

or remain in certain stable molecular configurations which are compatible with the hydrocarbons. It is probable that the vanadium-porphyrin complex can be identified with the latter concept.

Bertrand (1) in his review of his own work and that of many other investigators has indicated that vanadium is present to some extent in all living matter. The highest concentration of vanadium in living organisms discovered to date exists in the small sea animals, the ascidians, commonly referred to as sea squirts. The vanadium content of these contemporary marine creatures amounts to as high as 0.65% by weight on the dry basis. Other marine animals, such as the holothuria (sea cucumbers), also contain a surprising amount of vanadium.

Vinogradov (12), who made some of the vanadium determinations on sea fauna, proposed that vanadium-containing petroleum had their origin in such sea life.

CONCLUSIONS

Chemical and physical techniques have demonstrated the presence of a vanadium-porphyrin complex in Santa Maria Valley crude oil. Absorption spectral data indicate that the complex is similar if not identical to the vanadium complex of mesoporphyrin IX dimethyl ester. The vanadium complex is not water soluble but is soluble or dispersible in the crude oil. The complex possesses stability to electrical fields. It is also stable to heat treatment at 125° C. in the presence of water, but breaks down or changes its form at or below 450° C. It is not decomposed at 110° C. in the presence of 85% orthophosphoric acid.

The complex tends to be identified with the more asphaltic fractions of the crude, although its organic nature is shown by some solubility in all of the solvents used in this study.

The biological origin of the complex is suggested by the similarity of its structure to that of complexes of metals and porphyrins found in contemporary mammals and plants.

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Dialysis of Caustic Soda Solutions—Correction

In the article "Dialysis of Caustic Soda Solutions" [Marshall, R. D., and Storrow, J. A., *IND. ENG. CHEM.*, **43**, 2934-42 (1951)], the following corrections should be made:

Page 2934, first column, first paragraph, 12th line, insert references (7, 23, 43) after the words "tank type." Line 14, substitute "Barneveld dialyzers (20)" for "Kooij dialyzers." Second paragraph, first line, add reference (33).

Page 2934, second column, first paragraph, lines 12 and 13, should read "about half the attainable value (7) of 0.0013 gram of sodium hydroxide/(minute)(square cm.)(gram/ml.)." Paragraph 3, first line, insert (38) after word "equation."

Page 2936, first column, line 12 under Figure 2 should read "gives w , the total solute transferred in time, t ." Equation 11 should be $w = K(\Delta c_m)At$.

Page 2936, second column in the 10th line under Figure 3, the word "provides" should be substituted for "provide."

Page 2937, first column second line of the caption for Figure 4 should be "Left. Electrodes A to I." Line 18 under Figure 4 should read "were repeated after each test."

Page 2937, second column, first line should be changed to "hydrostatic pressure of less than a 4-inch water gage."

Page 2938, first column, in Table II, Part III, the heading over the third column should be " $\frac{dc_w}{dh} \times 10^3$, Cm.⁻¹." The heading over the last column of Part III of Table II should be " $K \times 10^3$, Mole/(Min.)(Sq. Cm.)(Mole/Ml.)." The heading "IV. Local Dialysis Coefficients Based on Lye-Side Data" should be inserted in Table II between Parts III and V. The heading over the last column of Part IV should read " $K \times 10^3$, Mole/(Min.)(Sq. Cm.)(Mole/Ml.)." In Part V, the unit for K_o should be "mole/(min.)(sq.cm.)(mole/ml.)."

Page 2938, second column, the first sentence following Equation 12a should read "Smoothed values of c_L and c_w could be taken from these equations." The second line of the equation at

the end of the first paragraph, giving the true mean value of K , should read "0.0075 mole NaOH/(min.)(sq.cm.)(mole/ml.)."

Page 2939, first column, line 2, "mole of sodium hydroxide/(minute)(sq.cm.)(mole/ml.)."

Page 2939, second column, line 6 under the heading "Membrane Resistance" should be "hydroxide/(minute)(sq.cm.)(mole/ml.)."

Equation 13 should be $k_2 = \frac{D}{nL}$.

Page 2940, first column, in Table IV, the heading of the first column should be " k_2 , Mole/(Min.)(Sq. Cm.)(Mole/Ml.)." The first line of footnote ^a in Table IV should read "Based on lye-side sodium hydroxide concentration as this seemed most suitable."

Equation at the bottom of the column should be $\frac{\partial}{\partial c} (c'D_m) = D$.

Page 2941, first column, the caption of Figure 9 should be "Concentration Distribution in Barneveld Dialyzer." Line 3 under Figure 9 should read "of 80.6 \times 80.6 sq. cm." rather than "80.6 sq. cm." Line 2 of third paragraph under Figure 9, the value for K should be "0.0054 gram/(minute)(sq. cm.)(gram/ml.)." Last paragraph, third and sixth lines, "Barneveld" should replace "Kooij" in each case. Line 9, the coefficients should have a value of "0.0075 gram/(min.)(sq. cm.)(gram/ml.)."

Page 2941, second column, the caption for Table VI should be "Operating Data for Barneveld Dialyzer." The heading over the third and fourth columns of Table VI should be " $K \times 10^3$, Gram/(Min.)(Sq. Cm.)(Gram/Ml.)."

Page 2942, first column, nomenclature, the units for K and k should be "gram-mole/(min.)(sq. cm.)(mole/ml.)." The unit for α should be "cm. minute/gram mole." In the second line of the value given for Δc , "+" before (Δc) should be omitted.

Page 2942, second column, unit for η should be "gram./cm. second." Reference (11) should read "Gmelin's 'Handbuch der anorganischen Chemie,' 8 Auflage, System-Nummer 20, Berlin, Verlag Chemie, 1927." Reference (25) should read "Marshall, R. D., M.Sc. Tech. thesis, Manchester, England, 1949." The last line of the second column should be "as a thesis to the Faculty of Technology, Manchester University, England."