REFERENCES


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Another Method of Mixing Air and Oxygen

To the Editor—We have read with interest the recent letter of Priano, Solanki, and Gloya, concerning a simple method of mixing air and oxygen utilizing an Alligation Alternate.1 Nomograms do exist,2 but as correctly pointed out, usually are absent when needed. Calculation of flows to achieve the desired inspired oxygen concentration (FIO2) when mixing oxygen with one other gas, e.g., nitrous oxide or nitrogen, is simple.

We presume most persons delivering anesthesia have access to a simple hand-held calculator, and assume, for ease of calculation that room air is composed of 20% oxygen and 80% nitrogen. To mix air and oxygen we convert the air flow to the equivalent flow of pure nitrogen. This allows us to set the flow of air (Vair), and by simple subtraction from the total flow (Vtotal) set the flow of oxygen (VO2) as follows:

\[ V_{\text{total}} = V_{\text{air}} + VO_2 \]  
\[ V_{\text{air}} = \frac{V_{\text{total}} \times (1 - FIO_2)}{0.8} \]

thus,

\[ VO_2 = V_{\text{total}} - V_{\text{air}} \]

For example, assume one wishes a total flow of 10 l/min and a FIO2 of 0.4:

\[ V_{\text{air}} = \frac{10 \times (1 - 0.4)}{0.8} = \frac{10 \times 0.6}{0.8} = 7.5 \text{ l/min} \]

and

\[ VO_2 = 10 - 7.5 = 2.5 \text{ l/min} \]

Equation 2 may be rewritten as:

\[ V_{\text{air}} = \frac{V_{\text{total}} \times (1 - FIO_2)}{1.25} \] (4)

which allows one to obtain the answer without needing a calculator.

An inline, properly calibrated, oxygen analyzer gives a double check of one's calculations and its use is recommended.

REFERENCES


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