Operate Breathing Apparatus

This training is based on the National Unit of Competency:

MSAPMOHS216A Operate breathing apparatus

Training Course Overview

You will learn about:

- **Conduct pre donning checks and tests on breathing apparatus**
- **Operate breathing apparatus**
- **Conclude operations of breathing apparatus**

Operate Breathing Apparatus Course Coverage

Introduction
Theory of breathing
Atmospheric hazards
The basics
Types of respiratory protection
Filter systems
Escape systems
Compressed air working systems – airlines
Self-contained breathing apparatus
How does it work
Safe operation of breathing apparatus
End of operations
Calculating duration
Breathing apparatus considerations
Maintenance of breathing apparatus

Module 1

1.1 Operate breathing apparatus

1.1.1 Introduction

This module is designed to make you a competent person to operate breathing apparatus.

In many workplaces there will exist atmospheric hazards. You need to be aware of various types of respiratory protection available to enable you to make an appropriate selection. This module will also have a practical component requiring you to safely use breathing apparatus open circuit, which is commonly used on confined space rescue or operating in unsafe atmospheres.

This module will cover:

- Conduct pre donning checks and tests on breathing apparatus
- Operate breathing apparatus
- Conclude operations

What you need to know:

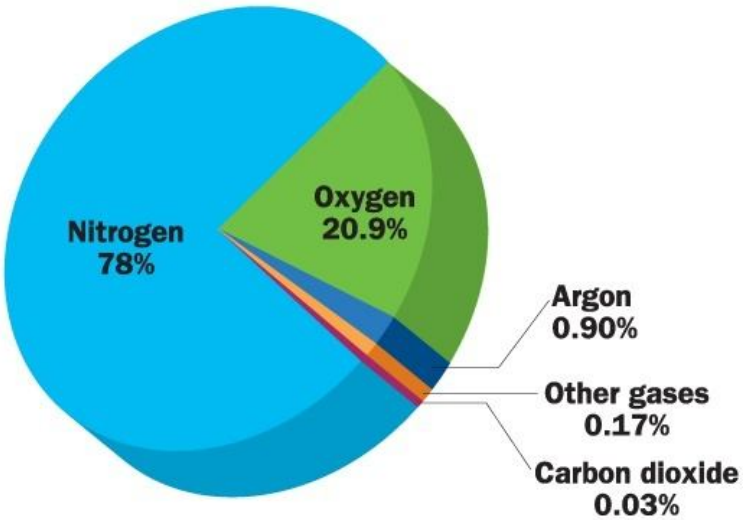
- Theory of breathing & the effects of respiratory hazards
- Operation of breathing equipment
- How to correctly use breathing equipment

Upon successful completion of this programme you will receive a certificate of attainment for the national unit of competency **MSAPMOHS216A Operate breathing apparatuys**

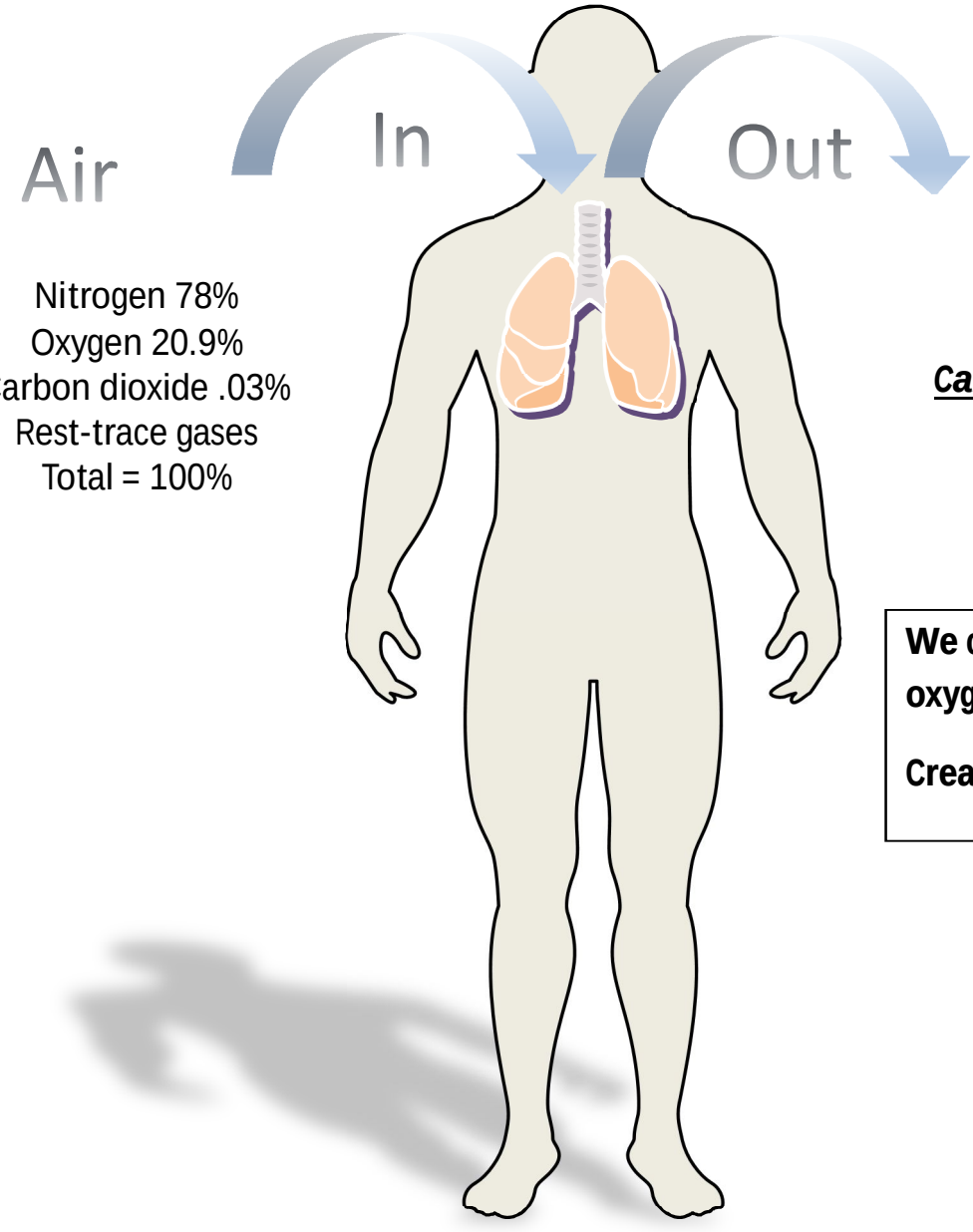
1.1.2 Theory of Breathing

Air is made up from a mixture of gases.

- Nitrogen 78.085%
- Oxygen 20.946%
- Carbon Dioxide 00.033%
- Trace Gases 00.997%



The act of respiration.



We consume approx. 4% oxygen &

Create 4% carbon dioxide

Oxygen Excess occurs due to a pure oxygen source leaking into your space causing an explosive environment.

Oxygen Deficiency can occur due to displacement by another gas, consumption or oxidisation and therefore is a danger to life and health

Carbon dioxdie CO2 is a waste gas and needs to be expelled from the body. We call carbon dioxide and a stimulus gas, it stimulates us to breathe.

1.1.3 Atmospheric Hazards

The atmosphere has many respiratory hazards which can include:

Dust – small solid particles of material floating in the air that can be harmful

Fumes – small solid particles generally created from heated metal operations such as welding or soldering. This material can be very harmful to the lungs

Mists – suspension of fine drops of liquid in a gas, what is the source of the mist?

Gases - an air-like fluid substance which expands freely to fill any space available, irrespective of its quantity. Can be harmful

Vapours - a substance diffused or suspended in the air, especially one normally liquid or solid. i.e. solvent vapours

Remember the three principle hazards with gases and vapours are TOXIC, EXPLOSIVE & OXYGEN EXCESS or DEFICIENCY.

1.1.4 Types of respiratory protection

1.1.4.1 Filter Systems

Air-purifying respirators are used against particulates (such as smoke or fumes), gases, and vapours that are at atmospheric concentrations less than immediately dangerous to life and health. The air-purifying respirator class includes:

- negative-pressure respirators, using mechanical filters and chemical media
- positive-pressure units such as powered air-purifying respirators (PAPRs)

Filter Types

There are two main types of filters:

- Paper and/or activated charcoal filters
- Charcoal is impregnated with heavy metals is a form of carbon processed to have small, low-volume pores that increase the surface area available for adsorption or chemical

reactions.

- Paper and/or activated charcoal filters are designed to filter out particles, dusts, gases, fumes, mists and vapours.

- They are NOT designed to be used in "IMMEDIATELY DANGEROUS TO LIFE AND HEALTH" IDLH environments. ***Remember than need to be changed due to saturation and cannot be used in areas low in oxygen.***

1.1.4.2 Escape Systems

These systems are designed to be carried on the person, and then activated and placed on once the hazard has presented itself.

They come in two forms:

- Air escape

- Closed circuit escape

Air Escape

This open circuit air escape is a system which includes a cylinder filled with compressed air with a constant flow regulator fixed to the valve. The duration of the set depends on cylinder capacity, not personal breathing rate. These units are only designed for escape

Closed Circuit Rebreather (CCR)

This escape system functions by:

- Removing carbon dioxide from the exhaled air using a scrubbing chemical.

- Add in oxygen either chemically, or from a small cylinder to replace oxygen consumed

- These units are designed to operate for periods from 30 – 90 minutes

1.1.4.3 Compressed Air Working Systems

These systems are designed for workers to wear whilst working in contimanted environments and supply the worker with compressed air. They are:

- Airline systems either from a bottle bank or breathing air compressor
- Self Contained Breathing Apparatus (SCBA) where you carry the cylinder on your back

1.1.5.4.2 Safe Operation of Breathing Apparatus

When setting up breathing apparatus in preparation for use, there is a five point check list:

1. ***Visual Inspection***
2. ***High Pressure contents***
3. ***High Pressure leak check***
4. ***Low Pressure Warning Whistle check, &***
5. ***Positive & Negative Mask check***

1.1.5.4.4 Calculating Duration

It is important that you know how to calculate your consumption rate, and then be able to calculate the duration of the breathing apparatus you are using. ***As a rule industry uses 40 litres per minute*** as the industry average for consumption.

Calculate your duration:

(Your Consumption Rate)YCR $= WC \times AU \div T$

e.g. $YCR = 6.8ltrs \times 130bars \div 15mins$

YCR = 58.9ltrs/min

(Your Duration)YD $= 6.8ltrs \times 300bars \div 58.9ltrs/min$

YD = 34.63mins including WWT

(Your Operation Time) $YOT = 34.63mins - 9.35mins$

$YOT = 25.28mins$

WC = Water Capacity

FP = Fill Pressure

T = Time

AU = Air used

C = Consumption Rate

Factors that effect your consumption rate:

- **Lung volume**
- **Fitness**
- **Smoking**
- **Claustrophobia**
- **Effort**
- **Experience levels**

Typical consumption rates based on an average person:

- Resting = 5-20l/m
- Moderate work = 20-30l/m
- Average work = 30-70l/m
- Hard - very hard work = 70-200l/m

Be aware - cylinders are filled with dry medical breathing air produced from a specially made high pressure air compressor. These breathing air compressors have been designed if maintained correctly not to create any contaminants in your breathing air. **We do not use LP compressors designed for air tools and spray painting for breathing air, the air will kill you.**