



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 07:12 AM GMT

PDB ID : 2ZXE  
Title : Crystal structure of the sodium - potassium pump in the E2.2K+.Pi state  
Authors : Shinoda, T.; Ogawa, H.; Cornelius, F.; Toyoshima, C.  
Deposited on : 2008-12-22  
Resolution : 2.40 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  
<http://wwpdb.org/validation/2016/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 : 1.7 (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

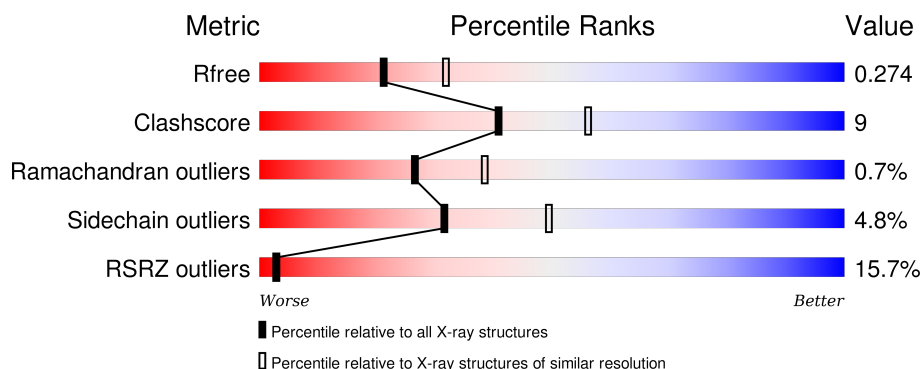
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	2919 (2.40-2.40)
Clashscore	102246	3407 (2.40-2.40)
Ramachandran outliers	100387	3351 (2.40-2.40)
Sidechain outliers	100360	3352 (2.40-2.40)
RSRZ outliers	91569	2928 (2.40-2.40)

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. 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	1028	<div> <div>10%</div> <div>74%</div> <div>21%</div> <div>• •</div> </div>
2	B	305	<div> <div>32%</div> <div>67%</div> <div>18%</div> <div>• 13%</div> </div>
3	G	74	<div> <div>11%</div> <div>38%</div> <div>15%</div> <div>47%</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
4	MF4	A	2001	-	-	-	X

## 2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 10340 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 Na, K-ATPase alpha subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	992	Total	C	N	O	S	0	0	0
			7675	4886	1290	1453	46			

- Molecule 2 is a protein called Na<sup>+</sup>,K<sup>+</sup>-ATPase beta subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	265	Total	C	N	O	S	0	0	0
			2151	1392	355	393	11			

- Molecule 3 is a protein called Phospholemman-like protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	39	Total	C	N	O	S	0	0	0
			305	200	50	54	1			

- Molecule 4 is TETRAFLUOROMAGNESATE(2-) (three-letter code: MF4) (formula: F<sub>4</sub>Mg).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	F	Mg	0	0
			5	4	1		

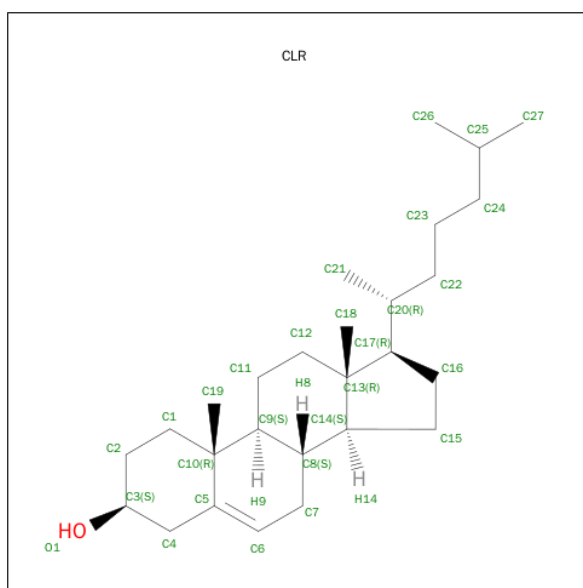
- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	Mg		0	0
			1	1			

- Molecule 6 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	3	Total	K		0	0
			3	3			

- Molecule 7 is CHOLESTEROL (three-letter code: CLR) (formula: C<sub>27</sub>H<sub>46</sub>O).

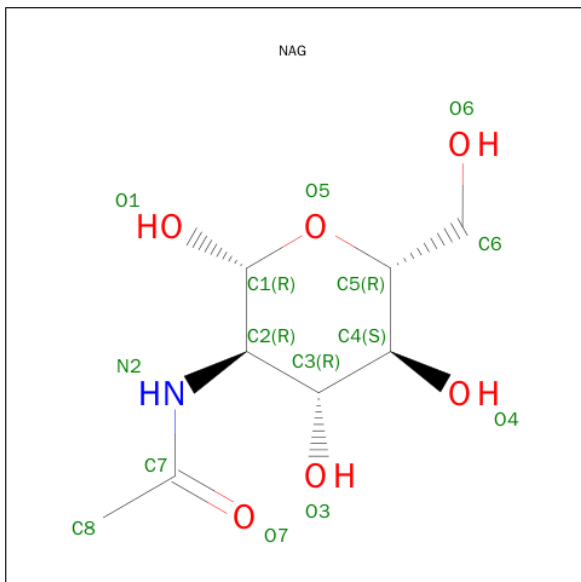


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			28	27	1		

- Molecule 8 is a polymer of unknown type called SUGAR (2-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	B	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 9 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



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

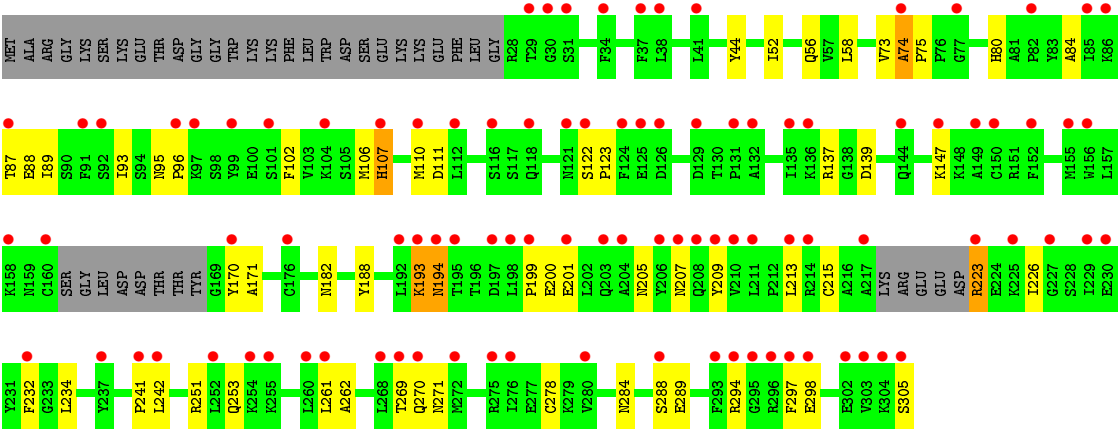
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	130	Total	O	0	0
			130	130		

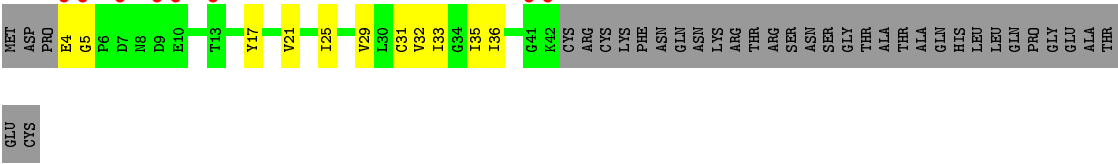
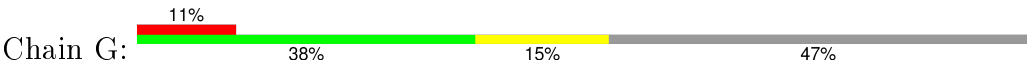
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according 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.

- Chain A:  10% 74% 21%

- Chain B:  32% 67% 18% 13%



● Molecule 3: Phospholemman-like protein





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	223.81Å 50.91Å 163.79Å 90.00° 105.12° 90.00°	Depositor
Resolution (Å)	15.00 – 2.40 14.99 – 2.40	Depositor EDS
% Data completeness (in resolution range)	100.0 (15.00-2.40) 99.1 (14.99-2.40)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.01 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, $R_{free}$	0.246 , 0.271 0.246 , 0.274	Depositor DCC
$R_{free}$ test set	3555 reflections (5.37%)	DCC
Wilson B-factor (Å <sup>2</sup> )	50.1	Xtriage
Anisotropy	0.099	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 66.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 69712 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	10340	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.90% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: MG, NAG, K, NDG, MF4, CLR

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	0.38	0/7825	0.51	0/10616
2	B	0.33	0/2205	0.48	0/2970
3	G	0.36	0/309	0.46	0/419
All	All	0.37	0/10339	0.51	0/14005

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	7675	0	7699	130	0
2	B	2151	0	2123	42	0
3	G	305	0	318	7	0
4	A	5	0	0	0	0
5	A	1	0	0	0	0
6	A	3	0	0	0	0
7	A	28	0	46	0	0
8	B	28	0	25	0	0
9	B	14	0	13	0	0
10	A	130	0	0	5	0
All	All	10340	0	10224	175	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 9.

All (175) 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:74:ALA:HB3	2:B:75:PRO:HD3	1.47	0.94
1:A:478:VAL:HG21	1:A:571:PHE:HB2	1.65	0.79
1:A:497:LYS:HE2	1:A:499:SER:HB2	1.69	0.76
1:A:261:THR:HG21	10:A:5063:HOH:O	1.84	0.76
1:A:868:SER:O	1:A:872:ILE:HG12	1.86	0.75
1:A:61:ARG:HB3	1:A:61:ARG:HH11	1.52	0.73
1:A:677:VAL:HG21	10:A:5074:HOH:O	1.87	0.73
1:A:261:THR:HG22	1:A:264:ARG:NH2	2.02	0.73
1:A:51:LEU:HD13	1:A:204:ARG:HG3	1.69	0.71
2:B:270:GLN:HG2	2:B:271:ASN:HD22	1.58	0.68
1:A:766:ARG:HD2	1:A:832:MET:CE	2.24	0.68
1:A:339:THR:HG23	1:A:820:ILE:HD13	1.77	0.67
1:A:905:GLN:NE2	2:B:182:ASN:HA	2.11	0.65
2:B:213:LEU:HD11	2:B:278:CYS:HB3	1.78	0.65
1:A:935:ILE:HG23	1:A:944:ILE:HD12	1.77	0.64
1:A:160:SER:HB3	1:A:741:VAL:HG22	1.80	0.64
1:A:78:ASN:HA	1:A:261:THR:HG23	1.79	0.63
1:A:816:MET:O	1:A:820:ILE:HG12	1.97	0.63
2:B:74:ALA:CB	2:B:75:PRO:HD3	2.23	0.63
1:A:52:HIS:HA	1:A:57:THR:HG23	1.80	0.63
1:A:673:LEU:HD22	1:A:677:VAL:HG11	1.80	0.63
2:B:193:LYS:HA	2:B:207:ASN:HD21	1.65	0.62
1:A:64:THR:HG22	1:A:66:ALA:H	1.65	0.61
1:A:323:PHE:O	1:A:327:ILE:HG12	2.01	0.61
3:G:29:VAL:O	3:G:33:ILE:HG12	2.00	0.60
1:A:363:ALA:HB1	1:A:730:ILE:HD12	1.83	0.60
1:A:483:ASN:HB2	1:A:486:ASN:HB2	1.82	0.60
2:B:270:GLN:HG2	2:B:271:ASN:ND2	2.16	0.60
1:A:905:GLN:HE21	2:B:182:ASN:HA	1.66	0.60
1:A:344:LEU:HB3	1:A:361:LEU:HG	1.84	0.60
2:B:84:ALA:HB1	2:B:88:GLU:H	1.67	0.59
1:A:392:TRP:HB3	1:A:588:LEU:HB2	1.84	0.59
3:G:21:VAL:O	3:G:25:ILE:HG12	2.02	0.59
1:A:106:ILE:O	1:A:110:LEU:HB2	2.03	0.59
1:A:212:LYS:HB2	1:A:251:GLU:HG2	1.85	0.58
2:B:106:MET:O	2:B:110:MET:HG2	2.03	0.58
1:A:345:THR:HA	1:A:361:LEU:HD11	1.84	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:75:PRO:HG2	2:B:294:ARG:HH21	1.68	0.57
1:A:491:SER:HB3	1:A:493:HIS:NE2	2.20	0.57
2:B:193:LYS:HA	2:B:207:ASN:ND2	2.20	0.57
2:B:74:ALA:HB3	2:B:75:PRO:CD	2.29	0.57
1:A:818:PRO:HB3	1:A:934:LEU:HD22	1.87	0.56
2:B:52:ILE:O	2:B:56:GLN:HG2	2.05	0.56
2:B:137:ARG:HD2	2:B:147:LYS:HB3	1.88	0.56
1:A:172:ILE:HD13	1:A:177:LYS:HB3	1.87	0.56
1:A:933:ASP:HA	1:A:936:ILE:HG12	1.86	0.55
1:A:190:LEU:HD11	1:A:206:ILE:HD11	1.88	0.55
2:B:93:ILE:H	2:B:305:SER:HB2	1.72	0.55
1:A:157:ILE:HD11	1:A:745:ALA:HA	1.88	0.55
1:A:994:TYR:O	1:A:997:ILE:HG22	2.06	0.55
1:A:351:MET:HA	1:A:354:LYS:HG2	1.88	0.55
1:A:596:ARG:HB2	1:A:599:VAL:HG23	1.89	0.55
1:A:261:THR:HG22	1:A:264:ARG:HH21	1.71	0.55
1:A:924:ILE:HD12	1:A:983:LEU:HD12	1.89	0.54
1:A:64:THR:HG22	1:A:66:ALA:N	2.23	0.54
1:A:994:TYR:HA	1:A:997:ILE:HG22	1.89	0.54
1:A:223:GLU:HB2	10:A:5106:HOH:O	2.07	0.54
1:A:921:SER:HA	1:A:983:LEU:HD11	1.90	0.54
2:B:213:LEU:HD23	2:B:261:LEU:HD13	1.89	0.53
1:A:424:ILE:HG23	1:A:506:VAL:HB	1.90	0.53
1:A:51:LEU:CD1	1:A:204:ARG:HG3	2.36	0.53
1:A:161:PHE:HA	1:A:164:MET:HE3	1.90	0.53
1:A:324:LEU:O	1:A:328:ILE:HG12	2.09	0.53
1:A:161:PHE:HA	1:A:164:MET:CE	2.39	0.52
1:A:212:LYS:HD3	1:A:224:PRO:HB2	1.90	0.52
1:A:808:LEU:O	1:A:812:LEU:HB2	2.10	0.52
2:B:75:PRO:HG2	2:B:294:ARG:NH2	2.25	0.52
3:G:32:VAL:O	3:G:36:ILE:HG12	2.09	0.52
1:A:766:ARG:HD2	1:A:832:MET:HE2	1.91	0.51
1:A:82:PRO:HA	1:A:158:MET:HG2	1.92	0.51
3:G:25:ILE:O	3:G:29:VAL:HG23	2.11	0.51
1:A:572:ASP:HB3	1:A:577:ASN:HB2	1.92	0.51
1:A:788:THR:N	1:A:789:PRO:HD2	2.26	0.51
1:A:417:THR:HA	1:A:522:LEU:HD22	1.93	0.51
2:B:288:SER:HB2	2:B:294:ARG:HH11	1.76	0.50
1:A:571:PHE:HA	1:A:577:ASN:HD22	1.76	0.50
1:A:359:LYS:HE2	1:A:746:ALA:O	2.12	0.49
2:B:232:PHE:HB2	2:B:262:ALA:HB3	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:826:GLN:HE22	1:A:950:LYS:HE3	1.78	0.49
1:A:1005:ARG:NH1	1:A:1006:ARG:HG3	2.28	0.49
2:B:209:TYR:HA	2:B:242:LEU:HD22	1.95	0.48
1:A:502:ARG:CG	1:A:503:TYR:H	2.27	0.48
1:A:442:ILE:O	1:A:445:ARG:HG2	2.14	0.48
1:A:323:PHE:CE1	1:A:793:PHE:HE2	2.32	0.47
1:A:797:ASN:HD22	1:A:887:ARG:HD3	1.79	0.47
1:A:171:VAL:HG12	1:A:191:VAL:HG22	1.97	0.47
1:A:132:LEU:HD21	1:A:804:THR:HG21	1.97	0.47
3:G:31:CYS:O	3:G:35:ILE:HG12	2.14	0.47
2:B:80:HIS:HB3	2:B:297:PHE:CZ	2.50	0.47
1:A:814:THR:HB	1:A:961:GLU:HG3	1.96	0.47
2:B:87:THR:HB	2:B:298:GLU:O	2.14	0.47
1:A:622:ILE:HG12	10:A:5110:HOH:O	2.14	0.47
2:B:215:CYS:HA	2:B:278:CYS:HA	1.96	0.46
1:A:336:LEU:HD11	1:A:776:ILE:HG12	1.96	0.46
1:A:924:ILE:HD12	1:A:983:LEU:CD1	2.45	0.46
1:A:127:ASN:HB3	1:A:131:TYR:CD1	2.50	0.46
1:A:63:LEU:HD22	1:A:189:ASP:HB3	1.96	0.46
2:B:226:ILE:HG22	2:B:269:THR:HB	1.96	0.46
1:A:631:VAL:HG23	1:A:633:ILE:HG12	1.96	0.46
2:B:74:ALA:CB	2:B:75:PRO:CD	2.92	0.46
1:A:234:GLU:HG2	10:A:5124:HOH:O	2.14	0.46
1:A:303:GLY:HA2	1:A:327:ILE:HG21	1.97	0.46
1:A:670:LEU:HD23	1:A:678:LEU:HD21	1.96	0.46
2:B:122:SER:HA	2:B:123:PRO:HA	1.75	0.46
1:A:784:ILE:HD11	1:A:854:TYR:CG	2.51	0.46
1:A:889:ARG:HD2	1:A:895:ILE:CD1	2.46	0.45
1:A:209:HIS:HB3	1:A:253:THR:HG22	1.98	0.45
1:A:475:PRO:HD2	1:A:494:GLU:HB2	1.99	0.45
2:B:84:ALA:HB1	2:B:88:GLU:N	2.32	0.45
1:A:847:GLU:H	1:A:847:GLU:CD	2.20	0.45
1:A:676:GLU:H	1:A:676:GLU:CD	2.20	0.45
1:A:722:SER:OG	1:A:723:PRO:HD3	2.17	0.45
1:A:631:VAL:CG2	1:A:633:ILE:HG12	2.46	0.45
1:A:52:HIS:HE2	1:A:59:LEU:HD12	1.82	0.44
1:A:915:GLU:O	1:A:918:CYS:HB2	2.17	0.44
2:B:194:ASN:N	2:B:194:ASN:HD22	2.15	0.44
1:A:806:THR:HG22	1:A:923:PHE:HB2	2.00	0.44
1:A:859:MET:HG2	2:B:44:TYR:CE2	2.53	0.44
1:A:354:LYS:HB2	1:A:354:LYS:HZ2	1.81	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:234:LEU:HG	2:B:241:PRO:HG3	1.99	0.44
2:B:107:HIS:O	2:B:111:ASP:HB2	2.18	0.44
1:A:246:SER:OG	1:A:267:MET:HG3	2.18	0.44
2:B:107:HIS:ND1	2:B:170:TYR:HE1	2.17	0.43
1:A:273:LEU:O	1:A:277:LEU:HG	2.19	0.43
1:A:790:PHE:O	1:A:794:ILE:HG12	2.19	0.43
1:A:110:LEU:HD22	1:A:324:LEU:HD12	1.99	0.43
1:A:511:PRO:HG2	1:A:542:TYR:CE1	2.53	0.43
2:B:147:LYS:HB2	2:B:253:GLN:HG3	1.99	0.43
1:A:87:PRO:HD2	1:A:90:ILE:HD12	1.99	0.43
3:G:4:GLU:CD	3:G:5:GLY:H	2.23	0.43
1:A:64:THR:HA	1:A:174:ASP:OD1	2.19	0.42
1:A:661:LYS:HE2	1:A:661:LYS:HA	2.00	0.42
1:A:766:ARG:HD2	1:A:832:MET:HE1	2.02	0.42
1:A:797:ASN:HB3	1:A:885:GLY:HA2	2.01	0.42
1:A:940:ARG:HE	1:A:1023:TYR:HB2	1.84	0.42
1:A:300:VAL:O	1:A:304:VAL:HG22	2.19	0.42
2:B:188:TYR:O	2:B:284:ASN:ND2	2.53	0.42
1:A:291:PHE:HA	1:A:294:ILE:HD12	2.01	0.42
2:B:223:ARG:HB2	2:B:223:ARG:HH11	1.84	0.42
2:B:89:ILE:HG22	2:B:102:PHE:CE2	2.55	0.42
1:A:170:LEU:HD21	1:A:177:LYS:HD3	2.00	0.42
1:A:291:PHE:HB3	1:A:845:VAL:HB	2.02	0.42
2:B:95:ASN:HA	2:B:96:PRO:HD3	1.86	0.42
1:A:48:LEU:HD23	1:A:59:LEU:HD11	2.01	0.42
2:B:137:ARG:HB3	2:B:147:LYS:HD2	2.01	0.42
1:A:784:ILE:N	1:A:785:PRO:HD2	2.35	0.42
2:B:194:ASN:HB3	2:B:205:ASN:OD1	2.20	0.42
1:A:510:ALA:HA	1:A:511:PRO:HD3	1.94	0.42
1:A:110:LEU:CD2	1:A:324:LEU:HD12	2.50	0.41
1:A:785:PRO:HB2	1:A:926:ILE:CD1	2.50	0.41
2:B:271:ASN:HD21	2:B:305:SER:N	2.19	0.41
1:A:367:LEU:HD23	1:A:761:GLY:HA3	2.01	0.41
1:A:378:THR:HA	1:A:382:THR:OG1	2.20	0.41
1:A:846:ASN:ND2	1:A:848:ARG:HB2	2.35	0.41
3:G:17:TYR:O	3:G:21:VAL:HG23	2.21	0.41
1:A:502:ARG:HE	1:A:562:GLU:HG2	1.85	0.41
1:A:920:THR:HG21	1:A:981:TYR:O	2.20	0.41
1:A:44:HIS:HB3	1:A:242:ILE:HD11	2.03	0.41
1:A:426:ALA:O	1:A:471:ARG:HD2	2.20	0.41
1:A:342:VAL:HB	1:A:820:ILE:HD12	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:871:VAL:HG22	2:B:58:LEU:HD13	2.02	0.41
1:A:502:ARG:HG3	1:A:562:GLU:HG2	2.02	0.41
1:A:540:ASN:N	1:A:540:ASN:HD22	2.18	0.41
1:A:647:ARG:HH21	1:A:648:LEU:HD11	1.86	0.41
1:A:301:PHE:O	1:A:305:SER:HB2	2.20	0.41
1:A:284:ILE:O	1:A:288:ILE:HG12	2.21	0.41
1:A:423:ARG:O	1:A:427:LEU:HB2	2.21	0.41
1:A:458:LYS:O	1:A:462:LEU:HB2	2.21	0.41
1:A:702:VAL:HG13	1:A:712:VAL:HG21	2.03	0.41
1:A:831:ILE:O	1:A:834:ARG:HG2	2.22	0.40
1:A:354:LYS:HE2	1:A:760:THR:HB	2.02	0.40
1:A:925:SER:O	1:A:929:VAL:HG22	2.22	0.40
1:A:989:PHE:HA	1:A:992:PHE:CD2	2.57	0.40
1:A:900:ASP:OD1	1:A:904:GLN:HB2	2.21	0.40
1:A:199:ILE:HG22	1:A:201:ALA:O	2.22	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	990/1028 (96%)	942 (95%)	43 (4%)	5 (0%)	34	48
2	B	259/305 (85%)	220 (85%)	35 (14%)	4 (2%)	13	17
3	G	37/74 (50%)	33 (89%)	4 (11%)	0	100	100
All	All	1286/1407 (91%)	1195 (93%)	82 (6%)	9 (1%)	26	38

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	121	THR
1	A	128	ASP

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Mol	Chain	Res	Type
1	A	576	PRO
2	B	74	ALA
2	B	171	ALA
2	B	201	GLU
1	A	123	ASP
1	A	1014	GLY
2	B	199	PRO

### 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	840/869 (97%)	796 (95%)	44 (5%)	29	45
2	B	232/266 (87%)	223 (96%)	9 (4%)	39	59
3	G	32/62 (52%)	32 (100%)	0	100	100
All	All	1104/1197 (92%)	1051 (95%)	53 (5%)	31	49

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	LEU
1	A	57	THR
1	A	61	ARG
1	A	63	LEU
1	A	72	LEU
1	A	128	ASP
1	A	165	VAL
1	A	213	VAL
1	A	217	SER
1	A	218	LEU
1	A	226	THR
1	A	231	PHE
1	A	245	PHE
1	A	248	ASN
1	A	250	VAL

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Mol	Chain	Res	Type
1	A	255	ARG
1	A	261	THR
1	A	284	ILE
1	A	309	LEU
1	A	344	LEU
1	A	354	LYS
1	A	391	MET
1	A	413	LYS
1	A	434	GLN
1	A	454	SER
1	A	457	LEU
1	A	524	ASN
1	A	540	ASN
1	A	557	HIS
1	A	581	THR
1	A	636	GLU
1	A	670	LEU
1	A	682	LEU
1	A	712	VAL
1	A	719	VAL
1	A	726	LYS
1	A	806	THR
1	A	811	ASP
1	A	833	LYS
1	A	847	GLU
1	A	880	PRO
1	A	974	THR
1	A	987	TRP
1	A	1019	GLN
2	B	73	VAL
2	B	107	HIS
2	B	139	ASP
2	B	193	LYS
2	B	194	ASN
2	B	200	GLU
2	B	223	ARG
2	B	251	ARG
2	B	289	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	118	GLN
1	A	129	ASN
1	A	163	ASN
1	A	225	GLN
1	A	434	GLN
1	A	524	ASN
1	A	540	ASN
1	A	577	ASN
1	A	754	ASN
1	A	797	ASN
1	A	826	GLN
1	A	905	GLN
1	A	1019	GLN
2	B	80	HIS
2	B	194	ASN
2	B	207	ASN
2	B	264	GLN
2	B	271	ASN
2	B	284	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 ⓘ

2 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	$\# Z  > 2$
8	NAG	B	4001	8,2	14,14,15	0.50	0	15,19,21	1.67	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
8	NDG	B	4002	8	14,14,15	0.47	0	15,19,21	1.06	1 (6%)

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
8	NAG	B	4001	8,2	-	0/6/23/26	0/1/1/1
8	NDG	B	4002	8	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	B	4002	NDG	C1-O-C5	2.72	115.70	112.25
8	B	4001	NAG	C1-O5-C5	5.54	119.28	112.25

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.6 Ligand geometry

Of 7 ligands modelled in this entry, 4 are monoatomic - leaving 3 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	MF4	A	2001	-	0,4,4	0.00	-	0,6,6	0.00	-
7	CLR	A	3001	-	31,31,31	0.42	0	48,48,48	1.01	5 (10%)
9	NAG	B	4021	2	14,14,15	0.59	0	15,19,21	1.19	2 (13%)

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	MF4	A	2001	-	-	0/0/0/0	0/0/0/0
7	CLR	A	3001	-	-	0/10/68/68	0/4/4/4
9	NAG	B	4021	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	3001	CLR	C4-C5-C6	-2.10	117.00	120.57
9	B	4021	NAG	C4-C3-C2	2.00	114.34	111.23
7	A	3001	CLR	C1-C2-C3	2.06	113.78	110.43
7	A	3001	CLR	C12-C11-C9	2.13	116.69	113.10
7	A	3001	CLR	C4-C5-C10	2.22	119.66	116.43
9	B	4021	NAG	C1-O5-C5	2.75	115.74	112.25
7	A	3001	CLR	C15-C14-C13	2.77	107.42	103.82

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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	992/1028 (96%)	0.38	98 (9%) 9 9	24, 46, 87, 112	0
2	B	265/305 (86%)	1.67	97 (36%) 0 0	44, 94, 120, 124	0
3	G	39/74 (52%)	0.86	8 (20%) 1 1	41, 50, 93, 97	0
All	All	1296/1407 (92%)	0.66	203 (15%) 3 3	24, 51, 108, 124	0

All (203) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	268	LEU	10.5
2	B	195	THR	8.9
1	A	125	PRO	7.6
1	A	126	ALA	7.1
2	B	303	VAL	7.1
1	A	562	GLU	7.0
2	B	304	LYS	6.9
3	G	41	GLY	6.3
1	A	498	SER	6.2
1	A	563	ASP	6.0
1	A	501	SER	5.5
1	A	89	TRP	5.5
1	A	127	ASN	5.4
2	B	96	PRO	5.2
2	B	149	ALA	5.2
2	B	207	ASN	5.2
2	B	99	TYR	5.1
1	A	121	THR	5.1
1	A	574	ASP	5.0
2	B	160	CYS	5.0
1	A	317	TRP	4.9
2	B	296	ARG	4.9
2	B	295	GLY	4.8

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Mol	Chain	Res	Type	RSRZ
2	B	214	ARG	4.7
1	A	32	LEU	4.7
1	A	894	TRP	4.6
2	B	85	ILE	4.6
2	B	121	ASN	4.6
2	B	298	GLU	4.5
2	B	230	GLU	4.4
2	B	199	PRO	4.4
1	A	1007	PHE	4.3
1	A	97	PHE	4.3
1	A	154	SER	4.3
1	A	153	LYS	4.2
2	B	156	TRP	4.2
2	B	194	ASN	4.2
1	A	675	THR	4.2
1	A	568	GLY	4.1
1	A	414	THR	4.1
3	G	7	ASP	4.1
1	A	84	PRO	4.1
1	A	231	PHE	4.1
2	B	252	LEU	3.9
1	A	571	PHE	3.9
1	A	499	SER	3.8
1	A	503	TYR	3.8
1	A	566	ASN	3.8
3	G	4	GLU	3.8
2	B	237	TYR	3.7
1	A	684	TYR	3.7
2	B	136	LYS	3.7
1	A	470	MET	3.6
3	G	5	GLY	3.6
2	B	155	MET	3.6
2	B	150	CYS	3.6
1	A	412	ASP	3.6
1	A	567	GLU	3.6
2	B	255	LYS	3.5
1	A	41	MET	3.5
3	G	13	THR	3.5
1	A	122	GLU	3.5
1	A	570	PRO	3.4
2	B	126	ASP	3.4
1	A	149	TYR	3.4

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Mol	Chain	Res	Type	RSRZ
3	G	42	LYS	3.4
2	B	209	TYR	3.3
1	A	279	VAL	3.3
2	B	92	SER	3.3
1	A	895	ILE	3.3
1	A	115	TYR	3.3
2	B	176	CYS	3.2
2	B	34	PHE	3.2
1	A	439	ASN	3.2
2	B	210	VAL	3.2
1	A	411	PHE	3.1
2	B	124	PHE	3.1
1	A	318	LEU	3.1
2	B	201	GLU	3.1
1	A	967	PHE	3.0
1	A	826	GLN	3.0
2	B	193	LYS	3.0
2	B	206	TYR	3.0
2	B	101	SER	2.9
2	B	213	LEU	2.9
2	B	203	GLN	2.9
1	A	308	ILE	2.9
2	B	276	ILE	2.9
2	B	158	LYS	2.9
3	G	9	ASP	2.9
1	A	576	PRO	2.8
2	B	29	THR	2.8
2	B	74	ALA	2.8
2	B	223	ARG	2.8
1	A	413	LYS	2.8
1	A	496	GLU	2.7
1	A	523	LEU	2.7
2	B	211	LEU	2.7
2	B	288	SER	2.7
1	A	521	ILE	2.7
1	A	522	LEU	2.7
1	A	1006	ARG	2.7
2	B	118	GLN	2.7
1	A	117	ILE	2.7
2	B	232	PHE	2.7
1	A	128	ASP	2.7
1	A	312	ILE	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	483	ASN	2.7
1	A	35	LEU	2.7
1	A	278	GLU	2.7
1	A	152	ALA	2.7
1	A	109	ILE	2.6
1	A	1004	MET	2.6
1	A	473	ARG	2.6
2	B	192	LEU	2.6
2	B	104	LYS	2.6
1	A	532	GLU	2.6
2	B	122	SER	2.6
2	B	132	ALA	2.6
2	B	107	HIS	2.6
1	A	525	GLY	2.6
1	A	136	LEU	2.6
1	A	502	ARG	2.6
1	A	1015	GLY	2.6
2	B	135	ILE	2.6
2	B	269	THR	2.6
1	A	529	PRO	2.6
2	B	242	LEU	2.6
2	B	125	GLU	2.6
2	B	152	PHE	2.6
2	B	91	PHE	2.5
1	A	111	CYS	2.5
2	B	270	GLN	2.5
1	A	536	GLU	2.5
1	A	129	ASN	2.5
2	B	275	ARG	2.5
2	B	260	LEU	2.5
2	B	305	SER	2.5
1	A	124	GLU	2.5
1	A	293	HIS	2.5
2	B	294	ARG	2.5
1	A	516	ASP	2.4
2	B	129	ASP	2.4
2	B	297	PHE	2.4
2	B	208	GLN	2.4
1	A	463	CYS	2.4
2	B	38	LEU	2.4
2	B	77	GLY	2.4
2	B	82	PRO	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	112	LEU	2.4
2	B	87	THR	2.4
2	B	197	ASP	2.4
1	A	534	MET	2.4
2	B	110	MET	2.4
1	A	1023	TYR	2.4
1	A	1014	GLY	2.4
3	G	10	GLU	2.4
1	A	1011	ARG	2.4
1	A	485	THR	2.4
1	A	310	SER	2.3
2	B	37	PHE	2.3
1	A	148	TYR	2.3
2	B	170	TYR	2.3
1	A	636	GLU	2.3
1	A	482	PHE	2.3
1	A	396	GLN	2.3
2	B	131	PRO	2.3
2	B	261	LEU	2.3
2	B	86	LYS	2.3
1	A	464	CYS	2.3
2	B	302	GLU	2.2
2	B	31	SER	2.2
2	B	41	LEU	2.2
1	A	94	ARG	2.2
2	B	147	LYS	2.2
1	A	120	ALA	2.2
2	B	229	ILE	2.2
1	A	575	GLU	2.2
1	A	484	SER	2.2
2	B	97	LYS	2.2
2	B	293	PHE	2.2
1	A	526	ALA	2.2
1	A	504	LEU	2.2
2	B	198	LEU	2.2
1	A	976	VAL	2.2
1	A	524	ASN	2.2
2	B	280	VAL	2.1
2	B	225	LYS	2.1
1	A	407	SER	2.1
2	B	116	SER	2.1
2	B	204	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	38	GLU	2.1
1	A	495	ASN	2.1
2	B	30	GLY	2.1
2	B	227	GLY	2.1
2	B	241	PRO	2.1
1	A	573	ALA	2.0
1	A	108	ALA	2.0
2	B	272	MET	2.0
1	A	184	PHE	2.0
2	B	144	GLN	2.0
2	B	217	ALA	2.0
2	B	254	LYS	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](#)

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, 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
8	NDG	B	4002	14/15	0.46	0.39	-	111,111,111,111	0
8	NAG	B	4001	14/15	0.79	0.20	-	107,108,109,110	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, 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
4	MF4	A	2001	5/5	0.95	0.17	2.30	29,31,32,33	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
7	CLR	A	3001	28/28	0.79	0.24	0.89	88,88,88,89	0
5	MG	A	2002	1/1	0.97	0.06	-1.82	26,26,26,26	0
6	K	A	2003	1/1	0.98	0.09	-2.40	47,47,47,47	0
6	K	A	2005	1/1	0.99	0.03	-2.94	42,42,42,42	0
6	K	A	2004	1/1	0.97	0.04	-3.97	47,47,47,47	0
9	NAG	B	4021	14/15	0.68	0.40	-	108,109,109,109	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.