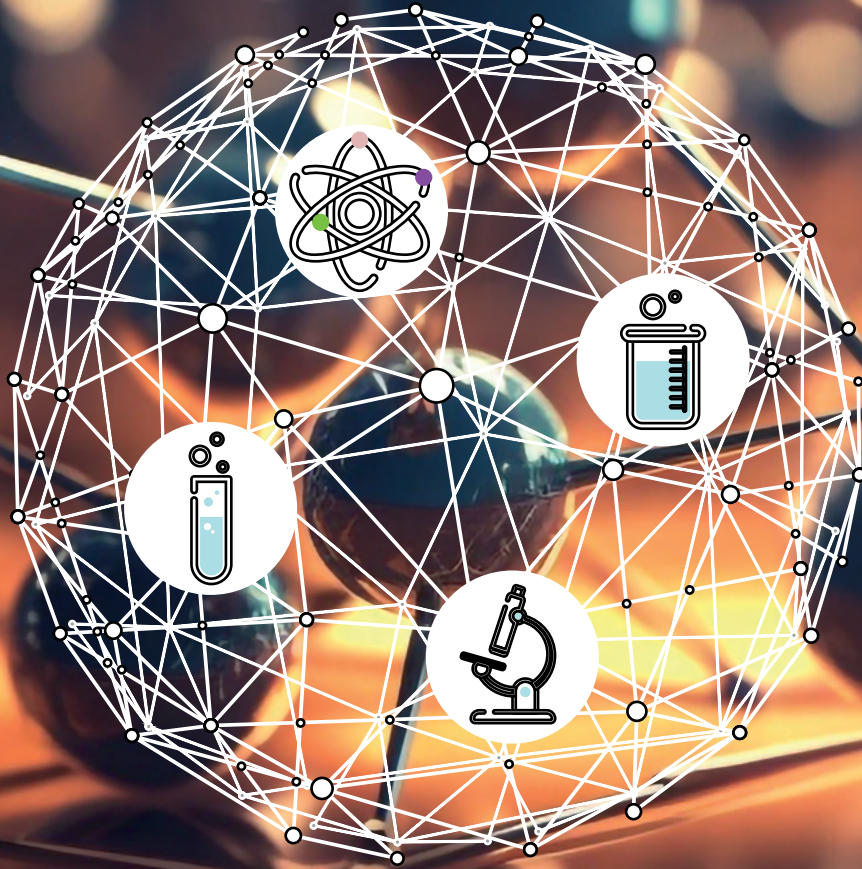


# 인증표준물질

Certified Reference Materials





## 중금속분석을 위한 시료전처리장비와 인증표준물질등 소모품 전문기업!



(주) 오디랩은 2008년 8월에 설립된 회사로 중금속분석에 사용되는 흑연블럭 산 분해장비인 에코프리 I, II, III 시리즈와 산 세척장치, 고순도 산 제조 장치, 유리분주기, ICP/ICP MS 소모품, 인증표준물질(CRM), 숙련도 평가물질 (PT) 등 을 제조, 수입판매하고 있습니다.

(주) 오디랩에서 제조 판매하는 흑연블럭 산 분해장비는 열선 가열판이나 마이크로웨이브의 단점을 보완한 제품으로 국내를 비롯하여 세계 7개국에 특허를 획득하였고 현재 해외로도 수출 중 에 있습니다.

또한 실험실에서 분석 데이터의 신뢰성확보를 위한 인증표준물질(CRM)과 표준물질(RM), 국제숙련도 물질을 전세계에서 수입하여 판매하고 있습니다. 인증표준물질은 고객이 찾으시는 제품을 탐색하여 드리고 있으며, 가장 근접한 제품으로 추천드리고 있습니다.

특히 유럽환경규제인 RoHS에 대응한 IEC62321시험법에 나오는 인증표준 물질을 국내 시험평가기관이나 국가기관에 공급하고 있으며, 환경부에서 실시하는 정도관리에 대응하여 LGC사에서 제공하는 환경관련 숙련도 물질을 공급하고 있습니다.

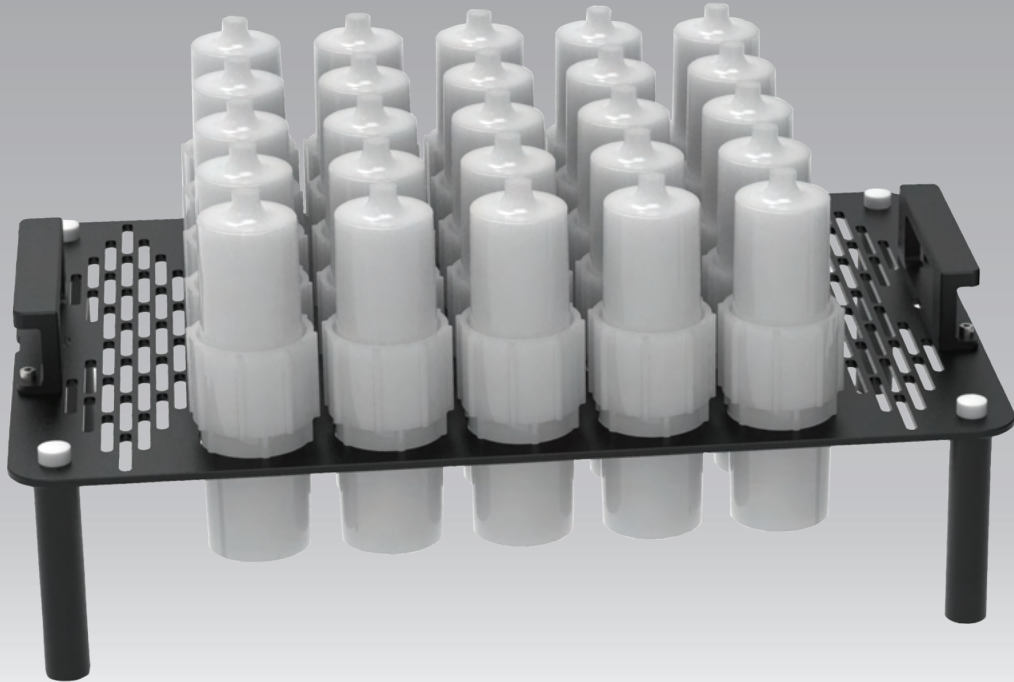
**저희 (주) 오디랩은 화학실험실의 동반자로서  
분석의 재현성과 정확성, 신뢰성 확보를 위해  
언제나 고객의 노력과 함께 하겠습니다**

 ODLAB

자동 산분해장비

**ADS25**





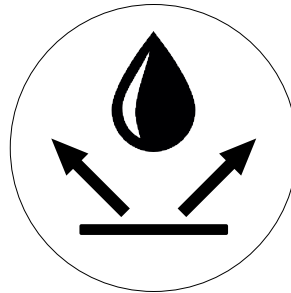
**경량화 & 벤틸레이션**

경량화 & 벤틸레이션 -



**산순환 포집분해용기**

산순환 포집분해용기 -



**오염방지&내구성**

오염방지&내구성 -



**앱 연동 조작**

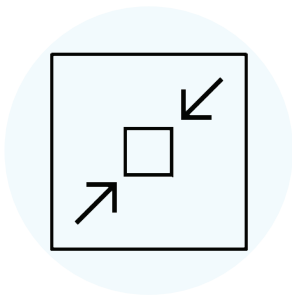
앱 연동 조작 -

이동 및 보관을 위해 플레이트를 타공디자인으로 경량화를 하였습니다 또한 타공을 통하여 원활하게 열기의 순환이 이루어 집니다.

좌우에 있는 리프트 장치로 산 순환 포집분해 용기 내부의 산을 가열 / 냉각 시켜서 사이펀 현상에 의해 리사이클 시켜 시료를 분해할 수 있도록 디자인 하였습니다.

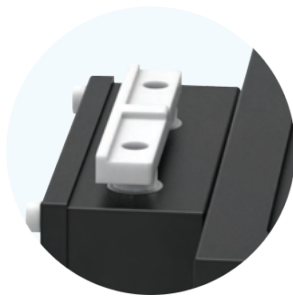
SUS 재질사용 및 테프론 특수코팅을 하여 표면이 쉽게 오염되지 않도록 제작하였습니다. 또한 상부 가열부와 하부 전자제어부는 서로 격리, 밀봉되어 열 또는 산 증기로 인하여 전자제어장치가 손상되지않도록 되어있습니다.

20 Step 으로 가열 / 냉각 으로 분해조건을 프로그램화 할 수 있으며, 앱을 사용하여 조절가능합니다.



**컴팩트한 사이즈**

컴팩트한 사이즈 -



**오토메틱 리프팅**

오토메틱 리프팅 -

메뉴얼 및 프로그래밍 기능으로 반복적인 가열 / 냉각을 할 수 있도록 리프팅 기능이 있습니다.



**균일한 온도**

균일한 온도 -

흑연 소재를 사용하여 균일한 온도를 제공하고 ( $\pm 1^{\circ}\text{C}$  온도편차를 갖는다) 제어는  $0.2^{\circ}\text{C}$  로 제어된다.



**수동 승강버튼**

수동 승강버튼 -

리프트 장치를 수동버튼을 사용하여 상부 랙(Rack)을 상하로 움직여 사용자가 원할 시 용기의 상태를 언제든지 확인 할 수 있습니다.

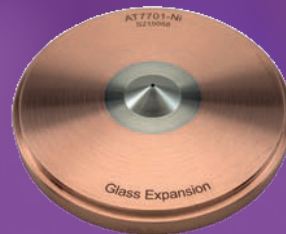


**GLASS EXPANSION**

Quality By Design

# ICP-OES / ICP-MS

모든 메이커 (애질런트, 씨모, 퍼킨..etc) 전제품



# Sediments

## Sediments

Code	Product	Unit
<b>BAM-U022</b>	Mineral Oil Contaminated Sediment Certified Value Total petrol hydrocarbon (TPH) .....8270 mg/kg	38 g
<b>ERM-CC020</b>	Trace elements in contaminated river sediment Aqua regia extractable mass fraction in mg/kg (extraction according to ISO 11466)  Certified Value Arsenic ..... 56.6 mg/kg      Arsenic ..... 56.6 mg/kg Cadmium ..... 20.8 mg/kg      Cadmium ..... 20.8 mg/kg Chromium ..... 290 mg/kg      Chromium ..... 290 mg/kg Cobalt ..... 32.8 mg/kg      Cobalt ..... 32.8 mg/kg Copper ..... 560 mg/kg      Copper ..... 560 mg/kg	38 g
<b>BCR-667</b>	ESTUARINE SEDIMENT Information on the preparation and the certification of the rare earth elements Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Nd, Pr, Sc, Sm, Tb, Tm and Yb, and of the elements Th and U is given in the certification report.  Certified Value Ce ..... 56.7 mg/kg      Pr .....6.1 mg/kg Dy .....4.01 mg/kg      Sc .....13.7 mg/kg Er .....2.35 mg/kg      Sm .....4.66 mg/kg Eu .....1.00 mg/kg      Tb .....0.682 mg/kg Gd .....4.41 mg/kg      Tm .....0.326 mg/kg Ho .....0.80 mg/kg      Yb .....2.20 mg/kg La .....27.8 mg/kg      Th .....10.0 mg/kg Lu .....0.325 mg/kg      U .....2.26 mg/kg Nd .....25.0 mg/kg	40 g
<b>BCR-277R</b>	ESTUARINE SEDIMENT The material consists of 40 g of powder, bottled in amber glass bottles, packaged under argon and closed with polyethylene inserts and plastic screw caps  Certified Value As .....18.3 mg/kg      Cu .....63 mg/kg Cd .....0.61 mg/kg      Hg .....0.128mg/kg Co .....22.5 mg/kg      Ni .....130 mg/kg Cr .....188 mg/kg      Zn .....178 mg/kg	40 g
<b>BCR-280R</b>	LAKE SEDIMENT The material consists of 30 g of powder, bottled in amber glass bottles, packaged under argon and closed with polyethylene inserts and plastic screw caps  Certified Value As .....33.4 mg/kg      Cu .....53 mg/kg Cd .....0.85 mg/kg      Hg .....1.46 mg/kg Co .....16.8 mg/kg      Ni .....69 mg/kg Cr .....126 mg/kg      Zn .....224 mg/kg	30 g



## Sediments

Code	Product	Unit																					
<b>ERM-CC580</b>	<b>ESTUARINE SEDIMENT</b> The material consists of a sediment sample in a glass bottle containing about 40 g of powder.  Certified Values, Mass fraction (based on dry mass) Total Hg .....132 mg / kg CH <sub>3</sub> Hg <sup>+</sup> .....75 µg / kg	40 g																					
<b>BCR-684</b>	<b>EXTRACTABLE PHOSPHORUS IN SEDIMENT FOLLOWING A FIVE-STEP EXTRACTION PROCEDURE</b> The material consists of a sediment sample in a glass bottle containing about 35 g of powder.  Certified Values, Mass fraction based on dry mass NaOH-extractable P .....550 mg/kg HCl-extractable P .....536 mg/kg Inorganic P .....1113 mg/kg Organic P .....209 mg/kg Conc.HCl-extract. P .....1373 mg/kg	35 g																					
<b>BCR-701</b>	<b>SEDIMENT</b> The material consists of a sediment sample in a glass bottle containing about 20 g of powder.  Certified Values, Extractable mass fraction based on dry mass  <table border="0"> <tr> <td>Step 1:</td> <td>Step 2:</td> <td>Step 3:</td> </tr> <tr> <td>Cd .....7.3 mg/kg</td> <td>Cd .....3.77 mg/kg</td> <td>Cd .....0.27 mg/kg</td> </tr> <tr> <td>Cr .....2.26 mg/kg</td> <td>Cr .....45.7 mg/kg</td> <td>Cr .....143 mg/kg</td> </tr> <tr> <td>Cu .....49.3 mg/kg</td> <td>Cu .....124 mg/kg</td> <td>Cu .....55 mg/kg</td> </tr> <tr> <td>Ni .....15.4 mg/kg</td> <td>Ni .....26.6 mg/kg</td> <td>Ni .....15.3 mg/kg</td> </tr> <tr> <td>Pb .....3.18 mg/kg</td> <td>Pb .....126 mg/kg</td> <td>Pb .....9.3 mg/kg</td> </tr> <tr> <td>Zn .....205 mg/kg</td> <td>Zn .....114mg/kg</td> <td>Zn .....46 mg/kg</td> </tr> </table>	Step 1:	Step 2:	Step 3:	Cd .....7.3 mg/kg	Cd .....3.77 mg/kg	Cd .....0.27 mg/kg	Cr .....2.26 mg/kg	Cr .....45.7 mg/kg	Cr .....143 mg/kg	Cu .....49.3 mg/kg	Cu .....124 mg/kg	Cu .....55 mg/kg	Ni .....15.4 mg/kg	Ni .....26.6 mg/kg	Ni .....15.3 mg/kg	Pb .....3.18 mg/kg	Pb .....126 mg/kg	Pb .....9.3 mg/kg	Zn .....205 mg/kg	Zn .....114mg/kg	Zn .....46 mg/kg	20 g
Step 1:	Step 2:	Step 3:																					
Cd .....7.3 mg/kg	Cd .....3.77 mg/kg	Cd .....0.27 mg/kg																					
Cr .....2.26 mg/kg	Cr .....45.7 mg/kg	Cr .....143 mg/kg																					
Cu .....49.3 mg/kg	Cu .....124 mg/kg	Cu .....55 mg/kg																					
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Pb .....3.18 mg/kg	Pb .....126 mg/kg	Pb .....9.3 mg/kg																					
Zn .....205 mg/kg	Zn .....114mg/kg	Zn .....46 mg/kg																					
<b>BCR-462</b>	<b>COASTAL SEDIMENT</b> The material consists of a dried sediment powder in a glass bottle. (25 g of powder.)  Certified Values, Mass fraction based on dry mass Tributyltin .....54 mg/kg Dibutyltin .....68 mg/kg	25 g																					
<b>BCR-646</b>	<b>FRESH WATER SEDIMENT</b> The material consists of a dried and ground sediment sample with a particle size < 90 micrometer stored in an amber glass bottle.  Certified Values, Mass fraction based on dry mass TBT: Sn(C <sub>4</sub> H <sub>9</sub> ) <sub>3</sub> <sup>+</sup> .....480 mg/kg DBT: Sn(C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> <sup>2+</sup> .....770 mg/kg MBT: Sn(C <sub>4</sub> H <sub>9</sub> ) <sub>3</sub> <sup>+</sup> .....610 mg/kg TPhT: Sn(C <sub>6</sub> H <sub>5</sub> ) <sub>3</sub> <sup>+</sup> .....29 mg/kg DPhT: Sn(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> <sup>2+</sup> .....36 mg/kg MPhT: Sn(C <sub>4</sub> H <sub>9</sub> ) <sub>3</sub> <sup>+</sup> .....69 mg/kg	40 g																					

Sediments

## Sediments

Code	Product	Unit		
BCR-535	<b>FRESHWATER HARBOUR SEDIMENT</b>	40 g		
	The sample consists of approximately 40 g of river harbour sediment in brown glass bottles with a polythene insert.			
	Certified Value, Mass fraction based on dry mass			
	Pyrene .....2.52 mg/kg			
	Benz[a]anthracene .....1.54 mg/kg			
	Benzo[a]pyrene .....1.16 mg/kg			
	Benzo[e]pyrene .....1.86 mg/kg			
	Benzo[b]fluoranthene .....2.29 mg/kg			
Benzo[k]fluoranthene .....1.09 mg/kg				
Indeno[1,2,3-cd]pyrene .....1.56 mg/kg				
BCR-536	<b>CHLOROBIPHENYLS IN FRESHWATER HARBOUR SEDIMENT</b>	40 g		
	The sample consists of approximately 40 g of freshwater harbour sediment in brown glass bottles with a polythene insert.			
	Mass fraction based on dry mass			
	<b>Congener number</b>		<b>IUPAC name</b>	<b>Certified Value</b>
	PCB 28 .....		2,4,4'-Trichlorobiphenyl .....	44 µg/kg
	PCB 52 .....		2,2',5,5'-Tetrachlorobiphenyl .....	38 µg/kg
	PCB 101 .....		2,2',4,5,5'-Pentachlorobiphenyl .....	44 µg/kg
	PCB 105 .....		2,3,3',4,4'-Pentachlorobiphenyl .....	3.5 µg/kg
	PCB 118 .....		2,3',4,4',5-Pentachlorobiphenyl .....	27.5 µg/kg
	PCB 128 .....		2,2',3,3',4,4'-Hexachlorobiphenyl .....	5.4 µg/kg
	PCB 138 .....		2,2',3,4,4',5'-Hexachlorobiphenyl .....	27 µg/kg
	PCB 149 .....		2,2',3,4',5',6-Hexachlorobiphenyl .....	49 µg/kg
	PCB 153 .....		2,2',4,4',5,5'-Hexachlorobiphenyl .....	50 µg/kg
	PCB 156 .....		2,3,3',4,4',5-Hexachlorobiphenyl .....	3.0 µg/kg
	PCB 163 .....		2,3,3',4',5,6-Hexachlorobiphenyl .....	17.2 µg/kg
	PCB 170 .....		2,2',3,3',4,4',5-Heptachlorobiphenyl .....	13.4 µg/kg
	PCB 180 .....		2,2',3,4,4',5,5'-Heptachlorobiphenyl .....	22.4 µg/kg
	ERM-CC537a		<b>FRESHWATER SEDIMENT</b>	40 g
			The starting material of ERM-CC537a is a freshwater sediment originating from a Belgian small river. It was air-dried, jet-milled, sieved to < 250 µm and finally homogenised.	
			Certified value, Mass fraction based on dry mass	
BDE-28 (2,4,4'-tribromodiphenyl ether) .....		0.28 µg/kg		
BDE-47 (2,2',4,4'-tetrabromodiphenyl ether) .....		16.5 µg/kg		
BDE-99 (2,2',4,4',5-pentabromodiphenyl ether) .....		34 µg/kg		
BDE-100 (2,2',4,4',6-pentabromodiphenyl ether) .....		5.8 µg/kg		
BDE-153 (2,2',4,4',5,5'-hexabromodiphenyl ether) .....		6.6 µg/kg		
BDE-154 (2,2',4,4',5,6'-hexabromodiphenyl ether) .....		3.5 µg/kg		
BDE-183 (2,2',3,4,4',5',6-heptabromodiphenyl ether) .....		1.41 µg/kg		
BDE-209 (decabromodiphenyl ether) .....		7.8 mg/kg		
α-HBCD (1,2,5,6,9,10-hexabromocyclododecane) .....		8.3 µg/kg		
β-HBCD (1,2,5,6,9,10-hexabromocyclododecane) .....		2.3 µg/kg		
γ-HBCD (1,2,5,6,9,10-hexabromocyclododecane) .....	60 µg/kg			

## Sediments

Code	Product	Unit	
IAEA-456	<b>Costal Sediment (Methyl Mercury)</b>	15 g	
	The sediment material was collected in New Caledonia, immediately frozen and then freeze dried.		
	The sediment was first sieved at 500 µm, ground, and then sieved at 125 µm followed by mechanical homogenization of the collected fraction		
	Certified Values, based on dry mass		
	Al .....55.4 × 10 <sup>3</sup> mg kg <sup>-1</sup>		
	As .....6.14 mg / kg <sup>-1</sup>		
	Cd .....0.198 mg / kg <sup>-1</sup>		
	Co .....47.2 mg / kg <sup>-1</sup>		
	Cr .....589 mg / kg <sup>-1</sup>		
	Cu .....44.6 mg / kg <sup>-1</sup>		
	Fe .....49.5 × 10 mg / kg <sup>-1</sup>		
IAEA-457	<b>Marine Sediment</b>	20 g	
	The certificate for the IAEA-457 CRM is the only official source for the trace elements mass fractions certified values and their expanded uncertainties.		
	Certified Values, based on dry mass		
	Ag .....1.85 mg / kg <sup>-1</sup>		
	Al .....82660 mg / kg <sup>-1</sup>		
	As .....10.2 mg / kg <sup>-1</sup>		
	Cd .....1.09 mg / kg <sup>-1</sup>		
	Co .....14.7 mg / kg <sup>-1</sup>		
	Cr .....144 mg / kg <sup>-1</sup>		
	Cu .....365 mg / kg <sup>-1</sup>		
	Fe .....41450 mg / kg <sup>-1</sup>		
Hg .....0.143 mg / kg <sup>-1</sup>			
IAEA-458	<b>Marine Sediment</b>	20 g	
	The certificate for the IAEA-458 CRM is the only official source for the trace elements mass fractions certified values and their expanded uncertainties.		
	Certified Values, based on dry mass		
	Al .....82.8x10 <sup>3</sup> mg / kg <sup>-1</sup>		
	As .....10.0 mg / kg <sup>-1</sup>		
	Cd .....0.49 mg / kg <sup>-1</sup>		
	Co .....15.6 mg / kg <sup>-1</sup>		
	Cr .....91.5 mg / kg <sup>-1</sup>		
	Cu .....48.1 mg / kg <sup>-1</sup>		
	Fe .....40.7x10 <sup>3</sup> mg / kg <sup>-1</sup>		
	Hg .....0.044 mg / kg <sup>-1</sup>		
Li .....71.7 mg / kg <sup>-1</sup>			
IAEA-475	<b>FRESH WATER SEDIMENT</b>	20 g	
	The certificate for the IAEA-475 CRM is the only official source for the trace elements mass fractions certified values and their expanded uncertainties.		
	Certified Values, based on dry mass		
	As .....12.6 mg / kg <sup>-1</sup>		Hg .....29.9 × 10 <sup>-3</sup> mg / kg <sup>-1</sup>
	Co .....12.4 mg / kg <sup>-1</sup>		MeHg .....0.199 × 10 <sup>-3</sup> mg / kg <sup>-1</sup>
	Cr .....65.8 mg / kg <sup>-1</sup>		Ni .....28.5 mg / kg <sup>-1</sup>
	Cu .....27.8 mg / kg <sup>-1</sup>		Pb .....29.9 mg / kg <sup>-1</sup>
	Fe .....34.2x10 mg <sup>3</sup> / kg <sup>-1</sup>		Zn .....100 mg / kg <sup>-1</sup>

## Sediments

Code	Product	Unit			
IAEA-459	<b>Marine Sediment</b>	50 g			
	A marine sediment sample was collected in Han River estuary, South Korea. This sediment was freeze-dried, ground and sieved at 125 µm.				
	Certified Value, based on dry mass				
	2-Methylnaphthalene .....		15.5 µg/kg <sup>-1</sup>		
	1-Methylnaphthalene .....		9.2 µg/kg <sup>-1</sup>		
	Acenaphthylene .....		3.2 µg/kg <sup>-1</sup>		
	Fluorene .....		4.7 µg/kg <sup>-1</sup>		
	Acenaphthene .....		1.78 µg/kg <sup>-1</sup>		
	Dibenzothiophene .....		9.4 µg/kg <sup>-1</sup>		
	Phenanthrene .....		33.9 µg/kg <sup>-1</sup>		
	Anthracene .....		6.0 µg/kg <sup>-1</sup>		
	Fluoranthene .....		37.3 µg/kg <sup>-1</sup>		
	Pyrene .....		46.3 µg/kg <sup>-1</sup>		
	Benz(a)anthracene .....		19.3 µg/kg <sup>-1</sup>		
	Chrysene+triphenylene .....		27.5 µg/kg <sup>-1</sup>		
	Benzo(b)fluoranthene .....		44.1 µg/kg <sup>-1</sup>		
	Benzo(b+j) fluoranthene .....		59 µg/kg <sup>-1</sup>		
	Benzo(k)fluoranthene .....		19.0 µg/kg <sup>-1</sup>		
	Benzo(e)pyrene .....		36 µg/kg <sup>-1</sup>		
	Benzo(a)pyrene .....		22.7 µg/kg <sup>-1</sup>		
	Indeno[1,2,3-c,d]pyrene .....		36 µg/kg <sup>-1</sup>		
Benzo(g,h,i)perylene .....	36 µg/kg <sup>-1</sup>				
IAEA-477	<b>Sediment</b>	50 g			
	Two sediment samples were collected in Queensland region, Australia using a Van Veen type sampler.				
	One site was sampled in Townsville Marina and the other in Townsville Ross River. Frozen samples were sent from Brisbane to IAEA laboratories in Monaco.				
	Certified Value, based on dry mass				
	Naphthalene .....		4.5 µg/kg <sup>-1</sup>		
	2-Methylnaphthalene .....		2.4 µg/kg <sup>-1</sup>		
	1-Methylnaphthalene .....		1.4 µg/kg <sup>-1</sup>		
	Phenanthrene .....		4.6 µg/kg <sup>-1</sup>		
	Anthracene .....		1.3 µg/kg <sup>-1</sup>		
	1-Methylphenanthrene .....		1.5 µg/kg <sup>-1</sup>		
	2-Methylphenanthrene .....		2.4 µg/kg <sup>-1</sup>		
	C1-Phen/Anth .....		7.6 µg/kg <sup>-1</sup>		
	Fluoranthene .....		6.6 µg/kg <sup>-1</sup>		
Pyrene .....	6.2 µg/kg <sup>-1</sup>				
Benzo[a]anthracene .....	2.4 µg/kg <sup>-1</sup>				
IAEA-477	<b>Estuarine Sediment</b>	70 g			
	Certified values				
	Al .....		2.297 ± 0.018 %	As .....	6.23 ± 0.21 mg/kg
	Ca .....		0.519 ± 0.02 %	Cd .....	0.148 ± 0.007 mg/kg
	Fe .....		2.008 ± 0.039 %	Cr .....	40.9 ± 1.9 mg/kg
	Mg .....		0.388 ± 0.009 %	Cu .....	10.01 ± 0.34 mg/kg
	P .....		0.027 ± 0.001 %	Pb .....	11.7 ± 1.2 mg/kg
	K .....		0.864 ± 0.016 %	Mn .....	234.5 ± 2.8 mg/kg
	Si .....		40 ± 0.16 %	Se .....	0.193 ± 0.028 mg/kg

## Sediments

Code	Product	Unit	
Na	0.741 ± 0.017 %	V	44.84 ± 0.76 mg/kg
S	0.352 ± 0.004 %	Zn	48.9 ± 1.6 mg/kg
Ti	0.456 ± 0.021 %		
Noncertified values			
Sb	0.3 mg/kg	Nd	15 mg/kg
Ba	210 mg/kg	Ni	23 mg/kg
Be	<1 mg/kg	Rb	38 mg/kg
Ce	34 mg/kg	Sc	5 mg/kg
Co	5 mg/kg	Ag	<0.3 mg/kg
Ga	5 mg/kg	Sr	68 mg/kg
La	17 mg/kg	Tl	<0.5 mg/kg
Li	18 mg/kg	Th	5.8 mg/kg
Hg	0.04 mg/kg	Sn	1 mg/kg
Mo	1.8 mg/kg	U	2 mg/kg

### SRM-1944

#### New York/New Jersey Waterway Sediment

50 g

This Standard Reference Material (SRM) is a mixture of marine sediment collected near urban areas in New York and New Jersey. Reference values are also provided for selected dibenzodioxin and dibenzofuran congeners, total organic carbon, total extractable material, and particle-size characteristics.

All of the constituents for which certified, reference, and information values are provided were naturally present in the sediment material before processing.

#### Certified Mass Fraction Values for Selected PAHs in SRM 1944 (Dry-Mass Basis)

##### Mass Fraction (mg/kg)

Phenanthrene	5.27 ± 0.22	Benzo[e]pyrene	3.28 ± 0.11
Fluoranthene	8.92 ± 0.32	Benzo[a]pyrene	4.30 ± 0.13
Pyrene	9.70 ± 0.42	Perylene	1.17 ± 0.24
Benzo[c]phenanthrene	0.76 ± 0.10	Benzo[ghi]perylene	2.84 ± 0.10
Benz[a]anthracene	4.72 ± 0.11	Indeno[1,2,3-cd]pyrene	2.78 ± 0.10
Chrysene	4.86 ± 0.10	Dibenz[a,j]anthracene	0.500 ± 0.044
Triphenylene	1.04 ± 0.27	Dibenz[a,c]anthracene	0.335 ± 0.013
Benzo[b]fluoranthene	3.87 ± 0.42	Dibenz[a,h]anthracene	0.424 ± 0.069
Benzo[j]fluoranthene	2.09 ± 0.44	Pentaphene	0.288 ± 0.026
Benzo[k]fluoranthene	2.30 ± 0.20	Benzo[b]chrysene	0.63 ± 0.10
Benzo[a]fluoranthene	0.78 ± 0.12	Picene	0.518 ± 0.093

#### Certified Mass Fraction Values for Selected PCB Congeners(a) in SRM 1944 (Dry-Mass Basis)

##### Mass Fraction (µg/kg)

PCB 8 (2,4'-Dichlorobiphenyl)	22.3 ± 2.3
PCB18 (2,2',5-Trichlorobiphenyl)	51.0 ± 2.6
PCB 28 (2,4,4'-Trichlorobiphenyl)	80.8 ± 2.7
PCB 31 (2,4',5-Trichlorobiphenyl)	78.7 ± 1.6
PCB 44 (2,2',3,5'-Tetrachlorobiphenyl)	60.2 ± 2.0
PCB 49 (2,2',4,5'-Tetrachlorobiphenyl)	53.0 ± 1.7
PCB 52 (2,2',5,5'-Tetrachlorobiphenyl)	79.4 ± 2.0
PCB 66 (2,3',4,4'-Tetrachlorobiphenyl)	71.9 ± 4.3
PCB 95 (2,2',3,5',6-Pentachlorobiphenyl)	65.0 ± 8.9
PCB 87 (2,2',3,4,5'-Pentachlorobiphenyl)	29.9 ± 4.3
PCB 99 (2,2',4,4',5-Pentachlorobiphenyl)	37.5 ± 2.4
PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl)	73.4 ± 2.5

## Sediments

Code	Product	Unit
PCB 105	(2,3,3',4,4'-Pentachlorobiphenyl)	24.5 ± 1.1
PCB 110	(2,3,3',4',6-Pentachlorobiphenyl)	63.5 ± 4.7
PCB 118	(2,3',4,4',5-Pentachlorobiphenyl)	58.0 ± 4.3
PCB 128	(2,2',3,3',4,4'-Hexachlorobiphenyl)	8.47 ± 0.28
PCB 138	(2,2',3,4,4',5'-Hexachlorobiphenyl)	62.1 ± 3.0
PCB 149	(2,2',3,4',5',6-Hexachlorobiphenyl)	49.7 ± 1.2
PCB 151	(2,2',3,5,5',6-Hexachlorobiphenyl)	16.93 ± 0.36
PCB 153	(2,2',4,4',5,5'-Hexachlorobiphenyl)	74.0 ± 2.9
PCB 156	(2,3,3',4,4',5-Hexachlorobiphenyl)	6.52 ± 0.66
PCB 170	(2,2',3,3',4,4',5-Heptachlorobiphenyl)	22.6 ± 1.4
PCB 180	(2,2',3,4,4',5,5'-Heptachlorobiphenyl)	44.3 ± 1.2
PCB 183	(2,2',3,4,4',5',6-Heptachlorobiphenyl)	12.19 ± 0.57
PCB 187	(2,2',3,4',5,5',6-Heptachlorobiphenyl)	25.1 ± 1.0
PCB 194	(2,2',3,3',4,4',5,5'-Octachlorobiphenyl)	11.2 ± 1.4
PCB 195	(2,2',3,3',4,4',5,6-Octachlorobiphenyl)	3.75 ± 0.39
PCB 206	(2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl)	9.21 ± 0.51
PCB 209	Decachlorobiphenyl	6.81 ± 0.33

### Certified Mass Fraction Values for Selected Chlorinated Pesticides in SRM 1944 (Dry-Mass Basis) Mass Fraction (µg/kg)

Hexachlorobenzene	6.03 ± 0.35
cis-Chlordane (alpha-Chlordane)	16.51 ± 0.83
trans-Nonachlor	8.20 ± 0.51

Reference Values for PAHs, Chlorinated Pesticides,  
Dibenz-p-dioxin and Dibenzofuran Congeners, Particle-Size  
Characteristics, Total Organic Carbon and Percent Extractable Mass.  
Certified and reference concentrations for selected inorganic constituents.

## SRM-2702

### Inorganics in Marine Sediment

50 g

#### Certified Mass Fraction Values for Elements in SRM 2702 mg/kg (unless noted as %)

A	8.41 % ± 0.22 %	Ni	75.4 ± 1.5
Sb	5.60 ± 0.24	P	0.1552 % ± 0.0066 %
As	45.3 ± 1.8	K	2.054 % ± 0.072 %
Ba	397.4 ± 3.2	Rb	127.7 ± 8.8
Cd	0.817 ± 0.011	Sc	25.9 ± 1.1
Ce	123.4 ± 5.8	Na	0.681 % ± 0.020 %
Cr	352 ± 22	Sr	119.7 ± 3.0
Co	27.76 ± 0.58	Tl	0.8267 ± 0.0060
La	3.5 ± 4.2	Th	20.51 ± 0.96
Pb	132.8 ± 1.1	Ti	0.884 % ± 0.082 %
Mn	1757 ± 58	V	357.6 ± 9.2
Hg	0.4474 ± 0.0069	Zn	485.3 ± 4.2

#### Reference Mass Fraction Values for Selected Elements in SRM 2702 mg/kg (unless noted as %)

Ca	0.343 % ± 0.024 %	Mo	10.8 ± 1.6
Cu	117.7 ± 5.6	Se	4.95 ± 0.46
Ga	24.3 ± 1.9	Ag	0.622 ± 0.078
Mg	0.990 % ± 0.074 %	Sn	31.6 ± 2.4

# Sediments

Code	Product	Unit
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## Information Mass Fraction Values for Selected Elements

mg/kg (unless noted as %)

Be	3.0	Nd	56
C total	3.36 %	Nb	63
C organic	3.27 %	Sm	10.8
Cs	7.1	S	1.5 %
Hf	12.6	W	6.2
Fe	7.4 %	U	10.4
Li	78.2		

### SRM-2703

#### Sediment for Solid Sampling (Small Sample) Analytical Techniques

5 g

NIST-2703 is a marine sediment collected at the mouth of the Baltimore Harbor. It is primarily intended for use in evaluating analytical methods for the direct determination of selected elements in solid samples of marine or freshwater sediment and similar matrices.

Direct and slurry sampling, as well as dissolution techniques using typically milligram size samples (<10 mg), can employ this Standard Reference Material in the user's procedures;

all certified and reference values are based on measurements using a samples size of at least 0.7 mg. Techniques using large samples (100 mg) should use NIST-2702 Marine sediment - Trace elements.

#### Certified Concentrations for Selected Elements (mg/kg, unless noted as %)

Al	8.33 % ± 0.22 %	Na	0.693 % ± 0.019 %
As	45.5 ± 1.7	Pb	130 ± 11
Ba	416 ± 32	Rb	130 ± 11
Cd	0.811 ± 0.076	Sb	5.62 ± 0.26
Ce	125.5 ± 5.0	Sc	25.95 ± 0.68
Co	27.70 ± 0.50	Sr	118 ± 18
Fe	7.38 % ± 0.32 %	Th	20.22 ± 0.74
Hg	0.474 ± 0.066	Ti	0.880 % ± 0.046 %
K	2.08 % ± 0.24 %	U	8.99 ± 0.72
La	75.9 ± 3.0	V	360 ± 13
Mn	1734 ± 48	Zn	480 ± 22

### SRM-1941b

#### Organics in Marine Sediment

50 g

Collected at the mouth of the Baltimore Harbour.

All of the constituents for which certified, reference, and information values are provided in NIST-1941b were naturally present in the sediment material before processing. A unit of NIST-1941b consists of a bottle containing 50 g of radiation-sterilized, freeze-dried sediment material.

#### Certified Mass Fraction Values for PAHs / Mass Fractions (µg/kg)

Naphthalene	848 ± 95	Benzo[b]fluoranthene	453 ± 21
Fluorene	85 ± 15	Benzo[k]fluoranthene	225 ± 18
Phenanthrene	406 ± 44	Benzo[e]pyrene	325 ± 25
Anthracene	184 ± 18	Benzo[a]pyrene	358 ± 17
3-Methylphenanthrene	105 ± 13	Perylene	397 ± 45
2-Methylphenanthrene	128 ± 14	Benzo[ghi]perylene	307 ± 45
1-Methylphenanthrene	73.2 ± 5.9	Indeno[1,2,3-cd]pyrene	341 ± 57
Fluoranthene	651 ± 50	Dibenz[a,j]anthracene	48.9 ± 4.6
Pyrene	581 ± 39	Dibenz[a,c]anthracene	36.7 ± 5.2

## Sediments

Code	Product	Unit
	Benz[a]anthracene .....335 ± 25	Dibenz[a,h]anthracene .....53 ± 10
	Chrysene .....291 ± 31	Benzo[b]chrysene .....53 ± 12
	Triphenylene .....108 ± 5	Picene .....46.6 ± 4.7

### Certified Mass Fraction Values for PCB Congeners / Mass Fractions (µg/kg)

PCB 8	2,4'-Dichlorobiphenyl	1.65 ± 0.19
PCB 18	2,2',5-Trichlorobiphenyl	2.39 ± 0.29
PCB 28	2,4,4'-Trichlorobiphenyl	4.52 ± 0.57
PCB 31	2,4',5-Trichlorobiphenyl	3.18 ± 0.41
PCB 44	2,2',3,5'-Tetrachlorobiphenyl	3.85 ± 0.20
PCB 49	2,2',4,5'-Tetrachlorobiphenyl	4.34 ± 0.28
PCB 52	2,2',5,5'-Tetrachlorobiphenyl	5.24 ± 0.28
PCB 66	2,3',4,4'-Tetrachlorobiphenyl	4.96 ± 0.53
PCB 87	2,2',3,4,5'-Pentachlorobiphenyl	1.14 ± 0.16
PCB 95	2,2',3,5',6-Pentachlorobiphenyl	3.93 ± 0.62
PCB 99	2,2',4,4',5-Pentachlorobiphenyl	2.90 ± 0.36
PCB 101	2,2',4,5,5'-Pentachlorobiphenyl	5.11 ± 0.34
PCB 105	2,3,3',4,4'-Pentachlorobiphenyl	1.43 ± 0.10
PCB 110	2,3,3',4',6-Pentachlorobiphenyl	4.62 ± 0.36
PCB 118	2,3',4,4',5-Pentachlorobiphenyl	4.23 ± 0.19
PCB 128	2,2',3,3',4,4'-Hexachlorobiphenyl	0.696 ± 0.044
PCB 138	2,2',3,4,4',5'-Hexachlorobiphenyl	3.60 ± 0.28
PCB 149	2,2',3,4',5',6-Hexachlorobiphenyl	4.35 ± 0.26
PCB 153	2,2',4,4',5,5'-Hexachlorobiphenyl	5.47 ± 0.32
PCB 156	2,3,3',4,4',5-Hexachlorobiphenyl	0.507 ± 0.090
PCB 170	2,2',3,3',4,4',5-Heptachlorobiphenyl	1.35 ± 0.09
PCB 180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	3.24 ± 0.51
PCB 183	2,2',3,4,4',5',6-Heptachlorobiphenyl	0.979 ± 0.087
PCB 187	2,2',3,4',5,5',6-Heptachlorobiphenyl	2.17 ± 0.22
PCB 194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	1.04 ± 0.06
PCB 195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	0.645 ± 0.060
PCB 201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	0.777 ± 0.034
PCB 206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	2.42 ± 0.19
PCB 209	Decachlorobiphenyl	4.86 ± 0.45

### Certified Mass Fraction Values for Chlorinated Pesticides / Mass Fractions (µg/kg)

Hexachlorobenzene .....5.83 ± 0.38	Trans-Nonachlor .....0.438 ± 0.073
Cis-Chlordane .....0.85 ± 0.11	4,4'-DDE .....3.22 ± 0.28
Trans-Chlordane .....0.566 ± 0.093	4,4'-DDD .....4.66 ± 0.46
Cis-Nonachlor .....0.378 ± 0.053	

Reference values for selected PCBs, PCBs, Pesticides and TOC

Indicative values for carbon, hydrogen and nitrogen

**BCR-320R**

**ESTUARINE SEDIMENT**

40 g

The material consists of 40 g of powder, bottled in amber glass bottles, packaged under argon and closed with polyethylene inserts and plastic screw caps

Certified Value

As ..... 21.7 mg/kg	Ni .....27.1 mg/kg
Cd .....2.64 mg/kg	Pb .....85 mg/kg
Co .....9.7 mg/kg	Sc .....5.2 mg/kg
Cr .....59 mg/kg	Th .....5.3 mg/kg



## Sediments

Code	Product	Unit
	Cu .....	46.3 mg/kg
	Fe .....	25700 mg/kg
	Hg .....	0.85 mg/kg
	Mn .....	910 mg/kg
	Tl .....	0.65 mg/kg
	U .....	1.56 mg/kg
	V .....	46.5 mg/kg
	Zn .....	319 mg/kg

SRM 8704	Buffalo River	50 g
	Certified value (%)	Certified value (mg/kg)
	Aluminum (Al) .....	6.10
	Calcium (Ca) .....	2.641
	Carbon (C) .....	3.351
	Iron (Fe) .....	3.97
	Magnesium (Mg) .....	1.200
	Potassium (K) .....	2.001
	Sodium (Na) .....	0.553
	Titanium (Ti) .....	0.457
		Antimony (Sb) .....
		3.07
		Barium (Ba) .....
		413
		Cadmium (Cd) .....
		2.94
		Cerium (Ce) .....
		66.5
		Cesium (Cs) .....
		5.83
		Chromium (Cr) .....
		121.9
		Cobalt (Co) .....
		13.57
		Europium (Eu) .....
		1.31
		Hafnium (Hf) .....
		8.4
		Lead (Pb) .....
		150
		Manganese (Mn) .....
		544
		Nickel (Ni) .....
		42.9
		Scandium (Sc) .....
		11.26
		Thorium (Th) .....
		9.07
		Uranium (U) .....
		3.09
		Vanadium (V) .....
		94.6
		Zinc (Zn) .....
		408

CRM 7307-a	Polycyclic Aromatic Hydrocarbons in Fresh Water Lake Sediment	50 g
	Certified value (µg/kg)	
	Fluorene .....	6.0
	Phenanthrene .....	24.5
	Anthracene .....	3.6
	Fluoranthene .....	25.1
	Pyrene .....	22.2
	Benzo[c]phenanthrene .....	3.21
	Benz[a]anthracene .....	7.1
	Chrysene .....	8.39
		Benzo[b]fluoranthene .....
		24.9
		Benzo[k]fluoranthene .....
		5.3
		Benzo[j]fluoranthene .....
		7.0
		Benzo[a]fluoranthene .....
		1.56
		Benzo[e]pyrene .....
		9.7
		Benzo[a]pyrene .....
		4.57
		Indeno[1,2,3-cd]pyrene .....
		5.6
		Benzo[ghi]perylene .....
		6.8

Sediments

## Sediments

Code	Product	Unit		
<b>SRM 1646a</b>	<b>ESTUARINE SEDIMENT</b>	70 g		
	Certified Value (%)		Certified Value (mg/kg)	
	Aluminum ..... 2.297		Arsenic ..... 6.23	
	Calcium ..... 0.519		Cadmium ..... 0.148	
	Iron ..... 2.008		Chromium ..... 40.9	
	Magnesium ..... 0.388		Copper ..... 10.01	
	Phosphorus ..... 0.027		Lead ..... 11.7	
	Potassium ..... 0.864		Manganese ..... 234.5	
	Silicon ..... 40.00		Selenium ..... 0.193	
	Sodium ..... 0.741		Vanadium ..... 44.84	
	Sulfur ..... 0.352		Zinc ..... 48.9	
	Titanium ..... 0.456			
	<hr/>			
	<b>CRM 7302-a</b>		<b>Trace Elements in Marine Sediment</b>	60 g
Certified Value (mg/kg)		Certified Value (mg/kg)		
Sb ..... 1.22		Hg ..... 0.52		
As ..... 22.1		Mo ..... 1.98		
Cd ..... 1.32		Ni ..... 25.8		
Cr ..... 145		Se ..... 0.61		
Co ..... 12.4		Ag ..... 0.49		
Cu ..... 57.8		Sn ..... 18.5		
Pb ..... 82.7		Zn ..... 401		
<hr/>				
<b>NRC HISS-1</b>	<b>Marine Sediment Certified Reference Material for total and extractable metal content</b>	100 g		
	Certified Value (mg/kg)		Certified Value (mg/kg)	
	aluminium ..... 7300		iron ..... 2460	
	arsenic ..... 0.801		lead ..... 3.13	
	beryllium ..... 0.129		lithium ..... 2.83	
	cadmium ..... 0.024		magnesium ..... 750	
	calcium ..... 11400		manganese ..... 66.1	
	chromium ..... 30.0		nickel ..... 2.16	
	copper ..... 2.29		potassium ..... 3320	
	selenium ..... 0.050		strontium ..... 96.9	
	silicon ..... 440000		titanium ..... 760	
	silver ..... 0.016		vanadium ..... 6.80	
	sodium ..... 3730		zinc ..... 4.94	
	<hr/>			
<b>PACS-3</b>	<b>Marine Sediment Certified Reference Material for total and extractable metal content</b>	50 g		
	Certified Value (mg/kg)		Certified Value (mg/kg)	
	aluminium ..... 65800		iron ..... 41060	
	antimony ..... 14.7		lead ..... 188.0	
	arsenic ..... 30.3		lithium ..... 31.9	
	beryllium ..... 1.06		magnesium ..... 14020	
	cadmium ..... 2.23		manganese ..... 432	
	calcium ..... 18900		mercury ..... 2.98	
	chromium ..... 90.6		nickel ..... 39.5	
	copper ..... 326		phosphorus ..... 937	

## Sediments

Code	Product	Unit	
potassium .....	12530	titanium .....	4420
silicon .....	26000	vanadium .....	129
sodium .....	35200	zinc .....	376
strontium .....	267	monobutyltin .....	1.47
sulfur .....	11 700	dibutyltin .....	0.631
tin .....	22.0	tributyltin .....	0.43

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Sediments

