SYSTEM DESCRIPTION AND OPERATION

What makes the AfroxPac work?

The AfroxPac contains a specifically designed chemical bed holding a chemical known as potassium superoxide or (KO_2).

How does it give me air or oxygen?

As the user breathes into the AfroxPac, his/her breath passes through the chemical bed. His/her breath contains water vapour (H_2O) and carbon dioxide (CO_2). The water vapour reacts with the potassium superoxide producing potassium hydroxide (KOH) and liberating oxygen (O_2). Most of the carbon dioxide (CO_2) reacts with the potassium hydroxide to produce a stable compound, potassium carbonate (K_2CO_3).

The chemical reactions taking place can be simply described as follows:

$$KO_2 + H_2O = KOH + O_2$$

(potassium superoxide) + (water) = (potassium hydroxide) + (oxygen)

$$KOH + CO_2 = K_2CO_3 + H_2O$$

(potassium hydroxide) + (carbon dioxide) = (potassium carbonate) + (water)

During use, more complex reactions occur than noted above, but for the level of training required, these reactions given should suffice.

HOW DOES THE AFROXPAC WORK IN PRACTICE?

When the AfroxPac is used the following happens:

As the user exhales into the mouthpiece, his/her breath passes down the breathing tube into the AfroxPac. The exhaled breath passes over the heat exchanger. Thereafter it passes through a special filter and then through the chemical bed containing the potassium superoxide (KO_2).

The moisture in the breath reacts with the KO_2 forming potassium hydroxide and liberates oxygen, which passes through the opening at the bottom of the chemical canister into the breathing bag. At the same time, carbon dioxide (CO_2) combines with potassium hydroxide to form potassium carbonate. CO_2 is thus removed from the air stream.

Note: *The air becomes heated by the chemical reaction that takes place. This is a normal phenomenon.*

It should also be noted that high concentrations of CO_2, formed by the body when consuming oxygen, is toxic to the human body and must be removed from the breathing circuit.

Upon inhalation, air reverses its flow, i.e. through the chemical bed where more oxygen is liberated and carbon dioxide removed, and through the filter to remove any chemical dust particles. It then passes over the heat exchanger to cool the air, into the breathing tube and finally into the lungs.

Note:

- The AfroxPac will supply breathable air for approximately 30 minutes at a breathing rate of 30 – 35 litres per minute. This breathing rate is the equivalent to that which will be measured when a person of about 70kg mass is walking at a pace of 4.5 kilometres per hour up an incline of 5 degrees.

- As the AfroxPac produces more oxygen than required, the breathing bag will become fully inflated during operation and excess oxygen will be expelled via the relief valve. This is normal and should not be of any cause for concern when experienced.

- Best results are obtained when the user remains calm and proceeds along the escape route at a normal brisk pace.

A diagrammatic representation, depicting the most important components and principle of operation is given in Figure 1.

(Figure 1) AFROXPAC SCSR – DIAGRAMMATIC REPRESENTATION