

TITLE: EVALUATION OF POET II (CRITICARE)
MULTIGAS INFRARED ANALYZER

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Infrared analyzers used for monitoring anesthetic agents are limited by their inability to automatically identify anesthetic agents and mixture of anesthetic agents.

Errors in filling anesthetic vaporizers can lead to the delivery of a wrong agent or a mixture of anesthetic agents at inappropriate concentrations.^{1,2}

We evaluated POET II (Criticare), an infrared analyzer capable of automatically identifying individual anesthetic agents and anesthetic agent mixtures by using calibration gas standards, and an anesthesia machine. For single agents 1% isoflurane, 1% enflurane or 1% halothane in nitrogen were used.

All the agents were identified automatically within 3.3 ± 0.3 seconds and the time to reach highest concentration was 7.29 ± 0.75 seconds. The accuracy for all agents was better than 0.08%.

To identify a mixture of anesthetic agents, a calibration gas consisting of 1% halothane, 1% isoflurane, 1% enflurane, 5% CO₂, 50 N₂O with balance O₂ used. All three agents were identified and displayed simultaneously on the monitor and the highest concentration was reached in an average of

32.7 ± 2.34 seconds. The accuracy for simultaneous identification of all agents was better than 0.1%.

In comparing the POET II analyzer to a mass spectrometer (Perkin Elmer) in identifying a single or a mixture of agents at various concentrations (0.2% to 5% delivered from an anesthesia machine) with unpaired T-test, no significant difference ($P < 0.05$) was found.

The POET II analyzer is able to identify specific anesthetic agents by utilizing the 7-16 micron infrared wavelength range where there is a differentiation between anesthetic agents. Compensations are made for temperature, pressure and N₂O interference. The response time of the unit is 500 msec.

In addition to the anesthetic agent monitoring, the POET II analyzer also measures inspired and expired concentrations of oxygen, nitrous oxide and carbon dioxide, performs pulse oximetry and displays up to 2 waveforms including capnogram.

POET II is an infrared anesthetic gas analyzer with the unique capability of automatically selecting and identifying individual anesthetic agents and anesthetic agent mixtures.

References

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TITLE: SENSITIVITY OF FEF END TIDAL
CO₂ DETECTOR

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The FEF end-tidal CO₂ detector (pH sensitive chemical indicator) depends on the color change to detect the presence of CO₂ in expired gas. Whether the color change in the indicator depends on the number of CO₂ molecules flowing past the indicator or the number of CO₂ molecules in contact with the indicator have not been investigated. The aim of this study was to determine the color changes observed with different concentrations and volumes of CO₂ when injected through FEF CO₂ detectors.

Methods. Different concentrations of CO₂ (0.5 to 2.5%) in oxygen were mixed in a 20 L. Douglas bag. Volumes of 40 ml. to 1000 ml. (dead space of detector 38 ml.) of the five concentrations of CO₂ were injected in 1 to 2 sec. through the FEF detector in a random fashion, with a new detector used for each CO₂ concentration. Eight volunteers were asked to match the color of the indicator with the color chart provided by the manufacturer. The FEF detector was flushed with 1.0 L. of atmospheric air following the color match to return the original color.

Results. Injection of same volumes and concentrations of CO₂ through the indicator did not give the same color change with each detector as observed by the volunteers. The color change observed depended on CO₂ concentration rather than the volumes injected through the detectors. The table shows percentage of each color range with different concentrations of CO₂ as indicated by the volunteers.

Color Range	Concentration of CO ₂ (%)				
	0.5	1.0	1.5	2.0	2.5
A	23	5	0	0	0
B	71	80	60	47	19
C	6	15	40	53	81

Discussion. This study indicates that color change in FEF CO₂ detector would primarily be influenced by the concentration rather than volume of CO₂ in the expired gas, i.e. the color change is dependent on the number of CO₂ molecules in contact with indicator. One disadvantage of the FEF CO₂ detector was the variability in color change observed by the volunteers. How this variability will affect the performance of this detector in clinical situations, e.g. CPR where the expired CO₂ is low, needs to be evaluated further.