



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 05:21 AM GMT

PDB ID : 2QEJ
Title : Crystal structure of a Staphylococcus aureus protein (SSL7) in complex with Fc of human IgA1
Authors : Ramsland, P.A.; Willoughby, N.; Trist, H.M.; Farrugia, W.; Hogarth, P.M.; Fraser, J.D.; Wines, B.D.
Deposited on : 2007-06-26
Resolution : 3.20 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
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

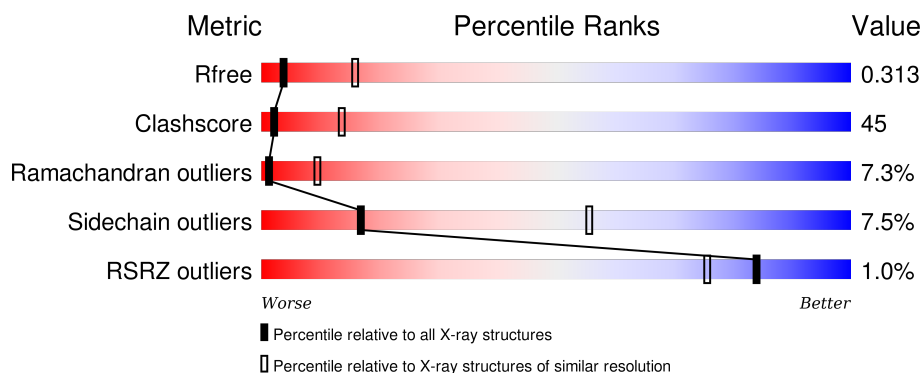
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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}	91344	1124 (3.24-3.16)
Clashscore	102246	1024 (3.22-3.18)
Ramachandran outliers	100387	1004 (3.22-3.18)
Sidechain outliers	100360	1003 (3.22-3.18)
RSRZ outliers	91569	1129 (3.24-3.16)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	216	<div> <div>2%</div> <div>38% 48% 10% ..</div> </div>
1	B	216	<div> <div>%</div> <div>38% 50% 8% ..</div> </div>
2	C	201	<div> <div>35% 50% 9% 5%</div> </div>
2	D	201	<div> <div>34% 56% 5% .</div> </div>

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	GOL	B	600	-	X	-	X
5	GOL	B	601	-	X	-	-
5	GOL	B	604	-	X	-	X
5	GOL	D	602	-	X	-	X
5	GOL	D	603	-	X	-	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 6418 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 IG ALPHA-1 C REGION.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	211	Total	C	N	O	S	0	0	0
			1613	1015	278	311	9			
1	B	209	Total	C	N	O	S	0	0	0
			1598	1007	276	306	9			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	240	GLU	-	EXPRESSION TAG	UNP P01876
A	241	SER	-	EXPRESSION TAG	UNP P01876
B	240	GLU	-	EXPRESSION TAG	UNP P01876
B	241	SER	-	EXPRESSION TAG	UNP P01876

- Molecule 2 is a protein called SUPERANTIGEN-LIKE MOLECULE 7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	191	Total	C	N	O	S	0	0	0
			1534	966	264	303	1			
2	D	192	Total	C	N	O	S	0	0	0
			1542	972	265	304	1			

- Molecule 3 is a polymer of unknown type called SUGAR (2-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	E	2	Total	C	N	O	0	0
			28	16	2	10		
3	E	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	1	Total	Ca	0	0
			1	1		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	14	Total	O	0	0
			14	14		
6	B	11	Total	O	0	0
			11	11		
6	C	9	Total	O	0	0
			9	9		
6	D	9	Total	O	0	0
			9	9		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	E	1	Total	O	0	0
			1	1		

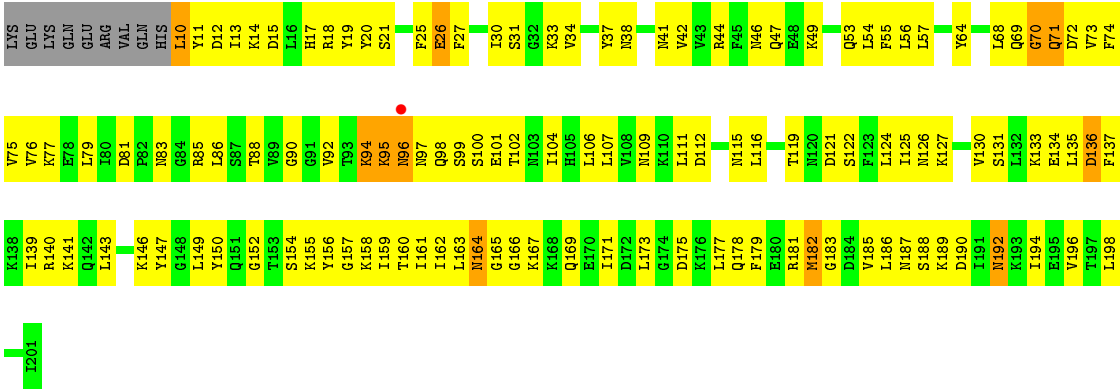
● Molecule 2: SUPERANTIGEN-LIKE MOLECULE 7

Chain D:

34%

56%

5%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	71.31Å 109.26Å 170.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.82 – 3.20 30.82 – 3.17	Depositor EDS
% Data completeness (in resolution range)	92.6 (30.82-3.20) 91.4 (30.82-3.17)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.93 (at 3.18Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.229 , 0.312 0.231 , 0.313	Depositor DCC
R_{free} test set	2081 reflections (9.89%)	DCC
Wilson B-factor (Å ²)	43.3	Xtriage
Anisotropy	0.124	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 44.9	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 22610 reflections	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	6418	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.89% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: GOL, CA, 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	0.43	0/1654	0.73	1/2258 (0.0%)
1	B	0.39	0/1639	0.68	0/2238
2	C	0.42	0/1553	0.69	1/2078 (0.0%)
2	D	0.39	0/1561	0.65	0/2089
All	All	0.41	0/6407	0.69	2/8663 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	186	LEU	CA-CB-CG	5.81	128.66	115.30
1	A	342	GLY	N-CA-C	-5.07	100.43	113.10

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	1613	0	1585	163	0
1	B	1598	0	1573	153	0
2	C	1534	0	1544	127	0
2	D	1542	0	1555	130	0
3	E	56	0	50	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	C	1	0	0	0	0
5	B	18	0	12	1	0
5	D	12	0	8	2	0
6	A	14	0	0	3	0
6	B	11	0	0	0	0
6	C	9	0	0	0	0
6	D	9	0	0	1	0
6	E	1	0	0	0	0
All	All	6418	0	6327	567	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 45.

The worst 5 of 567 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:B:295:GLU:HA	1:B:302:TYR:HB3	1.24	1.12
1:A:345:PHE:H	1:A:375:SER:HB2	1.14	1.11
1:B:353:PRO:HG3	1:B:448:ILE:HD11	1.38	1.04
1:A:277:VAL:HG11	1:A:328:PRO:HD3	1.41	0.99
1:B:290:VAL:HG12	1:B:291:GLN:H	1.27	0.99

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	209/216 (97%)	170 (81%)	25 (12%)	14 (7%)	1	12
1	B	207/216 (96%)	155 (75%)	30 (14%)	22 (11%)	0	3
2	C	189/201 (94%)	138 (73%)	42 (22%)	9 (5%)	3	22

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	D	190/201 (94%)	144 (76%)	33 (17%)	13 (7%)	1	11
All	All	795/834 (95%)	607 (76%)	130 (16%)	58 (7%)	1	9

5 of 58 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	274	ALA
1	A	295	GLU
1	A	310	GLY
1	A	375	SER
1	B	273	ASP

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	181/184 (98%)	163 (90%)	18 (10%)	10	38
1	B	179/184 (97%)	170 (95%)	9 (5%)	30	71
2	C	172/182 (94%)	158 (92%)	14 (8%)	15	51
2	D	173/182 (95%)	161 (93%)	12 (7%)	19	59
All	All	705/732 (96%)	652 (92%)	53 (8%)	17	55

5 of 53 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	392	ARG
2	C	37	TYR
2	D	119	THR
1	B	403	GLU
1	B	444	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
2	C	169	GLN
2	C	200	GLN
2	D	169	GLN
2	C	187	ASN
2	D	29	ASN

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 ⓘ

4 carbohydrates 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	$\# Z > 2$
3	NAG	E	5001	1,3	14,14,15	0.59	0	15,19,21	0.72	1 (6%)
3	NAG	E	5002	3	14,14,15	0.53	0	15,19,21	0.96	1 (6%)
3	NAG	E	5003	1,3	14,14,15	0.58	0	15,19,21	0.94	1 (6%)
3	NAG	E	5004	3	14,14,15	0.57	0	15,19,21	0.63	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
3	NAG	E	5001	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	5002	3	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	E	5003	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	5004	3	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	5002	NAG	C2-N2-C7	-2.84	119.39	123.04
3	E	5003	NAG	C2-N2-C7	-2.20	120.21	123.04
3	E	5001	NAG	C2-N2-C7	-2.11	120.32	123.04

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	5001	NAG	2	0
3	E	5003	NAG	3	0
3	E	5004	NAG	2	0

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 1 is monoatomic - leaving 5 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	GOL	B	600	-	5,5,5	4.61	5 (100%)	5,5,5	4.29	3 (60%)
5	GOL	B	601	-	5,5,5	4.58	5 (100%)	5,5,5	4.28	3 (60%)
5	GOL	B	604	-	5,5,5	4.70	5 (100%)	5,5,5	4.29	3 (60%)
5	GOL	D	602	-	5,5,5	4.70	5 (100%)	5,5,5	4.29	3 (60%)
5	GOL	D	603	-	5,5,5	4.68	5 (100%)	5,5,5	4.27	3 (60%)

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	GOL	B	600	-	-	0/4/4/4	0/0/0/0
5	GOL	B	601	-	-	0/4/4/4	0/0/0/0
5	GOL	B	604	-	-	0/4/4/4	0/0/0/0
5	GOL	D	602	-	-	0/4/4/4	0/0/0/0
5	GOL	D	603	-	-	0/4/4/4	0/0/0/0

The worst 5 of 25 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	602	GOL	C3-C2	-7.85	1.22	1.52
5	B	604	GOL	C3-C2	-7.80	1.22	1.52
5	D	603	GOL	C3-C2	-7.78	1.22	1.52
5	B	600	GOL	C3-C2	-7.57	1.23	1.52
5	B	601	GOL	C3-C2	-7.52	1.23	1.52

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	601	GOL	O1-C1-C2	2.50	122.33	110.18
5	B	600	GOL	O1-C1-C2	2.63	122.94	110.18
5	D	603	GOL	O1-C1-C2	2.69	123.21	110.18
5	B	604	GOL	O1-C1-C2	2.71	123.31	110.18
5	D	602	GOL	O1-C1-C2	2.72	123.36	110.18

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	601	GOL	1	0
5	D	602	GOL	1	0
5	D	603	GOL	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	211/216 (97%)	-0.43	4 (1%) 70 55	1, 24, 83, 99	0
1	B	209/216 (96%)	-0.14	3 (1%) 78 65	1, 44, 98, 99	0
2	C	191/201 (95%)	-0.58	0 100 100	1, 20, 64, 99	0
2	D	192/201 (95%)	-0.47	1 (0%) 91 87	1, 27, 72, 89	0
All	All	803/834 (96%)	-0.40	8 (0%) 84 75	1, 26, 86, 99	0

The worst 5 of 8 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	275	SER	4.3
1	A	276	GLY	3.2
1	B	270	GLY	3.2
1	B	300	GLY	3.0
1	A	271	LEU	3.0

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](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
3	NAG	E	5001	14/15	0.92	0.13	-0.82	44,44,75,76	0
3	NAG	E	5002	14/15	0.86	0.26	-	57,97,97,97	0
3	NAG	E	5004	14/15	0.69	0.40	-	77,99,99,99	0
3	NAG	E	5003	14/15	0.77	0.30	-	73,73,98,98	0

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
5	GOL	D	602	6/6	0.81	0.36	6.93	43,46,47,51	0
5	GOL	B	600	6/6	0.73	0.44	3.64	43,46,47,51	0
5	GOL	B	604	6/6	0.83	0.31	2.68	34,37,38,43	0
4	CA	C	554	1/1	0.82	0.13	-	30,30,30,30	0
5	GOL	D	603	6/6	0.84	0.28	-	43,46,47,51	0
5	GOL	B	601	6/6	0.79	0.31	-	43,46,47,51	0

6.5 Other polymers [i](#)

There are no such residues in this entry.