Full wwPDB X-ray Structure Validation Report (i)

Jan 2, 2024 – 11:01 am GMT

PDB ID	:	5BQE
Title	:	Crystal structure of Norrin in complex with the cysteine-rich domain of Frizzled 4 -Methylated form
Authors	:	Chang, T.-H.; Hsieh, F.-L.; Harlos, K.; Jones, E.Y.
Deposited on	:	2015-05-28
Resolution	:	2.30 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 (i)) were used in the production of this report:

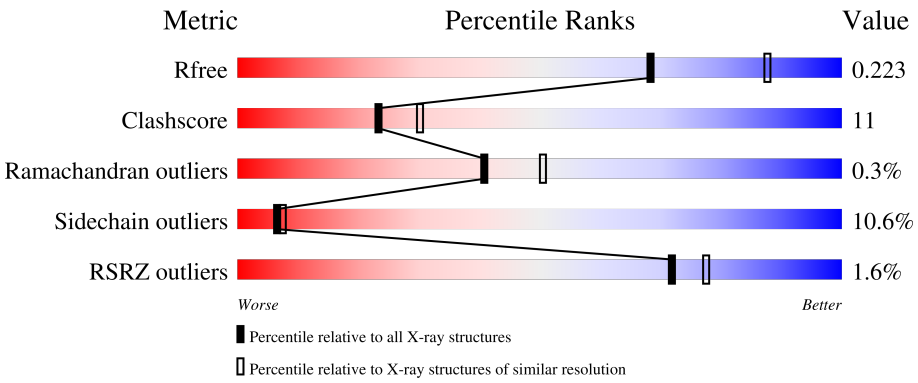
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	122	65% 14% • 17%
2	B	122	2% 66% 16% • 17%
3	C	149	2% 62% 19% • 18%

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	PG0	C	203	-	-	X	-

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 2711 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 Norrin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	101	796	484	155	143	14	0	0	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	22	GLY	-	expression tag	UNP Q00604
A	23	PRO	-	expression tag	UNP Q00604
A	24	GLY	-	expression tag	UNP Q00604
A	134	GLY	-	expression tag	UNP Q00604
A	135	THR	-	expression tag	UNP Q00604
A	136	GLU	-	expression tag	UNP Q00604
A	137	THR	-	expression tag	UNP Q00604
A	138	SER	-	expression tag	UNP Q00604
A	139	GLN	-	expression tag	UNP Q00604
A	140	VAL	-	expression tag	UNP Q00604
A	141	ALA	-	expression tag	UNP Q00604
A	142	PRO	-	expression tag	UNP Q00604
A	143	ALA	-	expression tag	UNP Q00604

- Molecule 2 is a protein called Norrin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	101	804	492	155	143	14	0	0	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	22	GLY	-	expression tag	UNP Q00604
B	23	PRO	-	expression tag	UNP Q00604
B	24	GLY	-	expression tag	UNP Q00604

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Chain	Residue	Modelled	Actual	Comment	Reference
B	134	GLY	-	expression tag	UNP Q00604
B	135	THR	-	expression tag	UNP Q00604
B	136	GLU	-	expression tag	UNP Q00604
B	137	THR	-	expression tag	UNP Q00604
B	138	SER	-	expression tag	UNP Q00604
B	139	GLN	-	expression tag	UNP Q00604
B	140	VAL	-	expression tag	UNP Q00604
B	141	ALA	-	expression tag	UNP Q00604
B	142	PRO	-	expression tag	UNP Q00604
B	143	ALA	-	expression tag	UNP Q00604

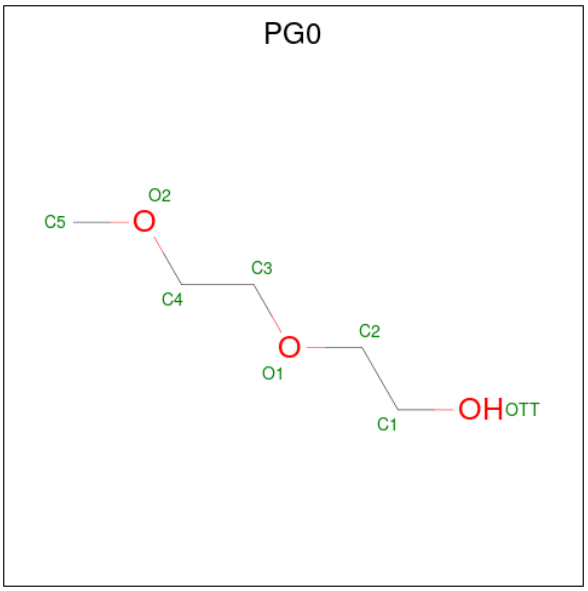
- Molecule 3 is a protein called Frizzled-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	122	957	604	163	174	16	0	0	0

There are 11 discrepancies between the modelled and reference sequences:

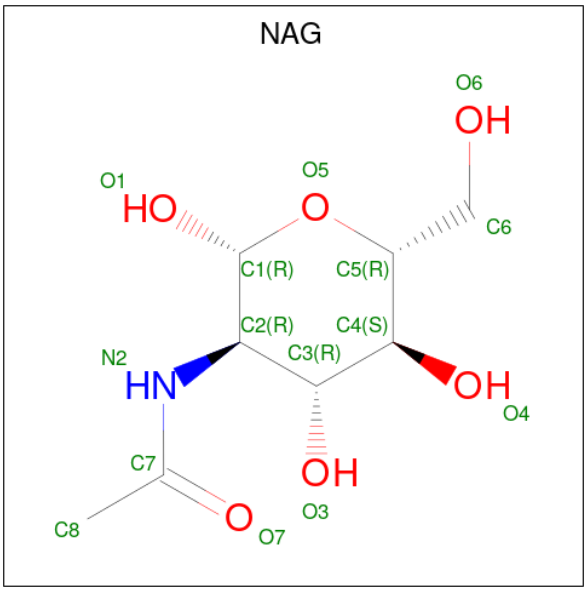
Chain	Residue	Modelled	Actual	Comment	Reference
C	39	ASP	-	expression tag	UNP Q9ULV1
C	40	THR	-	expression tag	UNP Q9ULV1
C	41	GLY	-	expression tag	UNP Q9ULV1
C	180	GLY	-	expression tag	UNP Q9ULV1
C	181	THR	-	expression tag	UNP Q9ULV1
C	182	LEU	-	expression tag	UNP Q9ULV1
C	183	GLU	-	expression tag	UNP Q9ULV1
C	184	VAL	-	expression tag	UNP Q9ULV1
C	185	LEU	-	expression tag	UNP Q9ULV1
C	186	PHE	-	expression tag	UNP Q9ULV1
C	187	GLN	-	expression tag	UNP Q9ULV1

- Molecule 4 is 2-(2-METHOXYETHOXY)ETHANOL (three-letter code: PG0) (formula: $C_5H_{12}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
4	B	1	8	5	3	0	0
			Total	C	O		
4	B	1	8	5	3	0	0
			Total	C	O		
4	C	1	8	5	3	0	0

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	C	1	14	8	1	5	0	0

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
6	C	1	1	1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	32	32	32	0	0
			Total	O		
7	B	45	45	45	0	0
			Total	O		
7	C	38	38	38	0	0

3 Residue-property plots (i)

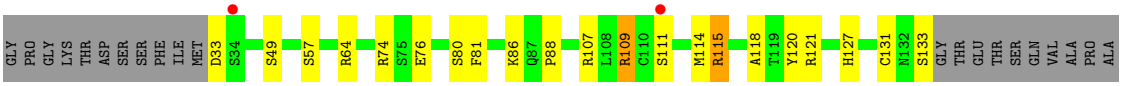
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Norrin

Chain A:

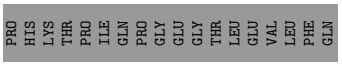
- Molecule 2: Norrin

Chain B:



- Molecule 3: Frizzled-4

Chain C:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 2 2	Depositor
Cell constants a, b, c, α, β, γ	98.92Å 98.92Å 120.42Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.46 – 2.30 49.46 – 2.30	Depositor EDS
% Data completeness (in resolution range)	98.5 (49.46-2.30) 98.5 (49.46-2.30)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.43 (at 2.29Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.197 , 0.221 0.216 , 0.223	Depositor DCC
R_{free} test set	1328 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å^2)	48.5	Xtriage
Anisotropy	0.047	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 46.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	2711	wwPDB-VP
Average B, all atoms (Å^2)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.67% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: CL, NAG, PG0, MLY

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	0.76	1/812 (0.1%)	0.63	1/1089 (0.1%)
2	B	0.69	0/776	0.55	0/1045
3	C	0.91	1/959 (0.1%)	0.67	5/1301 (0.4%)
All	All	0.80	2/2547 (0.1%)	0.62	6/3435 (0.2%)

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
2	B	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	88	PRO	N-CD	5.07	1.54	1.47
3	C	150	PRO	N-CD	5.03	1.54	1.47

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	90	CYS	N-CA-CB	-5.80	100.16	110.60
3	C	149	PRO	C-N-CD	5.69	140.34	128.40
3	C	148	PHE	C-N-CD	5.54	140.04	128.40
1	A	87	GLN	C-N-CD	5.54	140.04	128.40
3	C	139	TRP	C-N-CD	5.47	139.89	128.40
3	C	161	GLY	C-N-CD	5.42	139.78	128.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	111	SER	Peptide

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	796	0	780	27	0
2	B	804	0	788	15	0
3	C	957	0	927	19	0
4	B	16	0	24	4	0
4	C	8	0	12	11	0
5	C	14	0	13	0	0
6	C	1	0	0	0	0
7	A	32	0	0	0	0
7	B	45	0	0	0	0
7	C	38	0	0	2	0
All	All	2711	0	2544	58	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 11.

All (58) 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:109:ARG:HH21	2:B:115:ARG:HD3	1.08	1.14
2:B:115:ARG:HH21	2:B:115:ARG:HG3	1.27	0.98
1:A:56:SER:OG	1:A:109:ARG:O	1.88	0.91
3:C:163:GLY:HA2	4:C:203:PG0:H12	1.58	0.83
2:B:109:ARG:HH21	2:B:115:ARG:CD	1.91	0.83
1:A:52:LEU:CD2	1:A:53:TYR:CD1	2.64	0.79
3:C:161:GLY:H	4:C:203:PG0:H32	1.48	0.79
1:A:84:VAL:HG22	1:A:85:LEU:H	1.48	0.78
2:B:109:ARG:NH2	2:B:115:ARG:HD3	1.94	0.76
3:C:77:LEU:O	3:C:80:THR:OG1	2.05	0.74
1:A:84:VAL:HG13	1:A:85:LEU:N	2.04	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:81:PHE:CE1	2:B:118:ALA:HB2	2.25	0.71
2:B:115:ARG:HG3	2:B:115:ARG:NH2	2.00	0.71
1:A:52:LEU:HD23	1:A:53:TYR:HD1	1.53	0.69
1:A:52:LEU:HD23	1:A:53:TYR:CD1	2.28	0.65
1:A:52:LEU:HD22	1:A:53:TYR:CD1	2.31	0.64
1:A:84:VAL:HG22	1:A:85:LEU:N	2.11	0.64
1:A:52:LEU:CD2	1:A:53:TYR:HD1	2.06	0.63
3:C:44:ARG:NH1	7:C:303:HOH:O	2.24	0.63
1:A:88:PRO:HB2	2:B:121:ARG:HG3	1.81	0.63
1:A:84:VAL:HG13	1:A:85:LEU:H	1.63	0.61
1:A:109:ARG:CG	1:A:109:ARG:HH21	2.13	0.61
2:B:80:SER:OG	4:B:202:PG0:H52	2.00	0.61
3:C:163:GLY:HA2	4:C:203:PG0:C1	2.32	0.59
3:C:120:MET:CA	4:C:203:PG0:H31	2.33	0.59
1:A:52:LEU:HD22	1:A:53:TYR:CE1	2.39	0.58
1:A:88:PRO:HG2	1:A:89:PHE:CD2	2.39	0.57
1:A:52:LEU:HD23	1:A:53:TYR:N	2.21	0.55
2:B:33:ASP:N	2:B:33:ASP:OD1	2.41	0.53
3:C:119:GLY:HA3	4:C:203:PG0:H52	1.90	0.53
2:B:88:PRO:HG3	4:B:202:PG0:H11	1.90	0.53
3:C:61:THR:OG1	3:C:62:MLY:N	2.43	0.52
3:C:161:GLY:N	4:C:203:PG0:H32	2.22	0.52
3:C:123:SER:HB2	4:C:203:PG0:H22	1.93	0.51
3:C:160:GLU:HG2	4:C:203:PG0:C5	2.41	0.50
3:C:129:GLU:HB3	3:C:130:PRO:HD3	1.94	0.48
2:B:86:MLY:O	4:B:202:PG0:H53	2.13	0.48
2:B:80:SER:HB2	4:B:202:PG0:H42	1.96	0.47
3:C:120:MET:HA	4:C:203:PG0:H31	1.97	0.46
1:A:71:GLN:NE2	1:A:94:HIS:CD2	2.84	0.46
1:A:85:LEU:HD11	2:B:120:TYR:HA	1.98	0.46
1:A:109:ARG:CG	1:A:109:ARG:NH2	2.73	0.45
3:C:116:PRO:HB3	3:C:120:MET:CE	2.46	0.45
2:B:115:ARG:NH2	2:B:115:ARG:CG	2.73	0.44
4:C:203:PG0:H42	4:C:203:PG0:H21	1.74	0.44
3:C:102:TYR:OH	7:C:302:HOH:O	2.20	0.44
3:C:110:ILE:HG12	3:C:111:ASN:N	2.32	0.44
1:A:109:ARG:NH2	1:A:109:ARG:HG2	2.33	0.43
1:A:118:ALA:HB2	2:B:81:PHE:CE1	2.53	0.43
1:A:84:VAL:HG13	1:A:85:LEU:O	2.18	0.43
3:C:129:GLU:N	3:C:130:PRO:CD	2.83	0.42
1:A:52:LEU:C	1:A:53:TYR:O	2.57	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:83:THR:C	1:A:84:VAL:HG12	2.40	0.42
1:A:83:THR:O	1:A:84:VAL:HG12	2.19	0.41
3:C:116:PRO:HB3	3:C:120:MET:HE2	2.03	0.41
1:A:106:LEU:CD2	1:A:118:ALA:HB3	2.50	0.41
3:C:120:MET:N	4:C:203:PG0:H31	2.36	0.41
1:A:52:LEU:CD2	1:A:53:TYR:CE1	3.00	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	99/122 (81%)	93 (94%)	5 (5%)	1 (1%)	15	17
2	B	95/122 (78%)	94 (99%)	1 (1%)	0	100	100
3	C	118/149 (79%)	116 (98%)	2 (2%)	0	100	100
All	All	312/393 (79%)	303 (97%)	8 (3%)	1 (0%)	41	50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	84	VAL

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	94/110 (86%)	84 (89%)	10 (11%)	6 7
2	B	90/106 (85%)	78 (87%)	12 (13%)	4 4
3	C	109/133 (82%)	100 (92%)	9 (8%)	11 14
All	All	293/349 (84%)	262 (89%)	31 (11%)	6 7

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	47	SER
1	A	54	LYS
1	A	56	SER
1	A	59	MET
1	A	86	LYS
1	A	106	LEU
1	A	109	ARG
1	A	114	MET
1	A	127	HIS
1	A	132	ASN
2	B	49	SER
2	B	57	SER
2	B	64	ARG
2	B	74	ARG
2	B	76	GLU
2	B	107	ARG
2	B	109	ARG
2	B	114	MET
2	B	115	ARG
2	B	127	HIS
2	B	131	CYS
2	B	133	SER
3	C	43	ARG
3	C	44	ARG
3	C	67	VAL
3	C	73	THR
3	C	83	THR
3	C	103	VAL
3	C	126	ARG
3	C	147	LYS
3	C	151	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	94	HIS
2	B	50	HIS
3	C	156	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)

6 non-standard protein/DNA/RNA residues 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	$\#\|Z\| > 2$
2	MLY	B	58	2	9,10,11	0.51	0	6,11,13	0.86	0
2	MLY	B	102	2	9,10,11	0.57	0	6,11,13	0.84	0
2	MLY	B	86	2	9,10,11	0.50	0	6,11,13	0.80	0
2	MLY	B	104	2	9,10,11	0.55	0	6,11,13	0.83	0
3	MLY	C	125	3	9,10,11	0.55	0	6,11,13	0.67	0
3	MLY	C	62	3	9,10,11	0.58	0	6,11,13	0.81	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
2	MLY	B	58	2	-	3/8/9/11	-
2	MLY	B	102	2	-	4/8/9/11	-
2	MLY	B	86	2	-	3/8/9/11	-
2	MLY	B	104	2	-	0/8/9/11	-
3	MLY	C	125	3	-	0/8/9/11	-
3	MLY	C	62	3	-	4/8/9/11	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	86	MLY	C-CA-CB-CG
2	B	102	MLY	N-CA-CB-CG
2	B	102	MLY	C-CA-CB-CG
2	B	86	MLY	CD-CE-NZ-CH1
3	C	62	MLY	CD-CE-NZ-CH1
3	C	62	MLY	CD-CE-NZ-CH2
3	C	62	MLY	CA-CB-CG-CD
2	B	58	MLY	CA-CB-CG-CD
2	B	102	MLY	CE-CD-CG-CB
2	B	58	MLY	CE-CD-CG-CB
3	C	62	MLY	CG-CD-CE-NZ
2	B	102	MLY	CG-CD-CE-NZ
2	B	86	MLY	CD-CE-NZ-CH2
2	B	58	MLY	CD-CE-NZ-CH2

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	86	MLY	1	0
3	C	62	MLY	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 5 ligands modelled in this entry, 1 is 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	$\#\|Z\| > 2$
4	PG0	B	201	-	7,7,7	0.27	0	6,6,6	0.47	0
4	PG0	C	203	-	7,7,7	0.27	0	6,6,6	0.39	0
4	PG0	B	202	-	7,7,7	0.24	0	6,6,6	0.31	0
5	NAG	C	201	3	14,14,15	0.96	1 (7%)	17,19,21	1.78	4 (23%)

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
4	PG0	B	201	-	-	2/5/5/5	-
4	PG0	C	203	-	-	4/5/5/5	-
4	PG0	B	202	-	-	3/5/5/5	-
5	NAG	C	201	3	-	3/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	201	NAG	O5-C1	-2.15	1.40	1.43

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	C	201	NAG	O5-C1-C2	-3.76	105.36	111.29
5	C	201	NAG	O5-C5-C6	-3.39	101.88	107.20
5	C	201	NAG	C1-C2-N2	-2.23	106.68	110.49
5	C	201	NAG	O3-C3-C4	-2.16	105.36	110.35

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	C	201	NAG	O5-C5-C6-O6
5	C	201	NAG	C4-C5-C6-O6
4	B	202	PG0	OTT-C1-C2-O1
4	C	203	PG0	OTT-C1-C2-O1

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Mol	Chain	Res	Type	Atoms
4	B	202	PG0	O1-C3-C4-O2
4	B	201	PG0	O1-C3-C4-O2
4	C	203	PG0	C4-C3-O1-C2
4	B	201	PG0	C3-C4-O2-C5
4	B	202	PG0	C1-C2-O1-C3
4	C	203	PG0	C1-C2-O1-C3
4	C	203	PG0	O1-C3-C4-O2
5	C	201	NAG	C1-C2-N2-C7

There are no ring outliers.

2 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	203	PG0	11	0
4	B	202	PG0	4	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	101/122 (82%)	-0.02	0	100	100	38, 58, 116, 142	0
2	B	97/122 (79%)	0.16	2 (2%)	63	70	36, 53, 117, 152	0
3	C	120/149 (80%)	0.02	3 (2%)	57	64	35, 53, 105, 159	0
All	All	318/393 (80%)	0.05	5 (1%)	72	77	35, 54, 117, 159	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	43	ARG	4.4
2	B	111	SER	3.4
3	C	44	ARG	3.3
3	C	154	HIS	2.6
2	B	34	SER	2.5

6.2 Non-standard residues in protein, DNA, RNA chains (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
2	MLY	B	102	11/12	0.87	0.17	59,63,70,71	0
2	MLY	B	104	11/12	0.93	0.14	39,51,58,64	0
2	MLY	B	58	11/12	0.94	0.17	45,59,74,76	0
2	MLY	B	86	11/12	0.96	0.13	39,46,67,68	0
3	MLY	C	62	11/12	0.96	0.16	49,61,94,95	0
3	MLY	C	125	11/12	0.97	0.11	36,39,64,68	0

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, 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
4	PG0	C	203	8/8	0.69	0.30	56,63,72,73	0
6	CL	C	202	1/1	0.76	0.09	93,93,93,93	0
4	PG0	B	201	8/8	0.79	0.17	53,54,56,57	8
5	NAG	C	201	14/15	0.87	0.24	81,87,96,96	0
4	PG0	B	202	8/8	0.87	0.20	49,62,65,66	0

6.5 Other polymers (i)

There are no such residues in this entry.