

Taxonomy / Definitions and Rules for Classification

1. Definitions and rules for classification of L1 to L4

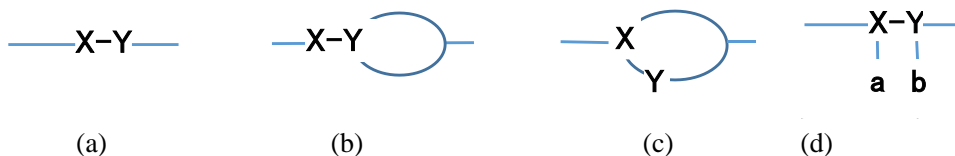
1.1 L1: Definitions of 29 items

Table 1 shows the 29 items at Level 1 (L1) specified on the basis of the characteristics of the chemical structure contained in each polymer repeating unit.

Table 1: 29 items classified based on the characteristics of the chemical structural formula of the functional group in each polymer repeating unit

	(L1)29 items
1	acrylic polymers
2	Polyamides
3	Polyanhydrides
4	Polycarbonates
5	Polydienes
6	metal containing polymers
7	Polyesters
8	Polyethers
9	halogenated polymers
10	inorganic polymers
11	Polyimides
12	Polyimines
13	Polyketones
14	Polyolefins
15	Polyphenylenes
16	poly(phosphine oxide)/ polythiophosphines
17	Polystyrenes
18	polysulfides/polysulfones/polysulfoxides
19	polysulfates/polysulfonates
20	Polysulfonamides
21	polythioketones/polythioesters/polythiocarbonates
22	Polythioamides
23	polythioureas/polythiourethanes
24	Polythioanhydrides
25	Polythioimides
26	polyureas/polyurethanes
27	vinyl polymers
28	condensed-ring aromatic polymers
29	Other polymers

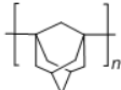
- 1) For each of Items 1 to 28 at L1, polymers are grouped together as one item when the chemical structure of the functional group falls under any of the following cases in which:
- The whole chemical structure forms the backbone;
 - and (c) The chemical structure of the functional group forms part of the ring; or
 - Part of the chemical structure substitutes for other atoms (a and b).



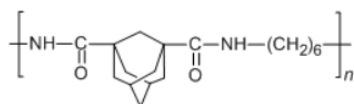
- 2) Polymers unassignable at L1 to Items 1 to 28 are assigned to “other polymers.”
- 3) When multiple classification items apply to the chemical structure of the repeating unit of a polymer, the polymer is classified accordingly. In other words, a single polymer may be classified into multiple items.
- 4) Some polymers having multiple functional groups may not be included in a classification item specified for polymers having only one of these functional groups.

For example,

Poly(adamantane) PID:P310013 is assignable to Item 14 “Polyolefins.” Meanwhile,



PID:P100055 **CU formula:**C18H28N2O2



is unassignable to polyolefins because of the definition of olefins, which states that an olefin consists only of a saturated aliphatic hydrocarbon group. This polymer is classified only into Item 2 “Polyamides.”

1.2 Definition contents of the Items at L2

- Item 1 “acrylic polymers”** are classified as aliphatic, aromatic, or heterocyclic, based on the type of the functional group bonded to the acryloyl group (-CH₂-CH₂-C(=)-).
- Item 27 “vinyl polymers”** are classified as aliphatic, aromatic, or heterocyclic, based on the type of the functional group of the side chain bonded to the vinylene group (-CH₂-C(-)H-).
- The classification of **Item 6 “metal-containing polymers,”** **Item 9 “halogenated polymers,”** **Item 10 “inorganic polymers,”** **Item 15 “polyphenylenes,”** and **Item 17 “polystyrenes”**

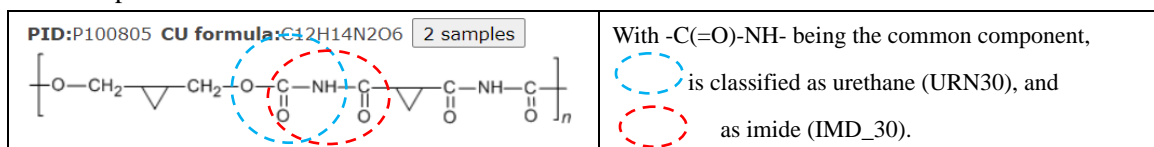
completes at L2.

- 4) Except those in 1), 2), and 3), Items 2 to 5, 7 and 8, 11 to 13, 15, 16, 18 to 26, and 28 at L1 are classified as aliphatic, aromatic, or heterocyclic, based on the structure of the functional group constituting the backbone.

(Supplementary note)

Some polymers may be split into different classification items having a common component, depending on the arrangement of the atoms bonded to their backbone.

Example



1.3 L3: Classification of the side chains in the repeating unit

- 1) For the items other than polydienes and polyolefins, their side chains are classified into the four items (unmodified, aliphatic, aromatic, and heterocyclic).
 - i) Unmodified: The repeating unit consists only of the backbone. Same in meaning as at L2.
 - ii) Aliphatic: **All side chains containing no cyclic structures are deemed aliphatic.** In other words, side chains consisting only of H, OH, halogen, or heteroatoms are also deemed as aliphatic. Note that D is handled equivalently to H.
 - iii) Aromatic: Side chains that contain benzene rings, condensed polycyclic rings containing at least one benzene ring or azulene ring (with seven- and five-membered rings condensed together).

(Supplementary note) Ferrocenes have aromaticity and hence are assigned to aromatic. They are classified at L4 as multi-ring aromatic.

- iv) Heterocyclic: Ring compounds containing heteroatoms.

- 2) Polydienes and polyolefins are classified based on the presence or absence of side chains. Their classification completes at L3.

1.4 Classification at L4

The three items of Aliphatic, Aromatic, and Heterocyclic specified at L3 are subdivided further into the following:

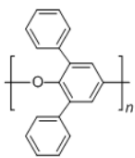
- acyclic aliphatic
- alicyclic aliphatic
- condensed-ring aromatic
- multiring aromatic
- single-ring aromatic

saturated heterocyclic

unsaturated heterocyclic

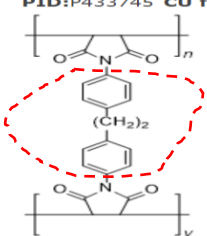
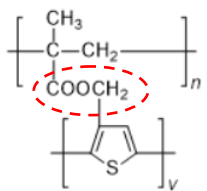
Here, the multiring aromatic and single-ring aromatic items correspond to the number of benzene rings contained in their respective side chain.

Assigned to single-ring aromatic if the functional group contained in the backbone has two side chains, each containing one benzene ring.

 <p style="text-align: center;">Example</p>	<p>The phenylene group contained in the backbone has two phenyl groups, one per each side chain, and hence is assigned to single-ring aromatic.</p> <p style="text-align: center;">PHN_45</p>
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(Supplementary note)

For net polymers with their repeating-unit backbones bonded to each other via a common side chain, the whole side chains bonded to the respective backbones were considered for classification.

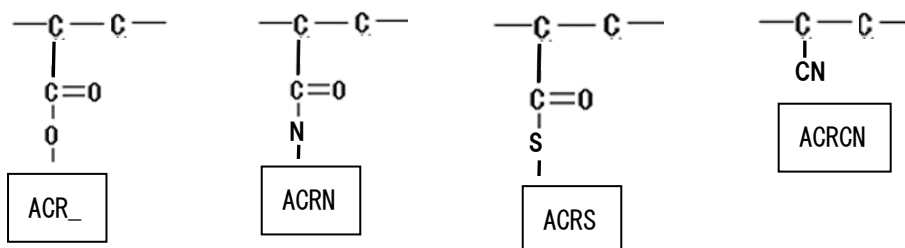
<p>PID:P433745 CU formula</p>  <p style="text-align: center;">IMDH44</p>	
<p>PID:P342644 CU for</p>  <p style="text-align: center;">ACR_41 VNL_41 SULFIH41</p>	

2. Definitions and rules for classification of the 29 items at L1

The alphabetic letters in the □ represent classification IDs.

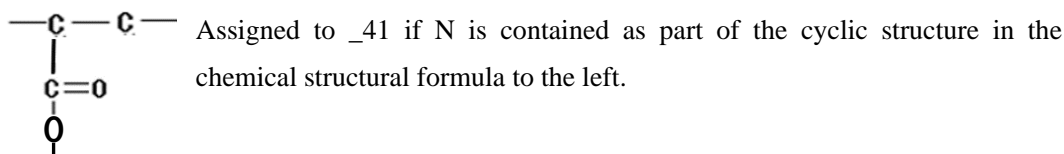
2.1 Acrylic polymers

Definition: Polymers in which the backbone consists of a straight-chain saturated aliphatic hydrocarbon group and at least one of the following groups is bonded directly to a backbone carbon:



- Polyacrylics may be characterized by two or more groups.
- Polymers classified into polyacrylics are also classified into vinyl polymers at the same time.
- Classified at L3 as “aliphatic” and assigned at L4 to “ACR (_,N,S,CN)41,” if hydrogen is bonded to the -C(=O)-(N,O,S)- in the side chain. In the conventional classification method, -COOH is classified only as vinyl.
- Not assigned to acrylic, even with the above chemical structural formula partially included, if the backbone contains double bonds, heteroatoms, or benzene rings.
- Not assigned to acrylic if halogen is contained as part of the vinyl group of the backbone.
- Only functional groups bonded to the -C(=O)-(N,O,S)- of the acryloyl group are considered for classification. Functional groups, such as methyl groups bonded to the vinyl group of the backbone, are assigned only to VNL_41.

(Supplementary note) Exceptional rule for ACRN items



	<p>P330079</p> <p>ACRN41, VNL_47</p>
	<p>P040327</p> <p>ACRN41, VNL_41, VNL_46</p>

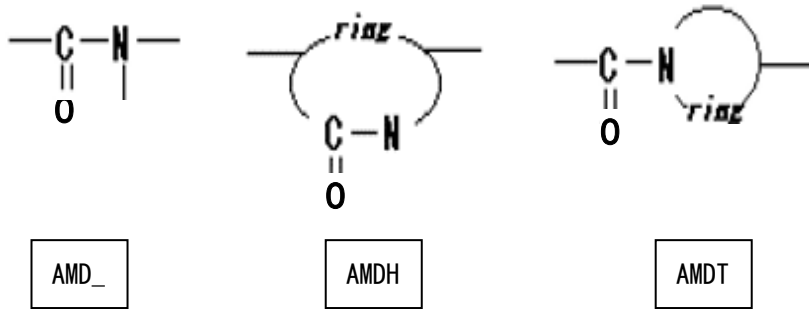
Table 2.1: Classification items for acrylic polymers

No	L1	L2	L3	L4)	ID					
1	acrylic polymers	unmodified	aliphatic	ACR_31	acyclic aliphatic	ACR_41	ACR_41			
					alicyclic aliphatic	ACR_42	ACR_42			
				ACR_2	aromatic	ACR_32	condensed-ring aromatic	ACR_43	ACR_43	
							multiring aromatic	ACR_44	ACR_44	
							single-ring aromatic	ACR_45	ACR_45	
				heterocyclic	ACR_33	saturated heterocyclic	ACR_46	ACR_46		
			unsaturated heterocyclic			ACR_47	ACR_47			
			N-substituted	aliphatic	ACRN31	acyclic aliphatic	ACRN41	ACRN41		
						alicyclic aliphatic	ACRN42	ACRN42		
						aromatic	ACRN32	condensed-ring aromatic	ACRN43	ACRN43
								multiring aromatic	ACRN44	ACRN44
		single-ring aromatic						ACRN45	ACRN45	
		heterocyclic				ACRN33	saturated heterocyclic	ACRN46	ACRN46	
				unsaturated heterocyclic	ACRN47		ACRN47			
		S-substituted		aliphatic	ACRS31	acyclic aliphatic	ACRS41	ACRS41		
						alicyclic aliphatic	ACRS42	ACRS42		
						aromatic	ACRS32	condensed-ring aromatic	ACRS43	ACRS43
								multiring aromatic	ACRS44	ACRS44
			single-ring aromatic					ACRS45	ACRS45	
			heterocyclic			ACRS33	saturated heterocyclic	ACRS46	ACRS46	
				unsaturated heterocyclic	ACRS47		ACRS47			
			CN-substituted	unmodified	ACRCN2	ACRCN30		ACRCN30		
							aliphatic	ACRCN31	acyclic aliphatic	ACRCN41
									alicyclic aliphatic	ACRCN42
							aromatic	ACRCN32	condensed-ring aromatic	ACRCN43
		multiring aromatic							ACRCN44	
		single-ring aromatic							ACRCN45	
heterocyclic	ACRCN33	saturated heterocyclic					ACRCN46			
		unsaturated heterocyclic					ACRCN47			

Note: The “30” in the last two digits of the classification ID means that the polymer has no side chain. The same applies to the tables that follow.

2.2 Polyamides

Definition: Polymers whose backbone contains a partial structure, such as the following:



However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polyurethanes: >N-CO- and the like in >N-CO-O-

Polyureas: >N-CO- and the like in >N-CO-N<

Polyimides: >N-CO- and the like in -CO-N-CO-

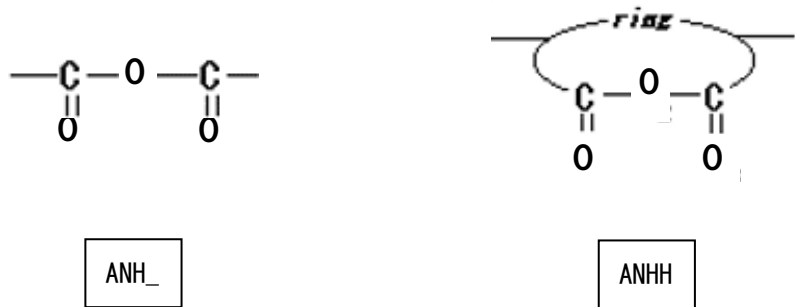


Table 2.2: Classification items for polyamides

No	L1	L2		L3		L4)		ID		
2	polyamides AMD1	unmodified linear	AMD_2	unmodified	AMD_30			AMD_30		
				aliphatic	AMD_31	acyclic aliphatic	AMD_4 1	AMD_41		
						alicyclic aliphatic	AMD_4 2	AMD_42		
				aromatic	AMD_32	condensed-ring aromatic	AMD_4 3	AMD_43		
						multiring aromatic	AMD_4 4	AMD_44		
						single-ring aromatic	AMD_4 5	AMD_45		
				heterocyclic	AMD_33	saturated heterocyclic	AMD_4 6	AMD_46		
						unsaturated heterocyclic	AMD_4 7	AMD_47		
				heterocyclic	AMDH_2	unmodified	AMDH30			AMDH30
						aliphatic	AMDH31	acyclic aliphatic	AMDH4 1	AMDH41
		alicyclic aliphatic	AMDH4 2					AMDH42		
		aromatic	AMDH32			condensed-ring aromatic	AMDH4 3	AMDH43		
						multiring aromatic	AMDH4 4	AMDH44		
						single-ring aromatic	AMDH4 5	AMDH45		
		heterocyclic	AMDH33			saturated heterocyclic	AMDH4 6	AMDH46		
						unsaturated heterocyclic	AMDH4 7	AMDH47		
		partially heterocyclic	AMDT2			unmodified	AMDT30			AMDT30
						aliphatic	AMDT31	acyclic aliphatic	AMDT4 1	AMDT41
				alicyclic aliphatic	AMDT4 2			AMDT42		
				aromatic	AMDT32	condensed-ring aromatic	AMDT4 3	AMDT43		
						multiring aromatic	AMDT4 4	AMDT44		
						single-ring aromatic	AMDT4 5	AMDT45		
				heterocyclic	AMDT33	saturated heterocyclic	AMDT4 6	AMDT46		
						unsaturated heterocyclic	AMDT4 7	AMDT47		

2.3 Polyanhydrides

Definition: Polymers whose backbone contains a partial structure, such as the following:

Table 2.3: Classification items for polyanhydrides

No	L1	L2		L3		L4)		ID
3	polyanhydrides ANH1	unmodified linear	ANH_2	unmodified	ANH_30			ANH_30
				aliphatic	ANH_31	acyclic aliphatic	ANH_41	ANH_41
						alicyclic aliphatic	ANH_42	ANH_42
				aromatic	ANH_32	condensed-ring aromatic	ANH_43	ANH_43
						multiring aromatic	ANH_44	ANH_44
						single-ring aromatic	ANH_45	ANH_45
				heterocyclic	ANH_33	saturated heterocyclic	ANH_46	ANH_46
						unsaturated heterocyclic	ANH_47	ANH_47
				heterocyclic	ANHH2	unmodified	ANHH30	
		aliphatic	ANHH31			acyclic aliphatic	ANHH41	ANHH41
						alicyclic aliphatic	ANHH42	ANHH42
		aromatic	ANHH32			condensed-ring aromatic	ANHH43	ANHH43
						multiring aromatic	ANHH44	ANHH44
						single-ring aromatic	ANHH45	ANHH45
		heterocyclic	ANHH33			saturated heterocyclic	ANHH46	ANHH46
						unsaturated heterocyclic	ANHH47	ANHH47

2.4 Polycarbonates

Definition: Polymers whose backbone contains a partial structure, such as the following:

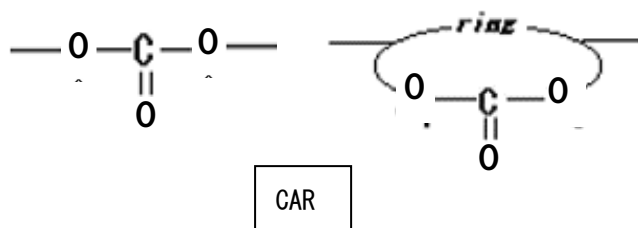


Table 2.4: Classification items for polycarbonates

No	L1	L2		L3		L4		ID
4	polycarbonates CAR1	polycarbonates	CAR_2	unmodified	CAR_30			CAR_30
				aliphatic	CAR_31	acyclic aliphatic	CAR_41	CAR_41
						alicyclic aliphatic	CAR_42	CAR_42
				aromatic	CAR_32	condensed-ring aromatic	CAR_43	CAR_43
						multiring aromatic	CAR_44	CAR_44
						single-ring aromatic	CAR_45	CAR_45
				heterocyclic	CAR_33	saturated heterocyclic	CAR_46	CAR_46
						unsaturated heterocyclic	CAR_47	CAR_47

2.5 Polydienes

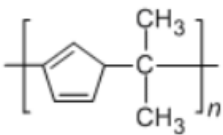
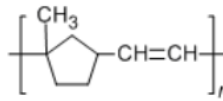
Definition: Polymers consisting of an aliphatic hydrocarbon group and having more than one double bond C=C or triple bond C≡C on the backbone or side chains (those containing more than one unsaturated aliphatic hydrocarbon group).

- Halogen may be bonded directly to the backbone.
- Polymers whose backbone contains unsaturated aliphatic cyclic hydrocarbon groups are also included here.
- Only those without benzene rings are considered. Fluorenes, for example, are not considered.
- The distinction between _30 and _31 is made based on the presence or absence of side chains regardless of whether bonded to an acyclic or alicyclic group.

Table 2.5: Classification items for polydienes

No	L1	L2		L3		L4		ID
5	polydienes DIE1	acyclic	DIE_2	unmodified	DIE_30			DIE_30
				pendant group-modified	DIE_31			DIE_31
		alicyclic	DIEC2	unmodified	DIEC30			DIEC30
				pendant group-modified	DIEC31			DIEC31

Examples:

	<p>A side-chained aliphatic hydrocarbon whose backbone contains an unsaturated aliphatic cyclic hydrocarbon. ⇒ polydiene (DIEC31)</p>
	<p>A side-chained aliphatic hydrocarbon whose backbone contains a saturated aliphatic cyclic hydrocarbon. ⇒ polydiene (DIEC31)</p>

2.6 Metal-containing polymers

Definition: Polymers whose backbone contain Sb, As, B, Ge, Pb, Hg, Se, Te, Sn, P, or Si.

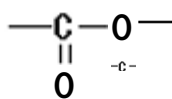
- Polymers whose backbone contains both one of these metals and hydrocarbons or heterocompounds are considered. Polymers whose backbone consists only of one of these metals are assigned to inorganic polymers.
- Metals other than the eleven kinds given as classification items were not considered for classification.

Table 2.6: Classification items for metal-containing polymers

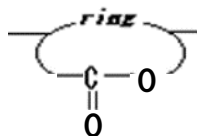
No	L1	L2		L3		L4		ID
6	metal containing polymers MTL1	Antimony (Sb)-containing	MTL21					MTL21
		Arsenic (As)-containing	MTL22					MTL22
		Boron (B)-containing	MTL23					MTL23
		Germanium (Ge)-containing	MTL24					MTL24
		Lead (Pb)-containing	MTL25					MTL25
		Mercury (Hg)-containing	MTL26					MTL26
		Selenium (Se)-containing	MTL27					MTL27
		Tellurium (Te)-containing	MTL28					MTL28
		Tin (Sn)-containing	MTL29					MTL29
		Phosphorus (P)-containing	MTL210					MTL210
		Silicon (Si)-containing	MTL211					MTL211

2.7 Polyesters

Definition: Polymers whose backbone contains a partial structure, such as the following:



ESL_



ESLH

However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polyurethanes: -CO-O- and the like in >N-CO-O-

Polyanhydrides: -CO-O- and the like in -CO-O-CO-

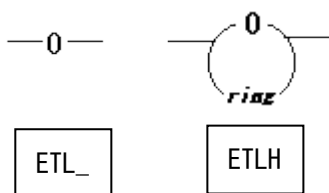
Polycarbonates: -CO-O- and the like in -O-CO-O-

Table 2.7: Classification items for polyesters

No	L1	L2		L3		L4		ID
7	polyesters ESL1	unmodified linear	ESL_2	unmodified	ESL_30			ESL_30
				aliphatic	ESL_31	acyclic aliphatic	ESL_41	ESL_41
						alicyclic aliphatic	ESL_42	ESL_42
				aromatic	ESL_32	condensed-ring aromatic	ESL_43	ESL_43
						multiring aromatic	ESL_44	ESL_44
						single-ring aromatic	ESL_45	ESL_45
				heterocyclic	ESL_33	saturated heterocyclic	ESL_46	ESL_46
		unsaturated heterocyclic	ESL_47			ESL_47		
		heterocyclic	ESLH2	unmodified	ESLH30			ESLH30
				aliphatic	ESLH31	acyclic aliphatic	ESLH41	ESLH41
						alicyclic aliphatic	ESLH42	ESLH42
				aromatic	ESLH32	condensed-ring aromatic	ESLH43	ESLH43
						multiring aromatic	ESLH44	ESLH44
						single-ring aromatic	ESLH45	ESLH45
heterocyclic	ESLH33			saturated heterocyclic	ESLH46	ESLH46		
		unsaturated heterocyclic	ESLH47	ESLH47				

2.8 Polyethers

Definition: Polymers whose backbone contains -O- or a ring system containing -O-.



However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polyesters: -O- and the like in -CO-O-

Polyurethanes: -O- and the like in >N-CO-O-

Polyanhydrides: -O- and the like in -CO-O-CO-

Polycarbonates: -O- and the like in -O-CO-O-

Polysulfones: -O- and the like in -SO₂-O-

Table 2.8: Classification items for polyethers

No	L1	L2	L3		L4		ID
8	polyethers ETL1	unmodified linear	ETL_2	unmodified	ETL_30		ETL_30
				aliphatic	ETL_31	acyclic aliphatic	ETL_41
			alicyclic aliphatic			ETL_42	ETL_42
			aromatic	ETL_32	condensed-ring aromatic	ETL_43	ETL_43
					multiring aromatic	ETL_44	ETL_44
					single-ring aromatic	ETL_45	ETL_45
			heterocyclic	ETL_33	saturated heterocyclic	ETL_46	ETL_46
		unsaturated heterocyclic			ETL_47	ETL_47	
		heterocyclic	ETLH2	unmodified	ETLH30		ETLH30
				aliphatic	ETLH31	acyclic aliphatic	ETLH41
			alicyclic aliphatic			ETLH42	ETLH42
			aromatic	ETLH32	condensed-ring aromatic	ETLH43	ETLH43
					multiring aromatic	ETLH44	ETLH44
					single-ring aromatic	ETLH45	ETLH45
heterocyclic	ETLH33		saturated heterocyclic	ETLH46	ETLH46		
		unsaturated heterocyclic	ETLH47	ETLH47			

2.9 Halogenated polymers (halogen-containing polymers)

Definition: Halogen-containing polymers are divided into either halogenated polyolefins or other halogenated polymers.

HAL21:

Polymers (polyolefins) consisting only of a saturated aliphatic hydrocarbon group, at least one hydrogen of the polymer substituted for by halogen

- Polymers in which halogen substitutes for the hydrogen bonded to the backbone.
- Polymers in which halogen substitutes for the hydrogen bonded to a side chain.
- Only —CH₂—CHX— in which halogen substitutes for the hydrogen bonded to the backbone are also classified into vinyl polymers (VNL_41).

HAL22:

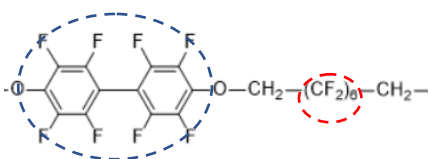
Polymers in which at least one halogen is bonded directly to the backbone consisting of a straight-chain hydrocarbon group containing heteroatoms or multiple bonds.

Note: Except when classifying halogenated polymers, halogens bonded to the functional group of the backbone are deemed as side chains and classified as _41.

Table 2.9: Classification items for halogenated polymers

No	L1	L2	L3	L4	ID
9	halogenated polymers	halogenated polyolefins	HAL21		HAL21
	HAL1	other halogenated polymers	HAL22		HAL22

[Typical classifications]

$\begin{array}{c} \text{—CH—} & \text{—CH—} \\ & \\ \text{O(CH}_2\text{)}_3\text{CH}_3 & \text{Cl} \end{array}$	<p>Not an olefin because a heteroatom (O) is contained in the repeating unit.</p> <p>⇒ HAL_22</p>
$\begin{array}{c} \text{—CH—CH}_2\text{—} \\ \\ \text{CF}_3 \end{array}$	<p>Halogen substitutes for the hydrogen of the olefin. Not assigned to VNL.</p> <p>⇒ HAL_21</p>
	<p>The F bonded to the benzene ring is not bonded directly to the backbone and is hence not considered for classification. Only F atoms bonded to backbones are considered for classification.</p> <p>⇒ HAL22, ETL_30, PHN_41</p>
$\begin{array}{c} \\ \text{—C=C—} \\ \end{array}$	<p>Not an olefin because a double bond is contained in the backbone.</p> <p>⇒ HAL22, DIE_31</p>

2.10 Inorganic polymers

Definition: Polymers whose backbone consists of elements other than carbon. Synonymous with “element-organic polymers.”

Specific examples include the following partial structures:

polyphosphazene (-P=N-)

INPN

polysilane (-Si-)

INSi

polysilazane (-Si-N-)

INSiN

polysiloxane (-Si-O-)

INSiO

- Polymers whose backbone contains hydrocarbons, as well as part of any of these elements, **are assigned to metal-containing polymers** rather than to inorganic polymers.

Table 2.10: Classification items for inorganic polymers

No	L1	L2	L3		L4		ID	
10	inorganic polymers IN1	polyphosphazenes	INPN2	unmodified	INPN30			INPN30
				aliphatic	INPN31	acyclic aliphatic	INPN41	INPN41
						alicyclic aliphatic	INPN42	INPN42
				aromatic	INPN32	condensed-ring aromatic	INPN43	INPN43
						multiring aromatic	INPN44	INPN44
						single-ring aromatic	INPN45	INPN45
				heterocyclic	INPN33	saturated heterocyclic	INPN46	INPN46
		unsaturated heterocyclic	INPN47			INPN47		
		polysilanes	INSi2	unmodified	INSi30			INSi30
				aliphatic	INSi31	acyclic aliphatic	INSi41	INSi41
						alicyclic aliphatic	INSi42	INSi42
				aromatic	INSi32	condensed-ring aromatic	INSi43	INSi43
						multiring aromatic	INSi44	INSi44
						single-ring aromatic	INSi45	INSi45
				heterocyclic	INSi33	saturated heterocyclic	INSi46	INSi46
		unsaturated heterocyclic	INSi47			INSi47		
		polysilazanes	INSiN2	unmodified	INSiN30			INSiN30
				aliphatic	INSiN31	acyclic aliphatic	INSiN41	INSiN41
						alicyclic aliphatic	INSiN42	INSiN42
				aromatic	INSiN32	condensed-ring aromatic	INSiN43	INSiN43
						multiring aromatic	INSiN44	INSiN44
						single-ring aromatic	INSiN45	INSiN45
				heterocyclic	INSiN33	saturated heterocyclic	INSiN46	INSiN46
		unsaturated heterocyclic	INSiN47			INSiN47		
		polysiloxanes	INSiO2	unmodified	INSiO30			INSiO30
				aliphatic	INSiO31	acyclic aliphatic	INSiO41	INSiO41
						alicyclic aliphatic	INSiO42	INSiO42
				aromatic	INSiO32	condensed-ring aromatic	INSiO43	INSiO43
multiring aromatic	INSiO44					INSiO44		
single-ring aromatic	INSiO45					INSiO45		
heterocyclic	INSiO33			saturated heterocyclic	INSiO46	INSiO46		

					unsaturated heterocyclic	INSiO47	INSiO47
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2.11 Polyimides

Definition: Polymers whose backbone contains a partial structure, such as the following:

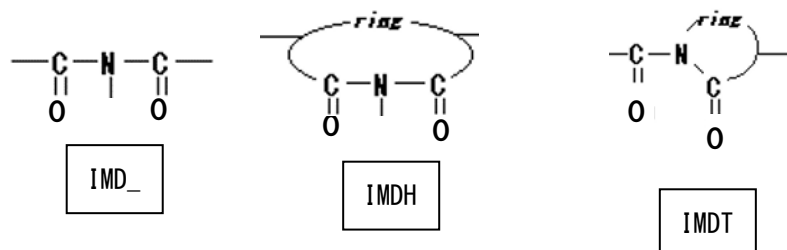


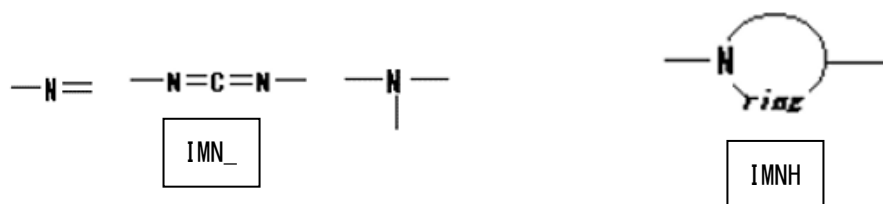
Table 2.11: Classification items for polyimides

No	L1	L2	L3		L4		ID		
11	polyimides IMD1	unmodified linear	IMD_2	unmodified	MD_30			IMD_30	
				aliphatic	MD_31	acyclic aliphatic	IMD_41	IMD_41	
						alicyclic aliphatic	IMD_42	IMD_42	
			aromatic	MD_32	condensed-ring aromatic	IMD_43	IMD_43		
					multiring aromatic	IMD_44	IMD_44		
					single-ring aromatic	IMD_45	IMD_45		
			heterocyclic	MD_33	saturated heterocyclic	IMD_46	IMD_46		
					unsaturated heterocyclic	IMD_47	IMD_47		
			heterocyclic	IMDH2	aliphatic	MDH30			IMDH30
							MDH31	acyclic aliphatic	IMDH41
					alicyclic aliphatic	IMDH42		IMDH42	
				aromatic	MDH32	condensed-ring aromatic	IMDH43	IMDH43	
		multiring aromatic				IMDH44	IMDH44		
		single-ring aromatic				IMDH45	IMDH45		
		heterocyclic		MDH33	saturated heterocyclic	IMDH46	IMDH46		
					unsaturated heterocyclic	IMDH47	IMDH47		
		partially heterocyclic		IMDT2	aliphatic	MDT30			IMDT30
							MDT31	acyclic aliphatic	IMDT41
					alicyclic aliphatic	IMDT42		IMDT42	
				aromatic	MDT32	condensed-ring aromatic	IMDT43	IMDT43	
			multiring aromatic			IMDT44	IMDT44		
single-ring aromatic	IMDT45		IMDT45						

				heterocyclic	MDT33	saturated heterocyclic	MDT46	MDT46
						unsaturated heterocyclic	MDT47	MDT47

2.12 Polyimines

Definition: Polymers whose backbone contains a partial structure, such as the following, containing C-N=:



However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polyamides: -N< and the like in CO-N<

Polyurethanes: -N< and the like in >N-CO-O-

Polyureas: -N< and the like in >N-CO-N<

Polyimides: -N< and the like in -CO-N-CO-

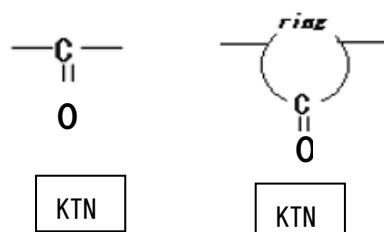
Polysulfones/sulfoxides/sulfonates/sulfonamides: -N< and the like in -SO₂-N<

Table 2.12: Classification items for polyimines

No	L1	L2	L3		L4		ID			
No	L1	unmodified linear	aliphatic	MN_31	acyclic aliphatic	MN_41	MN_41			
					alicyclic aliphatic	MN_42	MN_42			
			aromatic	MN_32	condensed-ring aromatic	MN_43	MN_43			
					multiring aromatic	MN_44	MN_44			
					single-ring aromatic	MN_45	MN_45			
			heterocyclic	MN_33	saturated heterocyclic	MN_46	MN_46			
					unsaturated heterocyclic	MN_47	MN_47			
			polyimines IMN1	heterocyclic polyimines	IMNH2	unmodified	IMNH30			IMNH30
						aliphatic	IMNH31	acyclic aliphatic	IMNH41	IMNH41
								alicyclic aliphatic	IMNH42	IMNH42
		aromatic				IMNH32	condensed-ring aromatic	IMNH43	IMNH43	
			multiring aromatic	IMNH44	IMNH44					
			single-ring aromatic	IMNH45	IMNH45					
		heterocyclic	IMNH33	saturated heterocyclic	IMNH46	IMNH46				
unsaturated heterocyclic	IMNH47			IMNH47						

2.13 Polyketones

Definition: Polymers whose backbone contains a partial structure, such as the following:



However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polyesters: -CO- and the like in -CO-O-

Polyamides: -CO- and the like in -CO-N<

Polyurethanes: -CO- and the like in >N-CO-O-

Polyureas: -CO- and the like in >N-CO-N<

Polyimides: -CO- and the like in -CO-N-CO-

Polyanhydrides: -CO- and the like in -CO-O-CO-

Polycarbonates: -CO- and the like in -O-CO-O-

Table 2.13: Classification items for polyketones

No	L1	L2	L3	L4	ID			
13	polyketones KTN1	unmodified linear	KTN_2	unmodified	KTN_30	KTN_30		
			aliphatic	KTN_31	acyclic aliphatic	KTN_41	KTN_41	
					alicyclic aliphatic	KTN_42	KTN_42	
			aromatic	KTN_32	condensed-ring aromatic	KTN_43	KTN_43	
					multiring aromatic	KTN_44	KTN_44	
					single-ring aromatic	KTN_45	KTN_45	
			heterocyclic	KTN_33	saturated heterocyclic	KTN_46	KTN_46	
		unsaturated heterocyclic			KTN_47	KTN_47		
		cyclic	KTNC2	unmodified	KTNC30	KTNC30		
				aliphatic	KTNC31	acyclic aliphatic	KTNC41	KTNC41
						alicyclic aliphatic	KTNC42	KTNC42
				aromatic	KTNC32	condensed-ring aromatic	KTNC43	KTNC43
						multiring aromatic	KTNC44	KTNC44
						single-ring aromatic	KTNC45	KTNC45
heterocyclic	KTNC33			saturated heterocyclic	KTNC46	KTNC46		
		unsaturated heterocyclic	KTNC47	KTNC47				

2.14 Polyolefins

Definition: Polymers consisting only of a saturated aliphatic hydrocarbon group (polymers containing no atoms other than carbon and hydrogen).

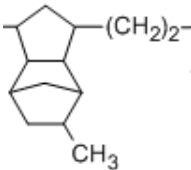
Classification at L2 is made based on whether the backbone is a straight-chain or ring backbone, for each case of which further classification follows based on the presence or absence of side chains.

- Polymers containing unsaturated carbon bonds are not included here.
- **A backbone containing both straight-chain and ring olefins is deemed as a ring backbone.**

Table 2.14: Classification items for polyolefins

No	L1	L2		L3		L4		ID
14	polyolefins OLF1	acyclic	OLF_2	unmodified	OLF_30			OLF_30
				pendant group-modified	OLF_31			OLF_31
		alicyclic	OLFC2	unmodified	OLFC30			OLFC30
				pendant group-modified	OLFC31			OLFC31

[Example]

	<p>Assigned to alicyclic if containing both straight-chain and ring olefins.</p> <p>⇒ OLFC_41</p>
---	---

2.15 Polyphenylenes

Definition: Polymers whose backbone contains a phenylene group.

More specifically, polymers whose backbone contains 1,4-phenylene, 1,3-phenylene, or 1,2-phenylene.

• **Polymers whose backbone contains atoms other than phenylene groups are also within the scope.**

Table 2.15: Classification items for polyphenylenes

No	L1	L2		L3		L4		ID
15	polyphenylenes PHN1	polyphenylene	PHN_2	unmodified	PHN_30			PHN_30
				aliphatic	PHN_31	acyclic aliphatic	PHN_41	PHN_41
						alicyclic aliphatic	PHN_42	PHN_42
				aromatic	PHN_32	condensed-ring aromatic	PHN_43	PHN_43
						multiring aromatic	PHN_44	PHN_44
						single-ring aromatic	PHN_45	PHN_45
				heterocyclic	PHN_33	saturated heterocyclic	PHN_46	PHN_46
						unsaturated heterocyclic	PHN_47	PHN_47

2.16 Poly(phosphane oxide)/poly(phosphane sulfide)

Definition: Polymers whose backbone contains at least one of the following groups containing straight-chain—P—:

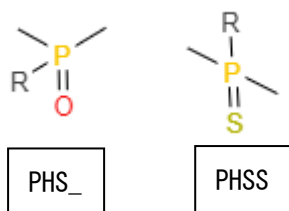


Table 2.16: Classification items for poly(phosphane oxide)/poly(phosphane sulfide)

No	L1	L2		L3		L4		ID	
16	aliphatic poly(phosphane oxide) /poly(phosphane sulfide) PHS1	poly(phosphane oxide)	PHS_2	unmodified	PHS_30			PHS_30	
				aliphatic	PHS_31	acyclic aliphatic		PHS_41	PHS_41
						alicyclic aliphatic		PHS_42	PHS_42
				aromatic	PHS_32	condensed-ring aromatic		PHS_43	PHS_43
						multiring aromatic		PHS_44	PHS_44
						single-ring aromatic		PHS_45	PHS_45
				heterocyclic	PHS_33	saturated heterocyclic		PHS_46	PHS_46
		unsaturated heterocyclic				PHS_47	PHS_47		
		poly(phosphane sulfide)	PHSS2	unmodified	PHSS30			PHSS30	
				aliphatic	PHSS31	acyclic aliphatic		PHSS41	PHSS41
						alicyclic aliphatic		PHSS42	PHSS42
				aromatic	PHSS32	condensed-ring aromatic		PHSS43	PHSS43
						multiring aromatic		PHSS44	PHSS44
						single-ring aromatic		PHSS45	PHSS45
heterocyclic	PHSS33			saturated heterocyclic		PHSS46	PHSS46		
		unsaturated heterocyclic		PHSS47	PHSS47				

2.17 Polystyrenes

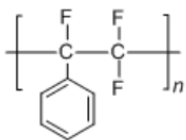
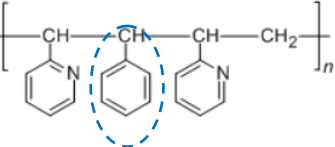
Definition: Polymers whose backbone consists of a saturated aliphatic hydrocarbon group with aromatic rings bonded to at least one backbone carbon.

- **No halogen is bonded to the backbone.**
- No heteroring is included.
- Polymers classified into polystyrenes are also classified into vinyl polymers at the same time.

Table 2.17: Classification items for polystyrenes

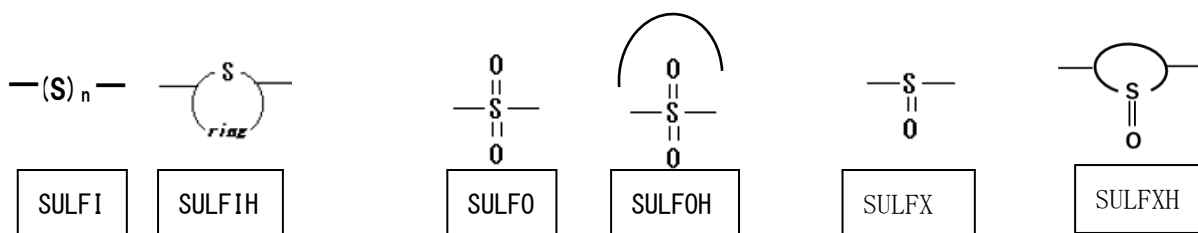
No	L1	L2		L3		L4		ID
17	polystyrenes STY1	polystyrenes	STY_2	unmodified	STY_30			STY_30
				aliphatic	STY_31	acyclic aliphatic	STY_41	STY_41
						alicyclic aliphatic	STY_42	STY_42
				aromatic	STY_32	condensed-ring aromatic	STY_43	STY_43
						multiring aromatic	STY_44	STY_44
						single-ring aromatic	STY_45	STY_45
				heterocyclic	STY_33	saturated heterocyclic	STY_46	STY_46
						unsaturated heterocyclic	STY_47	STY_47

Examples)

<p>PID:P020153 CU formula:C8H5F3</p> 	<p>Not assigned to STY because halogens are bonded to the backbone.</p> <p>⇒ HAL22</p>
<p>1. poly[(2-styrylpyridine)-alt-(2-vinylpyridine)]</p> <p>PID:P020194 CU formula:C20H18N2 2 samples</p> 	<p>Because the backbone is a straight-chain hydrocarbon group, the functional group having a side chain containing a benzene ring is assignable to STY.</p> <p>⇒ STY_30, VNL_45, VNL_47</p>

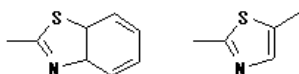
2.18 Polysulfides/polysulfones/polysulfoxides

Definition: Polymers whose backbone contains at least one of the following groups containing —S—:



However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

- Thioesters: -S- and the like in -CO-S-
- Thiourethanes: -S- and the like in >N-CO-S-
- Thioanhydrides: -S- and the like in -CO-S-CO-
- Thiocarbonates: -S- and the like in -O-CO-S-
- The S at either end of the Si in the backbone is deemed as that of polysulfides.
- Polymers containing the partial structures shown below are classified into polysulfides and polyimides.



[Example]

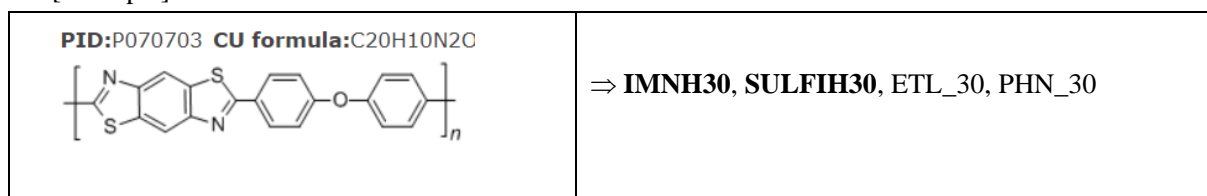


Table 2.18: Classification items for polysulfides/polysulfones/polysulfoxides

No	L1	L2	L3		L4		ID			
15	polysulfides /polysulfones /polysulfoxides (主鎖に-Sを含む) SULF1	linear polysulfides	SULFI2				SULFI2			
		heterocyclic polysulfides	SULFIH2	unmodified	SULFIH30			SULFIH30		
				aliphatic	SULFIH31	acyclic aliphatic	SULFIH41	SULFIH41		
						alicyclic aliphatic	SULFIH42	SULFIH42		
						aromatic	SULFIH32	condensed-ring aromatic	SULFIH43	SULFIH43
				multiring aromatic	SULFIH44			SULFIH44		
				single-ring aromatic	SULFIH45			SULFIH45		
				heterocyclic	SULFIH33	saturated heterocyclic	SULFIH46	SULFIH46		
						unsaturated heterocyclic	SULFIH47	SULFIH47		
				linear polysulfones	SULFO2					SULFO2
				heterocyclic polysulfones	SULFH2	unmodified	SULFH30			SULFH30
		aliphatic	SULFH31			acyclic aliphatic	SULFH41	SULFH41		
						alicyclic aliphatic	SULFH42	SULFH42		
						aromatic	SULFH32	condensed-ring aromatic	SULFH43	SULFH43
		multiring aromatic	SULFH44					SULFH44		
		single-ring aromatic	SULFH45					SULFH45		
		heterocyclic	SULFH33			saturated heterocyclic	SULFH46	SULFH46		
						unsaturated heterocyclic	SULFH47	SULFH47		
		linear polysulfoxides	SULFX2							SULFX2
		heterocyclic polysulfoxides	SULFXH ²			unmodified	SULFXH30			SULFXH30
aliphatic	SULFXH31			acyclic aliphatic	SULFXH41	SULFXH41				
				alicyclic aliphatic	SULFXH42	SULFXH42				
				aromatic	SULFXH32	condensed-ring aromatic	SULFXH43	SULFXH43		
multiring aromatic	SULFXH44					SULFXH44				
single-ring aromatic	SULFXH45					SULFXH45				
heterocyclic	SULFXH33			saturated heterocyclic	SULFXH46	SULFXH46				
				unsaturated heterocyclic	SULFXH47	SULFXH47				

2.19 Polysulfates/polysulfonates

Definition: Polymers whose backbone contains at least one of the following groups containing —S—O—:

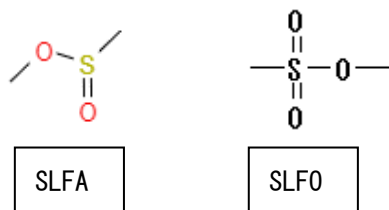


Table 2.19: Classification items for polysulfates/polysulfonates

No	L1	L2		L3		L4		ID
19	polysulfates /polysulfonates (主鎖に -S-O-を含む) SLF1	polysulfates	SLFA2	unmodified	SLFA30			SLFA30
				aliphatic	SLFA31	acyclic aliphatic	SLFA41	SLFA41
						alicyclic aliphatic	SLFA42	SLFA42
				aromatic	SLFA32	condensed-ring aromatic	SLFA43	SLFA43
						multiring aromatic	SLFA44	SLFA44
						single-ring aromatic	SLFA45	SLFA45
				heterocyclic	SLFA33	saturated heterocyclic	SLFA46	SLFA46
		unsaturated heterocyclic	SLFA47			SLFA47		
		polysulfonates	SLFO2	unmodified	SLFO30			SLFO30
				aliphatic	SLFO31	acyclic aliphatic	SLFO41	SLFO41
						alicyclic aliphatic	SLFO42	SLFO42
				aromatic	SLFO32	condensed-ring aromatic	SLFO43	SLFO43
						multiring aromatic	SLFO44	SLFO44
						single-ring aromatic	SLFO45	SLFO45
heterocyclic	SLFO33			saturated heterocyclic	SLFO46	SLFO46		
		unsaturated heterocyclic	SLFO47	SLFO47				

2.20 Polysulfonamides

Definition: Polymers whose backbone contains a partial structure, such as the following:

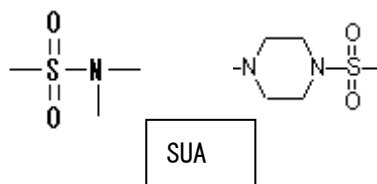


Table 2.20: Classification items for polysulfonamides

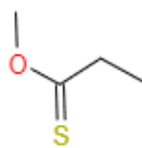
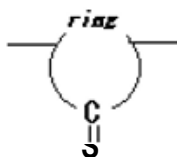
No	L1	L2		L3		L4		ID
20	polysulfonamides SUA1	polysulfonamides	SUA_2	unmodified	SUA_30			SUA_30
				aliphatic	SUA_31	acyclic aliphatic	SUA_41	SUA_41
						alicyclic aliphatic	SUA_42	SUA_42
				aromatic	SUA_32	condensed-ring aromatic	SUA_43	SUA_43
						multiring aromatic	SUA_44	SUA_44
						single-ring aromatic	SUA_45	SUA_45
				heterocyclic	SUA_33	saturated heterocyclic	SUA_46	SUA_46
						unsaturated heterocyclic	SUA_47	SUA_47

2.21 Polythioketones/polythioesters/polythiocarbonates

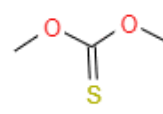
Definition: Polymers whose backbone contains any of the following partial structures containing $\text{C}(=\text{S})\text{-}$ or $\text{-C}(=\text{S})\text{-O-}$:



TKN

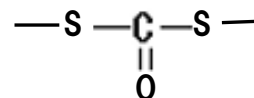
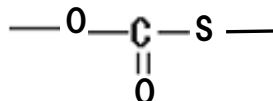
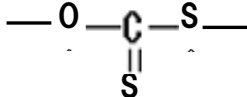
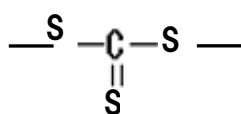


TES



TCA

The following structural formulae are also deemed as variants of TCA:



TCA

However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polythioamides: -CS- and the like in -CS-N<

Polythiourethanes: -CS- and the like in >N-CS-O-

Polythioureas: -CS- and the like in >N-CS-N<

Polythioimides: -CS- and the like in -CS-N-CS-

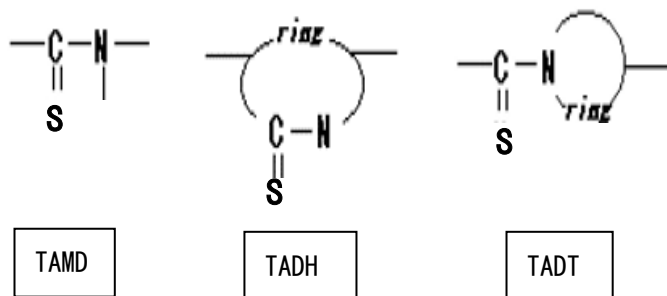
Polythioanhydrides: -CS- and the like in -CS-O-CS-

Table 2.21: Classification items for polythioketones/polythioesters/polythiocarbonates

No	L1	L2		L3		L4		ID		
21	polythioketones /polythioesters /polythiocarbonates (少なくとも一つのOがSと置換している) T1	polythioketones	TKN2	unmodified	TKN30			TKN30		
				aliphatic	TKN31	acyclic aliphatic	TKN41	TKN41		
						alicyclic aliphatic	TKN42	TKN42		
				aromatic	TKN32	condensed-ring aromatic	TKN43	TKN43		
						multiring aromatic	TKN44	TKN44		
						single-ring aromatic	TKN45	TKN45		
				heterocyclic	TKN33	saturated heterocyclic	TKN46	TKN46		
						unsaturated heterocyclic	TKN47	TKN47		
				polythioesters	TES2	unmodified	TES30			TES30
						aliphatic	TES31	acyclic aliphatic	TES41	TES41
		alicyclic aliphatic	TES42					TES42		
		aromatic	TES32			condensed-ring aromatic	TES43	TES43		
						multiring aromatic	TES44	TES44		
						single-ring aromatic	TES45	TES45		
		heterocyclic	TES33			saturated heterocyclic	TES46	TES46		
						unsaturated heterocyclic	TES47	TES47		
		polythiocarbonates	TCA2			unmodified	TCA30			TCA30
						aliphatic	TCA31	acyclic aliphatic	TCA41	TCA41
				alicyclic aliphatic	TCA42			TCA42		
				aromatic	TCA32	condensed-ring aromatic	TCA43	TCA43		
						multiring aromatic	TCA44	TCA44		
single-ring aromatic	TCA45					TCA45				
heterocyclic	TCA33			saturated heterocyclic	TCA46	TCA46				
				unsaturated heterocyclic	TCA47	TCA47				

2.22 Polythioamide

Definition: Polymers whose backbone contains a partial structure, such as the following:



However, excluded are cases where any of these partial structures is contained in an atomic group characterizing any of the following polymer systems:

Polythiourethanes: >N-CS- and the like in >N-CS-O-

Polythioureas: >N-CS- and the like in >N-CS-N<

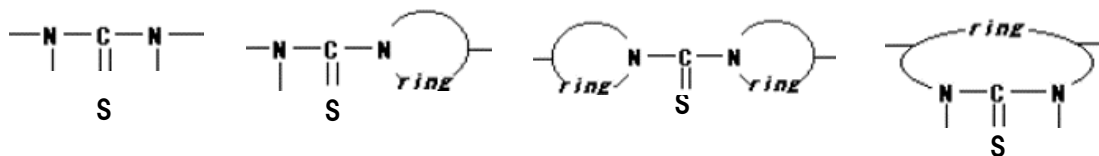
Polythioimides: >N-CS- and the like in -CS-N-CS-

Table 2.22: Classification items for polythioamide

No	L1	L2		L3		L4		ID		
22	polythioamide TA1	unmodified linear	TAMD2	unmodified	TAMD30			TAMD30		
				aliphatic	TAMD31	acyclic aliphatic	TAMD4 1	TAMD41		
						alicyclic aliphatic	TAMD4 2	TAMD42		
				aromatic	TAMD32	condensed-ring aromatic	TAMD4 3	TAMD43		
						multiring aromatic	TAMD4 4	TAMD44		
						single-ring aromatic	TAMD4 5	TAMD45		
				heterocyclic	TAMD33	saturated heterocyclic	TAMD4 6	TAMD46		
						unsaturated heterocyclic	TAMD4 7	TAMD47		
				heterocyclic	TADH2	unmodified	TADH30			TADH30
						aliphatic	TADH31	acyclic aliphatic	TADH4 1	TADH41
								alicyclic aliphatic	TADH4 2	TADH42
						aromatic	TADH32	condensed-ring aromatic	TADH4 3	TADH43
		multiring aromatic	TADH4 4					TADH44		
		single-ring aromatic	TADH4 5					TADH45		
		heterocyclic	TADH33			saturated heterocyclic	TADH4 6	TADH46		
						unsaturated heterocyclic	TADH4 7	TADH47		
		partially heterocyclic	TADT2			unmodified	TADT30			TADT30
						aliphatic	TADT31	acyclic aliphatic	TADT41	TADT41
								alicyclic aliphatic	TADT42	TADT42
						aromatic	TADT32	condensed-ring aromatic	TADT43	TADT43
				multiring aromatic	TADT44			TADT44		
				single-ring aromatic	TADT45			TADT45		
				heterocyclic	TADT33	saturated heterocyclic	TADT46	TADT46		
						unsaturated heterocyclic	TADT47	TADT47		

2.23 Polythioureas/polythiourethanes

Definition: Polymers whose backbone contains a partial structure, such as the following:



TURA



TURN

Table 2.23: Classification items for polythioureas/polythiourethanes

No	L1	L2	L3		L4		ID		
2.	polythioureas /polythiouret hanes TUR1	unmodified linear polythioureas	TURA2	unmodified	TURA30			TURA30	
				aliphatic	TURA31	acyclic aliphatic	TURA41	TURA41	
						alicyclic aliphatic	TURA42	TURA42	
						aromatic	TURA32	condensed-ring aromatic	TURA43
				multiring aromatic	TURA44			TURA44	
				single-ring aromatic	TURA45			TURA45	
			heterocyclic	TURA33	saturated heterocyclic	TURA46	TURA46		
					unsaturated heterocyclic	TURA47	TURA47		
					Heterocyclic polythioureas	TURAH2	unmodified	TURAH30	
			aliphatic	TURAH31			acyclic aliphatic	TURAH41	TURAH41
							alicyclic aliphatic	TURAH42	TURAH42
							aromatic	TURAH32	condensed-ring aromatic
		multiring aromatic	TURAH44	TURAH44					
		single-ring aromatic	TURAH45	TURAH45					
		heterocyclic	TURAH33	saturated heterocyclic		TURAH46	TURAH46		
				unsaturated heterocyclic		TURAH47	TURAH47		
				unmodified linear polythiourethane s		TURN2	unmodified	TURN30	
		aliphatic	TURN31				acyclic aliphatic	TURN41	TURN41
							alicyclic aliphatic	TURN42	TURN42
							aromatic	TURN32	condensed-ring aromatic
		multiring aromatic	TURN44		TURN44				
		single-ring aromatic	TURN45		TURN45				
		heterocyclic	TURN33		Heterocyclic saturated	TURN46	TURN46		
					unsaturated heterocyclic	TURN47	TURN47		
					heterocyclic polythiourethane s	TURNH2	unmodified	TURNH30	
		aliphatic	TURNH31				acyclic aliphatic	TURNH41	TURNH41
							alicyclic aliphatic	TURNH42	TURNH42
							aromatic	TURNH32	condensed-ring aromatic
		multiring aromatic	TURNH44	TURNH44					
		single-ring aromatic	TURNH45	TURNH45					
		heterocyclic	TURNH33	saturated heterocyclic		TURNH46	TURNH46		
				unsaturated heterocyclic		TURNH47	TURNH47		

2.24 Polythioanhydrides

Definition: Polymers whose backbone contains a partial structure, such as the following, with at least one O of the anhydride group substituted for by S:

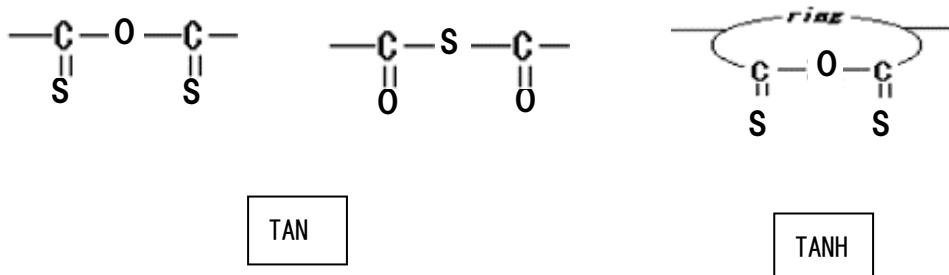


Table 2.24: Classification items for polythioanhydrides

No	L1	L2		L3		L4		ID
24	polythioanhydrides TAN1	unmodified linear	TAN_2	unmodified	TAN_30			TAN_30
				aliphatic	TAN_31	acyclic aliphatic	TAN_41	TAN_41
						alicyclic aliphatic	TAN_42	TAN_42
				aromatic	TAN_32	condensed-ring aromatic	TAN_43	TAN_43
						multiring aromatic	TAN_44	TAN_44
						single-ring aromatic	TAN_45	TAN_45
				heterocyclic	TAN_33	saturated heterocyclic	TAN_46	TAN_46
		unsaturated heterocyclic	TAN_47			TAN_47		
		heterocyclic	TANH2	unmodified	TANH30			TANH30
				aliphatic	TANH31	acyclic aliphatic	TANH4_1	TANH41
						alicyclic aliphatic	TANH4_2	TANH42
				aromatic	TANH32	condensed-ring aromatic	TANH4_3	TANH43
						multiring aromatic	TANH4_4	TANH44
						single-ring aromatic	TANH4_5	TANH45
heterocyclic	TANH33			saturated heterocyclic	TANH4_6	TANH46		
		unsaturated heterocyclic	TANH4_7	TANH47				

2.25 Polythioimides

Definition: Polymers whose backbone contains a partial structure, such as the following:

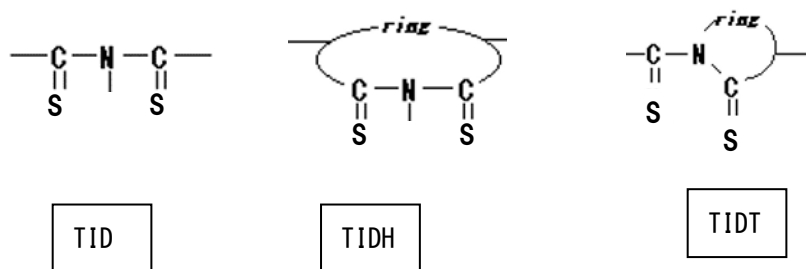


Table 2.25: Classification items for polythioimides

No	L1	L2	L3	L4	ID			
2.	polythioimides TID1	unmodified linear	TID_2	unmodified	TID_30	TID_30		
			aliphatic	TID_31	acyclic aliphatic	TID_41	TID_41	
					alicyclic aliphatic	TID_42	TID_42	
			aromatic	TID_32	condensed-ring aromatic	TID_43	TID_43	
					multiring aromatic	TID_44	TID_44	
					single-ring aromatic	TID_45	TID_45	
			heterocyclic	TID_33	saturated heterocyclic	TID_46	TID_46	
					unsaturated heterocyclic	TID_47	TID_47	
			heterocyclic	TIDH2	unmodified	TIDH30	TIDH30	
					aliphatic	TIDH31	acyclic aliphatic	TIDH41
		alicyclic aliphatic					TIDH42	TIDH42
		aromatic			TIDH32	condensed-ring aromatic	TIDH43	TIDH43
						multiring aromatic	TIDH44	TIDH44
						single-ring aromatic	TIDH45	TIDH45
		heterocyclic			TIDH33	saturated heterocyclic	TIDH46	TIDH46
						unsaturated heterocyclic	TIDH47	TIDH47
		partially heterocyclic			TIDT2	unmodified	TIDT30	TIDT30
						aliphatic	TIDT31	acyclic aliphatic
			alicyclic aliphatic	TIDT42				TIDT42
			aromatic	TIDT32		condensed-ring aromatic	TIDT43	TIDT43
						multiring aromatic	TIDT44	TIDT44
single-ring aromatic	TIDT45					TIDT45		
heterocyclic	TIDT33		saturated heterocyclic	TIDT46		TIDT46		

					unsaturated heterocyclic	TIDT47	TIDT47
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2.26 Polyureas/polyurethanes

Definition: Polymers whose backbone contains a partial structure, such as the following:

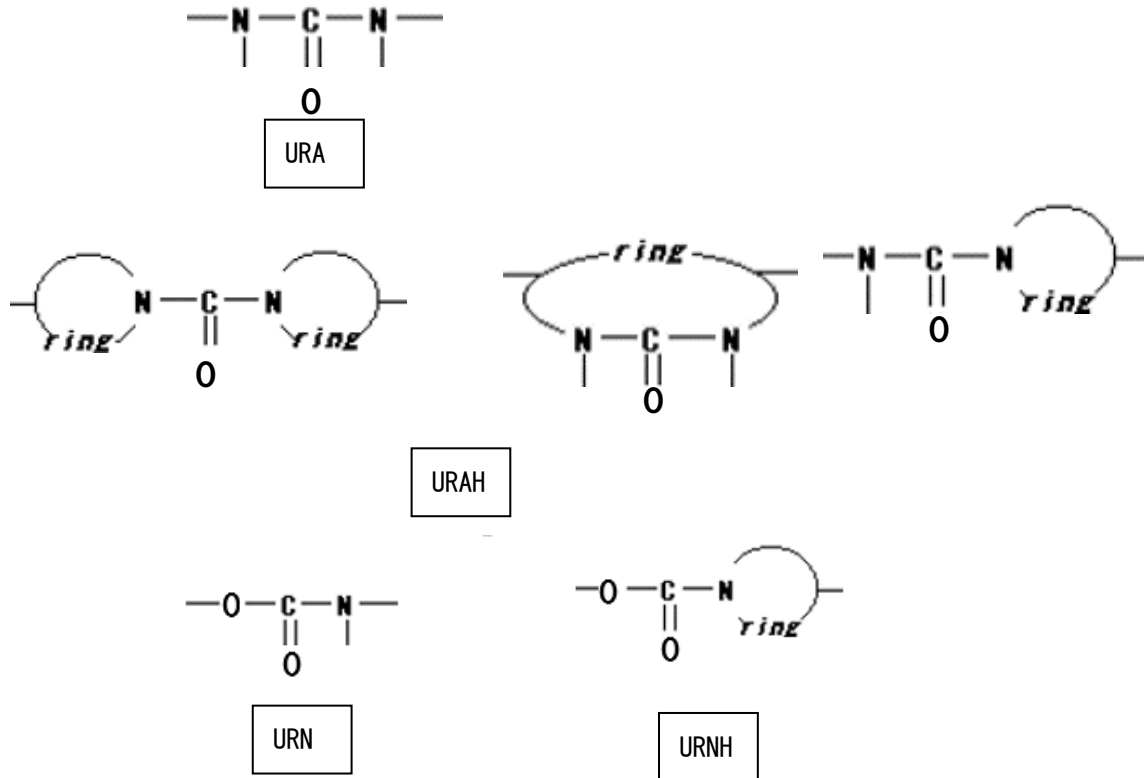


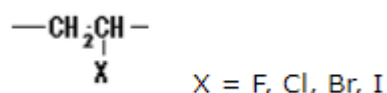
Table 2.26: Classification items for polyureas/polyurethanes

No	L1	L2	L3	L4	ID					
2	polyureas /polyurethanes UR1	unmodified linear polyureas	URA2	unmodified	URA30			URA30		
				aliphatic	URA31	acyclic aliphatic	URA41	URA41		
						alicyclic aliphatic	URA42	URA42		
				aromatic	URA32	condensed-ring aromatic	URA43	URA43		
						multiring aromatic	URA44	URA44		
						single-ring aromatic	URA45	URA45		
				heterocyclic	URA33	saturated heterocyclic	URA46	URA46		
						unsaturated heterocyclic	URA47	URA47		
				heterocyclic polyureas	URAH2	unmodified	URAH30			URAH30
						aliphatic	URAH31	acyclic aliphatic	URAH41	URAH41
		alicyclic aliphatic	URAH42					URAH42		
		aromatic	URAH32			condensed-ring aromatic	URAH43	URAH43		
						multiring aromatic	URAH44	URAH44		
						single-ring aromatic	URAH45	URAH45		
		heterocyclic	URAH33			saturated heterocyclic	URAH46	URAH46		
						unsaturated heterocyclic	URAH47	URAH47		
		unmodified linear polyurethanes	URN2			unmodified	URN30			URN30
						aliphatic	URN31	acyclic aliphatic	URN41	URN41
				alicyclic aliphatic	URN42			URN42		
				aromatic	URN32	condensed-ring aromatic	URN43	URN43		
						multiring aromatic	URN44	URN44		
						single-ring aromatic	URN45	URN45		
				heterocyclic	URN33	saturated heterocyclic	URN46	URN46		
						unsaturated heterocyclic	URN47	URN47		
				heterocyclic polyurethanes	URNH2	unmodified	URNH30			URNH30
						aliphatic	URNH31	acyclic aliphatic	URNH41	URNH41
		alicyclic aliphatic	URNH42					URNH42		
		aromatic	URNH32			condensed-ring aromatic	URNH43	URNH43		
multiring aromatic	URNH44					URNH44				
single-ring aromatic	URNH45					URNH45				
heterocyclic	URNH33	saturated heterocyclic	URNH46			URNH46				
		unsaturated heterocyclic	URNH47			URNH47				

2.27 Vinyl polymers

Definition: Polymers whose backbone consists only of an aliphatic hydrocarbon group with side chains containing aromatic rings, heteroatoms, or heteroatom-containing groups.

However, halogen-containing ones are limited to ones of the following form while ones taking any other form of bonding are classified only into halogenated polymers:



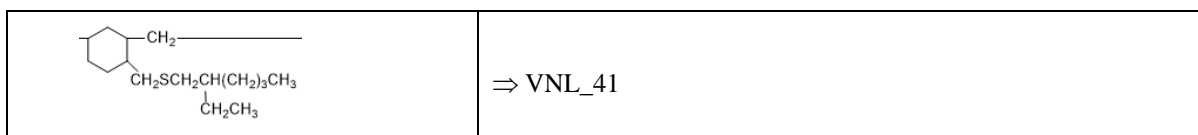
- The number of backbone carbon atoms in constitutional units (CU) is not limited.
- Polymers whose backbone contains a double bond C=C or triple bond C≡C are also classified hereto.
- Polymers classified into polystyrenes and polyacrylics are also classified into vinyl polymers at the same time.
- Vinyl polymers are not classified at the same time as polyolefins and polydienes.

Table 2.27: Classification items for vinyl polymers

No	(L1) 28 項目	(L2) (75 項目)	(L3) 224 項目	(L4)項目 (385 項目)	ID(469 項目)		
2	vinyl polymers VNL1	vinyl polymers	aliphatic	VNL_31	acyclic aliphatic	VNL_41	VNL_41
					alicyclic aliphatic	VNL_42	VNL_42
			aromatic	VNL_32	condensed-ring aromatic	VNL_43	VNL_43
					multiring aromatic	VNL_44	VNL_44
					single-ring aromatic	VNL_45	VNL_45
			heterocyclic	VNL_33	saturated heterocyclic	VNL_46	VNL_46
					unsaturated heterocyclic	VNL_47	VNL_47

[Typical classifications]

$\begin{array}{c} \text{CH}_3 \\ \\ \text{---CH=CH---CH}_2\text{---C---(CH}_2\text{)}_2\text{---} \\ \\ \text{COOCH}_3 \end{array}$	⇒ VNL_41
$\begin{array}{c} \text{---CH---CH---CH}_2\text{---CH---} \\ \quad \quad \quad \\ \text{COOH} \quad \text{COO(CH}_2\text{)}_7\text{CH}_3 \quad \text{C}_6\text{H}_5 \end{array}$	⇒ VNL_41, VNL_45, ACR_41, STY_30
$\begin{array}{c} \text{COO(CH}_2\text{)}_2\text{OH} \\ \\ \text{Cyclopentane ring} \end{array}$	⇒ VNL_41



2.28. Condensed-ring aromatic hydrocarbon (COND)

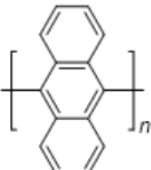
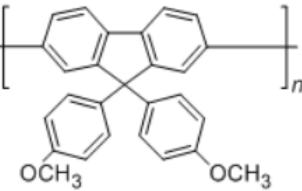
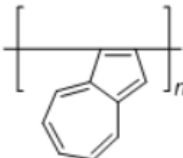
Definition: Polymers whose backbone contains a condensed polycyclic aromatic hydrocarbon.

Condensed polycyclic aromatic hydrocarbons refer to condensed polycyclic hydrocarbons containing at least one benzene ring, and azulene rings (with seven- and five-membered rings condensed together).

Table 2.28: Classification items for condensed-ring aromatic hydrocarbon

No	L1	L2	L3	L4	ID			
28	Condensed-ring aromatic hydrocarbon COND1	Condensed-ring aromatic hydrocarbon	COND_2	unmodified	COND_30	COND_30		
				aliphatic	COND_31	acyclic aliphatic	COND_41	COND_41
						alicyclic aliphatic	COND_42	COND_42
				aromatic	COND_32	condensed-ring aromatic	COND_43	COND_43
						multiring aromatic	COND_44	COND_44
						single-ring aromatic	COND_45	COND_45
				heterocyclic	COND_33	saturated heterocyclic	COND_46	COND_46
						unsaturated heterocyclic	COND_47	COND_47

Typical classifications:

<p>PID:P522064 CU formula:C14H8</p> 	COND_30
	COND_45
	COND_30

2.29 Other polymers

Definition: Polymers not belonging to Classification Items 01 to 28.

Table 2.29: Classification items for other polymers

No	L1	L2		L3		L4		ID
28	other polymers OTR1							OTR1