

'WAY UP THERE

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Since this partial pressure is just half of that required to equal normal sea level conditions, we can bring the oxygen requirements to normal by breathing 42% oxygen in our oxygen mask.

Figure 2 gives the oxygen conditions at various altitudes.

Sea Level	160	21 (normal)	100
18,000	80	42	100
33,500	40	84	100
34,000	33.6	100	100
40,000	29.4	100	87
41,000	28.56	100	85

FIG. 2

We can understand why the indicated altitude read on the altimeter governs oxygen needs and not true altitude. When the partial pressure of oxygen is too low, there are some alternatives which we may use.

One method is to increase the pressure of the air which we are in such as pressure cabins, suits, etc. We can also increase the percentage of oxygen with the results shown in Fig. 2. Too, we can breath 100% oxygen under pressure or a combination of the remedies named.

When the oxygen saturation of the blood in the arteries drops below 95%, which is normal oxygen content at sea level, anoxia starts. Anoxia is from the Greek meaning "without oxygen."

Above 34,000 feet, breathing 100% oxygen, the oxygen in the blood decreases quite rapidly. At 40,000 feet, there is barely enough partial pressure of oxygen to keep the content of the blood within safe limits.

Some people are affected more than others by oxygen want. However, without a mask and no exercise, generally speaking a person would keep his senses for 30 minutes, or so, at 18,000 feet. Consciousness would last only a few minutes at 25,000 feet, at 30,000, only a minute or so.

The blood's saturation decreases to 85% at 11,000 without a mask, or 41,000 with a mask. If the ascent is gradual, the flyer may feel fine.

He may feel much too good for his own welfare for his oxygen is undergoing depletion and his judgment and vision are in error. Night vision is only half as good at 12,000 feet as at sea level.

At 13,000 feet without a mask — or 42,000 with, the oxygen saturation is down to 80%. One gets pretty dull

mentally with clouding of thought and memory, perhaps tremor of hands, under these conditions.

At 18,000 feet without a mask — or 44,000 with, the oxygen saturation is down to 70%, which is the virtual limit of human tolerance.

Under these conditions, you may faint when pain or fear is involved. Vision may become double. Muscles are leaden and may hurt when worked. The fingers and face get bluish. The body is really giving the warning that the knock-out punch is near.

Now, anoxia is deceiving and many pilots will deny the truth of the above statements.

This writer has climbed to over 20,000 feet without oxygen; another time — at 25,000 — the valve in my mask acted up; another time my oxygen system failed completely at 29,000 feet.

All of these conditions are unhealthy and do not disprove any preceding statements.

We know the reason the blood cells cannot pick up the proper amount of oxygen at high altitudes. There are a few conditions which can make the situation worse.

Some drugs and their gases tend to block up the tissues so the blood cannot unload its oxygen, thus the oxygen returns to the lungs.

Remember too, as mentioned before, carbon monoxide is absorbed 200 times more readily than oxygen.

Another condition which should be considered is the flow of blood. Fear, pain, injury or shock may cause the blood flow to drop below normal and cuts the supply of oxygen through the body.

Anyone can stand a little anoxia with no harm. A man about to pass out from it may completely recover within 15 seconds if his oxygen is brought back to normal.

Once you become unconscious, it can kill quickly. However, bodily damage is rare, if you recover.

Since oxygen has no taste, smell or color, it is very necessary to have some type of flow indicator in the oxygen system. The mask should be on at 18,000 feet. The regulator should be checked to see that it is giving 100% oxygen at around 30,000 feet.

The diluter demand regulator is OK to 40,000 feet. With a pressure demand regulator, you may go a few thousand feet over 40,000.

However, between 8 and 12 miles is the range where the saliva bubbles,

then the skin balloons in places under the pressure of water vapor rising beneath it, and finally the blood itself, starts to boil.

We must have a pressurized cabin or suit for these altitudes.

You should think about going down when the oxygen tank pressure gauge gets down to 100 pounds. You should be down to 10,000 feet by the time the gauge reads 50 pounds. Any time you are above 30,000, be certain that your mask does not leak. It is uncomfortable to wear tight, but keep it that way.

When the top of a carbonated beverage is removed, gas bubbles rush to the top. Reduce the pressure on the body and much the same thing results.

Nitrogen plus small quantities of oxygen, carbon dioxide, water vapor, etc., have been absorbed by the flesh and blood which are held there by the outside pressure of air. The circulation of the blood tends to remove these excesses of gas (mostly body nitrogen) but the process is slow.

Above 30,000 feet, "bends" may occur. The bubbles of gas, seeking an exit, appear in joints and fat tissues just as suffered by deep-sea divers and caisson workers. The bubbles can be painful in the muscles and bloodstream and cases may paralyze arm or leg.

A very serious condition, which occasionally appears as a burning sensation in the lungs, is called the "chokes." It may be followed by stabbing pains and a desire to cough, but coughing gives no relief.

A feeling of suffocation, bluish discoloration of nails and lips may occur in severe cases. Unconsciousness may follow. By staying below 30,000 there is little worry about bends or chokes.

Overweight is bad as nitrogen bubbles collect in fat. People vary in the susceptibility to bends or chokes. Should bends occur, the pain will usually disappear if you descend to 25,000 feet or so. However, lung trouble may continue.

If near collapse or unconscious, descent is imperative. Use 100% oxygen. No permanent injury is known to have resulted from these discomforts.

Might mention that no harm results, such as brittle teeth, pneumonia, etc., from breathing pure oxygen.

Be careful what you eat before a high flight. Dried beans, hot dogs, cucumbers, cooked cabbage, onions

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