

## SOCIETY OF CHEMICAL INDUSTRY

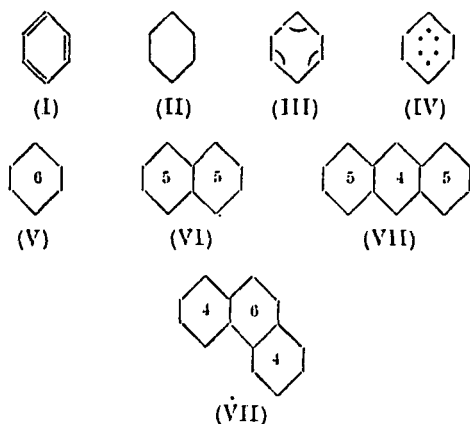
### OFFICIAL NOTICE

Questionnaire *re* Division of Abstracts and Transactions.—There are still several members who have not sent in their reply cards, and these are urged to do so without delay.

## CORRESPONDENCE

### THE REPRESENTATION OF THE BENZENE RING

SIR,—Your editorial column "A Question of Ethics" (CHEM. & IND., 1940, 59; 548) raises the question as to how the structure of benzene is to be most truthfully represented on paper. A choice is usually made between I and II. I think II is best shunned for the very good reason that it is often used to depict *cyclohexane*. Ingold (Nature, 1938, 141; 317) suggested formulation III, based on mesomerism in the benzene ring, but it is seen that even this very recent formula, like Kekulé's, is not completely symmetrical. Since Ingold's representation of a mesomeric state uses a "curved bond sign for each non-localized electron pair" (*i.e.*), formula III is equivalent to Armit and Robinson's "aromatic sextet" formulation IV. It is neither easy to write nor to print six dots in every benzene ring, but it would be simple enough to use the numeral 6 instead, giving formula V. Naphthalene, which cannot be formulated in Ingold's way, might be represented by VI.



The cases of anthracene and phenanthrene are each a *crux*. Clearly, in both these molecules, the two outer rings are equivalent, but differ from the intermediate one. There are in both these cases fourteen electrons to share amongst three rings, giving the possible arrangements 6 2 6, 5 4 5, 4 6 4, and 2 1 0 2. The first and last of these arrangements may be neglected on the grounds that they show too great a disparity between the two types of ring, and so will probably not occur to any great extent. An examination of the "double-bond character" of the bonds in anthracene and phenanthrene shows that the intermediate ring in the latter molecule is relatively highly chemically unsaturated (Pauling: Gilman's Organic Chemistry: an Advanced Treatise, 1938, 1879). Now chemical unsaturation is associated

with electron-donating molecular systems (Robinson: Outline of an Electrochemical Theory of the Course of Organic Reactions, 1932, 13). Hence it appears that the 4 6 4 allocation of electrons may be assigned to phenanthrene, and the 5 4 5 allocation to anthracene (VII).

I am, Sir, etc.,

GEORGE NOVELLO COPLEY

Aug. 19, 1940

### AN AUTOMATIC PIPETTE

SIR,—The automatic pipette described by your contributor in your last issue is very ingenious. What I would like, however, is a bottle which pours out 10 c.c. each time it is tilted in the normal way.

I have several other "wants."

I am, Sir, etc.,

ERNEST C. CRAVEN

Hull

Aug. 24, 1940

### VISION AND COLOUR-VISION.

SIR,—Accompanying Dr. Edridge-Green's article of August 10 are four figures printed in colour. I have examined Fig. 1 according to the directions of the author, and, both in daylight and in half-watt light, the central green strip appears to me yellowish green, whereas the outer ones appear bluish green. This observation is not in accord with that of the author of the paper, but it is in agreement with numerous published statements relating to colour contrast.

It would be interesting, although perhaps hardly within the province of applied chemistry, to know if any of your readers see this figure as Dr. Edridge-Green sees it.

As to Figs. 2, 3, and 4, these appear to have been produced by superimposed printings. If this is so, subtractive colour mixture will occur, owing to the transparency of the top impression. Moreover, the pattern is so small that additive colour mixture occurs (as in half-tone colour printing) between dots and interspaces, when the figures are observed at a distance of six feet, or with half-closed eyes.

It would appear that these experimental errors make the last three figures unsuitable for demonstrating the author's theory.

I am, Sir, etc.,

H. D. MURRAY

London, S.W.1

Aug. 20, 1940

[Note by the Editor.—These diagrams have been shown to a large number of my friends; a few of these had read about colour contrasts and most of these were in agreement with the view of Mr. Murray. A large majority of those who were unbiased by any teaching about colour contrasts agreed with the view of Dr. Edridge-Green. The editor had the advantage of seeing the originals of the diagrams and a number of similar diagrams made by coloured chalks. He made several such diagrams by coloured chalks and his view agrees with that of Dr. Edridge-Green.]