



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 14, 2017 – 10:15 am GMT

PDB ID : 2X8S
Title : CRYSTAL STRUCTURE OF THE ABN2 D171A MUTANT IN COMPLEX WITH ARABINOTRIOSE
Authors : Desanctis, D.; Inacio, J.M.; Lindley, P.F.; De Sa-Nogueira, I.; Bento, I.
Deposited on : 2010-03-11
Resolution : 1.50 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

<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 : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : trunk28620
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
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) : recalc28949

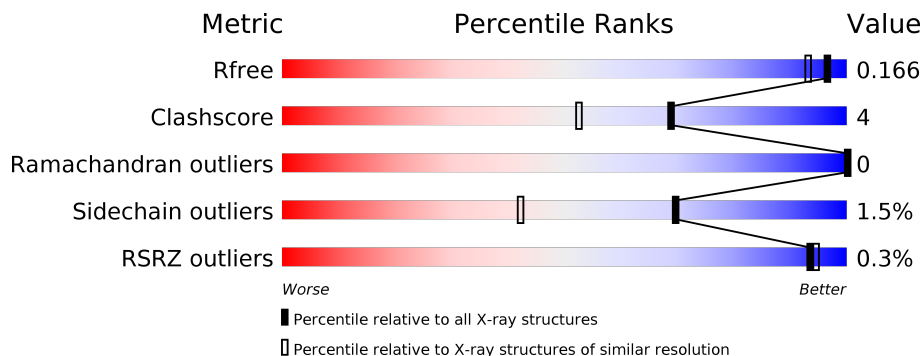
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.50 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}	100719	2279 (1.50-1.50)
Clashscore	112137	2503 (1.50-1.50)
Ramachandran outliers	110173	2445 (1.50-1.50)
Sidechain outliers	110143	2443 (1.50-1.50)
RSRZ outliers	101464	2305 (1.50-1.50)

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	470	 85% 9% 6%
1	B	470	 85% 9% 6%

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
2	AHR	A	1471	-	-	-	X
2	AHR	A	1472	-	-	-	X
2	AHR	A	1473[A]	-	-	-	X
2	AHR	A	1473[B]	-	-	-	X
2	AHR	B	1472	-	-	-	X
2	AHR	B	1474[A]	-	-	-	X
2	AHR	B	1474[B]	-	-	-	X
3	CL	B	1478	-	-	-	X
4	GOL	A	1475	-	-	-	X
4	GOL	A	1476	-	-	-	X
4	GOL	A	1477	-	-	X	X
4	GOL	B	1476	-	-	-	X
4	GOL	B	1480	-	-	X	X
4	GOL	B	1482	-	-	-	X
5	TRS	A	1478	-	-	-	X
8	PO4	B	1479	-	-	-	X
9	MPD	B	1483	-	-	-	X

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 7979 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 ENDO-ALPHA-1,5-L-ARABINANASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	443	Total	C	N	O	S	0	10	0
			3577	2273	605	687	12			
1	B	443	Total	C	N	O	S	0	11	0
			3590	2283	607	687	13			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	171	ALA	ASP	ENGINEERED MUTATION	UNP B3FRL6
A	470	LEU	-	EXPRESSION TAG	UNP B3FRL6
B	171	ALA	ASP	ENGINEERED MUTATION	UNP B3FRL6
B	470	LEU	-	EXPRESSION TAG	UNP B3FRL6

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

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	3	Total	C	O	0	1
			29	15	14		
2	B	3	Total	C	O	0	1
			29	15	14		

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	2	Total	Cl	0	0
			2	2		
3	A	1	Total	Cl	0	0
			1	1		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 5 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C₄H₁₂NO₃).



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

- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	1	Total	Ca	0	0
			1	1		

- Molecule 7 is SODIUM ION (three-letter code: NA) (formula: Na).

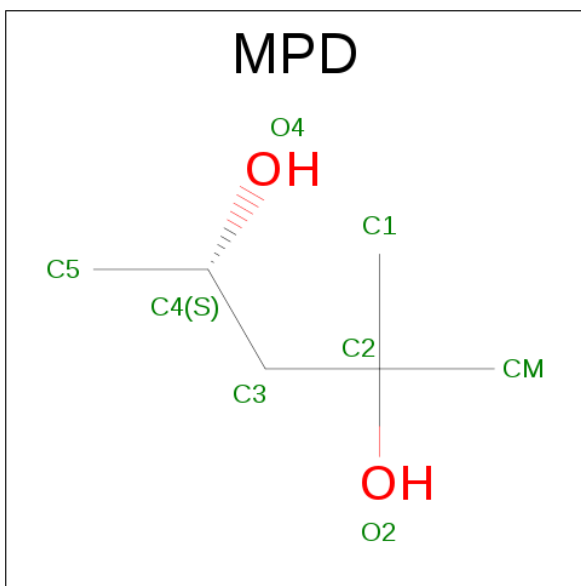
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	2	Total	Na	0	0
			2	2		

- Molecule 8 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



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

- Molecule 9 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	B	1	Total	C	O	0	0
			8	6	2		

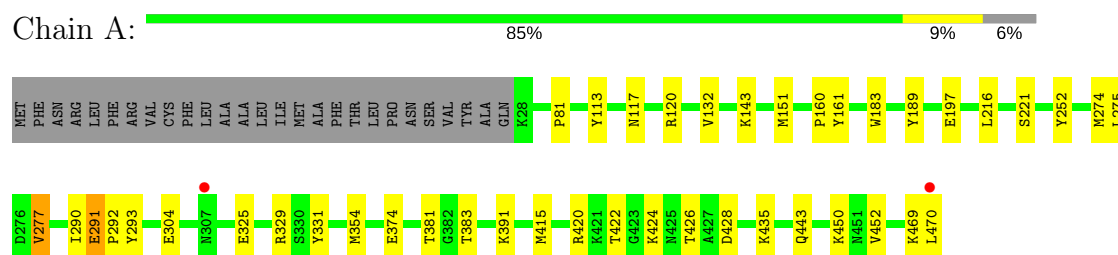
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	326	Total 326	O 326	0	0
10	B	365	Total 365	O 365	0	0

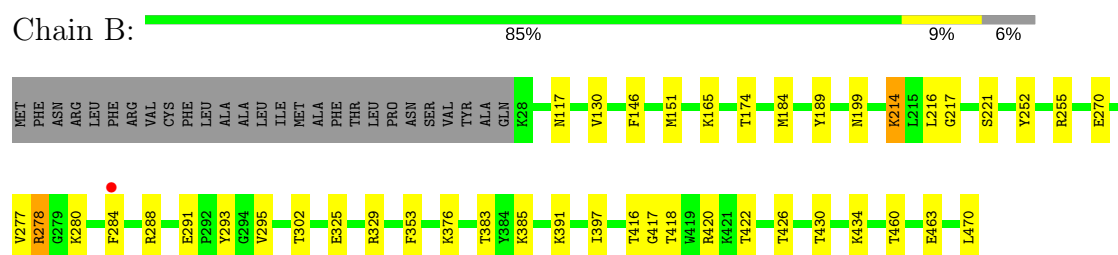
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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: ENDO-ALPHA-1,5-L-ARABINANASE



• Molecule 1: ENDO-ALPHA-1,5-L-ARABINANASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	51.95Å 57.98Å 85.59Å 96.14° 91.77° 117.34°	Depositor
Resolution (Å)	24.59 – 1.50 46.62 – 1.41	Depositor EDS
% Data completeness (in resolution range)	96.0 (24.59-1.50) 88.7 (46.62-1.41)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.44 (at 1.41Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.147 , 0.167 0.146 , 0.166	Depositor DCC
R_{free} test set	6702 reflections (4.96%)	DCC
Wilson B-factor (Å ²)	11.6	Xtriage
Anisotropy	0.173	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 51.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.019 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7979	wwPDB-VP
Average B, all atoms (Å ²)	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.51% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, MPD, CL, NA, CA, AHR, TRS, PO4

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	0.80	10/3673 (0.3%)	0.67	3/4976 (0.1%)
1	B	0.88	7/3686 (0.2%)	0.67	1/4992 (0.0%)
All	All	0.84	17/7359 (0.2%)	0.67	4/9968 (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	B	1	0

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	325	GLU	C-N	-12.28	1.05	1.34
1	B	325	GLU	C-N	-11.77	1.06	1.34
1	B	270	GLU	CB-CG	-8.71	1.35	1.52
1	A	81	PRO	C-N	-7.23	1.17	1.34
1	A	291	GLU	CB-CG	-7.20	1.38	1.52
1	A	452[A]	VAL	CB-CG2	-7.17	1.37	1.52
1	A	452[B]	VAL	CB-CG2	-7.17	1.37	1.52
1	B	270	GLU	CD-OE2	-6.99	1.18	1.25
1	B	284	PHE	CB-CG	-6.35	1.40	1.51
1	A	291	GLU	CG-CD	5.94	1.60	1.51
1	A	304	GLU	CD-OE1	-5.67	1.19	1.25
1	A	277[A]	VAL	CB-CG2	-5.63	1.41	1.52
1	A	277[B]	VAL	CB-CG2	-5.63	1.41	1.52
1	A	290	ILE	C-O	-5.51	1.12	1.23
1	B	214	LYS	CD-CE	-5.31	1.38	1.51
1	B	165	LYS	CD-CE	-5.25	1.38	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	353	PHE	C-O	-5.13	1.13	1.23

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	354	MET	CG-SD-CE	-12.18	80.72	100.20
1	B	278	ARG	NE-CZ-NH2	6.41	123.50	120.30
1	A	120	ARG	NE-CZ-NH1	-6.07	117.26	120.30
1	A	275	LEU	CB-CG-CD2	5.23	119.89	111.00

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	B	397[B]	ILE	CB

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	3577	0	3426	23	0
1	B	3590	0	3454	36	0
2	A	29	0	22	0	0
2	B	29	0	20	0	0
3	A	1	0	0	0	0
3	B	2	0	0	1	0
4	A	18	0	24	6	0
4	B	18	0	23	5	0
5	A	8	0	10	1	0
6	B	1	0	0	0	0
7	B	2	0	0	0	0
8	B	5	0	0	0	0
9	B	8	0	14	0	0
10	A	326	0	0	2	0
10	B	365	0	0	8	0
All	All	7979	0	6993	62	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 4.

All (62) 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:199:ASN:HD21	4:B:1480:GOL:H11	0.99	1.10
1:B:329[A]:ARG:HG2	1:B:329[A]:ARG:HH21	1.18	1.07
1:B:199:ASN:ND2	4:B:1480:GOL:H11	1.79	0.97
4:A:1477:GOL:H11	1:B:288:ARG:HG3	1.47	0.93
1:B:329[A]:ARG:CG	1:B:329[A]:ARG:HH21	1.81	0.92
1:B:199:ASN:HD21	4:B:1480:GOL:C1	1.90	0.79
1:A:277[B]:VAL:HG12	1:A:293:TYR:CG	2.24	0.73
1:B:329[A]:ARG:CG	1:B:329[A]:ARG:NH2	2.45	0.67
1:A:274:MET:O	1:A:277[B]:VAL:HG22	1.95	0.66
1:B:420:ARG:HD2	3:B:1478:CL:CL	2.33	0.65
1:B:434:LYS:HE2	10:B:2336:HOH:O	1.95	0.65
4:A:1475:GOL:H32	10:A:2014:HOH:O	1.96	0.65
1:A:277[A]:VAL:HG22	1:A:293:TYR:CG	2.33	0.64
1:B:329[A]:ARG:HG2	1:B:329[A]:ARG:NH2	2.00	0.64
4:B:1480:GOL:H2	10:B:2364:HOH:O	2.00	0.61
4:A:1477:GOL:H12	1:B:288:ARG:HB2	1.84	0.60
1:B:383:THR:HG22	1:B:470:LEU:HD23	1.86	0.58
1:A:132[B]:VAL:HG21	1:A:143:LYS:HD2	1.86	0.56
1:B:418:THR:OG1	1:B:430[B]:THR:HG22	2.06	0.56
1:B:422:THR:HB	1:B:426:THR:HB	1.88	0.55
1:B:434:LYS:CE	10:B:2336:HOH:O	2.54	0.55
1:B:302:THR:HB	1:B:397[B]:ILE:HD11	1.88	0.54
1:A:160:PRO:HD3	4:A:1477:GOL:H32	1.90	0.54
1:B:418:THR:H	1:B:430[B]:THR:HG22	1.73	0.53
1:B:460:THR:HG23	10:B:2335:HOH:O	2.07	0.52
1:A:435:LYS:HB3	1:A:435:LYS:NZ	2.24	0.52
4:B:1480:GOL:H12	10:B:2365:HOH:O	2.10	0.51
1:B:277:VAL:HG22	1:B:293:TYR:CG	2.46	0.49
1:A:329[B]:ARG:NE	1:A:331:TYR:OH	2.43	0.49
1:B:417:GLY:HA3	1:B:430[A]:THR:O	2.13	0.49
1:A:277[B]:VAL:HG12	1:A:293:TYR:CD2	2.48	0.49
1:A:132[B]:VAL:CG2	1:A:143:LYS:HD2	2.43	0.48
1:B:418:THR:N	1:B:430[B]:THR:HG22	2.28	0.48
1:B:130[B]:VAL:HG23	1:B:146:PHE:CE1	2.50	0.47
1:B:278:ARG:NH1	10:B:2219:HOH:O	2.47	0.47
1:B:416[A]:THR:HG22	10:B:2317:HOH:O	2.15	0.47
1:B:329[A]:ARG:NH2	10:B:2247:HOH:O	2.48	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:113:TYR:CD2	1:A:132[B]:VAL:HG22	2.50	0.46
1:A:277[B]:VAL:O	1:A:277[B]:VAL:HG23	2.15	0.46
1:B:174:THR:OG1	1:B:184[B]:MET:HG3	2.16	0.45
1:A:420:ARG:HG3	1:A:428:ASP:HB3	1.99	0.45
4:A:1477:GOL:H11	1:B:288:ARG:CG	2.32	0.45
1:A:291:GLU:N	1:A:292:PRO:CD	2.80	0.45
1:A:381:THR:C	1:A:469:LYS:HZ1	2.20	0.45
1:A:189:TYR:HA	1:A:221:SER:O	2.17	0.44
1:B:385:LYS:HG3	1:B:470:LEU:HD11	2.00	0.44
1:A:374:GLU:HA	1:A:424:LYS:HG2	1.99	0.44
1:B:189:TYR:HA	1:B:221:SER:O	2.20	0.42
1:A:443[B]:GLN:HB2	10:A:2251:HOH:O	2.19	0.42
1:B:214:LYS:CE	1:B:217:GLY:O	2.67	0.42
1:A:422:THR:HB	1:A:426:THR:HB	2.01	0.42
1:A:383:THR:HG22	1:A:470:LEU:HD12	2.02	0.41
1:A:383:THR:CG2	1:A:470:LEU:HD12	2.50	0.41
1:A:161:TYR:O	1:B:280:LYS:HE2	2.20	0.41
5:A:1478:TRS:O2	5:A:1478:TRS:O1	2.36	0.41
1:A:183:TRP:CZ3	1:A:197:GLU:HG2	2.56	0.41
4:A:1477:GOL:C1	1:B:288:ARG:HB2	2.50	0.41
1:B:391:LYS:HG2	1:B:463:GLU:HG2	2.03	0.41
1:B:288:ARG:HH21	1:B:291:GLU:CD	2.24	0.41
1:B:418:THR:H	1:B:430[B]:THR:CG2	2.33	0.40
1:A:450:LYS:HB3	1:A:450:LYS:HE3	1.71	0.40
1:B:255:ARG:HA	1:B:295:VAL:O	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	451/470 (96%)	441 (98%)	10 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	452/470 (96%)	442 (98%)	10 (2%)	0	100	100
All	All	903/940 (96%)	883 (98%)	20 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	380/394 (96%)	374 (98%)	6 (2%)	68	39
1	B	382/394 (97%)	377 (99%)	5 (1%)	73	48
All	All	762/788 (97%)	751 (99%)	11 (1%)	70	45

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	117	ASN
1	A	151	MET
1	A	216	LEU
1	A	252	TYR
1	A	391	LYS
1	A	415	MET
1	B	117	ASN
1	B	151	MET
1	B	216	LEU
1	B	252	TYR
1	B	376	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	318	HIS
1	A	351	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 ⓘ

8 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$
2	AHR	A	1471	2	10,10,10	0.79	0	13,14,14	1.44	3 (23%)
2	AHR	A	1472	2	9,9,10	0.89	1 (11%)	9,12,14	0.88	1 (11%)
2	AHR	A	1473[A]	-	9,9,10	0.50	0	9,12,14	1.19	1 (11%)
2	AHR	A	1473[B]	-	9,9,10	0.52	0	9,12,14	0.89	1 (11%)
2	AHR	B	1472	2	10,10,10	0.80	0	13,14,14	1.63	2 (15%)
2	AHR	B	1473	2	9,9,10	0.84	1 (11%)	9,12,14	0.78	0
2	AHR	B	1474[A]	-	9,9,10	1.70	1 (11%)	9,12,14	0.81	0
2	AHR	B	1474[B]	-	9,9,10	0.56	0	9,12,14	1.24	1 (11%)

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	AHR	A	1471	2	-	0/2/18/18	0/1/1/1
2	AHR	A	1472	2	-	0/2/15/18	0/1/1/1
2	AHR	A	1473[A]	-	-	0/2/15/18	0/1/1/1
2	AHR	A	1473[B]	-	-	0/2/15/18	0/1/1/1
2	AHR	B	1472	2	-	0/2/18/18	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	AHR	B	1473	2	-	0/2/15/18	0/1/1/1
2	AHR	B	1474[A]	-	-	0/2/15/18	0/1/1/1
2	AHR	B	1474[B]	-	-	0/2/15/18	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1474[A]	AHR	O5'-C5'	-5.00	1.21	1.42
2	B	1473	AHR	O5'-C5'	-2.02	1.33	1.42
2	A	1472	AHR	O5'-C5'	-2.00	1.33	1.42

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1472	AHR	O5'-C5'-C4'	-3.87	98.33	111.34
2	B	1474[B]	AHR	O5'-C5'-C4'	-3.23	100.48	111.34
2	A	1473[A]	AHR	O5'-C5'-C4'	-3.13	100.81	111.34
2	A	1471	AHR	O1'-C1'-O4'	-2.25	108.11	111.14
2	A	1472	AHR	C1'-C2'-C3'	2.03	104.78	101.67
2	A	1473[B]	AHR	O5'-C5'-C4'	2.03	118.17	111.34
2	A	1471	AHR	O4'-C1'-C2'	2.04	107.04	104.46
2	B	1472	AHR	C1'-C2'-C3'	2.53	105.50	102.30
2	A	1471	AHR	C1'-C2'-C3'	2.84	105.89	102.30

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 15 ligands modelled in this entry, 6 are monoatomic - leaving 9 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	GOL	A	1475	-	5,5,5	0.42	0	5,5,5	0.49	0
4	GOL	A	1476	-	5,5,5	0.83	0	5,5,5	0.84	0
4	GOL	A	1477	-	5,5,5	0.80	0	5,5,5	1.45	1 (20%)
5	TRS	A	1478	-	7,7,7	1.42	1 (14%)	9,9,9	1.46	3 (33%)
4	GOL	B	1476	-	5,5,5	0.44	0	5,5,5	0.40	0
8	PO4	B	1479	-	4,4,4	0.75	0	6,6,6	0.41	0
4	GOL	B	1480	-	5,5,5	1.40	0	5,5,5	1.91	2 (40%)
4	GOL	B	1482	-	5,5,5	0.62	0	5,5,5	0.65	0
9	MPD	B	1483	-	7,7,7	0.25	0	9,10,10	0.24	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	A	1475	-	-	0/4/4/4	0/0/0/0
4	GOL	A	1476	-	-	0/4/4/4	0/0/0/0
4	GOL	A	1477	-	-	0/4/4/4	0/0/0/0
5	TRS	A	1478	-	-	0/9/9/9	0/0/0/0
4	GOL	B	1476	-	-	0/4/4/4	0/0/0/0
8	PO4	B	1479	-	-	0/0/0/0	0/0/0/0
4	GOL	B	1480	-	-	0/4/4/4	0/0/0/0
4	GOL	B	1482	-	-	0/4/4/4	0/0/0/0
9	MPD	B	1483	-	-	0/5/5/5	0/0/0/0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1478	TRS	O1-C1	-2.37	1.34	1.42

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1478	TRS	O3-C3-C	-2.69	102.67	110.47
4	B	1480	GOL	C3-C2-C1	-2.66	100.93	111.52
4	B	1480	GOL	O1-C1-C2	-2.50	97.47	110.07
5	A	1478	TRS	O1-C1-C	-2.37	103.61	110.47
5	A	1478	TRS	C3-C-N	2.04	112.07	107.73
4	A	1477	GOL	C3-C2-C1	3.03	123.57	111.52

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1475	GOL	1	0
4	A	1477	GOL	5	0
5	A	1478	TRS	1	0
4	B	1480	GOL	5	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	443/470 (94%)	-0.38	2 (0%) 90 93	6, 13, 28, 40	0
1	B	443/470 (94%)	-0.38	1 (0%) 94 95	5, 12, 24, 39	0
All	All	886/940 (94%)	-0.38	3 (0%) 93 94	5, 13, 27, 40	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	307	ASN	3.8
1	B	284	PHE	3.6
1	A	470	LEU	2.9

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(Å ²)	Q<0.9
2	AHR	A	1473[B]	9/10	0.94	0.22	16.33	17,17,19,20	1
2	AHR	A	1473[A]	9/10	0.94	0.22	16.33	17,17,19,20	1
2	AHR	A	1471	10/10	0.89	0.20	7.48	12,25,26,26	0
2	AHR	A	1472	9/10	0.96	0.09	3.61	9,10,13,19	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	AHR	B	1474[B]	9/10	0.96	0.15	3.10	11,12,14,16	1
2	AHR	B	1474[A]	9/10	0.96	0.15	3.10	11,12,14,16	1
2	AHR	B	1472	10/10	0.85	0.19	2.22	13,26,28,28	0
2	AHR	B	1473	9/10	0.96	0.10	0.56	9,10,12,13	0

6.4 Ligands ⓘ

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
4	GOL	A	1475	6/6	0.96	0.18	47.49	14,22,29,32	0
4	GOL	A	1476	6/6	0.91	0.15	17.57	16,26,33,34	0
4	GOL	B	1482	6/6	0.92	0.16	15.71	13,27,34,36	0
4	GOL	A	1477	6/6	0.85	0.26	7.63	30,35,39,44	0
4	GOL	B	1480	6/6	0.89	0.20	6.99	23,31,46,49	0
8	PO4	B	1479	5/5	0.90	0.19	6.65	43,51,52,67	0
5	TRS	A	1478	8/8	0.83	0.13	4.26	38,38,48,51	0
9	MPD	B	1483	8/8	0.87	0.17	4.01	30,38,43,50	0
4	GOL	B	1476	6/6	0.95	0.11	3.82	14,18,23,26	0
3	CL	B	1478	1/1	0.97	0.19	3.67	36,36,36,36	0
6	CA	B	1471	1/1	1.00	0.08	1.61	5,5,5,5	0
7	NA	B	1477	1/1	0.98	0.08	-0.55	25,25,25,25	0
3	CL	B	1475	1/1	0.99	0.04	-	14,14,14,14	0
3	CL	A	1474	1/1	0.99	0.04	-	16,16,16,16	0
7	NA	B	1481	1/1	0.83	0.08	-	48,48,48,48	0

6.5 Other polymers ⓘ

There are no such residues in this entry.