

OBSTETRIC ANALGESIA

The Use of a Fixed Nitrous Oxide and Oxygen Mixture from One Cylinder

THIS communication is intended to publicise the fact that clinically useful mixtures of nitrous oxide and oxygen exist as a single gas phase at 2000 pounds per square inch on the gauge (P.S.I.G.) In the past theoretical considerations seem to have discouraged research into this possibility.

The use of gas mixtures from one cylinder is not new: in 1945 Barach and Rovenstine¹ recommended an 80% nitrous oxide and 20% oxygen v/v mixture, at a maximum cylinder pressure of 700 lb., for use in nitrous-oxide anaesthesia. Recently Dr. J. W. Haworth, of the British Oxygen Company Ltd., has shown that, at a pressure of 2000 P.S.I.G., oxygen has a considerable solvent effect on liquid nitrous oxide; and at this pressure, at room temperature, 75% nitrous oxide and 25% oxygen v/v exists as a single gas phase in the cylinder. This applies to all proportions of nitrous oxide in oxygen up to 75% v/v, but not above. The solvent action of compressed gases is known as the Poynting effect.

At St. Mary's Hospital, Portsmouth, a mixture of 50% nitrous oxide and 50% oxygen v/v, contained in one cylinder, has been used for the relief of pain in childbirth with the same effect as a corresponding mixture of gases from separate cylinders.

A great deal of development work will have to be done to assess the merits of this method of administering nitrous oxide and oxygen, and this will take time. Mixtures of nitrous oxide and oxygen in one cylinder are not generally available, and they have to be specially prepared in the laboratory. All the physical limits of such mixtures are not yet fully defined, and the mixtures are very much in the experimental stage. However, the discovery that

1. Barach, A. L., Rovenstine, E. A. *Anesthesiology*, 1945, 6, 449.

nitrous oxide, up to 75%, in oxygen remains in the gas phase until well above the pressure at which it normally becomes a liquid, holds promise for two reasons. Firstly, the cylinder space is utilised to the full; and, secondly, the nitrous oxide used for analgesia is made inseparable from a safe proportion of oxygen by a process which depends neither on a mixing device nor on two cylinders with different rates of emptying.

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