Full wwPDB X-ray Structure Validation Report (i)

Mar 9, 2026 – 06:32 AM UTC

PDB ID	:	5J11 / pdb_00005j11
Title	:	Structure of human TSLP in complex with TSLPR and IL-7Ralpha
Authors	:	Verstraete, K.; Savvides, S.N.
Deposited on	:	2016-03-28
Resolution	:	2.56 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 (i) 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 (1)) were used in the production of this report:

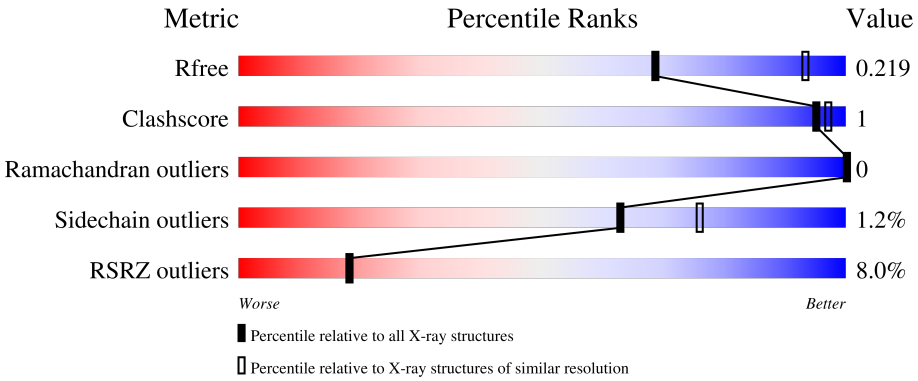
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (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 2.56 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	1853 (2.58-2.54)
Clashscore	190562	1897 (2.58-2.54)
Ramachandran outliers	187476	1875 (2.58-2.54)
Sidechain outliers	187428	1875 (2.58-2.54)
RSRZ outliers	180081	1853 (2.58-2.54)

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 <=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	147	5% 75% · 22%
2	B	240	10% 78% · 18%
3	C	230	3% 77% 5% 17%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 7778 atoms, of which 3745 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 Thymic stromal lymphopoietin.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	114	1698	551	824	147	167	9	0	0	0

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	MET	-	initiating methionine	UNP Q969D9
A	9	GLY	-	expression tag	UNP Q969D9
A	10	SER	-	expression tag	UNP Q969D9
A	11	SER	-	expression tag	UNP Q969D9
A	12	HIS	-	expression tag	UNP Q969D9
A	13	HIS	-	expression tag	UNP Q969D9
A	14	HIS	-	expression tag	UNP Q969D9
A	15	HIS	-	expression tag	UNP Q969D9
A	16	HIS	-	expression tag	UNP Q969D9
A	17	HIS	-	expression tag	UNP Q969D9
A	18	SER	-	expression tag	UNP Q969D9
A	19	SER	-	expression tag	UNP Q969D9
A	20	GLY	-	expression tag	UNP Q969D9
A	21	LEU	-	expression tag	UNP Q969D9
A	22	VAL	-	expression tag	UNP Q969D9
A	23	PRO	-	expression tag	UNP Q969D9
A	24	ARG	-	expression tag	UNP Q969D9
A	25	GLY	-	expression tag	UNP Q969D9
A	26	SER	-	expression tag	UNP Q969D9
A	27	HIS	-	expression tag	UNP Q969D9
A	28	MET	-	expression tag	UNP Q969D9
A	?	-	LYS	deletion	UNP Q969D9
A	?	-	ARG	deletion	UNP Q969D9
A	?	-	ARG	deletion	UNP Q969D9
A	?	-	LYS	deletion	UNP Q969D9
A	?	-	ARG	deletion	UNP Q969D9

- Molecule 2 is a protein called Interleukin-7 receptor subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	196	Total	C	H	N	O	S	0	0	0
			3021	1002	1478	254	279	8			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	initiating methionine	UNP D6RGV2
B	1	GLY	-	expression tag	UNP D6RGV2
B	2	SER	-	expression tag	UNP D6RGV2
B	3	SER	-	expression tag	UNP D6RGV2
B	4	HIS	-	expression tag	UNP D6RGV2
B	5	HIS	-	expression tag	UNP D6RGV2
B	6	HIS	-	expression tag	UNP D6RGV2
B	7	HIS	-	expression tag	UNP D6RGV2
B	8	HIS	-	expression tag	UNP D6RGV2
B	9	HIS	-	expression tag	UNP D6RGV2
B	10	SER	-	expression tag	UNP D6RGV2
B	11	SER	-	expression tag	UNP D6RGV2
B	12	GLY	-	expression tag	UNP D6RGV2
B	13	LEU	-	expression tag	UNP D6RGV2
B	14	VAL	-	expression tag	UNP D6RGV2
B	15	PRO	-	expression tag	UNP D6RGV2
B	16	ARG	-	expression tag	UNP D6RGV2
B	17	GLY	-	expression tag	UNP D6RGV2
B	18	SER	-	expression tag	UNP D6RGV2
B	19	HIS	-	expression tag	UNP D6RGV2
B	20	MET	-	expression tag	UNP D6RGV2
B	237	GLU	-	expression tag	UNP D6RGV2
B	238	MET	-	expression tag	UNP D6RGV2
B	239	ASP	-	expression tag	UNP D6RGV2

- Molecule 3 is a protein called Cytokine receptor-like factor 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	C	190	Total	C	H	N	O	S	0	0	0
			2952	985	1403	257	298	9			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	47	GLN	ASN	conflict	UNP Q9HC73

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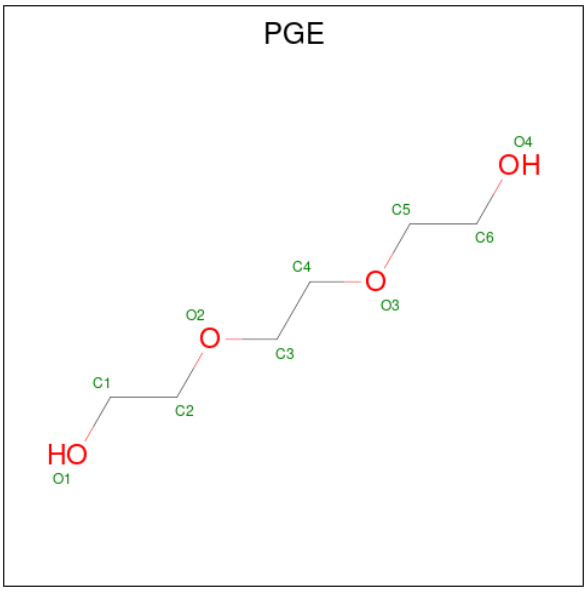
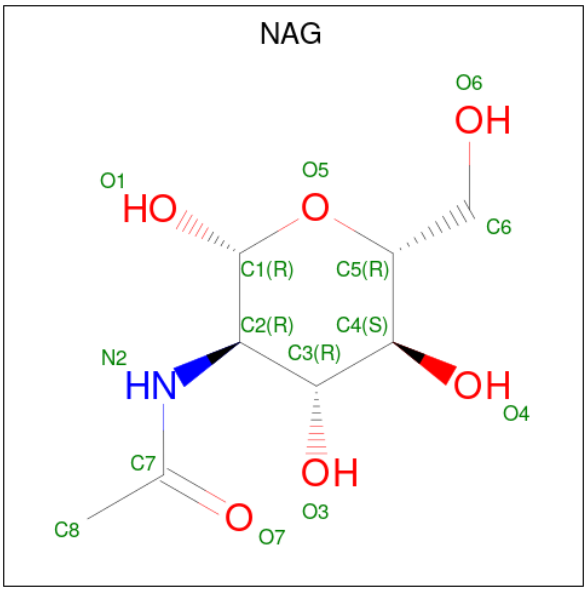
Chain	Residue	Modelled	Actual	Comment	Reference
C	222	GLY	-	expression tag	UNP Q9HC73
C	223	THR	-	expression tag	UNP Q9HC73
C	224	LYS	-	expression tag	UNP Q9HC73
C	225	HIS	-	expression tag	UNP Q9HC73
C	226	HIS	-	expression tag	UNP Q9HC73
C	227	HIS	-	expression tag	UNP Q9HC73
C	228	HIS	-	expression tag	UNP Q9HC73
C	229	HIS	-	expression tag	UNP Q9HC73
C	230	HIS	-	expression tag	UNP Q9HC73

- Molecule 4 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
4	C	1	24	6	14	4	0	0

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	C	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
5	C	1	Total	C	H	N	O	0	0
			27	8	13	1	5		

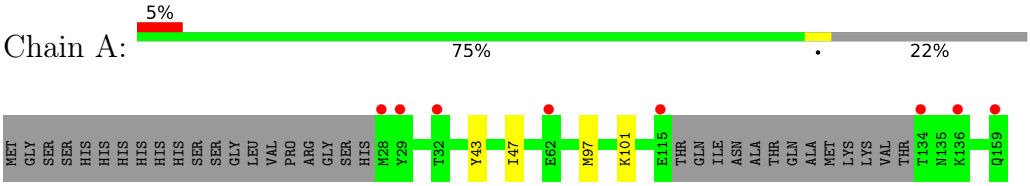
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	8	Total	O	0	0
			8	8		
6	B	5	Total	O	0	0
			5	5		
6	C	16	Total	O	0	0
			16	16		

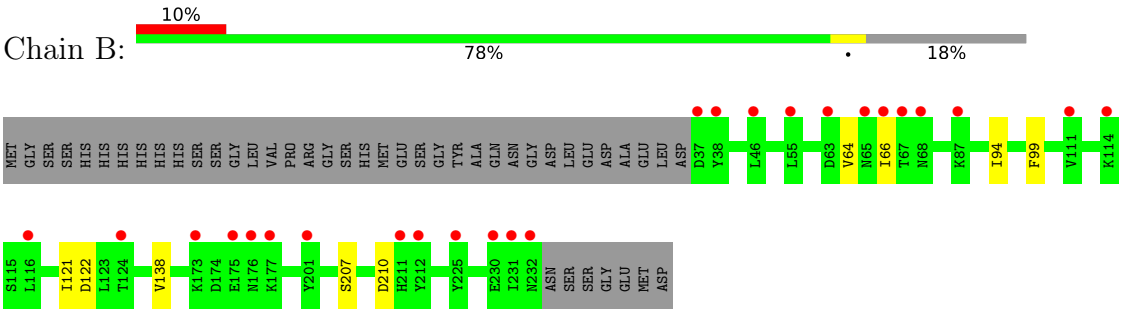
3 Residue-property plots (i)

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.

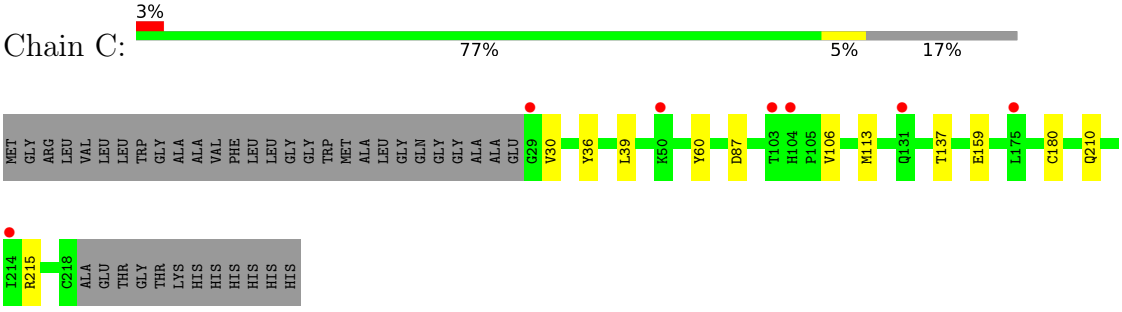
• Molecule 1: Thymic stromal lymphopoietin



• Molecule 2: Interleukin-7 receptor subunit alpha



• Molecule 3: Cytokine receptor-like factor 2



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	135.78Å 66.64Å 91.97Å 90.00° 109.20° 90.00°	Depositor
Resolution (Å)	45.76 – 2.56 45.76 – 2.56	Depositor EDS
% Data completeness (in resolution range)	97.7 (45.76-2.56) 97.9 (45.76-2.56)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.37 (at 2.58Å)	Xtriage
Refinement program	BUSTER 2.10.2	Depositor
R, R_{free}	0.191 , 0.218 0.193 , 0.219	Depositor DCC
R_{free} test set	1238 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å^2)	69.8	Xtriage
Anisotropy	0.338	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 70.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7778	wwPDB-VP
Average B, all atoms (Å^2)	88.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.93% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: PGE, NAG

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	0.88	0/891	1.12	0/1206
2	B	0.84	0/1582	1.02	3/2148 (0.1%)
3	C	0.89	1/1595 (0.1%)	1.13	1/2177 (0.0%)
All	All	0.87	1/4068 (0.0%)	1.09	4/5531 (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
3	C	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	113	MET	SD-CE	-5.22	1.66	1.79

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	87	ASP	CA-CB-CG	6.30	118.90	112.60
2	B	210	ASP	CA-CB-CG	5.54	118.14	112.60
2	B	99	PHE	CA-CB-CG	5.41	119.21	113.80
2	B	122	ASP	CA-CB-CG	5.13	117.73	112.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	60	TYR	Sidechain

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	874	824	824	3	0
2	B	1543	1478	1474	1	0
3	C	1549	1403	1409	5	0
4	C	10	14	14	0	0
5	C	28	26	26	1	0
6	A	8	0	0	0	0
6	B	5	0	0	0	0
6	C	16	0	0	0	0
All	All	4033	3745	3747	9	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 1.

All (9) 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)
3:C:137:THR:HG21	5:C:303:NAG:H82	1.78	0.65
3:C:180:CYS:SG	3:C:215:ARG:NH2	2.83	0.52
3:C:210:GLN:HB3	3:C:215:ARG:HD2	1.92	0.52
1:A:97:MET:HE3	1:A:101:LYS:HE2	1.92	0.51
2:B:64:VAL:O	2:B:66:ILE:HD12	2.14	0.47
1:A:97:MET:HE3	1:A:101:LYS:CE	2.45	0.47
3:C:30:VAL:HG21	3:C:106:VAL:HG12	1.98	0.45
1:A:43:TYR:HA	1:A:47:ILE:HB	2.01	0.43
3:C:36:TYR:CE2	3:C:39:LEU:HD23	2.53	0.43

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	110/147 (75%)	105 (96%)	5 (4%)	0	100	100
2	B	194/240 (81%)	184 (95%)	10 (5%)	0	100	100
3	C	188/230 (82%)	181 (96%)	7 (4%)	0	100	100
All	All	492/617 (80%)	470 (96%)	22 (4%)	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	93/129 (72%)	93 (100%)	0	100	100
2	B	163/219 (74%)	159 (98%)	4 (2%)	42	58
3	C	167/199 (84%)	166 (99%)	1 (1%)	78	85
All	All	423/547 (77%)	418 (99%)	5 (1%)	63	76

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	94	ILE
2	B	121	ILE
2	B	138	VAL
2	B	207	SER
3	C	159	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	71	ASN
1	A	145	GLN
2	B	52	GLN
2	B	144	ASN
2	B	192	GLN
2	B	211	HIS
3	C	210	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

3 ligands are modelled in this entry.

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	NAG	C	302	3	14,14,15	0.35	0	17,19,21	0.79	1 (5%)
5	NAG	C	303	3	14,14,15	0.33	0	17,19,21	1.22	1 (5%)
4	PGE	C	301	-	9,9,9	0.38	0	8,8,8	0.29	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	NAG	C	302	3	-	2/6/23/26	0/1/1/1
5	NAG	C	303	3	-	2/6/23/26	0/1/1/1
4	PGE	C	301	-	-	4/7/7/7	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	C	303	NAG	O5-C1-C2	-4.38	104.52	111.29
5	C	302	NAG	C1-C2-N2	-2.22	106.94	110.43

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	C	303	NAG	O5-C5-C6-O6
5	C	303	NAG	C4-C5-C6-O6
4	C	301	PGE	O3-C5-C6-O4
4	C	301	PGE	O1-C1-C2-O2
5	C	302	NAG	C8-C7-N2-C2
4	C	301	PGE	O2-C3-C4-O3
5	C	302	NAG	O7-C7-N2-C2
4	C	301	PGE	C3-C4-O3-C5

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	303	NAG	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

6.1 Protein, DNA and RNA chains

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^{th} 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	114/147 (77%)	0.38	8 (7%) 22 22	56, 76, 125, 143	0
2	B	196/240 (81%)	0.78	25 (12%) 7 7	68, 96, 151, 170	0
3	C	190/230 (82%)	0.23	7 (3%) 45 46	54, 77, 122, 149	0
All	All	500/617 (81%)	0.48	40 (8%) 18 18	54, 84, 140, 170	0

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	67	THR	5.0
2	B	37	ASP	4.9
1	A	159	GLN	4.3
1	A	28	MET	4.2
2	B	65	ASN	4.0
2	B	212	TYR	3.8
2	B	232	ASN	3.8
2	B	68	ASN	3.5
3	C	103	THR	3.3
2	B	63	ASP	3.2
2	B	111	VAL	3.2
3	C	131	GLN	3.2
2	B	87	LYS	3.2
2	B	176	ASN	3.2
1	A	136	LYS	3.0
2	B	116	LEU	3.0
2	B	46	LEU	2.9
3	C	50	LYS	2.8
2	B	66	ILE	2.8
2	B	231	ILE	2.6
1	A	115	GLU	2.6
2	B	38	TYR	2.5
2	B	175	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
2	B	201	TYR	2.5
3	C	104	HIS	2.5
2	B	230	GLU	2.4
2	B	114	LYS	2.4
3	C	29	GLY	2.4
1	A	32	THR	2.3
3	C	175	LEU	2.3
2	B	177	LYS	2.2
1	A	134	THR	2.2
1	A	29	TYR	2.1
2	B	211	HIS	2.1
2	B	124	THR	2.1
1	A	62	GLU	2.1
2	B	55	LEU	2.1
2	B	225	TYR	2.1
2	B	173	LYS	2.0
3	C	214	ILE	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, 95^{th} 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	NAG	C	303	14/15	0.66	0.14	131,146,154,156	0
4	PGE	C	301	10/10	0.72	0.20	86,96,98,98	0
5	NAG	C	302	14/15	0.88	0.12	98,110,116,120	0

6.5 Other polymers (i)

There are no such residues in this entry.