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Title: Symptomatology during hypoxic exposure to flame-retardant chamber atmospheres

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Abstract: Hypoxia was studied in 12 men during 63-h exposures to 17 and 13% O₂, with the subjects serving as their own controls by repeating the measurements in 21% O₂. All test atmospheres were contaminated with 0.9% CO₂ to simulate the condition of living aboard submarines. The mean SaO₂'s were 97-98% in all conditions of 21% O₂, 96% in 17% O₂ (n.s.), and 92% in 13% O₂ (P less than 0.05). The blood concentrations of 2,3-diphosphoglycerate were elevated in 13 and 17% O₂ (P less than 0.05). Seventeen percent O₂ did not cause significant symptoms of environmental stress; however, 13% O₂ caused symptoms of acute mountain sickness in 5 of 12 men. In the last 7 h of exposure to 17% O₂, reduction of the barometric pressure to 576 Torr reduced the ambient PO₂ to 98 Torr (similar to the PO₂ of 13% O₂ at normobaric pressure). This induced symptoms of acute mountain sickness in 3 of 11 men. All symptomatology and physiologic changes were reversed during recovery in 21% O₂. Monitoring devices indicated the presence of volatile organic contaminants at a mean concentration of 6.1 ppm in the chamber atmosphere. Combustion tests in the occupied chamber showed that flame propagation was retarded by lowering the O₂ concentration from

21 to 13-17%. We conclude that men can live comfortably in a normobaric, flame-retardant atmosphere consisting of 17% O2-0.9% CO2-6.1 ppm volatile organic compounds-balance N2.

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