



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 17, 2023 – 11:28 am GMT

PDB ID : 2XR6  
Title : Crystal structure of the complex of the carbohydrate recognition domain of human DC-SIGN with pseudo trimannoside mimic.  
Authors : Thepaut, M.; Suitkeviciute, I.; Sattin, S.; Reina, J.; Bernardi, A.; Fieschi, F.  
Deposited on : 2010-09-10  
Resolution : 1.35 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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 : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

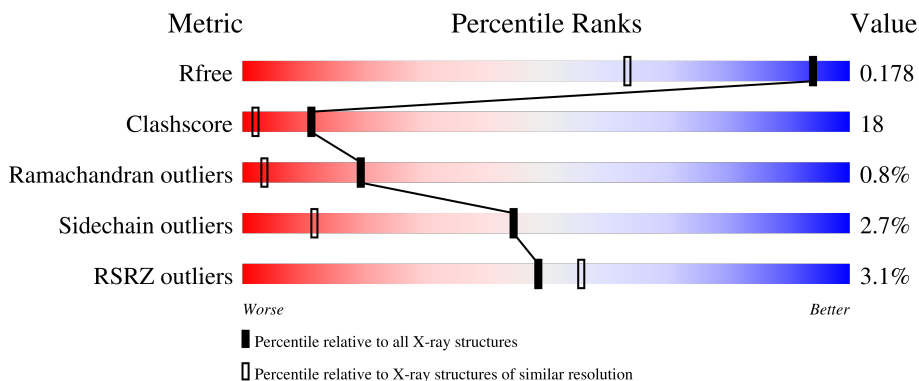
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.35 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))
$R_{free}$	130704	1509 (1.38-1.34)
Clashscore	141614	1551 (1.38-1.34)
Ramachandran outliers	138981	1530 (1.38-1.34)
Sidechain outliers	138945	1530 (1.38-1.34)
RSRZ outliers	127900	1487 (1.38-1.34)

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  $\geq 3$ , 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  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	170	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	AE9	A	1388	-	X	-	-

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 1422 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.

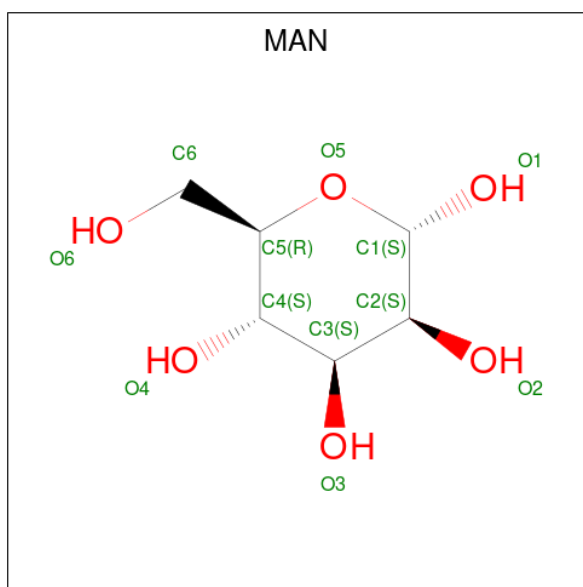
- Molecule 1 is a protein called CD209 ANTIGEN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	130	1189	762	193	221	13	0	25	0

There are 17 discrepancies between the modelled and reference sequences:

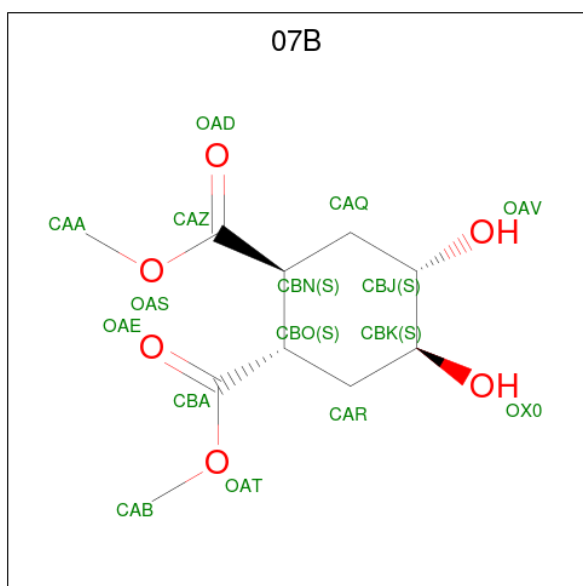
Chain	Residue	Modelled	Actual	Comment	Reference
A	235	MET	-	expression tag	UNP Q9NNX6
A	236	ALA	-	expression tag	UNP Q9NNX6
A	237	SER	-	expression tag	UNP Q9NNX6
A	238	TRP	-	expression tag	UNP Q9NNX6
A	239	SER	-	expression tag	UNP Q9NNX6
A	240	HIS	-	expression tag	UNP Q9NNX6
A	241	PRO	-	expression tag	UNP Q9NNX6
A	242	GLN	-	expression tag	UNP Q9NNX6
A	243	PHE	-	expression tag	UNP Q9NNX6
A	244	GLU	-	expression tag	UNP Q9NNX6
A	245	LYS	-	expression tag	UNP Q9NNX6
A	246	ILE	-	expression tag	UNP Q9NNX6
A	247	GLU	-	expression tag	UNP Q9NNX6
A	248	GLY	-	expression tag	UNP Q9NNX6
A	249	ARG	-	expression tag	UNP Q9NNX6
A	253	SER	CYS	engineered mutation	UNP Q9NNX6
A	384	SER	CYS	engineered mutation	UNP Q9NNX6

- Molecule 2 is alpha-D-mannopyranose (three-letter code: MAN) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>).



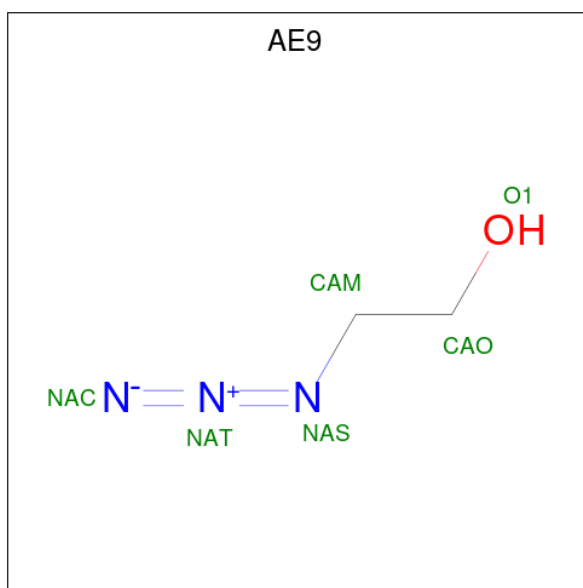
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			12	6	6		
2	A	1	Total	C	O	0	0
			11	6	5		

- Molecule 3 is dimethyl (1S,2S,4S,5S)-4,5-dihydroxycyclohexane-1,2-dicarboxylate (three-letter code: 07B) (formula: C<sub>10</sub>H<sub>16</sub>O<sub>6</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			14	10	4		

- Molecule 4 is 2-AZIDOETHANOL (three-letter code: AE9) (formula: C<sub>2</sub>H<sub>5</sub>N<sub>3</sub>O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			6	2	3	1		

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	3	Total	Ca	0	0
			3	3		

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	3	Total	Cl	0	0
			3	3		

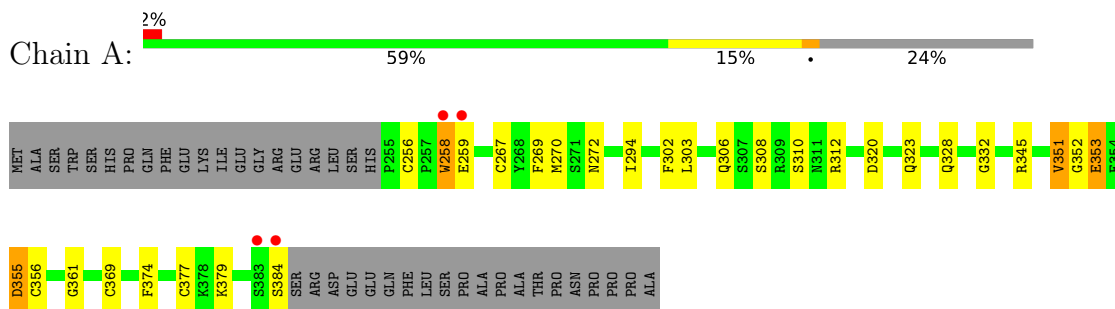
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	166	Total	O	0	18
			184	184		

### 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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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.

- Molecule 1: CD209 ANTIGEN



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	71.33Å 71.33Å 52.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.44 – 1.35 42.37 – 1.35	Depositor EDS
% Data completeness (in resolution range)	99.9 (50.44-1.35) 99.9 (42.37-1.35)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.72 (at 1.35Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.147 , 0.168 0.154 , 0.178	Depositor DCC
$R_{free}$ test set	1536 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	9.1	Xtriage
Anisotropy	0.161	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 52.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	1422	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	14.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.40% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: AE9, CA, 07B, MAN, CL

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	0.79	2/1299 (0.2%)	0.77	1/1758 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	351[A]	VAL	CB-CG1	-5.62	1.41	1.52
1	A	351[B]	VAL	CB-CG1	-5.62	1.41	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	355	ASP	CB-CG-OD1	5.51	123.26	118.30

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	1189	0	1141	40	0
2	A	23	0	18	1	0
3	A	14	0	12	1	0
4	A	6	0	4	1	0
5	A	3	0	0	0	0

*Continued on next page...*



Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	3	0	0	0	0
7	A	184	0	0	9	0
All	All	1422	0	1175	43	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 18.

The worst 5 of 43 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:258[A]:TRP:CD1	1:A:259[A]:GLU:HG2	1.40	1.57
1:A:256:CYS:SG	1:A:267[B]:CYS:HB3	1.74	1.26
1:A:258[A]:TRP:CD1	1:A:259[A]:GLU:CG	2.35	1.08
1:A:258[A]:TRP:NE1	1:A:259[A]:GLU:HG2	1.73	1.04
1:A:272[A]:ASN:HD22	1:A:312[A]:ARG:HH12	1.09	1.01

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	155/170 (91%)	151 (97%)	2 (1%)	2 (1%)	12   1

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	353[A]	GLU
1	A	353[B]	GLU

### 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	140/149 (94%)	134 (96%)	6 (4%)	29 3

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	270[B]	MET
1	A	270[C]	MET
1	A	345	ARG
1	A	258[B]	TRP
1	A	258[A]	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	370	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 6 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	MAN	A	1387	4,3	11,11,12	0.81	0	15,15,17	1.08	1 (6%)
2	MAN	A	1385	5,3	12,12,12	0.80	0	17,17,17	1.16	2 (11%)
3	07B	A	1386	2	14,14,16	0.93	0	18,18,22	2.61	7 (38%)
4	AE9	A	1388	2	4,5,5	2.24	1 (25%)	3,4,4	7.63	2 (66%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	MAN	A	1387	4,3	-	0/2/19/22	0/1/1/1
2	MAN	A	1385	5,3	-	0/2/22/22	0/1/1/1
3	07B	A	1386	2	-	8/12/23/28	0/1/1/1
4	AE9	A	1388	2	-	2/3/3/3	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1388	AE9	NAT-NAS	-4.25	1.12	1.23

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1388	AE9	CAM-NAS-NAT	12.91	177.19	115.95
3	A	1386	07B	OAS-CAZ-CBN	6.69	121.37	111.44
3	A	1386	07B	OAT-CBA-CBO	5.38	119.42	111.44
3	A	1386	07B	CAB-OAT-CBA	-3.77	107.41	115.94
2	A	1387	MAN	C1-C2-C3	2.69	112.97	109.67

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1386	07B	CBO-CBA-OAT-CAB
3	A	1386	07B	CBN-CAZ-OAS-CAA
4	A	1388	AE9	NAS-CAM-CAO-O1
3	A	1386	07B	OAE-CBA-OAT-CAB
3	A	1386	07B	OAD-CAZ-OAS-CAA

There are no ring outliers.

3 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1385	MAN	1	0
3	A	1386	07B	1	0
4	A	1388	AE9	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 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](#)

In the following table, the column labelled '#RSRZ > 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q < 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	130/170 (76%)	-0.20	4 (3%) 49 56	6, 9, 21, 38	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	258[A]	TRP	10.5
1	A	259[A]	GLU	6.3
1	A	384	SER	3.7
1	A	383	SER	2.1

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

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	07B	A	1386	14/16	0.80	0.22	20,46,53,54	0
2	MAN	A	1387	11/12	0.81	0.19	27,41,45,47	0
4	AE9	A	1388	6/6	0.89	0.16	37,40,43,44	0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	MAN	A	1385	12/12	0.97	0.06	8,12,18,26	0
6	CL	A	1394	1/1	0.99	0.08	32,32,32,32	0
5	CA	A	1390	1/1	1.00	0.05	7,7,7,7	0
5	CA	A	1391	1/1	1.00	0.04	6,6,6,6	0
6	CL	A	1392	1/1	1.00	0.06	15,15,15,15	0
6	CL	A	1393	1/1	1.00	0.02	15,15,15,15	0
5	CA	A	1389	1/1	1.00	0.03	10,10,10,10	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.