NOBENDEM QUIZ 6

Alrighty now!! Stay with me on this one! We're going to do some interesting things with decompression times – and, of course, what I'm REALLY interested in – is WHY it works that way!!

Lets make a dry chamber dive to 165FSW on air. We'll take 4 minutes to make the descent, and stay at 165 for 8 minutes - - work up a really great narc! Then we'll amble back up to 60 FSW at an ascent rate of 30 FPM, and stay at 60 for 10 minutes to collect some research samples. Finally, we're ready to make our ascent to the surface and want to calculate our decompression profile! We have a couple of "over 40" individuals along with us for the ride – so will need to use a safety enhancement of 65.

We will make the first stop at 30 FSW, the second at 20 FSW, and the third (if used) will be at 10 FSW. For the purposes of this quiz, assume we are totally immune from any possible CNS oxygen toxicity effects and will not need any air breaks during the decompression. All ascent segments are made at 30 FPM. Optimize all decompression profiles by taking into account the decompression that occurs during your ascents!

For the first set of questions, assume we use oxygen for the entire decompression profile – from the time we leave 60 FSW until we exit the chamber at the surface. Now consider two possible profiles: in the first, determine the required profile if the only stops made are at 30 FSW, and at 20 FSW - - that is, you STAY at 20 FSW until you are clean to proceed to the surface; in the second, determine the required profile if you make all three stops at 30, 20, and 10 FSW. Before you begin, think about the factors involved and try to decide which profile, if any, will produce the shortest total deco time!

For the second set of questions, assume we use 50/50 Nitrox for the entire decompression profile – from the time we leave 60 FSW until we exit the chamber at the surface. Again consider two possible profiles: in the first, determine the required profile if the only stops made are at 30 FSW, and at 20 FSW - - that is, you STAY at 20 FSW until you are clean to proceed to the surface; in the second, determine the required profile if you make all three stops at 30, 20, and 10 FSW. Think about the factors involved and try to decide which of these profiles, if any, will produce the shortest total deco time!

Bonus Question: HOW COME??!! Explain the results, as well as any differences between the expected profiles on oxygen and on Nitrox!

THE ANSWERS AND EVERYTHING

Profiles generated using 100% O2:

Depth	Stop Time
30	2
20	18
Residual N2	5690

Depth	Stop Time
30	2
20	5
10	13
Residual N2	5709

Profiles generated using 50/50 Nitrox:

Depth	Stop Time
30	5
20	64
Residual N2	7044

Depth	Stop Time
30	5
20	12
10	36
Residual N2	6638

For TOTAL deco times, ADD 2 minutes to each to account for the 60-foot ascent at 30 FPM.

Note that for the Oxygen decompressions, there is essentially NO difference between the resultant profiles (both are 20 min plus 2)! That means that the only reason to make more than one stop with oxygen is to minimize any potential for CNS O2 toxicity – which builds up more quickly, the deeper you are! So, although there is no time benefit, for longer required decompressions you may wish to ascend to a shallower depth as soon as possible. The ***REASON*** the deco times are the same is that when using 100% O2 you are denitrogenating against an external nitrogen partial pressure of ZERO - - independent of your depth! There is NO nitrogen in your decompression gas! Thus, it doesn't matter WHERE you stop, as long as you take the required amount of time for the ascent!

For the Nitrox decompressions there is a significant difference between the two profiles! Going shallower sooner produces a net reduction in total deco time of 16 minutes (53+2 compared to 69+2), *as well* as lowering the residual nitrogen load by 6%! In this case there IS a direct effect of depth on the partial pressure of nitrogen in the decompression gas! What drives the RATE of decompression is the difference between the tissue nitrogen level and the partial pressure of nitrogen in the inspired gas mix! The shallower you are, the greater this differential offgassing pressure becomes, leading to more rapid overall decompression!

The large safety enhancements used for dry diving are really only practical where 100% O2 is available as a decompression gas. The decompression time required for this relatively brief bottom time dive using even 50/50 Nitrox would be a grievous disincentive for most normal humans!