

# DEEP INTO DECO

The Diver's Decompression Textbook

Asser Salama



**SSI** SCUBA SCHOOLS INT.  
© Albrecht Salm  
Instructor No. 12653

A  
0312015

**BE**  
**BC**

# CONTENTS

FOREWORD.....	1
INTRODUCTION.....	2
1 HISTORICAL PERSPECTIVE .....	4
2 BASIC DECOMPRESSION PRINCIPLES .....	10
Halftimes .....	12
Supersaturation, gradient and critical supersaturation .....	13
Ascent rates .....	15
3 DISSOLVED-GAS (HALDANEAN) MODELS .....	16
Haldane.....	16
Workman.....	17
Bühlmann .....	17
Adaptive algorithms .....	19
Deep stops.....	20
Gradient factors.....	22
4 NITROX.....	25
Nitrox physiology .....	27
Nitrox for accelerated decompression.....	30
5 MIXED GAS.....	33
Which gas? .....	33
High-pressure nervous syndrome (HPNS).....	35
Using trimix.....	36
Isobaric counterdiffusion (ICD) .....	41
6 DUAL-PHASE (BUBBLE) MODELS.....	44
Asymptomatic (silent) bubbles .....	44
Evolution of dual-phase (bubble) models.....	46
Varying permeability model (VPM) .....	47
Critical volume algorithm (CVA) .....	51
VPM with Boyle's Law compensation (VPM-B).....	52
VPM-B conservatism .....	53
VPM-B variations .....	54
Reduced gradient bubble model (RGBM).....	56
Combined models .....	57

7 OTHER DECOMPRESSION MODELS .....	58
Slab diffusion .....	58
Kidd–Stubbs.....	58
U.S. Navy exponential linear (USN E-L) .....	59
Probabilistic models.....	60
Decompression Computation and Analysis Program (DCAP) .....	62
Arterial bubble (AB).....	63
Copernicus.....	65
SAUL.....	66
8 VARIOUS TOPICS .....	68
The oxygen window.....	68
Flying after diving (FAD).....	69
Accelerating no-fly time .....	70
Diving at altitude .....	78
Conservatism .....	78
Ultra-long halftimes.....	80
Asymmetric gas kinetics .....	80
Oxygen bends .....	81
Patent foramen ovale (PFO) .....	82
Multilevel dives.....	83
Temperature .....	85
Dehydration .....	86
Exercise.....	87
Omitted decompression .....	88
In-water recompression (IWR).....	89
Acclimatization .....	90
Washout treatment .....	91
Deep stops revisited .....	92
Closed-circuit rebreather (CCR) decompression .....	93
Novel approaches.....	95
Coda .....	96
APPENDIX: USING HYDROGEN AS A DIVING GAS .....	97
ACKNOWLEDGEMENTS.....	101
REFERENCES.....	102
INDEX.....	110