

Unit 6:

O₂ Precautions and Preparing EAN_x

- **O₂ Precautions**
- **The Fire Triangle**
- **40% Rule**
- **Methods of Making Nitrox**



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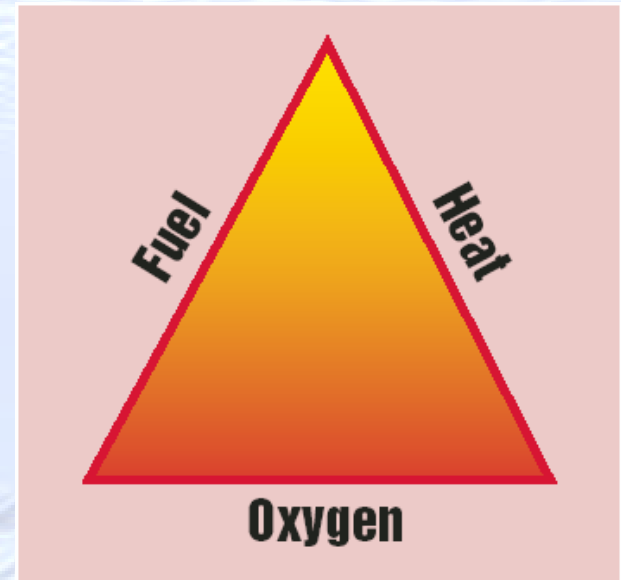
Student Performance:

By the end of the lesson you will be able to:

- **State the precautions that must be taken when around oxygen.**
- **Describe what the fire triangle is and how it applies to nitrox use.**
- **Describe oxygen cleaning is and what scuba equipment must be oxygen cleaned for nitrox use.**
- **Define the “40% Rule.”**
- **Describe how cylinders and valves are prepared for nitrox use and how they are marked as nitrox cylinders.**
- **List five methods that are used to make nitrox and which are most common.**

Oxygen Handling

- Firefighters use the concept of the “fire triangle.” In order for a fire to occur or continue, three things must be present: fuel, oxygen, and heat.
- As the fraction and partial pressure of oxygen increase, many materials that do not burn under normal conditions will burn if ignited.



Oxygen Handling continued

- **Equipment that will be used with pure or very high concentrations of oxygen must be specially prepared to withstand the oxygen and to prevent fires and oxidation.**

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Oxygen Handling continued

- **Equipment Considerations**
 - **Hydrocarbons and petroleum-based products must be avoided. This includes not only petroleum-based compressor lubricants but also the silicone lubricants normally used in scuba air systems. Neoprene, silicone “rubber,” plastic and metal shavings, even finely divided particulate matter all become potential fuels for a fire in an oxygen-rich environment, especially one at high pressure.**

Oxygen Handling continued

- **Oxygen Cleaning**
 - **The equipment must be “oxygen clean,” and “oxygen compatible” parts must be used in order to minimize the risk of fire or destruction by the oxygen.**
 - **After cleaning, future contamination must be avoided.**

Oxygen Handling continued

- **The 40% Rule**
 - **Any equipment that is to be used with pure oxygen or an oxygen level that is above 40% (and at a pressure above 200 psi) must be cleaned for oxygen service and have only oxygen-compatible parts.**
 - **This is a “rule of thumb,” but it is generally accepted for oxygen handling.**

Oxygen Handling continued

- **Equipment Preparation**
 - Normal maintenance service is sufficient for your regulator.
 - Your cylinder is a different matter.

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Oxygen Handling continued

- **Equipment Preparation** continued
 - **Cylinders must be prepared for designated nitrox service because most of the time pure oxygen will be used in preparing a nitrox fill.**
 - **After being cleaned for use with oxygen-enriched air, the cylinder will be labeled to clearly identify it as a nitrox cylinder.**

How Nitrox is Made

- **Partial-Pressure Mixing**
 - In partial-pressure mixing, the blending technician first puts a measured amount (pressure) of oxygen into the cylinder and then fills the cylinder to its service pressure with air.



How Nitrox is Made continued

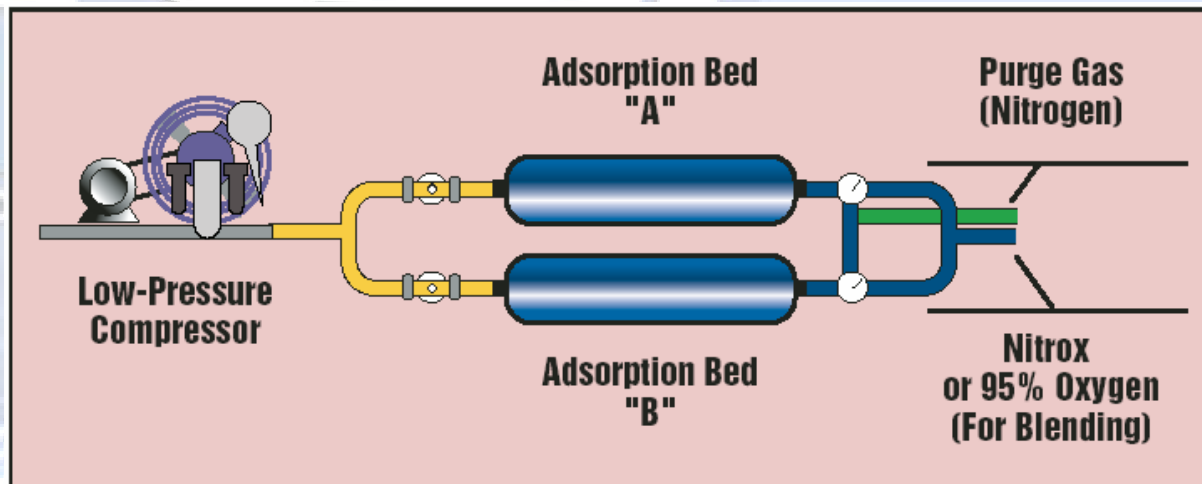
- **Continuous-Flow Mixing**
 - The continuous-flow method injects a measured flow of pure oxygen into the air before it reaches the intake of the compressor



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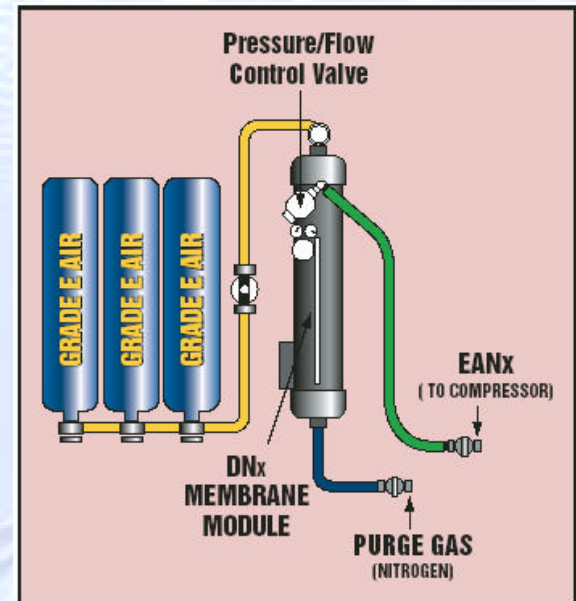
How Nitrox is Made continued

- **Pressure Swing Adsorption**
 - This method removes nitrogen from air rather than adding oxygen to it.
 - PSA passes air alternately over a molecular seive that adsorbs nitrogen.



How Nitrox is Made continued

- **Membrane Separation**
 - Membrane separation uses a semi-permeable “membrane” that allows oxygen to flow through it more readily than nitrogen.



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Your Responsibility

- **As a nitrox diver, you are responsible not only for your dive planning and execution but also for your equipment.**
- **You are also responsible for the correctness of what you will breathe.**
- **You are responsible for your cylinder's contents being what you asked for.**
- **A final step before you take the cylinder away with you is verifying the contents.**

End of Unit 6

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