$n = \infty\,;\ v = \frac{v_m c.p.p_0}{(p_0 - p)\,(p_0 - p + c.p)}. \qquad (4) \text{ and } (5)$$

Livingston obtained the relations

$$k_1\pi = \log\left(\frac{p_0 - p + c.p}{p_0 - p}\right) \text{ and}$$

$$k_2\sigma = \frac{(p_0 - p)\,(p_0 - p + c.p)}{c.p.p_0} \qquad (6) \text{ and } (7)$$

(where $k_1 = V\Sigma/RTv_m$, $k_2 = Nv_m/V\Sigma$, V is the molar gas volume, and Σ is the specific surface of the adsorbent). He then calculated the conditions under which the values of $k_1\pi$ and $k_2\sigma$, for any given value of c, could be expressed as a linear relation equivalent to equation (2):

$$k_1\pi = b' - mk_2\sigma. \qquad (8)$$

It follows from his reasoning that if the $k_1\pi - k_2\sigma$ relation is linear, then the pressure–volume adsorption isotherm may be expressed accurately by either the Brunauer – Emmett – Teller or Harkins – Jura equations.

Equations (6) and (7) are only valid for the limiting condition when $n = \infty$, being based on equation (5). In practice, it has been found that when $n > 5$, equation (5) represents the data fairly closely. However, with highly porous solids n is frequently less than 3, and equation (5) is no longer applicable. We have found, in adsorption experiments on highly porous amorphous carbons, that when $n < 3$, the Harkins – Jura plots of log p against $1/v^2$ are in-