



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 6, 2020 – 06:01 PM BST

PDB ID : 1E6N  
Title : Chitinase B from *Serratia marcescens* inactive mutant E144Q in complex with N-acetylglucosamine-pentamer  
Authors : Komander, D.; Synstad, B.; Eijsink, V.G.H.; Van Aalten, D.M.F.  
Deposited on : 2000-08-21  
Resolution : 2.25 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
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) : 2.13.1

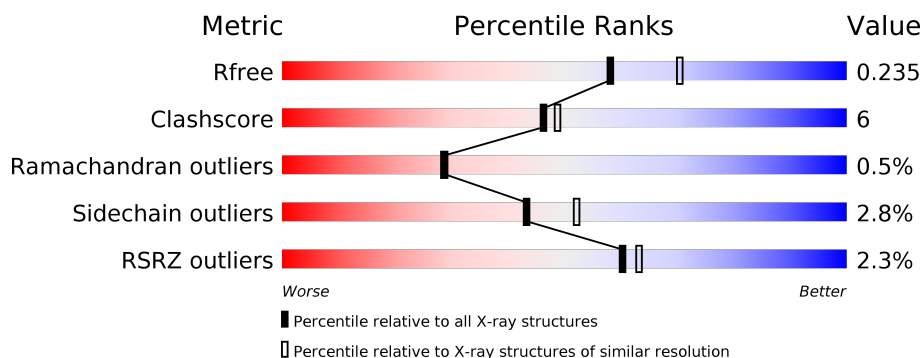
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.25 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	499	<div> <div>2%</div> <div> <div></div> <div>85%</div> <div>14%</div> <div>..</div> </div> </div>
1	B	499	<div> <div>2%</div> <div> <div></div> <div>85%</div> <div>14%</div> <div>.</div> </div> </div>
2	C	5	<div> <div>60%</div> <div>40%</div> </div>
2	D	5	<div> <div>40%</div> <div>40%</div> <div>20%</div> </div>

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 8440 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 CHITINASE B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	496	Total	C	N	O	S	0	1	0
			3899	2492	662	731	14			
1	B	497	Total	C	N	O	S	1	0	0
			3892	2490	657	731	14			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	144	GLN	GLU	conflict	UNP Q54276
B	144	GLN	GLU	conflict	UNP Q54276

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	5	Total	C	N	O	0	0	0
			71	40	5	26			
2	D	5	Total	C	N	O	0	0	0
			71	40	5	26			

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

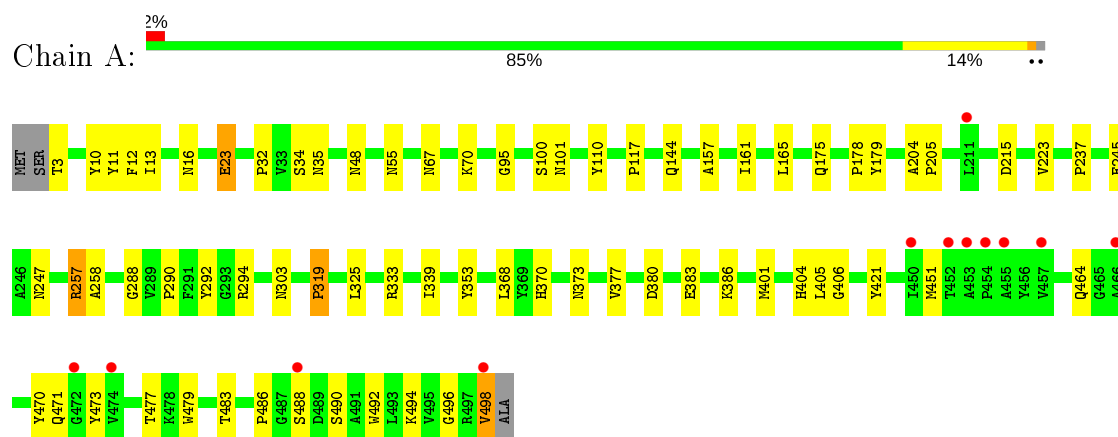
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	236	Total	O	0	0
			236	236		
5	B	205	Total	O	0	0
			205	205		

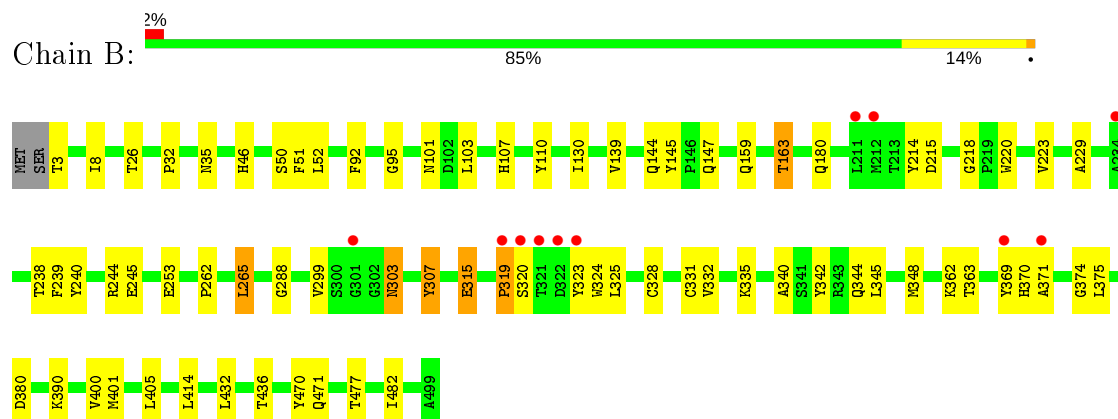
### 3 Residue-property plots

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: CHITINASE B



#### • Molecule 1: CHITINASE B



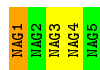
#### • Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



#### • Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

opyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D: 40% 40% 20%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	55.73Å 104.48Å 186.68Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.58 – 2.25 38.58 – 2.24	Depositor EDS
% Data completeness (in resolution range)	90.6 (38.58-2.25) 89.9 (38.58-2.24)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.81 (at 2.24Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.189 , 0.239 0.183 , 0.235	Depositor DCC
$R_{free}$ test set	986 reflections (2.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	24.6	Xtriage
Anisotropy	0.657	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 42.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	8440	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.24% of the height of the origin peak. No significant pseudotranslation is detected.*

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

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, NAG, SO4

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	0.50	0/4013	0.69	1/5468 (0.0%)
1	B	0.49	0/4003	0.67	0/5457
All	All	0.49	0/8016	0.68	1/10925 (0.0%)

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

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	100	SER	N-CA-C	5.62	126.18	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	292	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	3899	0	3736	50	0
1	B	3892	0	3717	52	0
2	C	71	0	63	0	0
2	D	71	0	63	1	0
3	A	40	0	0	3	0
3	B	20	0	0	0	0
4	B	6	0	8	0	0
5	A	236	0	0	4	0
5	B	205	0	0	1	0
All	All	8440	0	7587	98	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 6.

All (98) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:67:ASN:ND2	1:A:70:LYS:HG3	1.80	0.95
1:B:344:GLN:HG3	1:B:348:MET:HE3	1.59	0.84
1:A:11:TYR:CE2	1:A:13:ILE:HD11	2.17	0.79
1:A:383:GLU:HG2	5:A:2172:HOH:O	1.84	0.77
1:B:159:GLN:O	1:B:163:THR:HG22	1.86	0.76
1:B:328:CYS:HB2	1:B:348:MET:HE1	1.68	0.75
1:B:344:GLN:HG3	1:B:348:MET:CE	2.18	0.74
1:A:32:PRO:HD2	1:A:35:ASN:ND2	2.02	0.74
1:A:67:ASN:HD22	1:A:70:LYS:HG3	1.52	0.73
1:A:370:HIS:HD2	1:A:373:ASN:H	1.35	0.72
1:A:470:TYR:CD2	1:A:471:GLN:HG2	2.25	0.71
1:A:23:GLU:OE1	1:A:34:SER:HB3	1.92	0.70
1:A:498:VAL:HG12	1:A:498:VAL:OXT	1.94	0.66
1:B:315:GLU:HB2	1:B:319:PRO:HD3	1.81	0.63
1:B:223:VAL:HG13	1:B:307:TYR:HA	1.81	0.62
1:B:32:PRO:HD2	1:B:35:ASN:HD21	1.63	0.62
1:B:144:GLN:HA	1:B:145:TYR:CG	2.41	0.56
1:B:325:LEU:HD23	1:B:331:CYS:SG	2.45	0.56
1:B:218:GLY:HA3	1:B:220:TRP:CZ2	2.40	0.56
1:B:331:CYS:O	1:B:335:LYS:N	2.37	0.56
1:A:288:GLY:HA2	1:A:401:MET:O	2.05	0.55
1:B:92:PHE:CE1	1:B:139:VAL:HG22	2.41	0.55
1:B:223:VAL:CG1	1:B:307:TYR:HA	2.36	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:342:TYR:CG	1:B:414:LEU:HD11	2.42	0.54
1:A:370:HIS:CD2	1:A:373:ASN:H	2.24	0.53
1:B:362:LYS:NZ	1:B:436:THR:OG1	2.40	0.51
1:A:117:PRO:HD2	5:A:2048:HOH:O	2.10	0.51
1:A:11:TYR:HE2	1:A:13:ILE:HD11	1.71	0.51
1:A:483:THR:HG21	1:B:103:LEU:HD21	1.93	0.50
1:B:238:THR:HB	1:B:262:PRO:HB2	1.93	0.50
1:B:299:VAL:HG22	1:B:374:GLY:C	2.32	0.49
1:B:214:TYR:O	1:B:215:ASP:HB2	2.11	0.49
1:A:490:SER:HB2	1:B:245:GLU:O	2.13	0.49
1:A:55:ASN:HB2	3:A:1504:SO4:O2	2.12	0.48
1:B:328:CYS:CB	1:B:348:MET:HE1	2.39	0.48
1:A:165:LEU:HD22	1:A:179:TYR:HB3	1.95	0.48
1:A:353:TYR:O	1:A:370:HIS:HE1	1.95	0.48
1:A:101:ASN:HA	1:A:144:GLN:O	2.14	0.48
1:B:374:GLY:C	1:B:375:LEU:HD12	2.34	0.48
1:B:323:TYR:HD2	1:B:332:VAL:HG22	1.79	0.48
1:B:50:SER:HA	1:B:51:PHE:HA	1.71	0.48
1:B:32:PRO:HD2	1:B:35:ASN:ND2	2.27	0.48
1:A:464:GLN:HG3	1:A:479:TRP:HA	1.97	0.47
1:A:204:ALA:HB3	1:A:205:PRO:HD3	1.97	0.47
1:A:223:VAL:HG21	1:A:237:PRO:HB3	1.95	0.47
1:B:107:HIS:HE1	5:B:2074:HOH:O	1.97	0.46
1:A:451:MET:CG	1:A:496:GLY:HA3	2.44	0.46
1:A:483:THR:CG2	1:B:103:LEU:HD21	2.44	0.46
1:A:483:THR:HG21	1:B:103:LEU:CD2	2.45	0.46
1:B:240:TYR:CE2	1:B:244:ARG:NH2	2.83	0.46
1:B:477:THR:HG22	1:B:482:ILE:HD11	1.96	0.46
1:B:303:ASN:HD22	1:B:303:ASN:HA	1.52	0.46
1:A:486:PRO:HA	1:A:492:TRP:CD1	2.50	0.46
1:A:477:THR:HG23	1:A:492:TRP:CZ3	2.51	0.46
1:A:498:VAL:OXT	1:A:498:VAL:CG1	2.63	0.46
1:B:229:ALA:HB1	1:B:363:THR:HB	1.97	0.45
1:B:299:VAL:HG22	1:B:374:GLY:O	2.15	0.45
1:B:323:TYR:CD2	1:B:332:VAL:HG22	2.51	0.45
1:A:294:ARG:NH1	1:A:339:ILE:HD11	2.32	0.45
1:B:470:TYR:CD2	1:B:471:GLN:HG3	2.52	0.45
1:A:157:ALA:O	1:A:161:ILE:HG13	2.17	0.45
1:A:223:VAL:HG22	5:A:2104:HOH:O	2.17	0.44
1:A:370:HIS:HD2	1:A:373:ASN:N	2.10	0.44
1:A:486:PRO:C	1:A:488:SER:H	2.20	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:12:PHE:H	1:A:404:HIS:CD2	2.35	0.44
1:A:333:ARG:NH2	3:A:1508:SO4:O1	2.51	0.44
1:B:369:TYR:CZ	1:B:371:ALA:HA	2.52	0.44
1:B:52:LEU:CD2	1:B:130:ILE:HG21	2.48	0.43
1:B:229:ALA:CB	1:B:363:THR:HB	2.48	0.43
1:A:95:GLY:HA2	1:A:110:TYR:OH	2.18	0.43
1:A:245:GLU:OE2	1:B:253:GLU:HG2	2.18	0.43
1:A:451:MET:O	1:A:498:VAL:OXT	2.36	0.43
1:A:215:ASP:CG	1:A:294:ARG:HH21	2.21	0.43
1:B:8:ILE:O	1:B:401:MET:HA	2.18	0.43
1:A:257:ARG:HG3	1:A:258:ALA:N	2.32	0.43
1:B:400:VAL:HG22	1:B:401:MET:N	2.35	0.42
1:A:368:LEU:HB2	1:A:377:VAL:HB	2.02	0.42
1:B:144:GLN:HA	1:B:145:TYR:CD2	2.54	0.42
1:A:401:MET:C	1:A:401:MET:SD	2.98	0.42
1:B:95:GLY:HA2	1:B:110:TYR:OH	2.20	0.42
1:A:10:TYR:HA	1:A:48:ASN:HB2	2.01	0.42
1:A:223:VAL:HG23	1:A:223:VAL:O	2.19	0.41
1:B:370:HIS:HB3	1:B:375:LEU:HB2	2.02	0.41
1:B:239:PHE:CD1	1:B:265:LEU:HD22	2.55	0.41
1:B:288:GLY:HA2	1:B:401:MET:O	2.20	0.41
1:A:486:PRO:HA	1:A:492:TRP:CG	2.55	0.41
1:B:46:HIS:NE2	1:B:180:GLN:NE2	2.69	0.41
1:A:178:PRO:HD2	3:A:1505:SO4:O4	2.21	0.41
1:B:340:ALA:HB3	1:B:345:LEU:HD21	2.02	0.41
1:B:218:GLY:HA3	1:B:220:TRP:CE2	2.55	0.41
1:A:386:LYS:HG2	1:A:421:TYR:CZ	2.56	0.41
1:A:473:TYR:CD1	1:A:494:LYS:HD3	2.56	0.41
1:B:101:ASN:HA	1:B:144:GLN:O	2.21	0.40
1:B:315:GLU:OE1	1:B:315:GLU:N	2.54	0.40
1:B:390:LYS:NZ	1:B:432:LEU:O	2.50	0.40
1:A:404:HIS:CD2	1:A:406:GLY:H	2.40	0.40
1:A:205:PRO:HB3	5:A:2024:HOH:O	2.22	0.40
2:D:1:NAG:H2	2:D:1:NAG:H83	1.84	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	495/499 (99%)	479 (97%)	15 (3%)	1 (0%)	47	55
1	B	495/499 (99%)	470 (95%)	21 (4%)	4 (1%)	19	17
All	All	990/998 (99%)	949 (96%)	36 (4%)	5 (0%)	29	29

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	319	PRO
1	B	320	SER
1	B	315	GLU
1	B	319	PRO
1	B	324	TRP

### 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	402/405 (99%)	389 (97%)	13 (3%)	39	47
1	B	399/405 (98%)	390 (98%)	9 (2%)	50	59
All	All	801/810 (99%)	779 (97%)	22 (3%)	43	54

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	THR

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Mol	Chain	Res	Type
1	A	16	ASN
1	A	23	GLU
1	A	175	GLN
1	A	247	ASN
1	A	257	ARG
1	A	290	PRO
1	A	303	ASN
1	A	319	PRO
1	A	325	LEU
1	A	380	ASP
1	A	405	LEU
1	A	498	VAL
1	B	3	THR
1	B	26	THR
1	B	147	GLN
1	B	163	THR
1	B	265	LEU
1	B	303	ASN
1	B	307	TYR
1	B	380	ASP
1	B	405	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	107	HIS
1	A	210	ASN
1	A	247	ASN
1	A	273	GLN
1	A	303	ASN
1	A	350	GLN
1	A	370	HIS
1	A	404	HIS
1	A	471	GLN
1	B	35	ASN
1	B	57	ASN
1	B	76	ASN
1	B	147	GLN
1	B	180	GLN
1	B	273	GLN
1	B	303	ASN
1	B	394	GLN

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Mol	Chain	Res	Type
1	B	431	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 ⓘ

10 monosaccharides 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	NAG	C	1	2	15,15,15	0.65	0	21,21,21	0.60	0
2	NAG	C	2	2	14,14,15	0.65	0	17,19,21	0.70	0
2	NAG	C	3	2	14,14,15	0.66	0	17,19,21	0.72	0
2	NAG	C	4	2	14,14,15	0.74	0	17,19,21	2.21	6 (35%)
2	NAG	C	5	2	14,14,15	0.49	0	17,19,21	0.90	1 (5%)
2	NAG	D	1	2	15,15,15	0.63	0	21,21,21	1.70	4 (19%)
2	NAG	D	2	2	14,14,15	0.61	0	17,19,21	0.61	0
2	NAG	D	3	2	14,14,15	0.52	0	17,19,21	0.82	1 (5%)
2	NAG	D	4	2	14,14,15	1.28	1 (7%)	17,19,21	2.23	5 (29%)
2	NAG	D	5	2	14,14,15	0.58	0	17,19,21	0.71	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	NAG	C	1	2	-	0/6/26/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	NAG	C	3	2	-	0/6/23/26	0/1/1/1
2	NAG	C	4	2	-	1/6/23/26	0/1/1/1
2	NAG	C	5	2	-	0/6/23/26	0/1/1/1
2	NAG	D	1	2	-	2/6/26/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	D	3	2	-	0/6/23/26	0/1/1/1
2	NAG	D	4	2	-	1/6/23/26	0/1/1/1
2	NAG	D	5	2	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	4	NAG	C7-N2	3.85	1.47	1.34

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	4	NAG	O7-C7-N2	4.74	130.67	121.95
2	C	4	NAG	O7-C7-N2	4.62	130.44	121.95
2	D	4	NAG	C8-C7-N2	-4.29	108.84	116.10
2	C	4	NAG	C8-C7-N2	-4.15	109.07	116.10
2	D	4	NAG	C2-N2-C7	-3.98	117.23	122.90
2	D	4	NAG	C1-O5-C5	3.76	117.28	112.19
2	C	4	NAG	C2-N2-C7	-3.74	117.58	122.90
2	D	1	NAG	C1-C2-C3	-3.57	105.68	110.54
2	D	1	NAG	O7-C7-N2	3.54	128.46	121.95
2	C	4	NAG	C1-O5-C5	3.47	116.90	112.19
2	C	4	NAG	C1-C2-N2	2.98	115.58	110.49
2	C	5	NAG	C2-N2-C7	-2.95	118.70	122.90
2	D	1	NAG	C4-C3-C2	-2.85	106.16	110.34
2	D	1	NAG	C8-C7-N2	-2.84	111.29	116.10
2	D	4	NAG	O5-C1-C2	2.53	115.28	111.29
2	C	4	NAG	O5-C1-C2	2.16	114.70	111.29
2	D	3	NAG	C2-N2-C7	-2.08	119.94	122.90

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	1	NAG	C8-C7-N2-C2

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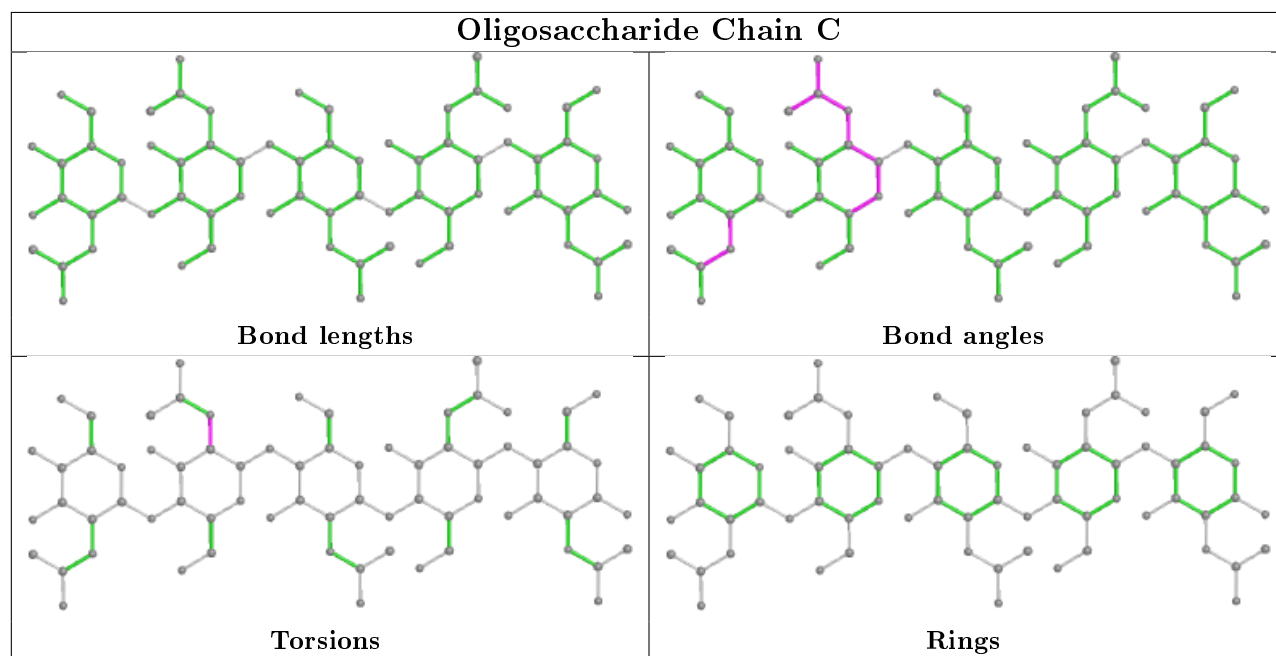
Mol	Chain	Res	Type	Atoms
2	D	1	NAG	O7-C7-N2-C2
2	D	2	NAG	O5-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
2	C	4	NAG	C1-C2-N2-C7
2	D	4	NAG	C1-C2-N2-C7

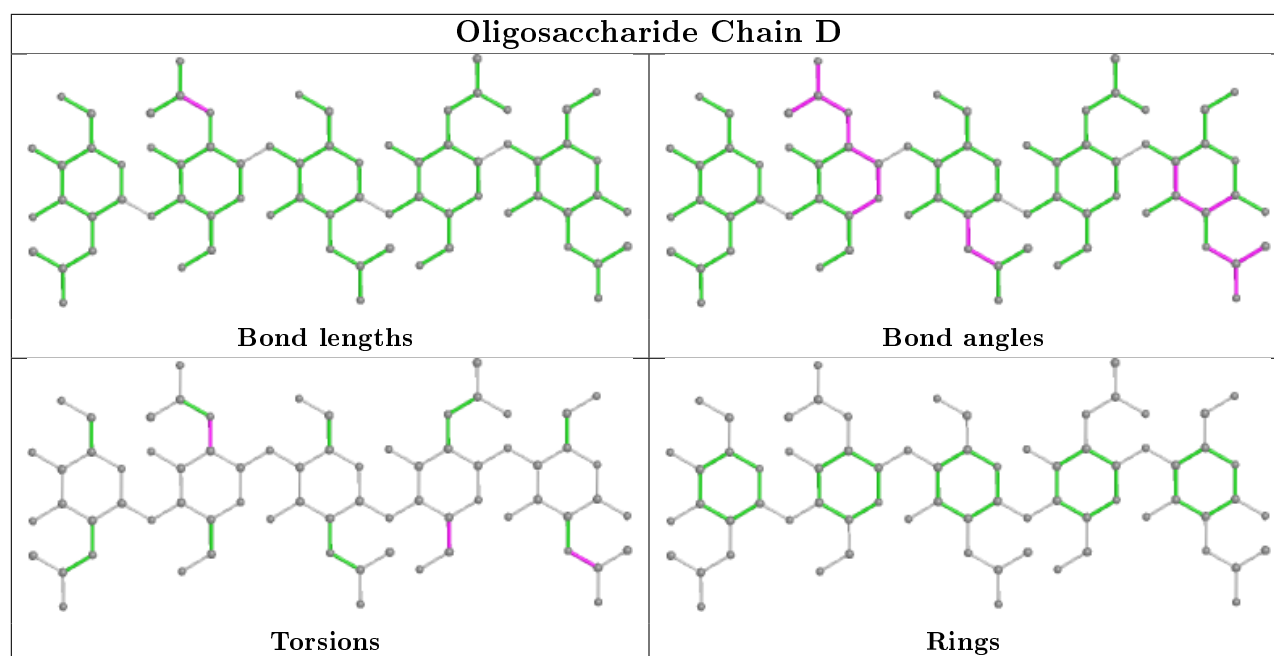
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	1	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.





## 5.6 Ligand geometry [i](#)

13 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	$\# Z  > 2$
3	SO4	A	1508	-	4,4,4	0.24	0	6,6,6	0.15	0
3	SO4	A	1507	-	4,4,4	0.29	0	6,6,6	0.11	0
3	SO4	A	1506	-	4,4,4	0.28	0	6,6,6	0.09	0
3	SO4	B	1506	-	4,4,4	0.27	0	6,6,6	0.08	0
3	SO4	A	1510	-	4,4,4	0.29	0	6,6,6	0.24	0
3	SO4	A	1511	-	4,4,4	0.34	0	6,6,6	0.19	0
3	SO4	B	1508	-	4,4,4	0.31	0	6,6,6	0.21	0
3	SO4	A	1505	-	4,4,4	0.30	0	6,6,6	0.15	0
3	SO4	B	1507	-	4,4,4	0.30	0	6,6,6	0.09	0
3	SO4	A	1509	-	4,4,4	0.34	0	6,6,6	0.09	0
4	GOL	B	1509	-	5,5,5	0.41	0	5,5,5	5.16	4 (80%)
3	SO4	A	1504	-	4,4,4	0.29	0	6,6,6	0.07	0
3	SO4	B	1505	-	4,4,4	0.31	0	6,6,6	0.09	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
4	GOL	B	1509	-	-	0/4/4/4	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1509	GOL	O3-C3-C2	10.01	158.19	110.20
4	B	1509	GOL	O2-C2-C3	4.33	128.19	109.12
4	B	1509	GOL	O1-C1-C2	2.86	123.93	110.20
4	B	1509	GOL	C3-C2-C1	-2.47	102.09	111.70

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
3	A	1508	SO4	1	0
3	A	1505	SO4	1	0
3	A	1504	SO4	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<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	496/499 (99%)	-0.23	12 (2%) 59 62	11, 24, 45, 57	0
1	B	497/499 (99%)	-0.13	11 (2%) 62 65	15, 26, 52, 66	1 (0%)
All	All	993/998 (99%)	-0.18	23 (2%) 60 63	11, 25, 49, 66	1 (0%)

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	301	GLY	4.1
1	A	498	VAL	3.4
1	A	472	GLY	3.3
1	A	452	THR	3.2
1	A	466	ALA	3.1
1	A	488	SER	3.1
1	B	321	THR	3.0
1	A	454	PRO	2.8
1	B	319	PRO	2.8
1	B	320	SER	2.7
1	A	450	ILE	2.6
1	B	211	LEU	2.6
1	B	369	TYR	2.5
1	A	455	ALA	2.5
1	B	323	TYR	2.3
1	A	453	ALA	2.3
1	B	371	ALA	2.3
1	B	322	ASP	2.2
1	B	212	MET	2.1
1	A	474	VAL	2.1
1	B	234	ALA	2.1
1	A	211	LEU	2.1
1	A	457	VAL	2.1

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

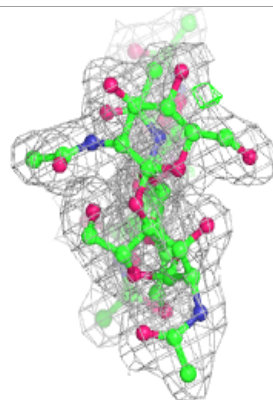
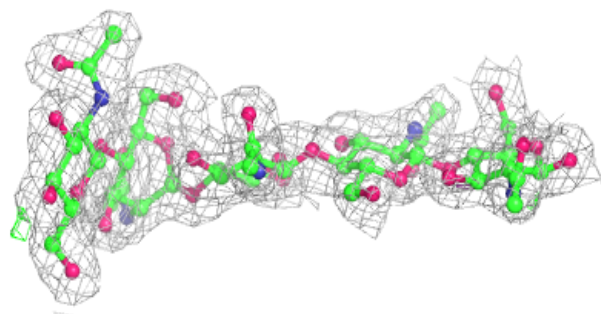
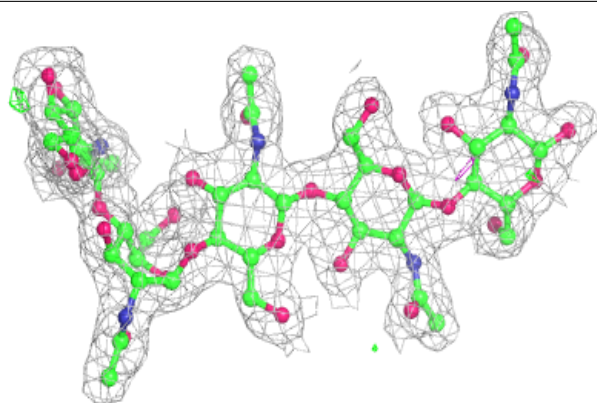
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	NAG	D	1	15/15	0.82	0.18	39,45,52,52	0
2	NAG	D	2	14/15	0.92	0.15	30,33,36,39	0
2	NAG	D	3	14/15	0.95	0.17	22,25,31,34	0
2	NAG	C	2	14/15	0.96	0.14	16,19,22,25	0
2	NAG	C	1	15/15	0.96	0.09	14,22,24,25	0
2	NAG	D	4	14/15	0.96	0.18	8,21,24,24	0
2	NAG	D	5	14/15	0.97	0.16	24,27,29,29	0
2	NAG	C	3	14/15	0.97	0.15	14,18,19,20	0
2	NAG	C	4	14/15	0.97	0.21	8,17,19,20	0
2	NAG	C	5	14/15	0.98	0.14	16,19,21,23	0

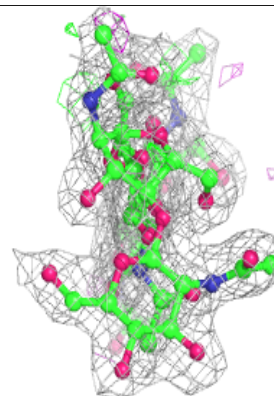
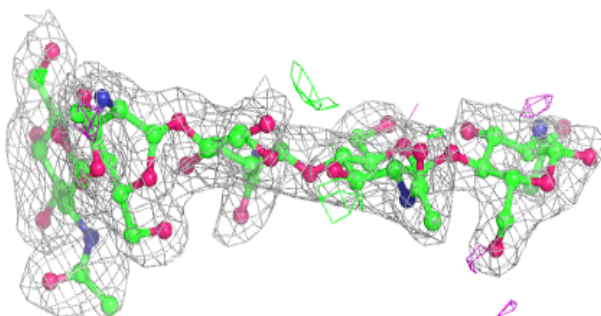
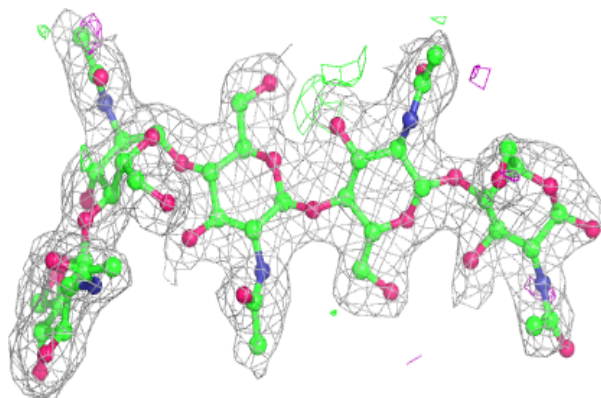
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around Chain C:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around Chain D:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SO4	A	1511	5/5	0.82	0.19	63,64,68,69	0
3	SO4	A	1510	5/5	0.86	0.17	76,76,77,78	0
3	SO4	A	1505	5/5	0.88	0.18	84,85,85,86	0
4	GOL	B	1509	6/6	0.89	0.12	31,32,34,36	0
3	SO4	B	1505	5/5	0.89	0.14	83,83,84,84	0
3	SO4	B	1508	5/5	0.90	0.24	89,90,90,90	0
3	SO4	B	1507	5/5	0.90	0.18	77,77,79,79	0
3	SO4	A	1504	5/5	0.92	0.19	89,89,89,89	0
3	SO4	A	1507	5/5	0.94	0.16	79,80,81,81	0
3	SO4	B	1506	5/5	0.95	0.11	80,81,81,81	0
3	SO4	A	1508	5/5	0.95	0.18	79,79,79,80	0
3	SO4	A	1509	5/5	0.95	0.09	66,66,66,67	0
3	SO4	A	1506	5/5	0.96	0.12	63,63,63,64	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.