



THE INDUSTRIAL ANALYSIS SERVICE LTD.

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TEST REPORT

Request No. 0138670
 Report No. ES210000004116-01
 Date of issue: 21 September 2021

To. NGK Electronics Devices, Inc.

Address: 2701-1 Higashibun, Ohmine-cho, Mine-Shi, Yamaguchi. 759-2212, Japan

Name of sample: Ni Plating(Ni-Co)

Date of receipt of sample: 13 September 2021

Measurement days: 13 September 2021 ~ 21 September 2021

The following is the report on the requested test of the sample

Test Items	Unit	Test result	D.L.	Test Method
Cd	ppm	N.D.	2.0	With reference to IEC62321-5(2013) ICP/MS
Pb	ppm	N.D.	2.0	With reference to IEC62321-5(2013) ICP/MS
Cr6+	ppm	N.D.	0.1	With reference to IEC62321-7-1(2015) Boiling water extraction/UV-VIS
Hg	ppm	N.D.	2.0	With reference to IEC62321-4(2013)/AMD1(2017) ICP/MS
PBBs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
PBDEs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
Bis(2-ethylhexyl) phthalate (DEHP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Butylbenzyl phthalate (BBP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Dibutyl phthalate (DBP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Diisobutyl phthalate (DIBP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Diisodecyl phthalate (DIDP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Diisononyl phthalate (DINP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Di-n-octyl phthalate (DNOP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
F	ppm	N.D.	50	With reference to EN14582(2016) Furnace combustion/IC

Note: The results shown in this test report refer only to the sample(s) tested.
 Plating part

N.D.means the analysis result is less than fixed quality lower limit level calculated according to our established precision management condition.
 mg/kg=ppm

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TAKANORI YOSHIDA

Test Items	Unit	Test result	D.L.	Test Method
Cl	ppm	N.D.	50	With reference to EN14582(2016) Furnace combustion/IC
Br	ppm	N.D.	50	With reference to EN14582(2016) Furnace combustion/IC
I	ppm	N.D.	50	With reference to EN14582(2016) Furnace combustion/IC
Sb	ppm	N.D.	2.0	With reference to US EPA Method 3050B Acid digestion/ICP/MS
Be	ppm	N.D.	2.0	With reference to US EPA Method 3050B Acid digestion/ICP/MS
P	ppm	N.D.	100	With reference to US EPA Method 3050B Acid digestion/ICP/MS
Hexabromocyclododecane (HBCDD)	ppm	N.D.	10	GC/MS
PFOS	ppm	N.D.	0.010	LC/MS/MS
PFOA	ppm	N.D.	0.010	LC/MS/MS
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 mg/kg=ppm



Test Items	Unit	Test result	D.L.	Test Method
Monobromobiphenyl (MonoBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Dibromobiphenyl (DiBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tribromobiphenyl (TriBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tetrabromobiphenyl (TetraBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Pentabromobiphenyl (PentaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Hexabromobiphenyl (HexaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Heptabromobiphenyl (HeptaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Octabromobiphenyl (OctaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Nonabromobiphenyl (NonaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Decabromobiphenyl (DecaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
SUM PBBs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
Monobromodiphenylether (MonoBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Dibromodiphenylether (DiBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tribromodiphenylether (TriBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tetrabromodiphenylether (TetraBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Pentabromodiphenylether (PentaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Hexabromodiphenylether (HexaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Heptabromodiphenylether (HeptaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Octabromodiphenylether (OctaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Nonabromodiphenylether (NonaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Decabromodiphenylether (DecaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
SUM PBDEs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
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Note: The results shown in this test report refer only to the sample(s) tested.

N.D. means the analysis result is less than fixed quality lower limit level calculated according to our established precision management condition.
mg/kg=ppm



Flow chart

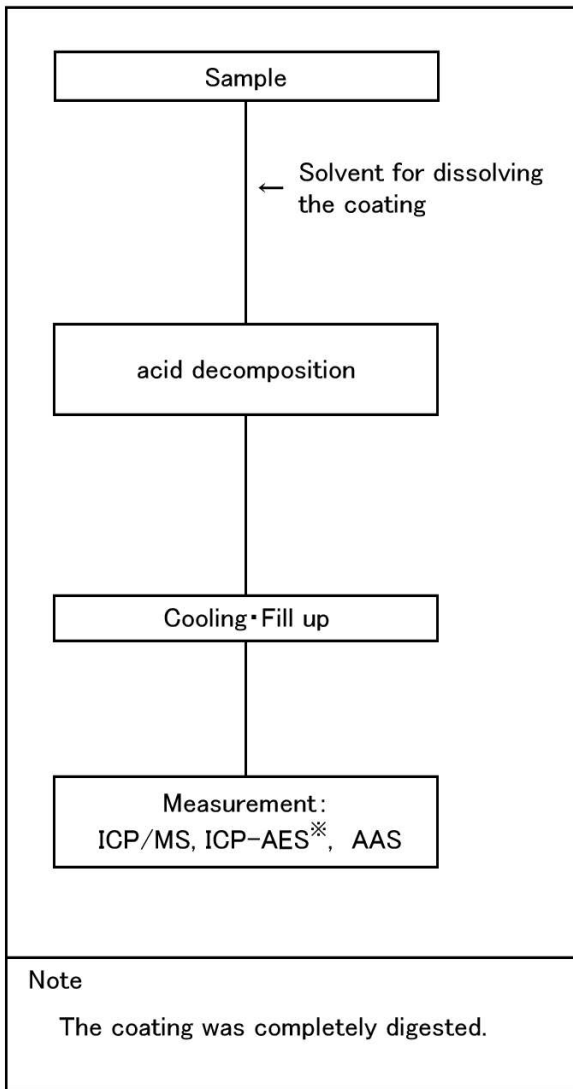
Report No. : ES210000004116-01

Measurement days : 13 September 2021 ~ 21 September 2021

Operator : Kensho Nakajima Wataru Imaoka

Cd, Pb, Hg, Sb, Be, P

Cr6+



Note

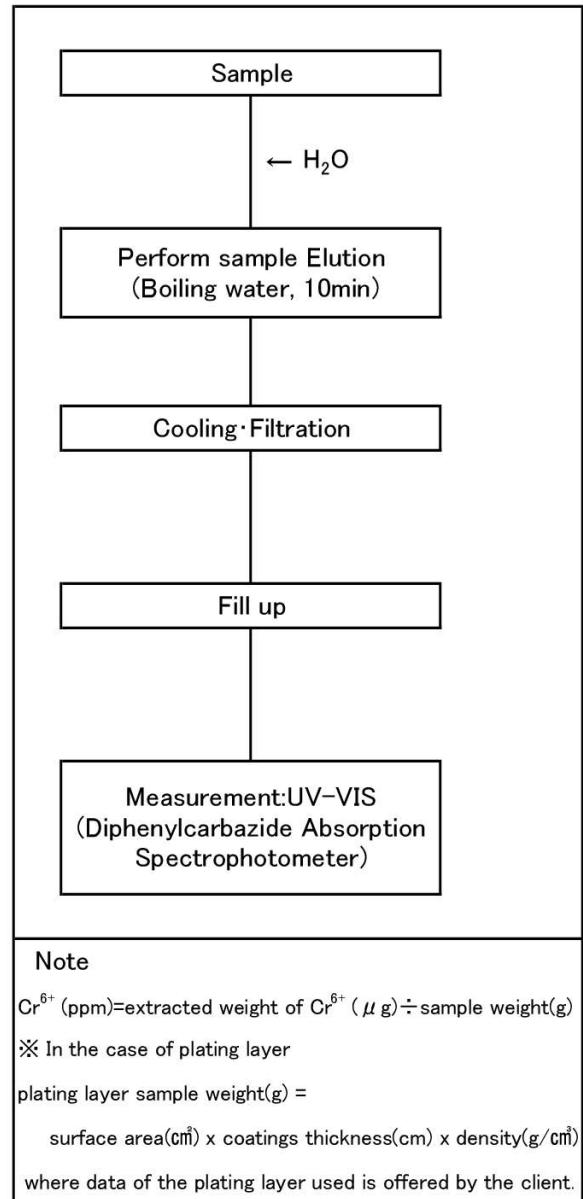
The coating was completely digested.

ICP/MS : Agilent Technologies 7700X

ICP-AES : Rigaku CIROS CCD

AAS : HIRANUMA MERCURY ANALYZER HG-200

※It is also called ICP-OES.



Note

Cr^{6+} (ppm) = extracted weight of Cr^{6+} (μg) \div sample weight(g)

※ In the case of plating layer

plating layer sample weight(g) =

surface area(cm^2) x coatings thickness(cm) x density(g/cm^3)

where data of the plating layer used is offered by the client.

UV-VIS : HITACHI High-Technologies U-2910

Flow chart

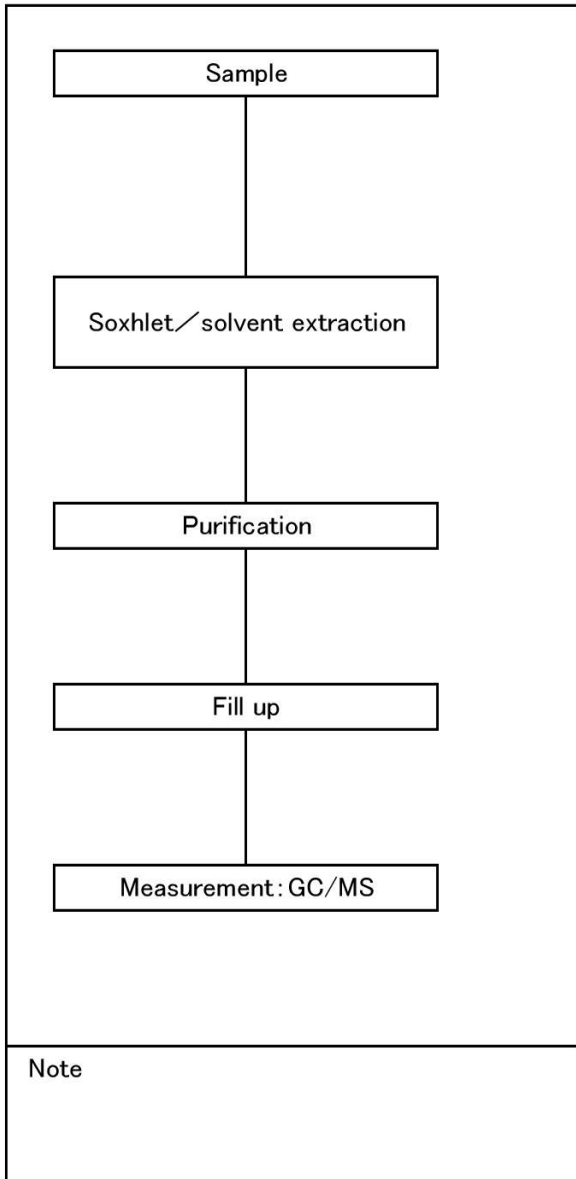
Report No. : ES210000004116-01

Measurement days : 13 September 2021 ~ 21 September 2021

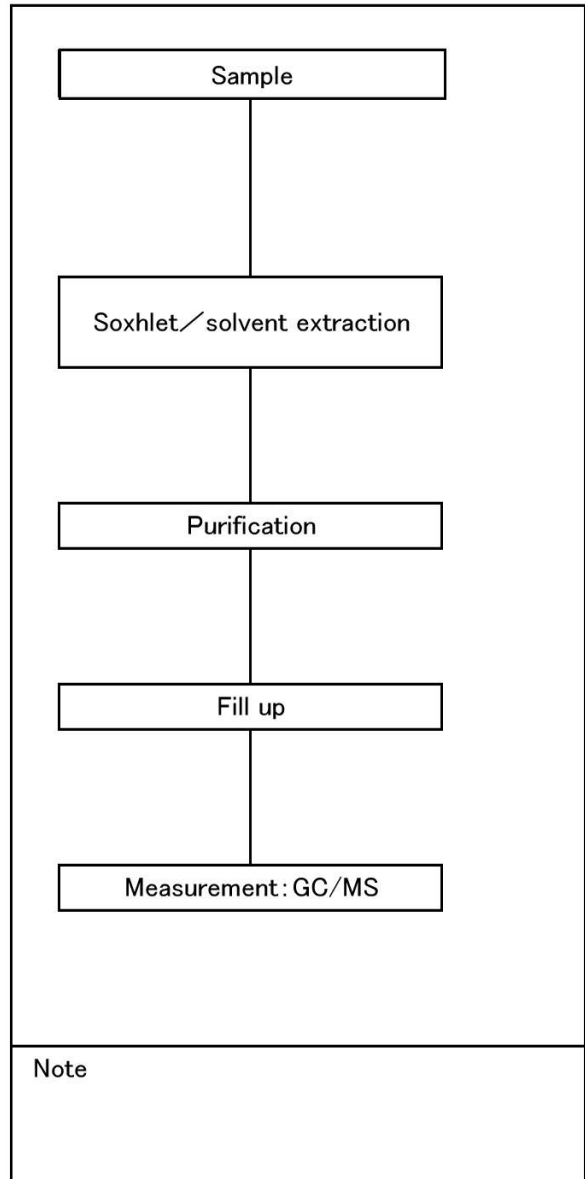
Operator : Yuichi Kuboji

PBBs, PBDEs,
Hexabromocyclododecane (HBCDD)

phthalates



GC/MS: Agilent Technologies GC 7890B MS 5977A



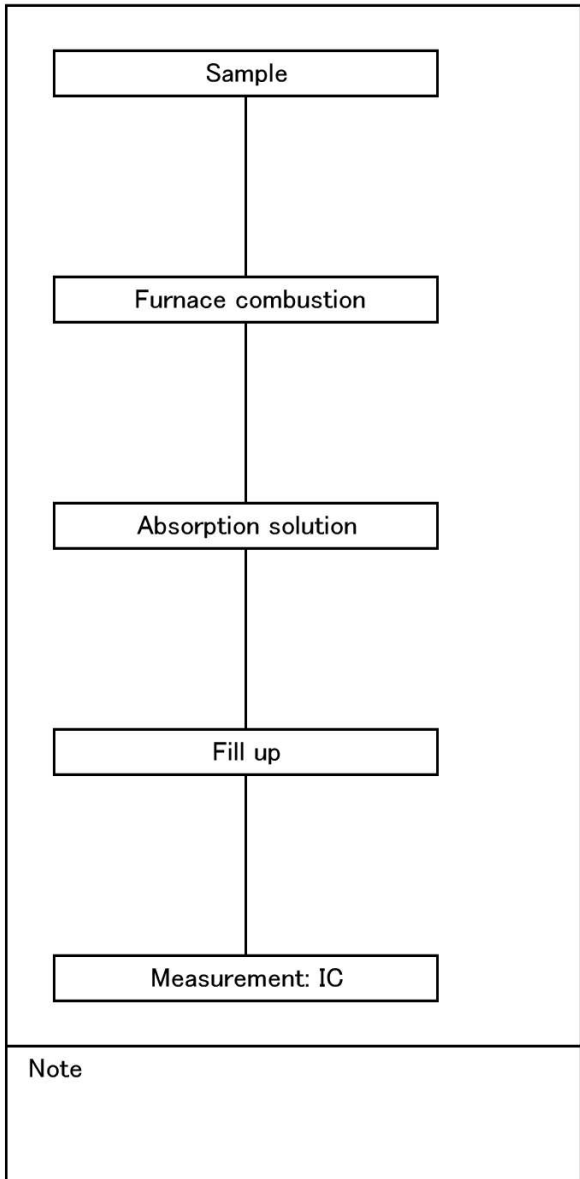
GC/MS : SHIMADZU GCMS-QP2020

Flow chart

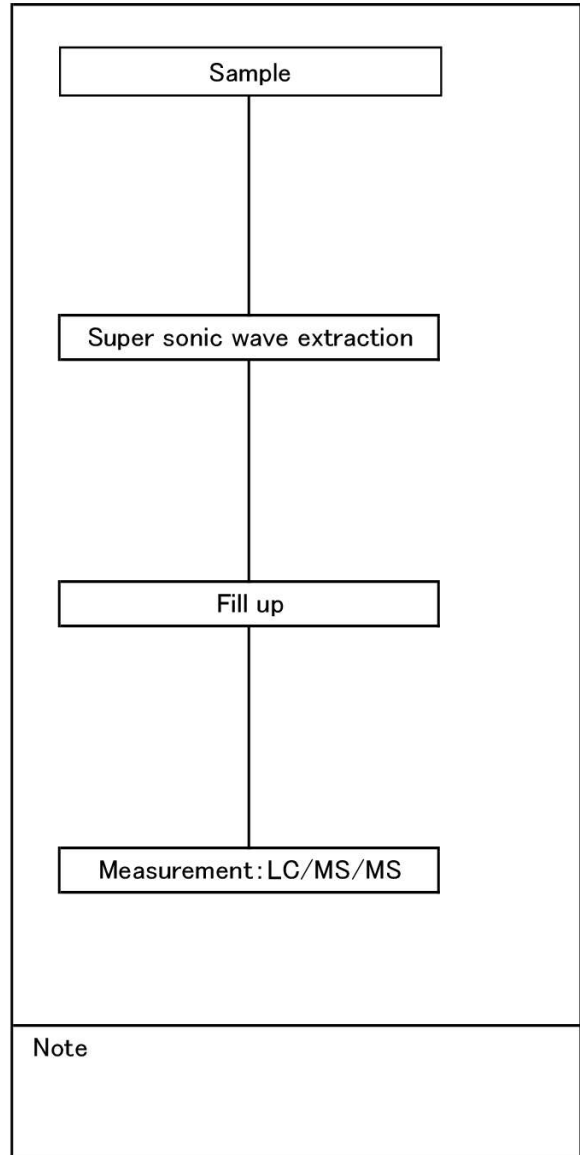
Report No. : ES210000004116-01
Measurement days : 13 September 2021 ~ 21 September 2021
Operator : Norio Watanabe Risa Minowada

F, Cl, Br, I

PFOS, PFOA



IC : DIONEX ICS-1100 RFIC



LC/MS/MS : Waters Xevo-TQ

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