

- **1400 ppm:** Conservative tenability limit (5-10% COHb after 10-15 minutes)
- **3200 ppm:** Headache, impaired judgment within 10 minutes
- **6400 ppm:** Incapacitation within 10-15 minutes

5.5 Oxygen Depletion

Hypoxia Effects:

- **Normal atmospheric:** 21% (20.95% O₂)
- **17-19%:** Mild symptoms - increased heart rate and breathing
- **15-17%:** Impaired coordination, rapid fatigue, respiratory distress
- **12-15%:** Poor judgment, poor coordination, labored breathing
- **<12%:** Severe incapacitation risk

The 15% threshold provides a conservative safety margin. Oxygen depletion primarily occurs in confined spaces with significant fire loads and limited ventilation.

$$FED_{O_2} = \sum \Delta t / (\exp(8.13 - 0.54(20.9 - [O_2])))$$

This hypoxia model accounts for the exponential increase in incapacitation time as oxygen concentration decreases below normal levels.