



Test Report

No.: ETR23602641

Date: 30-Jun-2023

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VALE CANADA LIMITED

200 BAY STREET, ROYAL BANK PLAZA, SUITE 1600, SOUTH TOWER, P.O. BOX 70, TORONTO, ONTARIO, M5J 2K2, CANADA

The following sample(s) was/were submitted and identified by the applicant as:

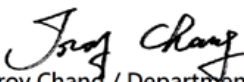
Sample Submitted By : VALE CANADA LIMITED
Sample Name : VALE CNR Ni S Pellets

=====
Sample Receiving Date : 14-Jun-2023
Testing Period : 14-Jun-2023 to 30-Jun-2023

Test Requested : (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) As specified by client, the sample(s) was/were tested for 5 PBTs with reference to Regulation of Persistent, Bioaccumulative, Toxic (PBT) Chemicals under Toxic Substances Control Act (TSCA) Section 6(h). Please refer to result table for testing item(s).
(3) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.
(2) Based on the performed tests on submitted sample(s), the test result(s) comply with the limits as set by Persistent, Bioaccumulative, Toxic (PBT) Chemicals under Toxic Substances Control Act (TSCA) Section 6(h).


Troy Chang / Department Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei



PIN CODE: 83157B74

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Test Part Description

No.1 : SILVER COLORED METAL

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Cadmium (Cd)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	100
Lead (Pb)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Mercury (Hg)	With reference to IEC 62321-4: 2013+AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	µg/cm ²	0.1	n.d.	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Dibromobiphenyl		mg/kg	5	n.d.	-
Tribromobiphenyl		mg/kg	5	n.d.	-
Tetrabromobiphenyl		mg/kg	5	n.d.	-
Pentabromobiphenyl		mg/kg	5	n.d.	-
Hexabromobiphenyl		mg/kg	5	n.d.	-
Heptabromobiphenyl		mg/kg	5	n.d.	-
Octabromobiphenyl		mg/kg	5	n.d.	-
Nonabromobiphenyl		mg/kg	5	n.d.	-
Decabromobiphenyl		mg/kg	5	n.d.	-
Sum of PBBs		mg/kg	-	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	n.d.	-
Dibromodiphenyl ether		mg/kg	5	n.d.	-
Tribromodiphenyl ether		mg/kg	5	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	n.d.	-
Octabromodiphenyl ether		mg/kg	5	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	n.d.	-
Decabromodiphenyl ether	mg/kg	5	n.d.	-	
Sum of PBDEs	mg/kg	-	n.d.	1000	

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Butyl benzyl phthalate (BBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisobutyl phthalate (DIBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α - HBCDD, β - HBCDD, γ - HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321-9: 2021, analysis was performed by GC/MS.	mg/kg	20	n.d.	-
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	Negative	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Asbestos					
Actinolite (CAS No.: 77536-66-4)	With reference to EPA 600/R-93/116: 1993, analysis was performed by Stereo Microscope (SM), Dispersion Staining Polarized Light Microscope (DS-PLM) and X-ray Diffraction Spectrometer (XRD).	-	-	Negative	-
Amosite (CAS No.: 12172-73-5)		-	-	Negative	-
Anthophyllite (CAS No.: 77536-67-5)		-	-	Negative	-
Chrysotile (CAS No.: 12001-29-5)		-	-	Negative	-
Crocidolite (CAS No.: 12001-28-4)		-	-	Negative	-
Tremolite (CAS No.: 77536-68-6)		-	-	Negative	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Perfluorooctane sulfonates (PFOS) (CAS No.: 1763-23-1)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Potassium Perfluorooctanesulfonate (PFOS-K) (CAS No.: 2795-39-3)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
Perfluorooctanesulfonic acid, lithium salt (PFOS-Li) (CAS No.: 29457-72-5)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH ₄) (CAS No.: 29081-56-9)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
Perfluorooctane sulfonate diethanolamine salt (PFOS-NH(OH) ₂) (CAS No.: 70225-14-8)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
Perfluorooctanesulfonic acid, tetraethylammonium salt (PFOS-N(C ₂ H ₅) ₄) (CAS No.: 56773-42-3)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
N-decyl-N,N-dimethyldecyl-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptafluorooctane-1-sulfonate (PFOS-DDA) (CAS No.: 251099-16-8)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
Perfluorooctane sulfonyl fluoride (POSF) (CAS No.: 307-35-7)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg) (CAS No.: 91036-71-4)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
Perfluorooctanesulfonic acid, sodium salt (PFOS-Na) (CAS No.: 4021-47-0)	Calculated from the result of PFOS.	mg/kg	0.01▲	n.d.	-
N-ethylperfluoro-1-octanesulfonamide (EtFOSA) (CAS No.: 4151-50-2)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
N-Methyl-Perfluorooctanesulfonamide (N-Me-FOSA) (CAS No.: 31506-32-8)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
N-Ethyl-Perfluorooctanesulfonamidoethanol (N-Et-FOSE alcohol) (CAS No.: 1691-99-2)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
N-Methyl-Perfluorooctanesulfonamidoethanol (N-Me-FOSE alcohol) (CAS No.: 24448-09-7)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Perfluorooctanesulfonamide (PFOSA) (CAS No.: 754-91-6)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Perfluorooctanoic Acid (PFOA) (CAS No.: 335-67-1)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Sodium perfluorooctanoate (PFOA-Na) (CAS No.: 335-95-5)	Calculated from the result of PFOA.	mg/kg	0.01▲	n.d.	-
Potassium perfluorooctanoate (PFOA-K) (CAS No.: 2395-00-8)	Calculated from the result of PFOA.	mg/kg	0.01▲	n.d.	-
Silver perfluorooctanoate (PFOA-Ag) (CAS No.: 335-93-3)	Calculated from the result of PFOA.	mg/kg	0.01▲	n.d.	-
Perfluorooctanoyl fluoride (PFOA-F) (CAS No.: 335-66-0)	Calculated from the result of PFOA.	mg/kg	0.01▲	n.d.	-
Ammonium pentadecafluorooctanoate (APFO) (CAS No.: 3825-26-1)	Calculated from the result of PFOA.	mg/kg	0.01▲	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS) (CAS No.: 39108-34-4)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Methyl perfluorooctanoate (Me-PFOA) (CAS No.: 376-27-2)	With reference to CEN/TS 15968: 2010, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
Ethyl perfluorooctanoate (Et-PFOA) (CAS No.: 3108-24-5)	With reference to CEN/TS 15968: 2010, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH) (CAS No.: 678-39-7)	With reference to CEN/TS 15968: 2010, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTA) (CAS No.: 27905-45-9)	With reference to CEN/TS 15968: 2010, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMA) (CAS No.: 1996-88-9)	With reference to CEN/TS 15968: 2010, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
Perfluoro-1-iodooctane (PFOI) (CAS No.: 507-63-1)	With reference to CEN/TS 15968: 2010, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
Decabromodiphenyl ether (DecaBDE) (CAS No.: 1163-19-5)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	Prohibited / N/A(*3)
Phenol, isopropylated, phosphate (3:1) (PIP 3:1) (CAS No.: 68937-41-7)		mg/kg	5	n.d.	Prohibited / N/A(*1)
2,4,6-Tris(tert-butyl)phenol (2,4,6-TTBP) (CAS No.: 732-26-3)		mg/kg	5	n.d.	3000 / N/A(*2)
Pentachlorothiophenol (PCTP) (CAS No.: 133-49-3)		mg/kg	5	n.d.	10000
Hexachlorobutadiene (HCBd) (CAS No.: 87-68-3)		mg/kg	5	n.d.	Prohibited

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Note :

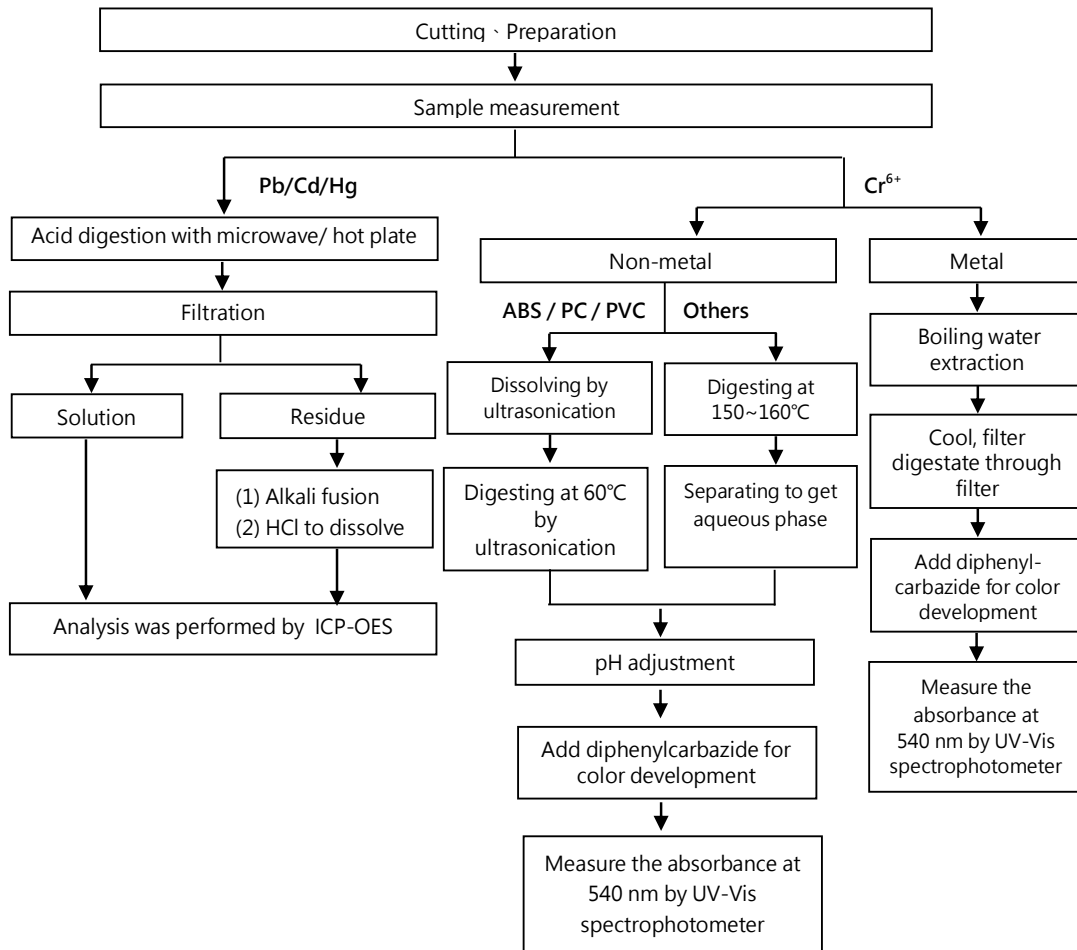
1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. **= Qualitative analysis (No Unit)
6. Negative = Undetectable ; Positive = Detectable
7. Testing range of asbestos qualitative analysis is from less than 0.1% to 100%. The judgment criterion: asbestos fibers being found is shown as "Positive"; asbestos fibers not being found is shown as "Negative".
8. ▲ : The MDL was evaluated for element / tested substance.
Parameter Conversion Table : https://eecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others
9. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.
10. Detail explanation of the regulation is available at the following link.
<https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/persistent-bioaccumulative-and-toxic-pbt-chemicals-under>
11. N/A(*1) : The submitted sample is exempted from the regulated scope if it is anyone of the following :
 - Hydraulic fluids for aviation or military
 - Lubricants and grease
 - New and replacement parts for motor and aerospace vehicles
 - Manufacture of cyanoacrylate adhesives in closed systems
 - Specialized engine air filters for locomotive and marine applications
 - Plastic for recycling from PIP (3:1)-containing products or articles
 - Finished products or articles made of plastic recycled from PIP (3:1)-containing products or articles
 - Processing and distribution in commerce of PIP (3:1)-containing articles, before October 31, 2024
12. N/A(*2) : The submitted sample is exempted from the regulated scope if it is not oil and lubricant additives.
13. N/A(*3) : The submitted sample is exempted from the regulated scope if it is anyone of the following :
Exempts processing and distribution for recycling of DecaBDE-containing plastic from products or articles and DecaBDE-containing products or articles made from such recycled plastic.
14. (#2) =
 - a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm². The sample coating is considered to contain Cr(VI).
 - b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 µg/cm²). The coating is considered a non-Cr(VI) based coating
 - c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.

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Analytical flow chart of heavy metal

These samples were dissolved totally by pre-conditioning method according to below flow chart.

(Cr⁶⁺ test method excluded)

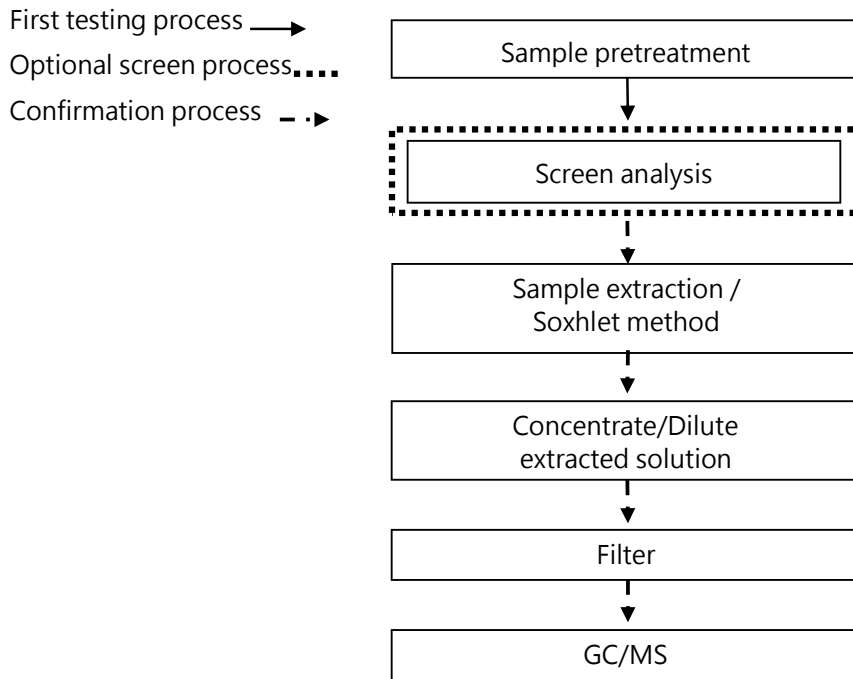


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200 BAY STREET, ROYAL BANK PLAZA, SUITE 1600, SOUTH TOWER, P.O. BOX 70, TORONTO, ONTARIO, M5J 2K2, CANADA

Analytical flow chart – PBBs / PBDEs



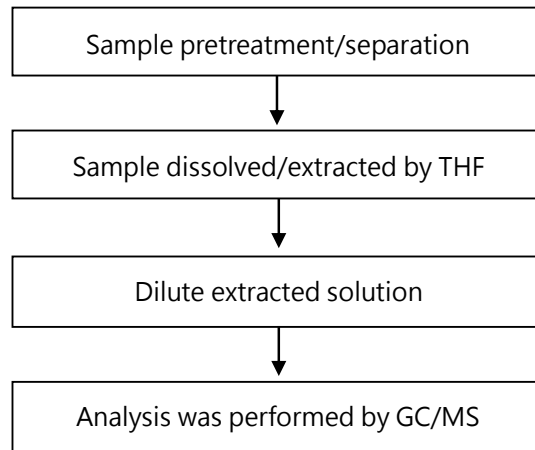
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Analytical flow chart - Phthalate

【Test method: IEC 62321-8】

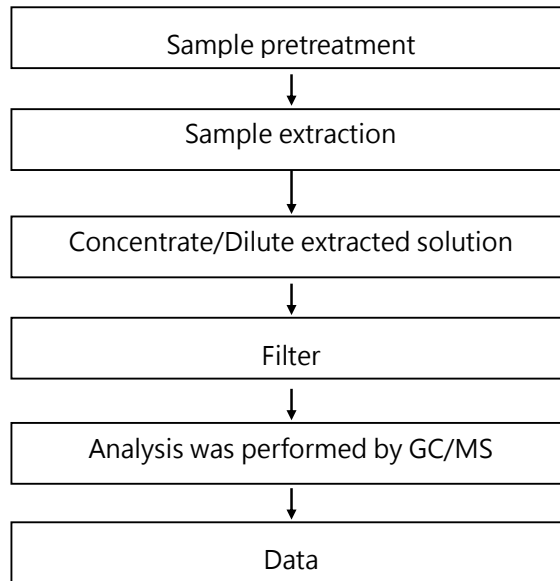


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Analytical flow chart - HBCDD

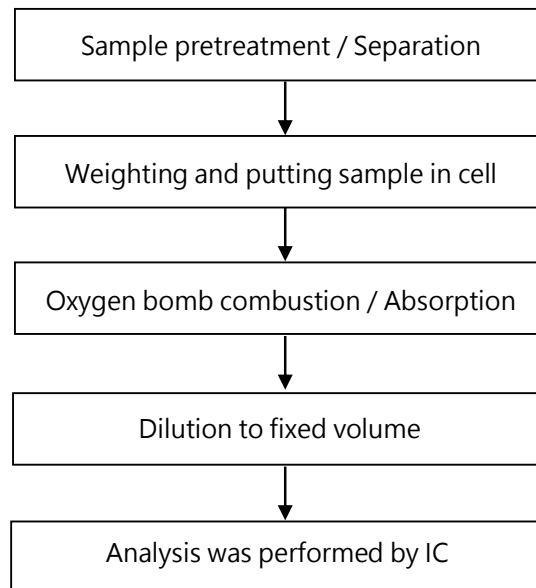


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Analytical flow chart - Halogen



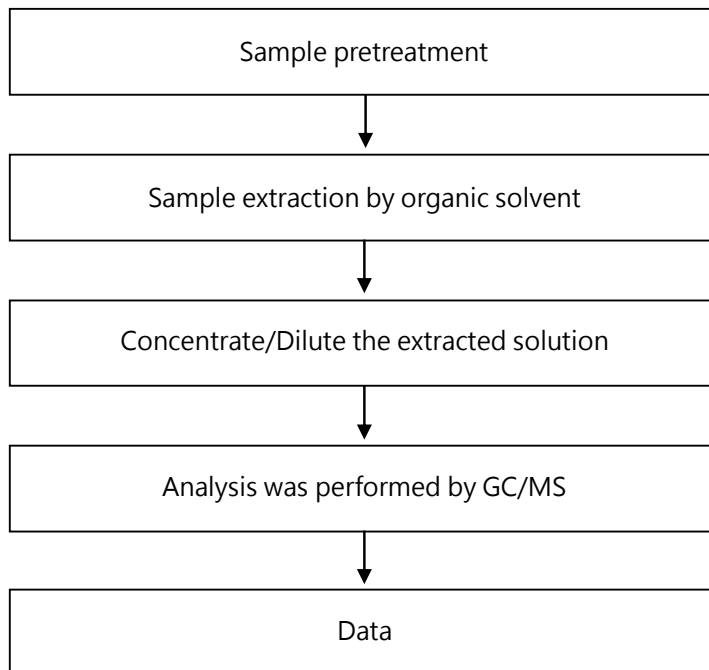
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Analytical flow chart

* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT

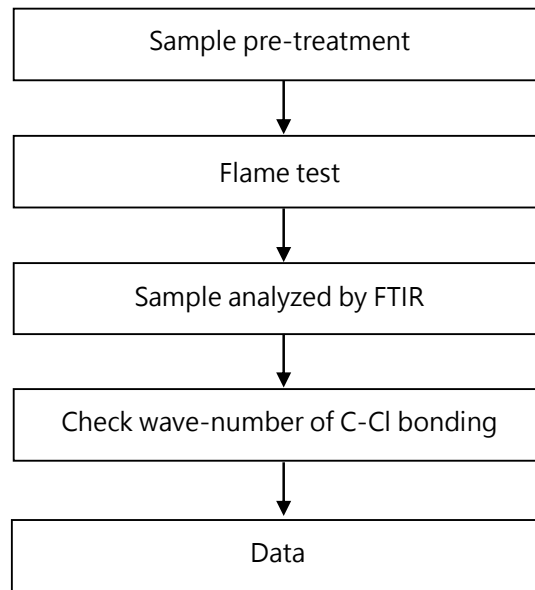


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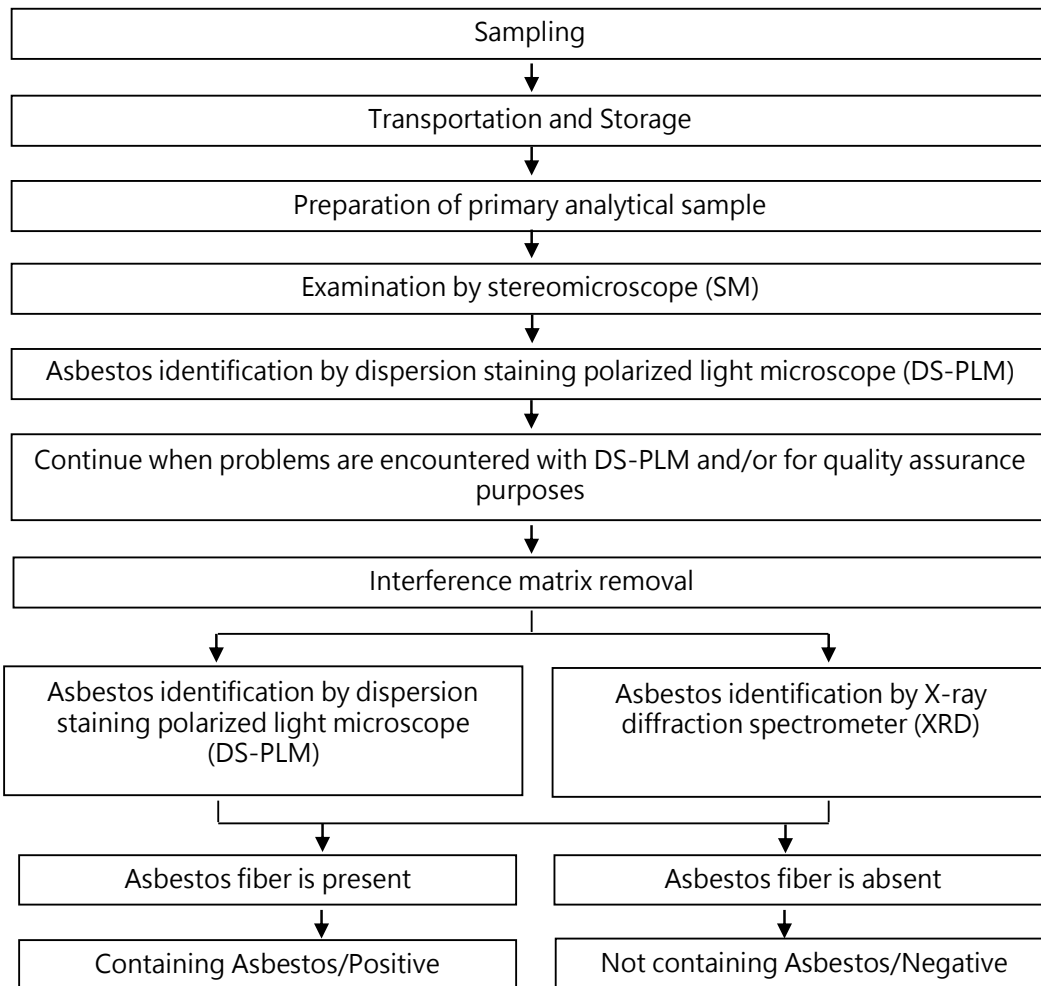
Analysis flow chart - PVC



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Analysis flow chart for determination of Asbestos

【Reference method: EPA 600/R-93/116】

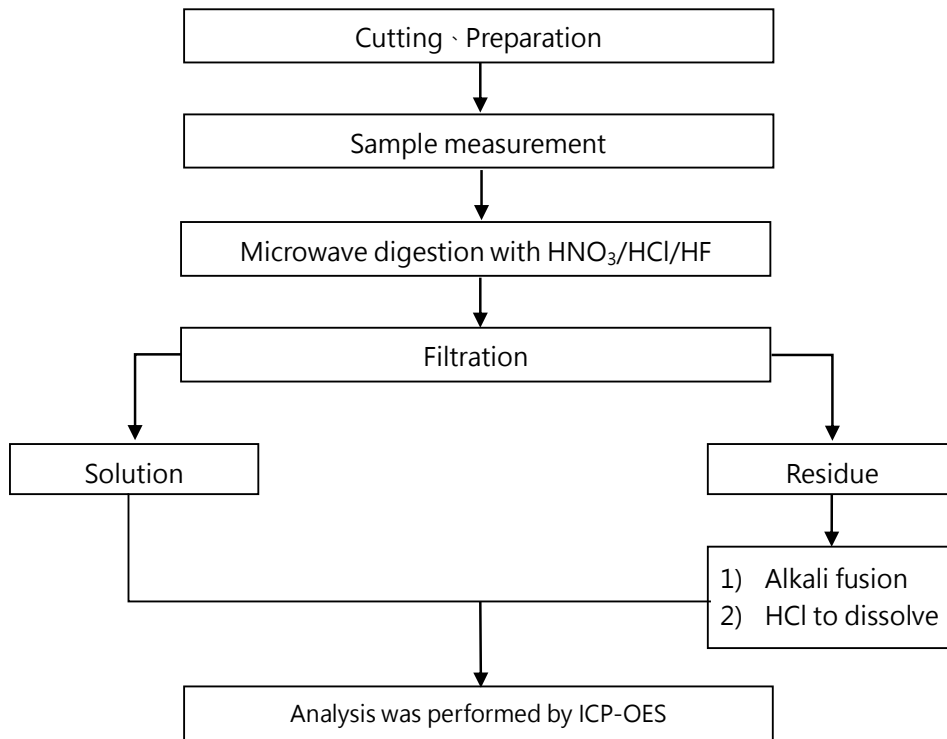


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Analytical flow chart of elements (Heavy metal included)

These samples were dissolved totally by pre-conditioning method according to below flow chart.

【 Reference method : US EPA 3051A 、 US EPA 3052 】

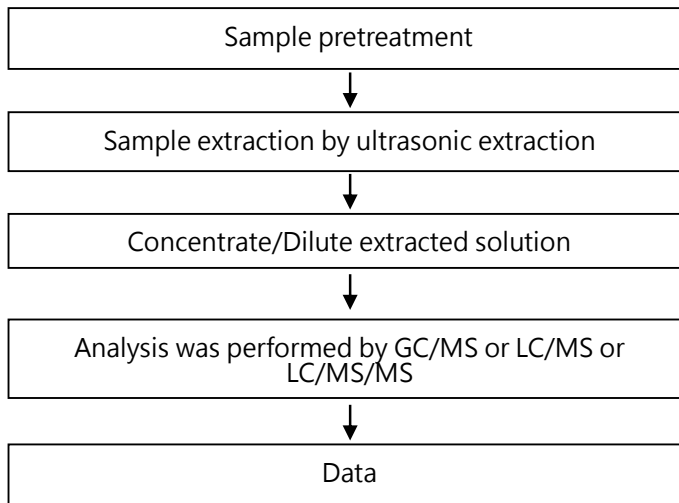


* US EPA 3051A method does not add HF.

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Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)

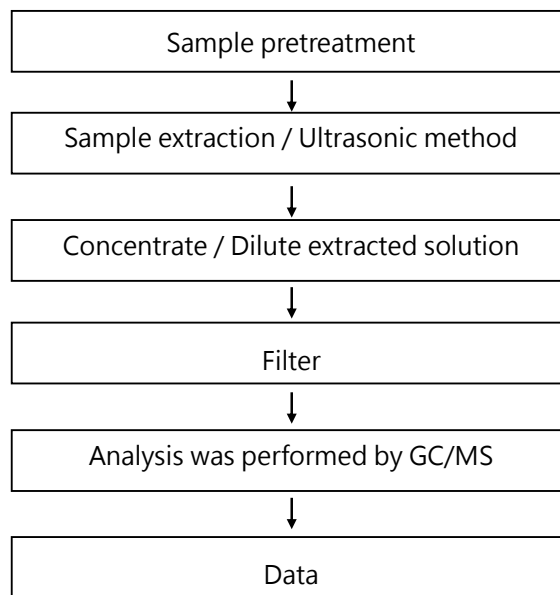


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Analytical flow chart - Persistent, Bioaccumulative, Toxic (PBTs)



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CANADA

* The tested sample / part is marked by an arrow if it's shown on the photo. *

ETR23602641



** End of Report **

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