

The Biomarker Catalogue

A black silhouette of a person in profile, facing right, holding a bow and arrow. The figure is positioned behind a solid red horizontal band that spans the width of the page. The figure's legs are visible below the band.

**Page 1-10  
General**

A decorative pattern of white hexagons arranged in a honeycomb lattice, located in the bottom left corner of the page.

**The collection of reference standards  
- 2008 -**



## Professor Dr. Nils Andreas Sørensen (1909-1987)

I would like to dedicate this catalogue to a great and unique chemist, teacher and personality, the late Professor Nils Andreas Sørensen.

Professor Nils Andreas Sørensen was born in Oslo in 1909, moved to Trondheim and finished his master's degree at The Norwegian Institute of Technology (NTH) in 1933. As a student of Professor C.N. Riiber he received his doctor degree in 1937, moved to Heidelberg in 1938 where he studied with the Nobel laureate Richard Kuhn until he was appointed Professor in Organic Chemistry at NTH in 1939, at just 30 years of age.

Professor Sørensen contributed to several important areas of natural product chemistry. His scientific production covers the chemistry of mutarotation of sugars, and the chemistry of carotenoids. He was also the first to discover naturally occurring acetylenic compounds. Professor Sørensen was, in addition to being a unique chemist, an expert in botany which he combined with his chemistry background in a superb manner. He followed a tradition of natural product chemistry in Trondheim which has been manifested by later groups at NTH.

In addition to lecturing on specialized topics in traditional natural product chemistry, such as steroids and triterpenoids, he lectured on mycotoxins and chemotherapeutica. The results of the latter topics can be found in this catalogue. Professor Sørensen has given much inspiration to generations of organic chemists in Trondheim and elsewhere in Norway.

Professor C.N. Riiber was a gentleman from the "old school", elegant and witty in his form, with a tremendous precision characterizing his work. Professor Richard Kuhn's work revealed a stringent sense of formality and an exceptional ability to focus on essential problems. Influence and inspiration from these masters imprinted Professor Sørensen with a sparkling and elegant wit which distinguished him as a brilliant teacher and inspiring lecturer. Nonetheless are Professor Sørensen's immense knowledge and relentless curiosity probably the most distinguishing features of his personality. Professor Sørensen had, in addition, a relentless source of energy. He has, quite correctly, been described as a lightning bolt in a double breasted suit with an outdoor Alp hat and an indoor cigar. The picture of Professor Sørensen is not complete before mentioning that he was an enthusiastic moose hunter, mountain climber and farmer.

Source: "Sørensniader"

Dr. Jon E. Johansen  
Chair, Chiron AS





## Innovative and sophisticated standards - Creative solutions

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In this catalogue you will find, in addition to a number of new products related to petroleum and environmental applications, two new sections: "Food safety" and "Pharmaceutical and forensic".

Several patented products and applications are included in our catalogue, and new inventions are continually under development. Updates on new products are included in our Biomarker Focus mailings and new products catalogues (see pdf versions under the 'Newsletters' section on [www.chiron.no](http://www.chiron.no)).

Chiron offers a varied, flexible and innovative range of biomarkers to suit the needs of the individual customer. The cover illustrated the strength of our team. If you look for an unique quality and unique compounds, please contact us: We welcome you to the Chiron biomarker era of 2008.

## Chiron

*Chiron was an immortal god, he was the eldest and wisest of the centaurs, a tribe of half horse-men. As opposed to his brethren Chiron was intelligent, civilized and kind.*

*He was revered as an astrologer, healer and a great teacher to the likes of Ajax, Heracles and Achilles.*

*In the end Chiron sacrificed his immortality for allowing humanity to obtain the use of fire.*

*Chiron:- Our symbol of strength.*





# The Biomarker catalogue–2008

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# Chapter I: General

## How to order

We need the following information when you order:

- Catalogue number and product name
- Quantity
- Shipping and invoice addresses

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## Custom synthesis

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Please contact us for custom synthesis and custom development projects.



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Most compounds appearing in this catalogue are synthesized or isolated by Chiron AS.

The products are delivered in neat form or as solutions in high purity solvents. The solutions are normally supplied in flame sealed vials but can be delivered with screw cap bottles or in GC-vials upon request. The purity is assigned by capillary GC unless otherwise stated. The identity is assigned by NMR and MS. MSDS and Certificate of Analysis is available on all products.

Chiron is currently working according to the international quality standard ISO 17025 and ISO 9001.

### Special quotations

Please contact us for:

- "Bulk deliveries"
- Custom made solutions
- Custom synthesis

For larger quantities; please ask for special quotations.

## Conditions for sale

### Complaints

All claims must be in writing and made within 60 days of invoice date. No return will be accepted without prior authorization.

### Prices

The prices can be quoted in NOK, USD, EUR or GBP.

### Use of products

Our products are offered for LABORATORY USE ONLY and may not be used as drugs, cosmetics or food additives.

### Warranty and compensation claims

The stated specifications for each product indicate an average guiding value and may vary for each batch. Any indemnity will be limited to an amount not exceeding the price of the goods.



## Units

In this catalogue we have used the following units for concentrations:

$$\text{mg/mL} = 10^{-3}\text{g/mL} = 1000\mu\text{g/mL} = 1000\text{ng}/\mu\text{L} = 1000\text{ppm}$$

$$\mu\text{g/mL} = 10^{-6}\text{g/mL} = 0.001\text{mg/mL} = 1000\text{ng/mL} = 1\text{ng}/\mu\text{L} = 1\text{ppm}$$

$$\text{ng/mL} = 10^{-9}\text{g/mL} = 10^{-6}\text{mg/mL} = 10^{-3}\mu\text{g/mL} = 1\mu\text{g/mL} = 10^{-3}\text{ppm}$$

$$\text{pg/mL} = 10^{-12}\text{g/mL} = 10^{-6}\text{ppm}$$

**ppm:** = Parts per million  
1 ppm = 1 $\mu\text{g/mL}$  = 0.001 $\text{mg/mL}$  = 0.001 $\text{g/L}$   
1 ppm = 1 $\mu\text{g/g}$  = 0.001 $\text{mg/g}$  = 0.001 $\text{g/kg}$

**ppb:** Parts per billion  
1ppb = 0.001ppm = 10 $^{-6}$  $\text{mg/mL}$

Note: 1 European billion is 1000 European milliards (= 1000 US billions)

## Concentrations of Standards can be given as:

Weight by total weight: w/w  
Weight by total volume: wt%  
Volume by total volume: vol%

Weight by volume is most common and usually used by Chiron

## Sulfur Concentration:

Sulfur concentration is given as % weight sulfur by total volume or weight

## How exact is your solution?

You can make a solution by dissolving the analyte in an exact volume or by weighing the final solution. By using a volumetric flask you will always depend on the temperature in the room. A volumetric flask is equilibrated at an exact temperature and you have to keep the same room temperature in order to make a reproducible concentration.

However, by weighing the solution you will always make a solution in exactly the same way each time, independent of the temperature in the room. Good Laboratory Practice at Chiron is to weigh all solutions.

To make an exact solution from the Chiron ampoule, transfer the content of the vial into your flask and weight to exact volume (use the densities below). Alternatively, but less exact, dilute to a fixed volume in a volumetric flask.



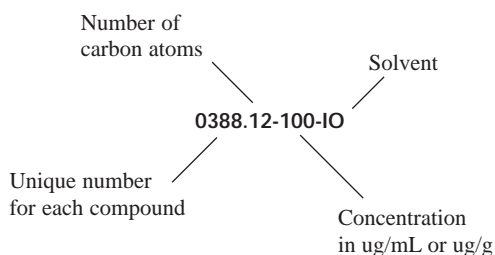
The following solvent-densities are used for Chiron solutions:

Acetone	0.7910 g/mL	Hexane	0.6603 g/mL
Acetonitrile	0.7826 g/mL	Isooctane	0.6919 g/mL
Chlorobenzene	1.1069 g/mL	Methanol	0.7914 g/mL
Cyclohexane	0.7800 g/mL	Pentane	0.6260 g/mL
Benzene	0.8700 g/mL	Toluene	0.8667 g/mL
Dichloromethane	1.3260 g/mL		

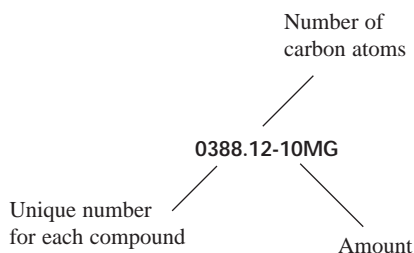
## Updated numbering in our catalogue

**NEW**

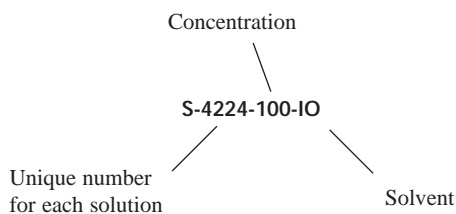
Numbering for single, pure compounds in solution:



Numbering for single compounds, neat:



Numbering for solutions:





### Concentrations

1 = 1µg/mL, 1.1µg/mL

10 = 10µg/mL

100 = 100µg/mL = 0.1mg/mL

K = 1000µg/mL = 1mg/mL

5K = 5000µg/mL = 5mg/mL

0,1Wt% ≈ 100µg/g

### Weight

100 = 100µg/g ≈ 0,1Wt%

K = 1000µg/g ≈ 1Wt%

### Amounts

10UG = 10µg

10MG = 10mg

100MG = 100mg

1G = 1g

1KG = 1kg

1UL = 1µl

### Solvents

1,2,3-Trichlorobenzene	TB	Light white Mineral oil (20cSt)	LW
Acetone	AC	Methanol	ME
Acetonitrile	AN	Methyl-tert-butyl ether (MTBE)	MT
Benzene	B	n-Hexadecane	HD
Benzene d6	BD	n-Hexane	HX
Carbon disulfide (CS <sub>2</sub> )	CS	n-Nonane	NN
Chlorobenzene	CB	n-Octane	OC
Cyclohexane	CY	n-Pentane	PE
Dichloromethane/Methylene chloride	DC	Pentane	PE
Dioxane	DI	Petroleum ether	PT
DMF	DF	RFA Gasoline	RF
DMSO	DS	t-Butyl methyl ether	BM
Dodecane	DD	Toluene	T
Ethanol	ET	Ultralight white Mineral oil (3cSt)	3C
Heavy white Mineral oil (70cSt)	HW	Water	W
Heptane	HP	Xylene	XY
Hexane	HX		
Isooctane	IO	Mix of solvents	MX
Isopropanol	IP		



## Common abbreviations

ABS	Alkylbenzenesulfonate	EDTA	Ethylenediaminetetraacetic acid
AED	Atomic Emission Detection	EDXRF	Energy Dispersive X-ray Fluorescence Spectroscopy
ASP	Amnesic Shellfish	EEC	European Economic Community
ASTM	American Society For Testing and Materials	EFSA	The European Food Safety Authority
BAF	Bioaccumulating Factor	EI	Electron Capture Detection
BaP	Benzo[a]pyrene	ELCD	Electrolytic Conductivity Detectors
BCF	Bioconcentration Factor	EMEC	European Meeting on Environmental Chemistry
BDE	Bromodiphenylether	EN	European Norm
BOD	Biochemical Oxygen Demand	EP	European Pharmacopeia
BP	British Pharmacopeia	EPA	The US Environmental Protection Agency
BSA	N,O-Bis(trimethylsilyl)acetamide	EPH	Extractable Petroleum Hydrocarbons
BSTFA	N,O-Bis(trimethylsilyl)trifluoroacetamide	EAA	Ether-Alcohol-Aromatic
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	EAA	European Aluminium Association
BZ-system	Numbering system for PCBs according to Ballschitter and Zell	FAME	Fatty Acid Methyl Ester
CA	Chemical Abstract	FID	Flame Ionization Detection
CAS No.	Chemical Abstract Service Registry Number	FOSA	Perfluorooctane Sulphonamide
CD	Circular Dichroism	F-PAH®	Fluorinated PAHs, Internal Standards
CEN	Comite Europeen de NorEuropean Committee for Standardization	F-PBDE®	Fluorinated PBDEs, Internal Standards
centi	Hundredth (10 <sup>-2</sup> )	F-PCB®	Fluorinated PCBs, Internal Standards
Ci	Curie (Unit)	FPD	Flame Photometric Detection
CMR	Carcinogenic, mutagenic and toxic to reproduction	FTCA	Perfluorohexanoic acid
CoA	Coenzyme A	FTOH	Perfluorohexan-1-ol
COD	Chemical Oxygen Demand	giga	Billion, Milliard (10 <sup>9</sup> )
COPIND	Causing Organophosphate Induced Neuropsychiatric Disorder	GLF	General Food Law (EU)
CP	Chemically Pure	GRO	Gasoline Range Organics
CRM	Certified Reference Materials	hecto	Hundred (10 <sup>2</sup> )
DBT	Dibutyltin	Heptacosa	Perfluoro-tri-n-butylamine
DDD	1,1-Dichloro-2,2-bis(p-chlorophenyl)ethane	HFBA	Heptafluorobutyric anhydride
DDE	1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene	HMDS	1,1,1,3,3,3-Hexamethyldisilazane
DDT	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane	HRGC	High Resolution GC
deca	Tenth (10 <sup>-1</sup> )	ICP-AES	Inductive Coupled Plasma Atomic Emission Spectroscopy
deci	Tenth (10 <sup>-1</sup> )	IDF	International Dairy Federation
DHA	Docosahexaenoic acid	IMO	International Maritime Organisation
DIPE	Diisopropyl ether	IMOG	International Meeting on Organic Geochemistry
DIS	Draft International Standard	IRMS	Isotope Ratio Mass Spectrometry
DMDMP	Dimethyldibenzothiophene	ISPAC	International Society for Polycyclic Aromatic Compounds
DMF	Dimethylformamide	ISTD	Internal Standard
DMN	Dimethylnaphthalene	ITX	Isopropylthioxanthone
DMP	Dimethylphenanthrene	IUPAC	International Union of Pure and Applied Chemistry
DMSO	Dimethyl sulfoxide	kilo	Thousand (10 <sup>3</sup> )
DNA	Deoxyribonucleic Acid	L(E)C50	Lethal Concentration to 50 %
DNBP	Dinoseb	LAS	Linear Alkylbenzenesulfonates
DOT	Diocetyl tin	LD	Lethal Dose
DPA	Docosapentaenoic Acid	log Kow	Partition coefficient octanol/water
DPT	Diphenyltin	MAGME	Methyl Acrylamido Glycolate Methyl Ether Monobutyltin
DRO	Diesel Range Organics	MBT	Monobutyltin
DSP	Diarrhetic Shellfish	MCCP	Medium Chain Chlorinated Alkanes
DT50	Degradable Total to 50 % (Half -time)	MCPA	4-Chloro-2-methylphenoxyacetic Acid
Dutch Seven	A mixture of seven commonly occurring PCBs	MDL	Method Detection Limit
EAOG	European Association of Organic Geochemists	MDMC	Minimum Detectable Mutagenic Concentration
EC	European Community	MDMP	Methyldibenzothiophene
ECD	Electron Capture Detection		



mega	Million (10 <sup>6</sup> )	PMS	Postmitochondrial supernatant
micro	Millionth (10 <sup>-6</sup> )	PNA	Paraffins, Naphthenes, Aromatics
milli	Thousandth (10 <sup>-3</sup> )	PONA	Paraffins, Olefins, Naphthenes, Aromatics
MN	Methylnaphthalene	POP	Persistent Organic Pollutants
MOT	Monooctyltin	POSH	Oxygenheterocyclic PAHs
MP	Methylphenanthrene	ppb	Parts per billion
MPLC	Medium Pressure Liquid Chromatography	ppm	Parts per million
MPT	Monophenyltin	PSP	Paralytic Shellfish
MSTFA	N-Methyl-N-(trimethylsilyl)trifluoroacetamide	PUF	Polyurethane Foam
MTBE	tert-Butyl methyl ether	PVC	Polyvinylchloride
MW	Molecular Weight	QSAR	Quantitative Structure Activity Relationship
nano	Billionth, Milliardth (10 <sup>-9</sup> )	RCRA	Resource, Conservation, and Recovery Act
NBA	3-Nitrobenzanthrone	RNA	Ribonucleic acid
NCI	Negative Ion Chemical Ionization	RRO	Residue Range Organics
NIGOGA	The Norwegian Industry Guide to Geochemical Analysis	SCCP	Short Chain Chlorinated Alkanes
NIST	National Institute for Standards and Technology	SCS	System Calibration Standard
NMR	Nuclear Magnetic Resonance	SETAC	Society of Environmental, Toxicology and Chemistry
NPD	Naphthalenes, Phenanthrenes, Dibenzothiophenes	SFT	Norwegian Pollution Control Authority
NPE(O)	Nonylphenol Polyethoxylates	SIMDIS	Simulated Distillation
OPEO	4-tert-Octylphenol Polyethoxylates	SOP	Standard Operating Procedure
ORD	Optical Rotatory Dispersion	SRM	Standard Reference Materials
OSPAR	Commission of the Conv. for the Protection of the Marine Env. of the North-East Atlantic	STP	Sewage Treatment Plant
PAC	Polycyclic Aromatic Compounds = PAH	TAME	tert-Amylmethyl ether
PAH	Polycyclic Aromatic Hydrocarbons	TBT	Tetrabutyltin (Chloride)
PANH	Nitrogenheterocyclic PAHs	TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
PAR	Precision and Recovery	TCT	Tricyclohexyltin
PASH	Sulfurheterocyclic PAHs	TDI	Tolerable Daily Intake
PB	Inducers Phenobarbital	TE-GC-MS	Thermal Extraction Capillary GC-MS
PBB	Polybrominated Biphenyls	TeMN	Tetramethylnaphthalene
PBDE	Polybrominated Diphenylethers	TEPA	Tris-(aziridinyl)-phosphineoxide
PBN	Polybrominated Naphthalenes	TEX	Toluene-Ethylbenzene-Xylenes
PBN	Polybromonaphthalene	TFAI	1-(Trifluoroacetyl)imidazole
PBT	Persistent Bioaccumulating Toxicants	TFAA	Trifluoroacetic Anhydride
PCA	Polychlorinated Alkanes	THC	Tetrahydrocannabinol
PCB	Polychlorinated Biphenylethers	THF	Tetrahydrofuran
PCDD	Polychlorinated Dibenzo-p-dioxines	THM	Trihalomethanes
PCDF	Polychlorinated Dibenzofurans	TLC	Thin Layer Chromatography
PCN	Polychlorinated Naphthalenes	Tm	17-(H)-22,29,30-Trisnorhopane
PFA	Polyfluorinated Alkanes	TMCS	Chlorotrimethylsilane
PFAS	Polyfluoroalkane Sulfonates	TMN	Trimethylnaphthalene
PFB	Perfluorobenzoyl Derivative	TMP	Trimethylphenanthrene
PFBBr	Perfluorobenzoyl Bromide	TMP	Trimethylphosphate
PFBS	Perfluorobutane Sulfonate (sulfonic Acid)	TMSI	1-(Trimethylsilyl)imidazole
PFC	Polyfluorinated Organic Compounds	TmTP	Tri-m-tolylphosphate
PFCA	Perfluorocarboxylic Acid	ToTP	Tri-o-tolylphosphate
PFDA	Perfluorodecanoic Acid	TPP	Triphenylphosphate
PFHS	Perfluorohexane Sulfonate	TPT	Triphenyltin (Chloride)
PFNA	Perfluorononanoic Acid	TPTP	Tri-p-tolylphosphate
PFOA	Perfluorooctanoic Acid	Ts	18-(H)-22,29,30-Trisnorhopane
PFOS	Perfluorooctane Sulfonic Acid	TTP	Tritolylphosphate (isomer mixture)
PFUA	Perfluoroundecanoic Acid	UNEP	United National Environment Programme
pico	Trillionth, Billionth (10 <sup>-12</sup> )	USP	US Pharmacopeia
PINA	Paraffins, Isoparaffins, Naphthenes, Aromatics	UST	Underwater Storage Tank
PIONA	Paraffins, Isoparaffins, Olefins, Naphthenes, Aromatics	VOC	Volatile Organic Compounds
		WHO	World Health Organization
		XRF	Wavelength Dispersive X-ray Fluorescence