DecoChek-DIVE ANALYSER

User Guide V1.01

The purpose of the program is to analyze dive profiles against the Combined Decompression Model CDM-18. This represents a summary of all 'man-tested' decompression research and should thus identify any problems in your proposed dive plan. These dive profiles are usually generated by 3rd party decompression software. The analyzer is created in Microsoft-Excel spreadsheet format. Inputting data is easy. Simply enter figures into the data fields highlighted in yellow. To enter a dive plan, Input your descent runtime, in one minute increments, next, input the depth you expect to arrive at by this time.

The Descent:-

Run-time	Depth(m)
0	0
1	20
2	30
3	40
4	50
5	60
6	60
8	60
10	60
12	60
14	60
16	60
18	60
20	60
21	50
23	39
24	36
25	33
26	30
27	27
28	24
29	21
30	18
31	15
32	12
37	9
45	6
55	3
56	0

The first input row is the dives "run time", always start with zero time with zero depth. The run time should move down the screen in one-minute intervals, until the target depth is reached. You can input the depths you expect to be at in the next column.

Bottom Time:

Once you have reached your target depth, input the time in 2 or 5-minute intervals(or at least 4 evenly spaced data points during the bottom time of long dives) at the same depth. This staged input method will give smoother graphs later. As you input the dive time at maximum depth you will notice in column C, your current ascent ceiling.

You could theoretically ascend directly to this depth, although you should aim to ascend no faster than 10metres shallower every 1 minute on dives shallower than 150m.

10 meters per minute is acceptable while ascending from 150m to 10m.

15 meters per minute is acceptable while ascending from 200m to 150m.

20 meters per minute is acceptable while ascending from 250m to 200m.

25 meters per minute is acceptable while ascending from 300m to 250m.

The Ascent:-

From your bottom depth, add 1-minute time while ascending 10 meters depth, repeat this until you reach the ascent ceiling (from column C). On deeper stops, remain at the stop for as long as it takes to get a next stop depth at least 3m shallower than your current depth.

Run-time	Depth(m)	Ceiling(m)
0	0	0.00
1	20	-4.57
2	30	3.17
3	40	11.04
4	50	18.97
5	60	26.93
6	60	31.17
8	60	34.63
10	60	35.61
12	60	35.89
14	60	35.97
16	60	35.99
18	60	36.00
20	60	36.00
21	50	32.26
23	39	22.90
24	36	20.17
25	33	19.12
26	30	17.94
27	27	16.64
28	24	15.41
29	21	13.82
30	18	12.24
31	15	10.67
32	12	9.55
37	9	6.12
45	6	1.83
55	3	-0.41
56	0	-0.58

Warnings:

If you ascend beyond a decompression ceiling, you will see a DCS warning appear in red. You should increase the time at the previous stop until an ascent ceiling at least 3 meters shallower is shown.

A minus number is given as the ascent ceiling, when it is safe to go from the last decompression stop to the surface.

Breathing Gases:

Input your chosen breathing gas selections into the columns 4 and 5. These values will be oxygen values or helium values. The appropriate PO2 values will be shown in column J. The appropriate EAD value for helium content will be shown in column R. Adjust the oxygen values and helium to suit your personal preferences and the logistics of the dive.

Warnings:

When selecting a new ascent gas, if the gas you input puts you at risk of counter diffusion, a warning will appear in red saying ICD, this is an abbreviation for Isobaric Counter Diffusion. This condition can occur when you breathe a gas containing mixtures which effectively raise your current EAD value above a pre determined limit. This limit is the result of the current decompression ceiling relative to your current EAD.

%-Oxygen	%-Helium
21	0
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
20	30
50	0
50	0
50	0
50	0
50	0
100	0
100	0
100	0

You must avoid breathing counter-diffusing gases when the ICD warning is given. To remove the ICD warning you should increase the Helium value in your next mix or raise your ascent ceiling, which is easiest to do by reducing time at depth. In borderline cases, increasing the pre gas switch stop by a minute or two can remove mild ICD risks.

Isobaric Counter Diffusion Predicting Algorithm

The DecoChek software is the first program to actively warn users when conditions are present that have caused decompression complications due to counter diffusing gases in the past. Technical divers are descending deeper and longer than before. As the dive becomes more extreme, conditions will occur that will become dangerous if counter diffusing gases are not considered during pre dive planning.

Counter Diffusing Gases are seldom a problem during recreational technical scuba dives, but as time spent in deep water increases, certain fast tissues within the human body become very vulnerable to gas changes during ascent. The gas mixes used in scuba diving often have very different solubility and diffusing characteristics. A gas with high solubility for example Nitrogen can have disastrous consequences if introduced to a tissue that is pre saturated with Helium which has low solubility. The Helium will be rapidly displaced as a gas, causing tissue damage. This tissue damage has typically impacted the faster tissues during deep decompression stops during gas switches. The problem is vastly exacerbated by inappropriate decompression schedules. A gas with low solubility often has high diffusability and vice versa.

There are other forms of Isobaric Counter Diffusion that have affected experimental divers during descent, another type affecting commercial divers inspiring mixtures that differ from their surroundings.

Adjusting Half Times

half time(mins)	1.1	1.8	3	5	7	10	15	20	30	40	50	60	80	100	120	240	480	640
Crit-edge-bar	2	2.72	2.94	2.72	2.54	2.38	2.2	2	1.82	1.66	1.6	1.5	1.43	1.34	1.34	1.34	1.34	1.34
Crit-edge-(m)	15.3	24.4	27.2	24.4	22.2	20.1	17.8	15.3	13.0	11.0	10.3	9.0	8.1	7.0	7.0	7.0	7.0	7.0
Asc-limit(bar)	T1.1	T1.8	T3	T5	T7	T10	T15	T20	T30	T40	T50	T60	T80	T100	T120	T240	T480	T640
-0.55	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
-0.46	1.54	1.30	1.12	1.00	0.94	0.90	0.86	0.84	0.83	0.82	0.81	0.81	0.80	0.80	0.80	0.79	0.79	0.79
0.32	2.32	1.91	1.55	1.28	1.15	1.05	0.97	0.93	0.88	0.86	0.85	0.84	0.82	0.82	0.81	0.80	0.80	0.79
1.10	3.10	2.58	2.06	1.63	1.42	1.25	1.11	1.03	0.95	0.91	0.89	0.87	0.85	0.84	0.83	0.81	0.80	0.80
1.90	3.90	3.29	2.62	2.04	1.74	1.49	1.27	1.16	1.04	0.98	0.94	0.92	0.89	0.87	0.85	0.82	0.81	0.80
2.69	4.69	4.03	3.24	2.50	2.10	1.76	1.47	1.31	1.14	1.06	1.01	0.97	0.93	0.90	0.88	0.84	0.81	0.81
3.12	5.12	4.53	3.72	2.91	2.43	2.02	1.65	1.46	1.25	1.14	1.07	1.02	0.97	0.93	0.91	0.85	0.82	0.81
3.46	5.46	5.10	4.42	3.56	3.00	2.48	2.00	1.73	1.44	1.29	1.19	1.13	1.05	1.00	0.96	0.88	0.83	0.82
3.56	5.56	5.37	4.86	4.05	3.47	2.89	2.32	1.99	1.63	1.44	1.31	1.23	1.12	1.06	1.02	0.90	0.85	0.83
3.59	5.59	5.49	5.13	4.43	3.85	3.24	2.61	2.23	1.81	1.58	1.43	1.33	1.20	1.12	1.07	0.93	0.86	0.84
3.60	5.60	5.55	5.30	4.71	4.17	3.54	2.87	2.46	1.98	1.71	1.55	1.43	1.28	1.18	1.12	0.96	0.87	0.85
3.60	5.60	5.58	5.41	4.93	4.42	3.81	3.11	2.67	2.14	1.85	1.66	1.52	1.35	1.24	1.17	0.99	0.89	0.86
3.60	5.60	5.59	5.48	5.09	4.63	4.04	3.33	2.87	2.30	1.97	1.76	1.62	1.42	1.30	1.22	1.01	0.90	0.87
3.60	5.60	5.60	5.53	5.21	4.81	4.24	3.53	3.05	2.45	2.10	1.87	1.71	1.50	1.36	1.27	1.04	0.92	0.88
3.23	5.23	5.34	5.38	5.16	4.81	4.28	3.59	3.11	2.50	2.14	1.91	1.74	1.52	1.39	1.29	1.05	0.92	0.89
2.29	4.29	4.58	4.84	4.86	4.65	4.23	3.62	3.16	2.57	2.20	1.96	1.79	1.57	1.42	1.32	1.07	0.93	0.90
2.02	4.01	4.29	4.60	4.71	4.56	4.20	3.62	3.18	2.59	2.23	1.99	1.81	1.58	1.44	1.34	1.07	0.93	0.90
1.91	3.74	4.02	4.36	4.54	4.45	4.15	3.61	3.19	2.61	2.25	2.01	1.83	1.60	1.45	1.35	1.08	0.94	0.90
1.79	3.49	3.76	4.12	4.37	4.33	4.08	3.60	3.19	2.62	2.27	2.02	1.85	1.61	1.46	1.36	1.09	0.94	0.90
1.66	3.24	3.50	3.88	4.19	4.20	4.01	3.57	3.18	2.63	2.28	2.04	1.86	1.63	1.47	1.37	1.09	0.94	0.91
1.54	3.00	3.25	3.64	4.00	4.06	3.92	3.53	3.17	2.63	2.29	2.05	1.87	1.63	1.48	1.38	1.10	0.95	0.91
1.38	2.32	2.71	3.21	3.68	3.83	3.76	3.44	3.11	2.61	2.27	2.04	1.87	1.63	1.48	1.38	1.10	0.95	0.91
1.22	1.89	2.29	2.84	3.39	3.60	3.60	3.35	3.05	2.58	2.26	2.03	1.86	1.63	1.48	1.38	1.10	0.95	0.91

Warning : incorrectly setting the pre set Half time and m-values to values not confirmed by 'man-based' testing will make the analysis sheet useless.

Interesting comparisons may be made substituting different tissue model values corresponding to Buhlmann, USN, DCAP,COMEX etc.
If you change any of these values, save a copy of the original sheet first!

For those wishing to change the Half time values and ascent limitation values (purely for demonstration purposes), simply modify these values in the sheet. As you modify these values, for instance, the fast times T1-T2, you will see the changes to the first stop depths. If you change the slower tissue limits T60-T120, you will see the shallower stop times change. The decompression stops and times there at, are a function of tissue half time and ascent limit (critical-edge) in bar (ata) for that tissue. You will see that the slower the tissue, the smaller the ascent limit. The Ascent limit is sometimes called an M value.

Interestingly the ascent limits for the fastest tissues T1-T2 have small ascent limits (critical-edge) also, these are the helium stop values. Helium being a dynamic gas, needs a more "controlled" ascent than nitrogen. If you are using Air or Nitrox gases, you may want to want to make the fastest values the same as T3

Display Options

The DecoChek incorporates many data fields, to get a less cluttered view of the dive plan, choose one of the visual display options, by switching through the various graph modes located on the tabs at bottom left.
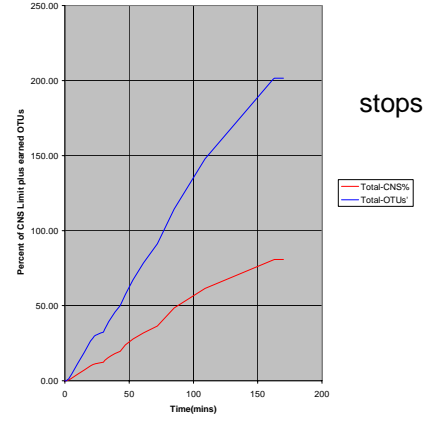
Gas mixes, Depth and EAD

Legend:
- Depth(m)
- %-Oxygen
- %-Helium
- EAD(m)
- Ascent Ceiling
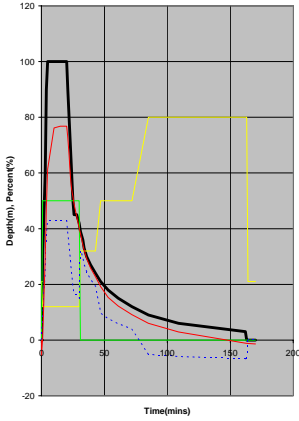
To fix a dive plan full of warnings, add time to the deco or, change your dive software!

Have fun…dive safe…dive educated

Oxygen CNS & Earned OTUs

stops

Legend:
- Total-CNS%
- Total-OTUs'

Ascent Ceiling

Time(minutes)

Legend:
- Dive Profile
- Ascent Ceiling