from the directly measured value. We therefore commend the practice of deriving O_2 content from measurements of P_{O_2} for the purposes mentioned above, simply because of the consistency of the error in each estimate, which then cancels out on subtraction. This, of course, is possible only if the values being subtracted lie on an estimated/measured O_2 content relation having a slope of 1.00. Theye's results and ours clearly show that 1.39 overestimates the O_2-combining capacity of hemoglobin in practice, and we have found that the "traditional" factor of 1.34 is arbitrarily correct.

It is indeed paradoxical, in a world of progressive quest for greater accuracy in measurement, that we are forced to accept errors deliberately because of the intangibility of end-pulmonary capillary blood!

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To the Editor:—The letter from Dr. Prys-Roberts and associates stresses several uncertainties involved in calculating blood O_2 content from P_{O_2}, Hb, and HbO_2. My remarks will be confined to the point common to their previous[1] and our recent publication.[2]

In their and our laboratories, calculation of blood O_2 content using existing standard methods for the determination of P_{O_2}, Hb, and HbO_2 and the O_2-combining factor for Hb of 1.39 yields values for O_2 content which are significantly larger than those obtained by the Van Slyke procedure. There is little reason to question the absolute accuracy of the Van Slyke procedure, since it is direct, relies on no assumptions outside the realm of basic chemistry and physics, and has been validated by comparison with an independent standard.[3] Also, in more recent times, O_2 content by the Van Slyke procedure has been shown to agree with O_2 content determined by other, independent methods based upon measurement of P_{O_2} after release of the O_2 chemically combined with the Hb.[4, 5] Accordingly, it has been concluded that the error resides in the method for calculation of blood O_2 content. This is customarily accomplished by appropriate substitution in the equation:

$$\text{Blood } O_2 \text{ content} = P_{O_2} \times S + Hb \times F \times HbO_2,$$

where P_{O_2} is the tension of O_2 in the whole-blood sample, S is the O_2 solubility factor for the temperature at which P_{O_2} was measured, Hb is the concentration of hemoglobin available for combination with O_2, F is the O_2-combining factor of Hb, and HbO_2 is the fractional amount of hemoglobin chemically combined with O_2.

There is little reason to believe that the error resides in the calculation of the physically dissolved component ($P_{O_2} \times S$), since this is ordinarily less than 1 per cent of the total O_2 content and none of the possibilities considered would be of sufficient magnitude to eliminate the discrepancy. It is more likely that the problem resides in the calculation of the chemically combined component ($Hb \times F \times HbO_2$), as suggested by Prys-Roberts and ourselves. Possibilities include an erroneously high international standard for Hb relative to the actual amount of Hb available for combination with O_2, a theoretical value for F which

is greater than is realizable, and erroneous assumptions about the Hb–HbO_2 relationships and dissociation curve. Precisely which of these is involved is not clear to me at this time, and the suggestion of Prys-Roberts and ourselves to use a value for F less than 1.39 represents merely an empirical solution to the problem.

Hopefully, this interchange will provoke the interest of our physical chemist friends, who will, I believe, find this to be a challenging problem. Finally, I can only admire Dr. Van Slyke, who assiduously avoided the entire problem by labeling the method for determination of the chemically combined component "O_2 Capacity Method" and leaving for the individual the hazard of deriving Hb or F or HbO_2 from his findings.[6]

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Instrumentation in Operating Rooms

To the Editor:—The device described by Lomanto and Leeming ("A Safety Signal for Detection of Excessive Anesthetic Gas Flows," ANESTHESIOLOGY 33:663, 1970) is another example of unneeded instrumentation. Instruments can and often do not work. And, a very simple test is available to detect this problem. An anesthesiologist should breathe through the anesthetic circuit before applying it to a patient *every time* anesthesia is given. In addition to detection of the presence of anesthetic agents, valves can be checked for competence and leaks can be detected. This is an essential step in setting up.

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To the Editor:—It appears that Dr. Calmes does not understand the purpose for which the safety signal is designed. I agree that in recent times there has been a great clamor for more and more instruments in the operating room, and that the demand may be greater than the actual need. Monitors, however, should be used when indicated.

Dr. Calmes suggests that the anesthesiologist breathe through the anesthetic circuit to test for leaks and competency of valves before applying it to the patient. I disagree. This would constitute a breach of sterile technique, because in our institution all anesthetic equipment employed, from the patient to the soda lime canister, is gas-sterilized. One need not breathe through the circuit to test for leaks and competency of valves. This can be accomplished by merely occluding the Y connector and simultaneously squeezing the reservoir bag with the pop-off valve closed.

There has been much discussion about the anesthesiologist's educated hand. I am now informed that the anesthesiologist also has an educated nose. Admittedly, those gases with characteristic odors are readily detected. However, nitrous oxide, which is virtually odorless, would be extremely difficult to smell, and if it were flowing in quantities in excess of 80 per cent the sniffer would be flirting with danger. This practice is foolhardy and unnecessary, be-