



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 11:31 AM UTC

PDB ID : 5C0E / pdb_00005c0e
Title : HLA-A02 carrying YLGGPDFPTI
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Deposited on : 2015-06-12
Resolution : 1.49 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	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

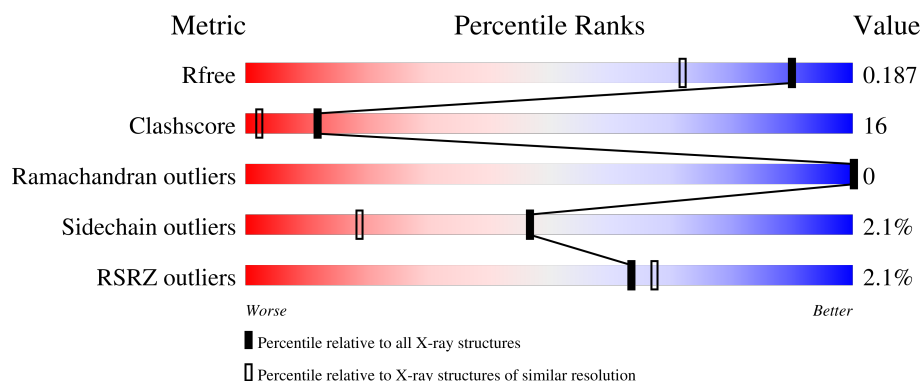
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.49 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}	180053	4037 (1.50-1.50)
Clashscore	190562	4235 (1.50-1.50)
Ramachandran outliers	187476	4153 (1.50-1.50)
Sidechain outliers	187428	4150 (1.50-1.50)
RSRZ outliers	180081	4039 (1.50-1.50)

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 $\leq 5\%$. 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	277	% 87% 12% .
2	B	100	4% 71% 27% ..
3	C	10	80% 10% 10%

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
5	EDO	B	103	-	X	-	-
6	GOL	B	104	-	-	X	-
7	PG4	A	318	-	-	X	-
7	PG4	B	105	-	-	X	-
7	PG4	B	107	-	X	X	-
7	PG4	B	108	-	-	X	-
7	PG4	B	109	-	-	X	-
7	PG4	B	110	-	-	X	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 3943 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 HLA class I histocompatibility antigen, A-2 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	277	Total	C	N	O	S	0	14	0
			2387	1487	442	448	10			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P01892

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	100	Total	C	N	O	S	0	1	0
			846	538	142	162	4			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	initiating methionine	UNP P61769

- Molecule 3 is a protein called Marker peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	10	Total	C	N	O	0	0	0
			83	57	11	15			

- Molecule 4 is BROMIDE ION (CCD ID: BR) (formula: Br).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Br	0	0
			1	1		

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



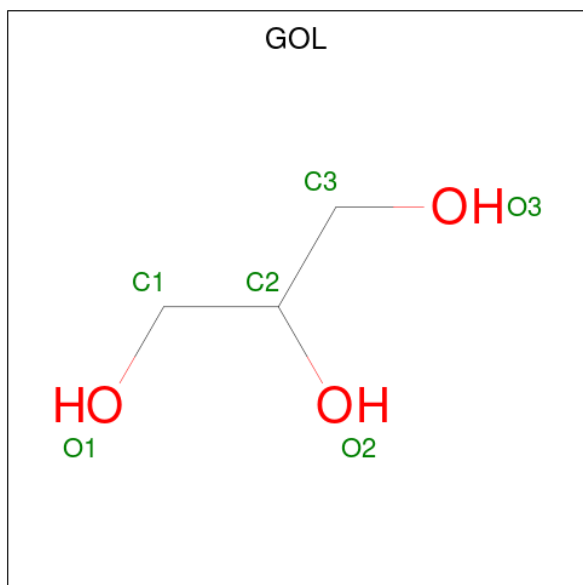
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total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

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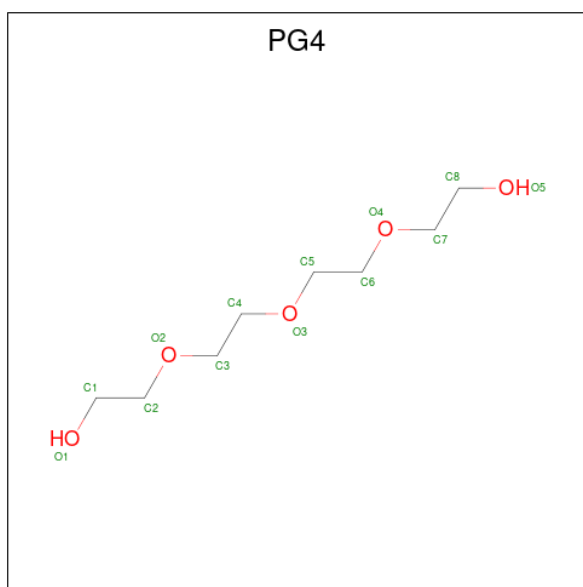
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 7 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: $C_8H_{18}O_5$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			13	8	5		
7	A	1	Total	C	O	0	0
			13	8	5		
7	A	1	Total	C	O	0	0
			13	8	5		
7	A	1	Total	C	O	0	0
			13	8	5		
7	B	1	Total	C	O	0	0
			13	8	5		
7	B	1	Total	C	O	0	0
			13	8	5		
7	B	1	Total	C	O	0	0
			13	8	5		
7	B	1	Total	C	O	0	0
			13	8	5		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	285	Total	O	0	0
			285	285		

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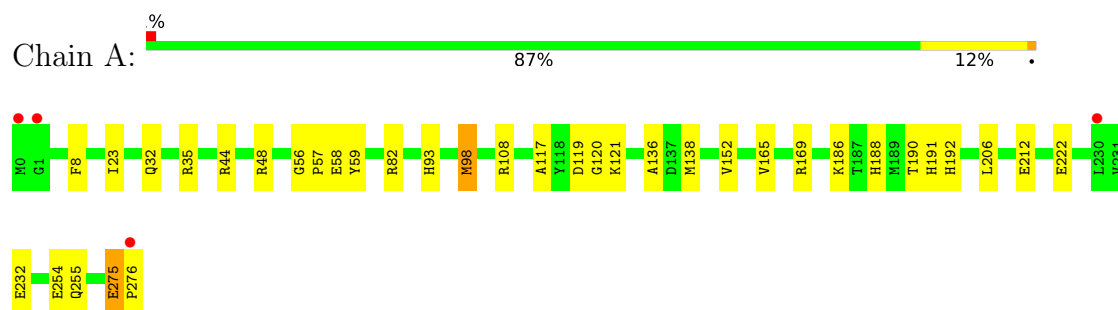
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	95	Total 95	O 95	0	0
8	C	11	Total 11	O 11	0	0

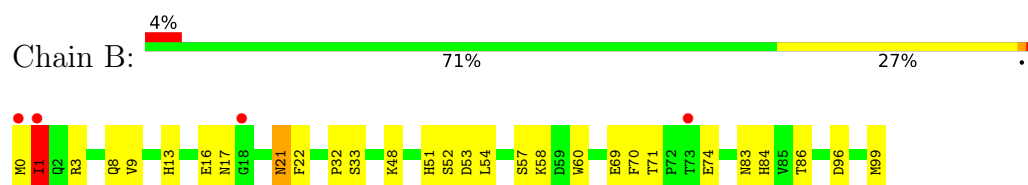
3 Residue-property plots [i](#)

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 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.

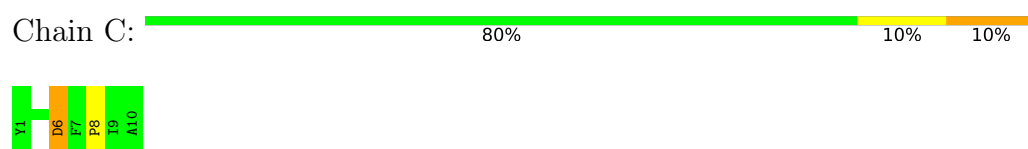
- Molecule 1: HLA class I histocompatibility antigen, A-2 alpha chain



- Molecule 2: Beta-2-microglobulin



- Molecule 3: Marker peptide



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	56.07Å 79.74Å 57.00Å 90.00° 115.74° 90.00°	Depositor
Resolution (Å)	31.29 – 1.49 31.29 – 1.49	Depositor EDS
% Data completeness (in resolution range)	99.0 (31.29-1.49) 99.0 (31.29-1.49)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.30 (at 1.49Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.156 , 0.179 0.164 , 0.187	Depositor DCC
R_{free} test set	3669 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	14.0	Xtriage
Anisotropy	0.320	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 44.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.024 for l,-k,h	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	3943	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.72% 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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, BR, PG4, GOL

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	1.17	0/2453	1.08	2/3325 (0.1%)
2	B	1.18	1/869 (0.1%)	1.11	1/1174 (0.1%)
3	C	1.43	1/87 (1.1%)	1.14	0/117
All	All	1.18	2/3409 (0.1%)	1.09	3/4616 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	71	THR	CA-CB	-5.25	1.46	1.53
3	C	6	ASP	CG-OD1	5.15	1.35	1.25

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1	ILE	CB-CA-C	-7.54	98.92	111.29
1	A	275	GLU	N-CA-C	-6.66	99.13	109.79
1	A	136	ALA	N-CA-C	5.17	117.82	111.82

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	275	GLU	Peptide

5.2 Too-close contacts

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	2387	0	2242	46	0
2	B	846	0	808	46	0
3	C	83	0	74	3	0
4	A	1	0	0	0	0
5	A	56	0	83	3	0
5	B	12	0	17	0	0
6	A	12	0	16	0	0
6	B	6	0	8	4	0
6	C	6	0	8	0	0
7	A	65	0	89	20	0
7	B	78	0	106	45	0
8	A	285	0	0	12	0
8	B	95	0	0	4	0
8	C	11	0	0	2	0
All	All	3943	0	3451	111	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 16.

All (111) 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)
2:B:9:VAL:O	7:B:110:PG4:H81	1.30	1.22
7:A:318:PG4:H61	8:C:207:HOH:O	1.47	1.13
2:B:9:VAL:O	7:B:110:PG4:C8	2.18	0.91
2:B:99:MET:HB2	7:B:110:PG4:H71	1.55	0.86
2:B:21:ASN:HD22	2:B:22:PHE:H	1.21	0.86
1:A:186:LYS:HD2	7:B:105:PG4:H62	1.58	0.85
1:A:23:ILE:HD13	7:B:107:PG4:H81	1.66	0.77
2:B:99:MET:HB2	7:B:110:PG4:C7	2.15	0.76
2:B:16:GLU:OE1	7:B:109:PG4:H72	1.87	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:206:LEU:CD1	7:B:108:PG4:H51	2.17	0.73
2:B:69[B]:GLU:H	2:B:69[B]:GLU:CD	2.01	0.69
2:B:48:LYS:O	2:B:48:LYS:HG3	1.93	0.68
2:B:99:MET:C	7:B:110:PG4:H82	2.17	0.68
1:A:93:HIS:HD2	1:A:119:ASP:OD2	1.76	0.68
1:A:8:PHE:HE2	7:B:106:PG4:H61	1.59	0.68
1:A:255:GLN:NE2	8:A:401:HOH:O	2.10	0.67
2:B:13:HIS:H	2:B:21:ASN:HD21	1.41	0.67
7:B:109:PG4:H82	8:B:276:HOH:O	1.96	0.66
8:A:530:HOH:O	7:B:107:PG4:H61	1.94	0.66
1:A:206:LEU:HD11	7:B:108:PG4:H51	1.77	0.66
7:A:319:PG4:H71	8:A:547:HOH:O	1.96	0.66
1:A:232[B]:GLU:OE2	8:A:402:HOH:O	2.13	0.65
1:A:186:LYS:CD	7:B:105:PG4:H62	2.26	0.65
2:B:54:LEU:H	7:B:107:PG4:H82	1.61	0.65
2:B:57:SER:O	7:B:106:PG4:H62	1.98	0.64
1:A:188:HIS:HD2	8:A:561:HOH:O	1.80	0.64
2:B:33:SER:O	7:B:107:PG4:H32	1.98	0.64
1:A:58:GLU:HB3	7:A:318:PG4:H32	1.80	0.63
1:A:138:MET:HG2	7:A:320:PG4:H12	1.80	0.63
1:A:56:GLY:HA3	7:A:318:PG4:H21	1.82	0.62
7:B:105:PG4:H51	7:B:109:PG4:H12	1.81	0.61
7:A:319:PG4:H11	8:A:474:HOH:O	2.01	0.61
1:A:44:ARG:HE	7:A:322:PG4:H52	1.66	0.61
1:A:165[B]:VAL:CG1	1:A:169:ARG:NH2	2.64	0.60
2:B:17:ASN:HB3	6:B:104:GOL:C1	2.31	0.60
7:B:107:PG4:H62	7:B:107:PG4:H21	1.84	0.60
1:A:93:HIS:HE1	8:A:455:HOH:O	1.83	0.60
1:A:206:LEU:HD11	7:B:108:PG4:C5	2.32	0.60
2:B:99:MET:OXT	7:B:108:PG4:H11	2.02	0.59
1:A:32:GLN:H	7:A:319:PG4:C8	2.16	0.58
7:B:110:PG4:C8	7:B:110:PG4:H41	2.33	0.58
2:B:99:MET:O	7:B:110:PG4:H32	2.04	0.58
2:B:84:HIS:HD2	2:B:86:THR:OG1	1.87	0.58
2:B:22:PHE:CE2	2:B:69[A]:GLU:HG2	2.39	0.58
2:B:96:ASP:O	7:B:110:PG4:H72	2.04	0.57
1:A:35[B]:ARG:NE	1:A:48[B]:ARG:NH1	2.51	0.57
1:A:206:LEU:HD13	7:B:108:PG4:H51	1.85	0.57
1:A:59:TYR:HA	7:A:318:PG4:H51	1.87	0.56
7:B:105:PG4:H42	7:B:109:PG4:H41	1.87	0.56
7:A:322:PG4:H31	7:A:322:PG4:O1	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:191:HIS:HD2	8:A:654:HOH:O	1.89	0.55
1:A:58:GLU:HG2	7:A:318:PG4:H62	1.89	0.54
2:B:17:ASN:HB3	6:B:104:GOL:H12	1.89	0.53
1:A:119:ASP:O	2:B:1:ILE:HD11	2.09	0.53
2:B:74:GLU:HB2	6:B:104:GOL:O1	2.08	0.53
7:A:319:PG4:C1	8:A:474:HOH:O	2.56	0.53
2:B:17:ASN:HB3	6:B:104:GOL:H11	1.90	0.52
1:A:35[A]:ARG:NH2	8:A:404:HOH:O	2.30	0.52
1:A:35[A]:ARG:HE	2:B:53:ASP:CG	2.18	0.51
1:A:120:GLY:HA3	2:B:1:ILE:HD11	1.91	0.51
7:B:105:PG4:C2	7:B:109:PG4:H52	2.40	0.51
2:B:69[B]:GLU:CD	2:B:69[B]:GLU:N	2.68	0.50
1:A:222:GLU:HG3	5:A:305:EDO:H12	1.94	0.49
7:B:110:PG4:H82	7:B:110:PG4:H41	1.93	0.49
7:B:110:PG4:H21	8:B:216:HOH:O	2.13	0.49
1:A:82:ARG:HD2	8:A:615:HOH:O	2.12	0.49
1:A:191:HIS:HE1	1:A:254:GLU:OE1	1.95	0.49
5:A:311:EDO:O2	7:A:322:PG4:H42	2.12	0.49
2:B:54:LEU:H	7:B:107:PG4:H71	1.77	0.49
2:B:99:MET:HE3	7:B:110:PG4:H11	1.94	0.49
3:C:8:PRO:HG2	8:C:210:HOH:O	2.13	0.48
1:A:32:GLN:HB2	7:A:319:PG4:H81	1.94	0.48
1:A:255:GLN:H	1:A:255:GLN:CD	2.21	0.48
2:B:83:ASN:HD22	2:B:84:HIS:H	1.60	0.48
2:B:32:PRO:O	2:B:84:HIS:HE1	1.97	0.48
2:B:21:ASN:HD22	2:B:22:PHE:N	2.02	0.47
1:A:8:PHE:CE2	7:B:106:PG4:H61	2.44	0.47
2:B:96:ASP:HB3	7:B:110:PG4:H72	1.96	0.47
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.49	0.47
2:B:8:GLN:OE1	7:B:110:PG4:H31	2.15	0.46
7:B:105:PG4:O2	7:B:109:PG4:H52	2.15	0.46
2:B:51:HIS:HD2	2:B:52:SER:O	1.99	0.46
1:A:121[B]:LYS:HB3	1:A:121[B]:LYS:HE2	1.73	0.46
7:A:319:PG4:H42	7:A:319:PG4:H62	1.67	0.45
1:A:59:TYR:HB2	7:A:318:PG4:H41	1.99	0.45
1:A:165[B]:VAL:HG11	1:A:169:ARG:NH2	2.32	0.45
2:B:1:ILE:HD13	2:B:3:ARG:HH11	1.82	0.45
1:A:58:GLU:HB3	7:A:318:PG4:H12	1.98	0.44
1:A:152:VAL:HG21	3:C:8:PRO:HG3	2.00	0.44
2:B:54:LEU:H	7:B:107:PG4:C8	2.30	0.44
7:B:105:PG4:O3	7:B:109:PG4:H42	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:99:MET:OXT	7:B:108:PG4:C1	2.65	0.44
2:B:1:ILE:HA	8:B:281:HOH:O	2.18	0.44
1:A:108[A]:ARG:HH11	1:A:108[A]:ARG:HD2	1.59	0.43
1:A:121[A]:LYS:HD3	2:B:1:ILE:HG12	1.99	0.43
1:A:98:MET:O	1:A:98:MET:HE3	2.19	0.43
8:A:505:HOH:O	3:C:6:ASP:HA	2.19	0.43
2:B:58:LYS:N	7:B:106:PG4:H52	2.34	0.43
1:A:57:PRO:HA	7:A:322:PG4:H72	2.01	0.42
2:B:48:LYS:O	2:B:48:LYS:CG	2.57	0.42
1:A:44:ARG:HE	7:A:322:PG4:C5	2.31	0.42
2:B:99:MET:HE3	7:B:110:PG4:C1	2.49	0.42
5:A:310:EDO:O2	7:A:320:PG4:H51	2.20	0.42
2:B:22:PHE:CE2	2:B:69[A]:GLU:CG	3.01	0.42
7:B:110:PG4:C7	7:B:110:PG4:H41	2.50	0.42
2:B:96:ASP:H	7:B:110:PG4:H72	1.83	0.42
1:A:98:MET:HE3	1:A:98:MET:C	2.44	0.42
1:A:190:THR:OG1	1:A:192:HIS:HE1	2.02	0.41
7:B:108:PG4:C8	8:B:249:HOH:O	2.67	0.41
2:B:96:ASP:O	7:B:110:PG4:O5	2.32	0.41
7:B:108:PG4:H22	7:B:108:PG4:H41	1.81	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	289/277 (104%)	286 (99%)	3 (1%)	0	100	100
2	B	99/100 (99%)	98 (99%)	1 (1%)	0	100	100
3	C	8/10 (80%)	8 (100%)	0	0	100	100
All	All	396/387 (102%)	392 (99%)	4 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	247/233 (106%)	244 (99%)	3 (1%)	63	38
2	B	96/95 (101%)	92 (96%)	4 (4%)	26	4
3	C	8/8 (100%)	8 (100%)	0	100	100
All	All	351/336 (104%)	344 (98%)	7 (2%)	47	20

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	98	MET
1	A	212	GLU
1	A	276	PRO
2	B	0	MET
2	B	1	ILE
2	B	21	ASN
2	B	70	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	86	ASN
1	A	93	HIS
1	A	115	GLN
1	A	188	HIS
1	A	191	HIS
1	A	192	HIS
2	B	21	ASN
2	B	24	ASN
2	B	51	HIS
2	B	83	ASN
2	B	84	HIS

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Mol	Chain	Res	Type
2	B	89	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 33 ligands modelled in this entry, 1 is monoatomic - leaving 32 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	$\# Z > 2$
5	EDO	A	314	-	3,3,3	0.53	0	2,2,2	0.31	0
7	PG4	B	105	-	12,12,12	0.41	0	11,11,11	0.60	0
5	EDO	A	312	-	3,3,3	1.86	1 (33%)	2,2,2	0.45	0
5	EDO	B	103	-	3,3,3	3.02	1 (33%)	2,2,2	2.06	1 (50%)
5	EDO	A	307	-	3,3,3	0.24	0	2,2,2	0.93	0
7	PG4	A	321	-	12,12,12	0.95	0	11,11,11	1.81	3 (27%)
5	EDO	A	302	-	3,3,3	0.59	0	2,2,2	1.17	0
5	EDO	A	315	-	3,3,3	1.03	0	2,2,2	0.47	0
5	EDO	A	311	-	3,3,3	0.38	0	2,2,2	0.63	0
7	PG4	A	318	-	12,12,12	1.18	0	11,11,11	1.43	3 (27%)
7	PG4	B	106	-	12,12,12	0.80	0	11,11,11	0.98	0
5	EDO	A	306	-	3,3,3	0.36	0	2,2,2	0.76	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	EDO	B	102	-	3,3,3	0.31	0	2,2,2	0.52	0
6	GOL	C	101	-	5,5,5	0.45	0	5,5,5	2.50	3 (60%)
7	PG4	B	110	-	12,12,12	0.97	0	11,11,11	2.07	5 (45%)
7	PG4	B	108	-	12,12,12	0.80	0	11,11,11	1.96	5 (45%)
6	GOL	A	316	-	5,5,5	0.72	0	5,5,5	1.01	0
5	EDO	A	304	-	3,3,3	0.38	0	2,2,2	0.47	0
5	EDO	A	313	-	3,3,3	0.66	0	2,2,2	0.36	0
6	GOL	B	104	-	5,5,5	0.42	0	5,5,5	1.70	2 (40%)
5	EDO	A	308	-	3,3,3	0.73	0	2,2,2	0.07	0
7	PG4	B	107	-	12,12,12	1.43	2 (16%)	11,11,11	2.03	5 (45%)
5	EDO	B	101	-	3,3,3	0.43	0	2,2,2	0.48	0
7	PG4	A	320	-	12,12,12	1.23	1 (8%)	11,11,11	1.33	1 (9%)
7	PG4	A	319	-	12,12,12	0.81	0	11,11,11	1.24	1 (9%)
5	EDO	A	310	-	3,3,3	0.79	0	2,2,2	0.30	0
6	GOL	A	317	-	5,5,5	0.75	0	5,5,5	0.85	0
5	EDO	A	303	-	3,3,3	0.68	0	2,2,2	0.66	0
7	PG4	B	109	-	12,12,12	0.71	0	11,11,11	0.85	0
5	EDO	A	309	-	3,3,3	0.72	0	2,2,2	0.23	0
7	PG4	A	322	-	12,12,12	0.88	0	11,11,11	0.77	0
5	EDO	A	305	-	3,3,3	0.56	0	2,2,2	0.38	0

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
5	EDO	A	314	-	-	1/1/1/1	-
7	PG4	B	105	-	-	3/10/10/10	-
5	EDO	A	312	-	-	0/1/1/1	-
5	EDO	B	103	-	-	1/1/1/1	-
5	EDO	A	307	-	-	1/1/1/1	-
7	PG4	A	321	-	-	6/10/10/10	-
5	EDO	A	302	-	-	1/1/1/1	-
5	EDO	A	315	-	-	1/1/1/1	-
5	EDO	A	311	-	-	1/1/1/1	-
7	PG4	A	318	-	-	7/10/10/10	-
7	PG4	B	106	-	-	6/10/10/10	-
5	EDO	A	306	-	-	0/1/1/1	-
5	EDO	B	102	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	GOL	C	101	-	-	2/4/4/4	-
7	PG4	B	110	-	-	8/10/10/10	-
7	PG4	B	108	-	-	8/10/10/10	-
6	GOL	A	316	-	-	1/4/4/4	-
5	EDO	A	304	-	-	1/1/1/1	-
5	EDO	A	313	-	-	0/1/1/1	-
6	GOL	B	104	-	-	2/4/4/4	-
5	EDO	A	308	-	-	0/1/1/1	-
7	PG4	B	107	-	-	7/10/10/10	-
5	EDO	B	101	-	-	0/1/1/1	-
7	PG4	A	320	-	-	5/10/10/10	-
7	PG4	A	319	-	-	6/10/10/10	-
5	EDO	A	310	-	-	0/1/1/1	-
6	GOL	A	317	-	-	2/4/4/4	-
5	EDO	A	303	-	-	0/1/1/1	-
7	PG4	B	109	-	-	7/10/10/10	-
5	EDO	A	309	-	-	1/1/1/1	-
7	PG4	A	322	-	-	5/10/10/10	-
5	EDO	A	305	-	-	1/1/1/1	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	103	EDO	O1-C1	-5.11	1.16	1.42
5	A	312	EDO	O1-C1	-2.99	1.26	1.42
7	A	320	PG4	O2-C2	-2.95	1.29	1.42
7	B	107	PG4	O4-C7	2.24	1.51	1.42
7	B	107	PG4	O5-C8	2.05	1.52	1.42

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	107	PG4	C3-O2-C2	3.61	129.05	113.26
7	B	110	PG4	O3-C4-C3	3.54	126.51	110.35
6	C	101	GOL	O3-C3-C2	-3.52	94.53	110.38
7	A	321	PG4	O2-C2-C1	3.46	125.36	110.11
7	A	320	PG4	O4-C6-C5	3.29	125.36	110.35
7	A	321	PG4	C7-O4-C6	3.14	126.99	113.26
6	C	101	GOL	O2-C2-C3	-3.04	96.59	109.18
6	C	101	GOL	C3-C2-C1	2.98	122.72	111.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	110	PG4	C3-O2-C2	2.85	125.71	113.26
7	B	108	PG4	C5-O3-C4	2.79	125.48	113.26
7	B	107	PG4	O2-C2-C1	-2.78	97.87	110.11
7	B	107	PG4	O3-C4-C3	2.68	122.58	110.35
7	B	108	PG4	O2-C2-C1	2.64	121.77	110.11
5	B	103	EDO	O1-C1-C2	2.64	132.46	112.39
7	A	321	PG4	O1-C1-C2	2.61	127.17	111.82
7	A	319	PG4	C7-O4-C6	2.60	124.64	113.26
7	B	108	PG4	O3-C5-C6	2.54	121.95	110.35
7	B	110	PG4	O3-C5-C6	2.54	121.95	110.35
7	B	110	PG4	O4-C6-C5	2.48	121.64	110.35
7	B	107	PG4	O3-C5-C6	2.45	121.53	110.35
7	A	318	PG4	O2-C3-C4	2.40	121.30	110.35
6	B	104	GOL	O1-C1-C2	2.34	120.90	110.38
6	B	104	GOL	C3-C2-C1	-2.32	103.28	111.80
7	B	108	PG4	C3-O2-C2	-2.25	103.39	113.26
7	B	108	PG4	O4-C6-C5	-2.20	100.31	110.35
7	B	110	PG4	O4-C7-C8	2.13	119.48	110.11
7	B	107	PG4	O5-C8-C7	2.11	124.25	111.82
7	A	318	PG4	C7-O4-C6	2.08	122.36	113.26
7	A	318	PG4	O4-C7-C8	2.02	119.00	110.11

There are no chirality outliers.

All (85) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	104	GOL	C1-C2-C3-O3
6	C	101	GOL	O1-C1-C2-C3
7	A	320	PG4	C4-C3-O2-C2
7	B	107	PG4	C3-C4-O3-C5
7	A	322	PG4	C1-C2-O2-C3
7	B	110	PG4	C4-C3-O2-C2
7	A	319	PG4	C6-C5-O3-C4
7	A	321	PG4	C5-C6-O4-C7
7	A	319	PG4	O3-C5-C6-O4
7	A	320	PG4	O2-C3-C4-O3
7	A	321	PG4	O3-C5-C6-O4
7	A	318	PG4	O2-C3-C4-O3
7	A	322	PG4	O3-C5-C6-O4
7	B	108	PG4	O3-C5-C6-O4
7	B	105	PG4	O2-C3-C4-O3
7	B	110	PG4	O4-C7-C8-O5

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Mol	Chain	Res	Type	Atoms
7	A	321	PG4	O2-C3-C4-O3
7	B	109	PG4	O2-C3-C4-O3
7	B	106	PG4	O1-C1-C2-O2
7	B	107	PG4	O4-C7-C8-O5
7	B	109	PG4	O4-C7-C8-O5
7	B	110	PG4	O1-C1-C2-O2
7	A	320	PG4	O3-C5-C6-O4
7	A	322	PG4	O2-C3-C4-O3
7	B	107	PG4	O3-C5-C6-O4
7	B	107	PG4	O2-C3-C4-O3
6	A	316	GOL	O1-C1-C2-C3
6	A	317	GOL	C1-C2-C3-O3
7	A	319	PG4	O4-C7-C8-O5
7	B	108	PG4	O1-C1-C2-O2
6	B	104	GOL	O2-C2-C3-O3
6	C	101	GOL	O1-C1-C2-O2
7	A	318	PG4	O4-C7-C8-O5
5	A	307	EDO	O1-C1-C2-O2
7	B	106	PG4	O2-C3-C4-O3
7	A	321	PG4	O4-C7-C8-O5
7	B	110	PG4	O3-C5-C6-O4
7	B	108	PG4	C3-C4-O3-C5
7	A	322	PG4	O4-C7-C8-O5
7	A	320	PG4	O1-C1-C2-O2
7	B	110	PG4	O2-C3-C4-O3
5	A	311	EDO	O1-C1-C2-O2
7	B	108	PG4	C4-C3-O2-C2
7	B	108	PG4	O4-C7-C8-O5
7	B	109	PG4	C1-C2-O2-C3
7	B	109	PG4	C8-C7-O4-C6
7	B	108	PG4	C5-C6-O4-C7
7	B	109	PG4	C3-C4-O3-C5
7	B	110	PG4	C8-C7-O4-C6
7	B	107	PG4	O1-C1-C2-O2
5	A	309	EDO	O1-C1-C2-O2
7	A	318	PG4	C4-C3-O2-C2
7	B	108	PG4	C8-C7-O4-C6
7	B	106	PG4	C5-C6-O4-C7
7	B	106	PG4	O3-C5-C6-O4
7	A	318	PG4	O1-C1-C2-O2
7	B	105	PG4	O4-C7-C8-O5
7	A	321	PG4	C4-C3-O2-C2

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Mol	Chain	Res	Type	Atoms
7	A	320	PG4	C5-C6-O4-C7
7	A	319	PG4	O1-C1-C2-O2
7	B	109	PG4	C4-C3-O2-C2
7	B	107	PG4	C4-C3-O2-C2
7	B	107	PG4	C8-C7-O4-C6
7	A	322	PG4	C8-C7-O4-C6
7	B	110	PG4	C1-C2-O2-C3
5	A	314	EDO	O1-C1-C2-O2
5	B	103	EDO	O1-C1-C2-O2
7	A	318	PG4	O3-C5-C6-O4
7	B	105	PG4	C5-C6-O4-C7
6	A	317	GOL	O2-C2-C3-O3
5	A	304	EDO	O1-C1-C2-O2
5	B	102	EDO	O1-C1-C2-O2
7	A	319	PG4	O2-C3-C4-O3
7	B	109	PG4	O1-C1-C2-O2
7	B	110	PG4	C3-C4-O3-C5
5	A	305	EDO	O1-C1-C2-O2
5	A	315	EDO	O1-C1-C2-O2
7	A	321	PG4	C1-C2-O2-C3
7	B	108	PG4	O2-C3-C4-O3
7	A	318	PG4	C5-C6-O4-C7
7	B	106	PG4	C6-C5-O3-C4
7	B	106	PG4	C1-C2-O2-C3
7	A	318	PG4	C6-C5-O3-C4
7	A	319	PG4	C5-C6-O4-C7
5	A	302	EDO	O1-C1-C2-O2

There are no ring outliers.

14 monomers are involved in 70 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	105	PG4	7	0
5	A	311	EDO	1	0
7	A	318	PG4	7	0
7	B	106	PG4	4	0
7	B	110	PG4	17	0
7	B	108	PG4	8	0
6	B	104	GOL	4	0
7	B	107	PG4	7	0
7	A	320	PG4	2	0
7	A	319	PG4	6	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	310	EDO	1	0
7	B	109	PG4	7	0
7	A	322	PG4	5	0
5	A	305	EDO	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, 95th 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 ²)	Q<0.9
1	A	277/277 (100%)	-0.25	4 (1%) 73 77	4, 14, 27, 76	14 (5%)
2	B	100/100 (100%)	0.05	4 (4%) 42 46	10, 20, 39, 53	1 (1%)
3	C	10/10 (100%)	-0.21	0 100 100	11, 16, 22, 22	0
All	All	387/387 (100%)	-0.17	8 (2%) 63 67	4, 15, 33, 76	15 (3%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	0	MET	5.6
2	B	1	ILE	5.3
1	A	276	PRO	5.1
1	A	1	GLY	3.8
2	B	0	MET	3.0
2	B	73	THR	2.3
1	A	230	LEU	2.2
2	B	18	GLY	2.0

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 oligosaccharides 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, 95th 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 ²)	Q<0.9
5	EDO	A	309	4/4	0.71	0.20	30,39,40,41	0
5	EDO	A	314	4/4	0.71	0.21	45,52,53,55	0
7	PG4	A	322	13/13	0.75	0.18	31,41,52,54	0
5	EDO	A	308	4/4	0.77	0.20	49,49,49,51	0
6	GOL	C	101	6/6	0.79	0.19	31,39,41,44	0
7	PG4	B	105	13/13	0.79	0.16	26,46,50,53	0
6	GOL	A	317	6/6	0.80	0.17	38,45,46,53	0
7	PG4	A	321	13/13	0.80	0.18	26,39,60,63	0
7	PG4	A	319	13/13	0.81	0.15	26,38,44,44	0
7	PG4	B	106	13/13	0.81	0.15	24,40,55,57	0
5	EDO	A	310	4/4	0.82	0.14	34,36,37,38	0
5	EDO	A	302	4/4	0.82	0.14	26,27,29,42	0
5	EDO	A	305	4/4	0.82	0.14	27,36,37,39	0
7	PG4	B	107	13/13	0.82	0.16	19,24,37,38	0
7	PG4	A	320	13/13	0.83	0.22	7,16,22,24	13
7	PG4	B	110	13/13	0.83	0.17	19,30,41,42	0
5	EDO	A	311	4/4	0.86	0.12	41,44,49,53	0
6	GOL	A	316	6/6	0.86	0.13	21,37,44,47	0
7	PG4	B	108	13/13	0.86	0.14	17,28,36,38	0
7	PG4	B	109	13/13	0.86	0.15	21,31,37,38	0
5	EDO	A	313	4/4	0.86	0.14	38,44,47,49	0
6	GOL	B	104	6/6	0.87	0.12	31,35,43,46	0
5	EDO	A	307	4/4	0.88	0.12	32,36,36,39	0
7	PG4	A	318	13/13	0.88	0.13	22,31,38,40	0
5	EDO	A	306	4/4	0.89	0.12	25,27,28,30	0
5	EDO	B	102	4/4	0.91	0.11	34,37,38,46	0
5	EDO	A	315	4/4	0.91	0.13	16,20,21,26	0
5	EDO	B	103	4/4	0.93	0.18	9,12,22,34	0
5	EDO	A	304	4/4	0.93	0.10	26,29,30,37	0
5	EDO	B	101	4/4	0.93	0.11	33,35,35,37	0
5	EDO	A	303	4/4	0.93	0.10	21,22,22,22	0
5	EDO	A	312	4/4	0.95	0.16	12,18,30,40	0
4	BR	A	301	1/1	1.00	0.02	10,10,10,10	0

6.5 Other polymers ⓘ

There are no such residues in this entry.