



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:43 AM UTC

PDB ID : 9O25 / pdb_00009o25
Title : Heparanase P6 in complex with fragment J41
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Deposited on : 2025-04-03
Resolution : 1.65 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : **NOT EXECUTED**
Xtrriage (Phenix) : 2.0
EDS : **NOT EXECUTED**
Buster-report : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

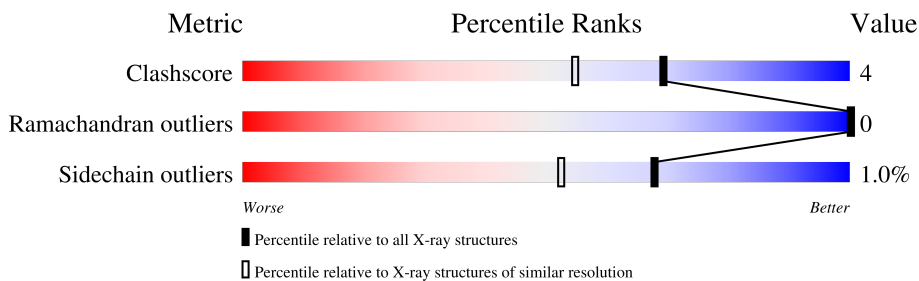
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	2662 (1.66-1.66)
Ramachandran outliers	187476	2621 (1.66-1.66)
Sidechain outliers	187428	2621 (1.66-1.66)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	382	
2	B	74	

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 3972 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Heparanase 50 kDa subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	382	3051	1962	525	551	13	0	5	0

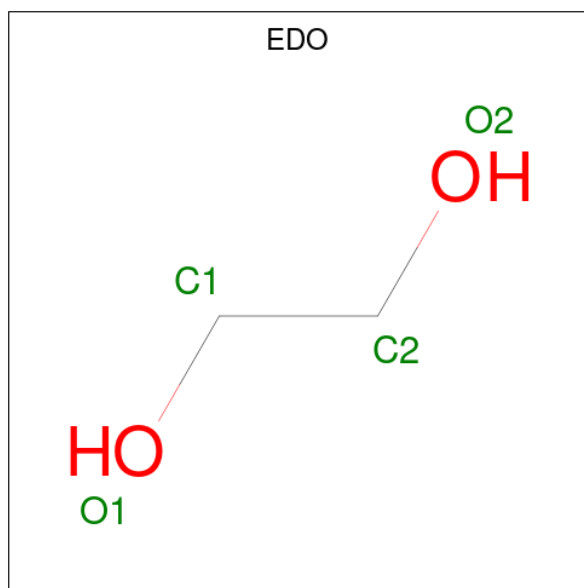
There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	178	LYS	ASN	conflict	UNP Q9Y251
A	195	SER	ALA	conflict	UNP Q9Y251
A	197	GLY	LEU	conflict	UNP Q9Y251
A	212	ALA	SER	conflict	UNP Q9Y251
A	219	ASP	SER	conflict	UNP Q9Y251
A	230	ARG	LEU	conflict	UNP Q9Y251
A	234	GLY	ASP	conflict	UNP Q9Y251
A	244	LYS	GLU	conflict	UNP Q9Y251
A	248	HIS	GLN	conflict	UNP Q9Y251
A	273	GLY	ARG	conflict	UNP Q9Y251
A	292	ALA	SER	conflict	UNP Q9Y251
A	307	LEU	LYS	conflict	UNP Q9Y251
A	318	THR	ILE	conflict	UNP Q9Y251
A	322	GLN	SER	conflict	UNP Q9Y251
A	327	LEU	PHE	conflict	UNP Q9Y251
A	354	GLY	LEU	conflict	UNP Q9Y251
A	426	GLN	SER	conflict	UNP Q9Y251
A	427	ASP	LYS	conflict	UNP Q9Y251
A	477	GLN	LYS	conflict	UNP Q9Y251
A	483	HIS	LEU	conflict	UNP Q9Y251
A	486	ASP	HIS	conflict	UNP Q9Y251
A	498	GLN	LEU	conflict	UNP Q9Y251
A	512	LYS	MET	conflict	UNP Q9Y251
A	513	PRO	GLU	conflict	UNP Q9Y251
A	530	ALA	SER	conflict	UNP Q9Y251
A	540	PRO	ALA	conflict	UNP Q9Y251

- Molecule 2 is a protein called Heparanase 8 kDa subunit.

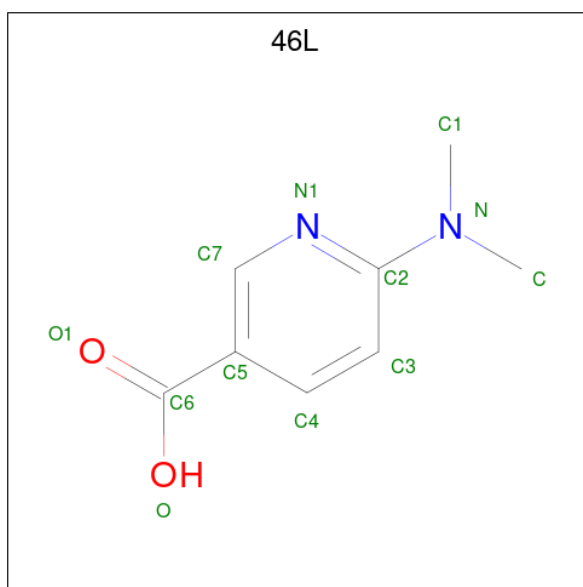
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	74	585	383	95	107	0	0	0

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	4	2	2	0	0
3	A	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is 6-(dimethylamino)pyridine-3-carboxylic acid (CCD ID: 46L) (formula: C₈H₁₀N₂O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	12	8	2	2	0	0

- Molecule 5 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2^-$).



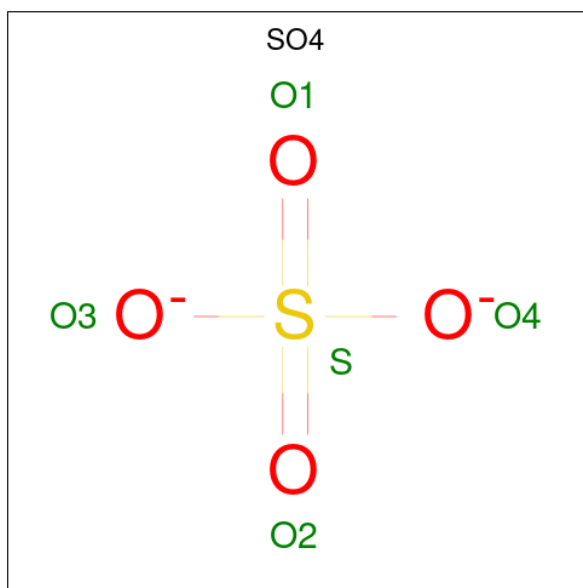
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	A	1	4	2	2	0	0

- Molecule 6 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			7	4	3		

- Molecule 7 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 8 is water.

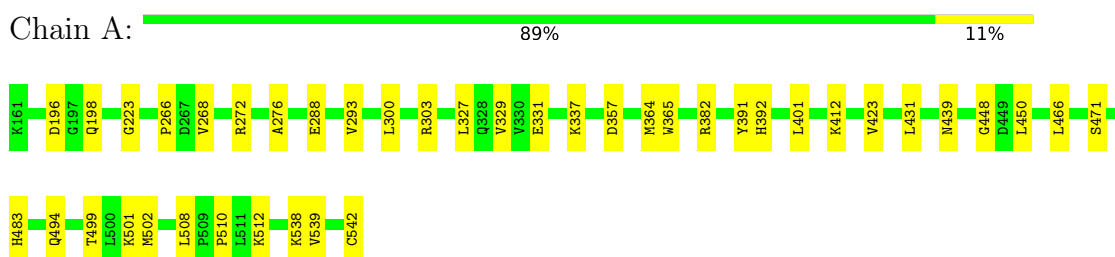
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	251	Total 251	O 251	0	0
8	B	49	Total 49	O 49	0	0

3 Residue-property plots [i](#)

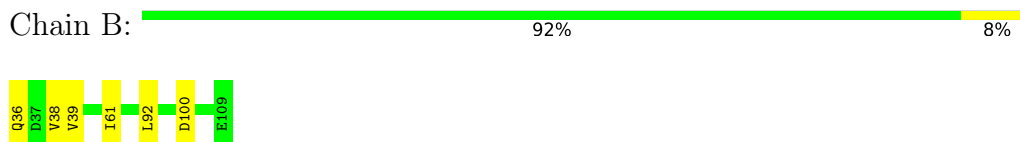
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

- Molecule 1: Heparanase 50 kDa subunit



- Molecule 2: Heparanase 8 kDa subunit



4 Data and refinement statistics

EDS was not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.75Å 74.69Å 124.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.80 – 1.65	Depositor
% Data completeness (in resolution range)	99.9 (47.80-1.65)	Depositor
R_{merge}	0.33	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.19 (at 1.65Å)	Xtrriage
Refinement program	PHENIX (1.21.2_5419: ???)	Depositor
R, R_{free}	0.183 , 0.216	Depositor
Wilson B-factor (Å ²)	23.9	Xtrriage
Anisotropy	0.429	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	3972	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.65% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, 46L, PEG, ACT, EDO

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.25	0/3126	0.48	0/4232
2	B	0.26	0/599	0.49	0/814
All	All	0.25	0/3725	0.48	0/5046

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3051	0	3063	24	0
2	B	585	0	597	4	0
3	A	8	0	12	1	0
4	A	12	0	9	0	0
5	A	4	0	3	0	0
6	A	7	0	10	2	0
7	A	5	0	0	0	0
8	A	251	0	0	2	0
8	B	49	0	0	0	0
All	All	3972	0	3694	26	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including

hydrogen atoms). The all-atom clashscore for this structure is 4.

All (26) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:483:HIS:HB2	1:A:494:GLN:HG3	1.73	0.69
2:B:36:GLN:HG3	2:B:38:VAL:H	1.61	0.65
1:A:510:PRO:HB2	1:A:512:LYS:HD2	1.80	0.64
1:A:266:PRO:HG2	1:A:268:VAL:HG13	1.82	0.61
1:A:423:VAL:HG13	2:B:39:VAL:HG13	1.86	0.57
1:A:357:ASP:HB2	1:A:401:LEU:HD22	1.85	0.57
1:A:288[A]:GLU:H	1:A:288[A]:GLU:CD	2.18	0.51
1:A:502[B]:MET:SD	1:A:508:LEU:HD23	2.50	0.51
1:A:276:ALA:HB3	1:A:329:VAL:HG21	1.94	0.49
1:A:450:LEU:HD21	1:A:539:VAL:HG21	1.95	0.49
1:A:512:LYS:HD3	8:A:887:HOH:O	2.13	0.47
1:A:538:LYS:HA	1:A:538:LYS:HD2	1.74	0.45
1:A:293:VAL:HG23	1:A:337:LYS:HG2	1.99	0.45
1:A:272:ARG:HA	8:A:878:HOH:O	2.18	0.44
1:A:300:LEU:CD1	1:A:364:MET:HE1	2.47	0.44
1:A:439:ASN:HA	3:A:601:EDO:H11	1.99	0.44
1:A:466:LEU:O	1:A:471:SER:HB3	2.18	0.43
1:A:448:GLY:HA2	1:A:542:CYS:HB2	2.00	0.43
1:A:412:LYS:HA	1:A:412:LYS:HD3	1.82	0.43
2:B:61:ILE:HG13	2:B:92:LEU:HD11	2.00	0.43
1:A:499:THR:OG1	6:A:604:PEG:H31	2.19	0.42
1:A:501:LYS:HE2	6:A:604:PEG:H12	2.02	0.42
1:A:196:ASP:OD1	1:A:198:GLN:HG2	2.20	0.41
1:A:365:TRP:CH2	1:A:382:ARG:HB2	2.55	0.41
1:A:327:LEU:O	1:A:331:GLU:HG3	2.21	0.41
1:A:223:GLY:HA2	2:B:100:ASP:OD1	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [\(i\)](#)

5.3.1 Protein backbone [\(i\)](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was

analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	385/382 (101%)	374 (97%)	11 (3%)	0	100	100
2	B	72/74 (97%)	71 (99%)	1 (1%)	0	100	100
All	All	457/456 (100%)	445 (97%)	12 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	332/327 (102%)	328 (99%)	4 (1%)	63	45
2	B	66/66 (100%)	66 (100%)	0	100	100
All	All	398/393 (101%)	394 (99%)	4 (1%)	68	52

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	303	ARG
1	A	391	TYR
1	A	392	HIS
1	A	431	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	162	ASN
1	A	459	ASN
1	A	472	ASN
1	A	474	GLN
2	B	46	GLN
2	B	50	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

Mogul was not executed - this section is therefore empty.

5.5 Carbohydrates [i](#)

Mogul was not executed - this section is therefore empty.

5.6 Ligand geometry [i](#)

Mogul was not executed - this section is therefore empty.

5.7 Other polymers [i](#)

Mogul was not executed - this section is therefore empty.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section is therefore empty.

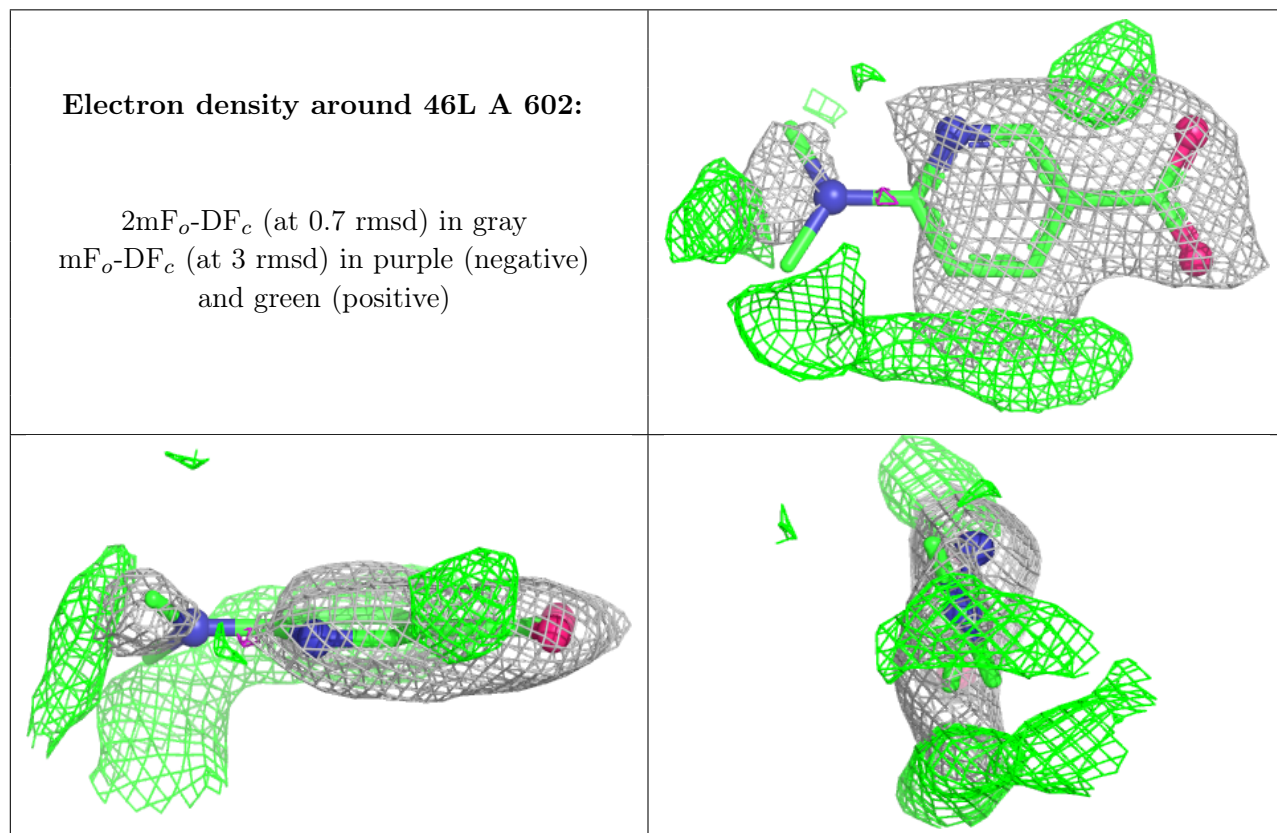
6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



6.5 Other polymers

EDS was not executed - this section is therefore empty.