



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 08:57 AM EDT

PDB ID : 2OW7 / pdb_00002ow7
Title : Golgi alpha-mannosidase II complex with (1R,6S,7R,8S)-1-thioniabicyclo[4.3.0]nonan-7,8-diol chloride
Authors : Kuntz, D.A.
Deposited on : 2007-02-15
Resolution : 1.77 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

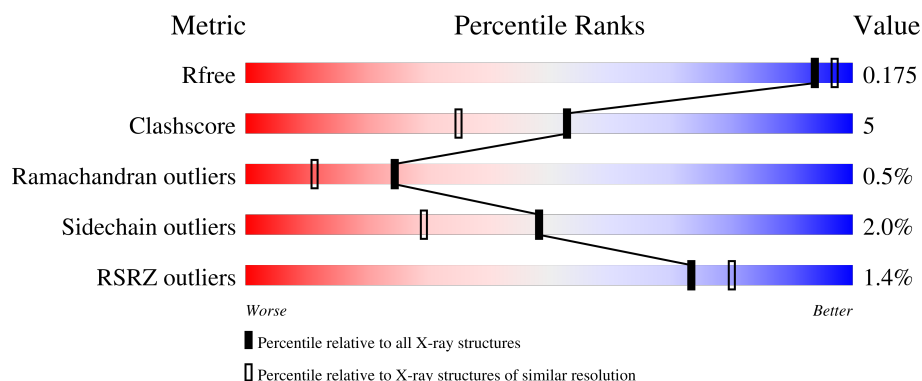
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.77 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1365 (1.78-1.78)
Clashscore	190562	1395 (1.78-1.78)
Ramachandran outliers	187476	1382 (1.78-1.78)
Sidechain outliers	187428	1382 (1.78-1.78)
RSRZ outliers	180081	1365 (1.78-1.78)

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 $\leq 5\%$. 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	1045	

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 9465 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 Alpha-mannosidase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1016	8281	5259	1453	1528	41	0	13	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	ARG	-	expression tag	UNP Q24451
A	2	SER	-	expression tag	UNP Q24451
A	3	SER	-	expression tag	UNP Q24451
A	4	HIS	-	expression tag	UNP Q24451
A	5	HIS	-	expression tag	UNP Q24451
A	6	HIS	-	expression tag	UNP Q24451
A	7	HIS	-	expression tag	UNP Q24451
A	8	HIS	-	expression tag	UNP Q24451
A	9	HIS	-	expression tag	UNP Q24451
A	10	GLY	-	expression tag	UNP Q24451
A	11	GLU	-	expression tag	UNP Q24451
A	12	PHE	-	expression tag	UNP Q24451
A	907	LYS	GLU	conflict	UNP Q24451

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



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

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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		

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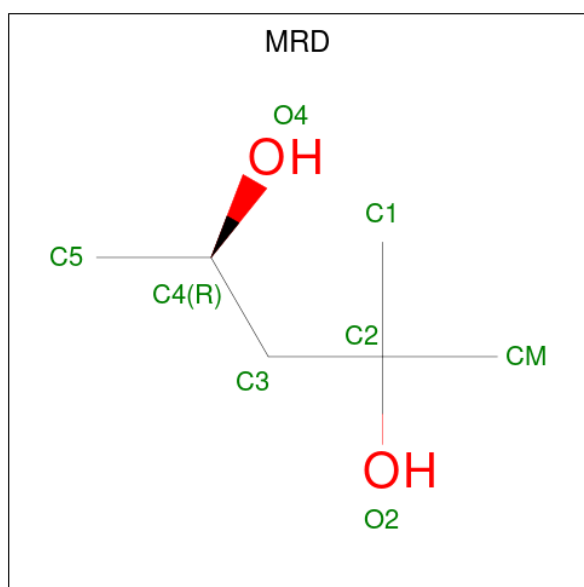
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is ZINC ION (CCD ID: ZN) (formula: Zn).

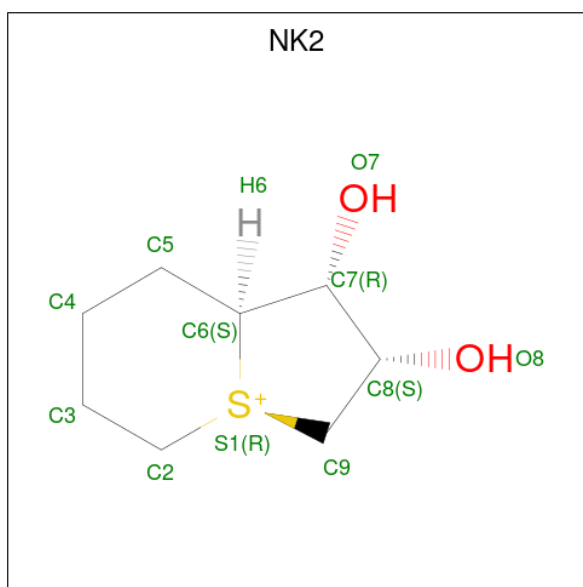
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Zn	0	0
			1	1		

- Molecule 5 is (4R)-2-METHYLPENTANE-2,4-DIOL (CCD ID: MRD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			8	6	2		

- Molecule 6 is (1R,6S,7R,8S)-1-THIONIABICYCLO[4.3.0]NONAN-7,8-DIOL (CCD ID: NK2) (formula: C₈H₁₅O₂S).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	O	S	0	0
			11	8	2	1		

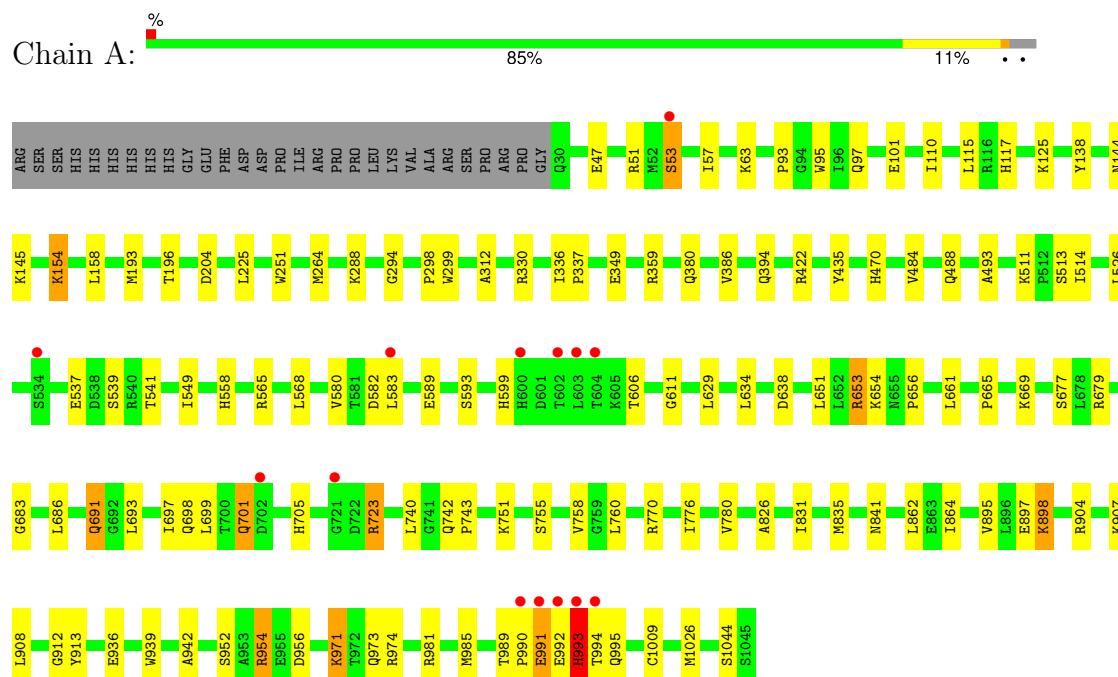
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1115	Total	O	0	10
			1125	1125		

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: Alpha-mannosidase 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	68.90Å 108.58Å 137.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.54 – 1.77 10.54 – 1.77	Depositor EDS
% Data completeness (in resolution range)	99.6 (10.54-1.77) 99.0 (10.54-1.77)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.15 (at 1.77Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.162 , 0.203 0.165 , 0.175	Depositor DCC
R_{free} test set	1470 reflections (1.46%)	wwPDB-VP
Wilson B-factor (Å ²)	13.8	Xtriage
Anisotropy	0.053	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.44 , 64.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	9465	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.30% 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, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, SO4, MRD, NAG, NK2

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	1.41	22/8516 (0.3%)	1.16	7/11559 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	53[A]	SER	C-O	10.96	1.38	1.24
1	A	53[B]	SER	C-O	10.96	1.38	1.24
1	A	831	ILE	CA-CB	7.45	1.63	1.54
1	A	864	ILE	C-O	7.17	1.31	1.23
1	A	110	ILE	CA-CB	7.00	1.62	1.54
1	A	196	THR	CA-CB	6.63	1.61	1.53
1	A	912	GLY	N-CA	6.54	1.51	1.45
1	A	593	SER	N-CA	5.95	1.50	1.45
1	A	599	HIS	C-O	-5.83	1.17	1.23
1	A	336	ILE	CA-CB	5.78	1.61	1.54
1	A	386	VAL	CA-CB	5.78	1.61	1.54
1	A	294	GLY	C-O	5.72	1.31	1.23
1	A	973	GLN	N-CA	5.71	1.53	1.45
1	A	776	ILE	C-O	5.68	1.30	1.24
1	A	514	ILE	N-CA	5.63	1.52	1.46
1	A	826	ALA	CA-CB	5.57	1.62	1.53
1	A	422	ARG	CA-CB	5.55	1.56	1.52
1	A	312	ALA	CA-CB	5.47	1.61	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	493	ALA	N-CA	5.26	1.52	1.46
1	A	780	VAL	CA-CB	5.24	1.60	1.54
1	A	359	ARG	N-CA	5.17	1.52	1.46
1	A	565	ARG	CZ-NH1	5.04	1.39	1.32

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	53[A]	SER	N-CA-C	7.24	122.52	112.45
1	A	53[B]	SER	N-CA-C	7.24	122.52	112.45
1	A	683	GLY	CA-C-N	-5.91	114.18	120.03
1	A	683	GLY	C-N-CA	-5.91	114.18	120.03
1	A	665	PRO	N-CA-C	5.57	120.82	113.86
1	A	699	LEU	N-CA-C	5.26	116.69	111.07
1	A	330	ARG	N-CA-C	5.12	119.57	113.23

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	954	ARG	Sidechain
1	A	993	HIS	Peptide

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	8281	0	8058	81	0
2	A	14	0	13	0	0
3	A	25	0	0	0	0
4	A	1	0	0	0	0
5	A	8	0	14	2	0
6	A	11	0	14	0	0
7	A	1125	0	0	22	0
All	All	9465	0	8099	83	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 5.

All (83) 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:936:GLU:HG2	7:A:6881:HOH:O	1.47	1.14
1:A:144:ASN:HB2	7:A:6738:HOH:O	1.68	0.92
1:A:954:ARG:NH2	1:A:981[A]:ARG:HH21	1.67	0.90
1:A:435:TYR:HE2	1:A:526:LEU:HD13	1.41	0.85
1:A:952:SER:H	1:A:995:GLN:NE2	1.76	0.84
5:A:2001:MRD:H1C1	7:A:6596:HOH:O	1.80	0.81
1:A:723:ARG:HG2	1:A:723:ARG:HH11	1.46	0.80
1:A:952:SER:H	1:A:995:GLN:HE21	1.28	0.80
1:A:154:LYS:HE2	7:A:6731:HOH:O	1.82	0.78
1:A:992:GLU:O	1:A:993:HIS:HB2	1.92	0.69
1:A:435:TYR:CE2	1:A:526:LEU:HD13	2.27	0.67
1:A:47:GLU:OE2	1:A:51:ARG:HD3	1.94	0.67
1:A:971:LYS:HB2	1:A:971:LYS:NZ	2.11	0.66
1:A:723:ARG:HH11	1:A:723:ARG:CG	2.09	0.65
1:A:125:LYS:HE2	7:A:6755:HOH:O	1.99	0.63
1:A:435:TYR:HE2	1:A:526:LEU:CD1	2.10	0.62
1:A:989:THR:CG2	1:A:991:GLU:HG3	2.30	0.62
1:A:47:GLU:CD	1:A:51:ARG:HD3	2.25	0.61
1:A:541:THR:HG23	7:A:6148:HOH:O	2.00	0.61
1:A:990:PRO:O	1:A:991:GLU:C	2.43	0.61
1:A:679:ARG:HH12	1:A:701:GLN:HG2	1.65	0.60
1:A:742:GLN:HG3	7:A:6196:HOH:O	2.03	0.58
5:A:2001:MRD:H1C3	7:A:6429:HOH:O	2.03	0.58
1:A:47:GLU:OE2	1:A:51:ARG:CD	2.50	0.58
1:A:541:THR:HG21	7:A:6162:HOH:O	2.03	0.58
1:A:537:GLU:HG2	1:A:539:SER:HB3	1.86	0.57
1:A:679:ARG:NH1	1:A:701:GLN:HG2	2.20	0.57
1:A:989:THR:HG22	1:A:991:GLU:HG3	1.86	0.56
1:A:971:LYS:HB2	1:A:971:LYS:HZ3	1.70	0.56
1:A:755[B]:SER:HB3	7:A:6308:HOH:O	2.07	0.55
1:A:154:LYS:CE	7:A:6731:HOH:O	2.45	0.54
1:A:679:ARG:HH12	1:A:701:GLN:CG	2.19	0.54
1:A:907:LYS:HG3	7:A:7111:HOH:O	2.05	0.54
1:A:651:LEU:CD1	1:A:653:ARG:HG2	2.38	0.54
1:A:904:ARG:HG2	1:A:985[A]:MET:SD	2.48	0.54
1:A:954:ARG:NH2	1:A:956:ASP:OD2	2.40	0.53
1:A:117:HIS:ND1	7:A:6776:HOH:O	2.23	0.53
1:A:125:LYS:CE	7:A:6755:HOH:O	2.56	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:484:VAL:O	1:A:488:GLN:HG3	2.09	0.53
1:A:511:LYS:HE2	1:A:513:SER:OG	2.10	0.52
1:A:939:TRP:CD2	1:A:942:ALA:HB2	2.46	0.51
1:A:974:ARG:NH1	7:A:6661:HOH:O	2.40	0.51
1:A:582:ASP:OD1	1:A:582:ASP:C	2.56	0.49
1:A:990:PRO:O	1:A:991:GLU:O	2.30	0.49
1:A:264[B]:MET:SD	1:A:337:PRO:HG2	2.52	0.49
1:A:723:ARG:HG2	1:A:723:ARG:NH1	2.21	0.48
1:A:651:LEU:HD11	1:A:653:ARG:HD2	1.95	0.47
1:A:740:LEU:HD22	1:A:760:LEU:HD22	1.96	0.47
1:A:251:TRP:CD1	1:A:251:TRP:C	2.92	0.47
1:A:611:GLY:HA3	1:A:661:LEU:CD2	2.45	0.47
1:A:743:PRO:HB2	1:A:758:VAL:CG2	2.44	0.46
1:A:288:LYS:HD2	1:A:349:GLU:CD	2.40	0.46
1:A:580:VAL:HG22	1:A:634:LEU:HD22	1.97	0.46
1:A:606:THR:HG21	1:A:653:ARG:NH2	2.30	0.46
1:A:913:TYR:HB2	1:A:985[B]:MET:HE3	1.97	0.46
1:A:841:ASN:HB3	1:A:898:LYS:HZ3	1.81	0.46
1:A:568:LEU:HD12	1:A:770:ARG:HD3	1.97	0.45
1:A:115:LEU:HD23	1:A:145:LYS:HD3	1.99	0.45
1:A:954:ARG:NH2	1:A:981[A]:ARG:NH2	2.49	0.45
1:A:656:PRO:HB3	7:A:6930:HOH:O	2.16	0.45
1:A:51:ARG:HG3	7:A:6409:HOH:O	2.16	0.44
1:A:558:HIS:HA	1:A:629:LEU:HD23	1.99	0.44
1:A:691:GLN:NE2	7:A:6208:HOH:O	2.48	0.44
1:A:589:GLU:OE2	1:A:751:LYS:HD3	2.18	0.43
1:A:693:LEU:HD13	7:A:6381:HOH:O	2.19	0.43
1:A:653:ARG:HD3	1:A:656:PRO:HA	2.01	0.43
1:A:835:MET:HE2	1:A:862:LEU:HD22	2.01	0.43
1:A:686:LEU:HD22	1:A:697:ILE:HG12	2.00	0.42
1:A:954:ARG:CZ	1:A:981[A]:ARG:HH21	2.32	0.42
1:A:225:LEU:C	1:A:225:LEU:HD23	2.45	0.42
1:A:895:VAL:HG12	1:A:897:GLU:HG3	2.01	0.42
1:A:53[A]:SER:HB2	7:A:6420:HOH:O	2.19	0.41
1:A:954:ARG:HH22	1:A:981[A]:ARG:HH21	1.57	0.41
1:A:298:PRO:HD2	1:A:299:TRP:CZ3	2.55	0.41
1:A:841:ASN:HB3	1:A:898:LYS:NZ	2.35	0.41
1:A:1009:CYS:HB3	1:A:1026:MET:HA	2.03	0.41
1:A:908:LEU:HG	7:A:7110:HOH:O	2.19	0.41
1:A:93:PRO:HD2	1:A:470:HIS:CE1	2.56	0.41
1:A:138:TYR:CE1	1:A:193:MET:CE	3.04	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:606:THR:HG21	1:A:653:ARG:HH21	1.86	0.40
1:A:97:GLN:HB3	1:A:101:GLU:HB2	2.03	0.40
1:A:698:GLN:HB2	1:A:705:HIS:ND1	2.37	0.40
1:A:380[A]:GLN:OE1	7:A:6044:HOH:O	2.21	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	1027/1045 (98%)	998 (97%)	24 (2%)	5 (0%)	24	11

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	991	GLU
1	A	993	HIS
1	A	95	TRP
1	A	994	THR
1	A	204	ASP

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	914/929 (98%)	896 (98%)	18 (2%)	48 29

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	ILE
1	A	63	LYS
1	A	154	LYS
1	A	158	LEU
1	A	394	GLN
1	A	549	ILE
1	A	583	LEU
1	A	638	ASP
1	A	653	ARG
1	A	654	LYS
1	A	669	LYS
1	A	677	SER
1	A	691	GLN
1	A	701	GLN
1	A	723	ARG
1	A	898	LYS
1	A	971	LYS
1	A	1044	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	249	GLN
1	A	347	ASN
1	A	371	ASN
1	A	373	GLN
1	A	701	GLN
1	A	778	ASN
1	A	812	GLN
1	A	866	GLN
1	A	995	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 1 is monoatomic - leaving 8 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	MRD	A	2001	-	7,7,7	0.96	0	9,10,10	1.03	0
3	SO4	A	4004	-	4,4,4	0.39	0	6,6,6	0.53	0
2	NAG	A	3001	1	14,14,15	0.67	0	17,19,21	2.84	6 (35%)
3	SO4	A	4003	-	4,4,4	0.41	0	6,6,6	0.56	0
3	SO4	A	4005	-	4,4,4	0.23	0	6,6,6	0.07	0
6	NK2	A	6001	4	10,12,12	0.56	0	11,17,17	2.19	4 (36%)
3	SO4	A	4001	-	4,4,4	0.57	0	6,6,6	0.27	0
3	SO4	A	4002	-	4,4,4	0.46	0	6,6,6	0.28	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	MRD	A	2001	-	-	2/5/5/5	-
6	NK2	A	6001	4	-	-	0/2/2/2
2	NAG	A	3001	1	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	3001	NAG	C1-O5-C5	9.50	124.91	112.19
6	A	6001	NK2	C2-S1-C9	5.14	110.98	100.28
2	A	3001	NAG	O5-C5-C4	3.40	119.09	110.83
6	A	6001	NK2	C9-C8-C7	3.05	109.08	106.43
2	A	3001	NAG	C4-C3-C2	-2.62	107.18	111.02
2	A	3001	NAG	C1-C2-N2	2.43	114.27	110.43
2	A	3001	NAG	O5-C1-C2	-2.29	107.74	111.29
2	A	3001	NAG	C8-C7-N2	2.23	119.81	116.12
6	A	6001	NK2	C5-C6-C7	-2.22	113.35	117.39
6	A	6001	NK2	C4-C5-C6	2.15	114.60	111.04

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	3001	NAG	C8-C7-N2-C2
2	A	3001	NAG	O7-C7-N2-C2
5	A	2001	MRD	C2-C3-C4-O4
5	A	2001	MRD	C2-C3-C4-C5
2	A	3001	NAG	O5-C5-C6-O6
2	A	3001	NAG	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	2001	MRD	2	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	1016/1045 (97%)	-0.59	14 (1%) 73 80	4, 14, 28, 51	13 (1%)

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	992	GLU	7.5
1	A	993	HIS	6.8
1	A	991	GLU	6.1
1	A	994	THR	3.9
1	A	602	THR	3.1
1	A	603	LEU	2.9
1	A	583	LEU	2.9
1	A	721	GLY	2.6
1	A	534	SER	2.6
1	A	990	PRO	2.6
1	A	600	HIS	2.5
1	A	53[A]	SER	2.3
1	A	604	THR	2.0
1	A	702	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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($\text{\AA}^2$)	Q<0.9
2	NAG	A	3001	14/15	0.51	0.13	48,58,62,63	0
3	SO4	A	4005	5/5	0.73	0.36	20,20,20,20	0
3	SO4	A	4004	5/5	0.81	0.15	51,53,58,58	0
3	SO4	A	4002	5/5	0.88	0.14	41,45,48,48	0
3	SO4	A	4001	5/5	0.93	0.16	21,23,29,38	0
3	SO4	A	4003	5/5	0.93	0.10	48,49,54,54	0
5	MRD	A	2001	8/8	0.95	0.05	13,19,24,25	0
6	NK2	A	6001	11/11	0.98	0.05	7,9,12,13	0
4	ZN	A	5001	1/1	1.00	0.03	11,11,11,11	0

6.5 Other polymers [i](#)

There are no such residues in this entry.