



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 07:48 PM GMT

PDB ID : 1HBJ  
Title : X-ray Crystal structure of complex between *Torpedo californica* AChE and a reversible inhibitor, 4-Amino-5-fluoro-2-methyl-3-(3-trifluoroacetylbenzylthio methyl)quinoline  
Authors : Greenblatt, H.M.; Kryger, G.; Lewis, T.L.; Doucet, C.; Viner, R.; Silman, I.; Sussman, J.L.  
Deposited on : 2001-04-16  
Resolution : 2.50 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](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

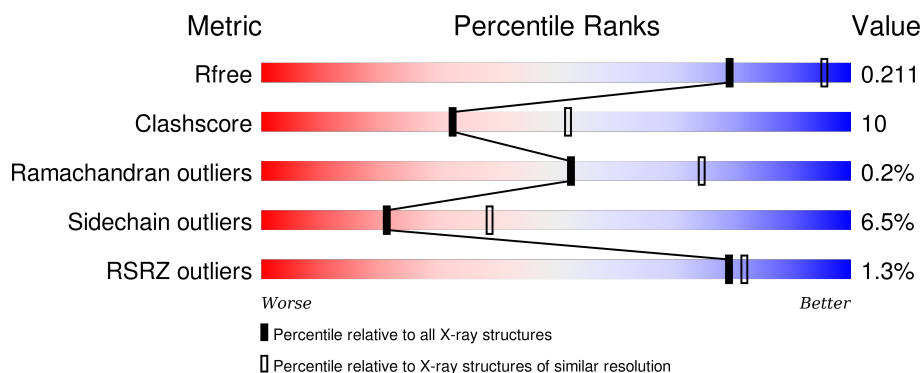
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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))
$R_{free}$	91344	3553 (2.50-2.50)
Clashscore	102246	4242 (2.50-2.50)
Ramachandran outliers	100387	4156 (2.50-2.50)
Sidechain outliers	100360	4158 (2.50-2.50)
RSRZ outliers	91569	3562 (2.50-2.50)

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  $\geq 3$ , 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	543	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	MES	A	1540	-	-	-	X

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	PG4	A	1541	-	-	-	X

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 4510 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 ACETYLCHOLINESTERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	532	Total	C	N	O	S	0	0	0
			4244	2721	720	781	22			

- Molecule 2 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).

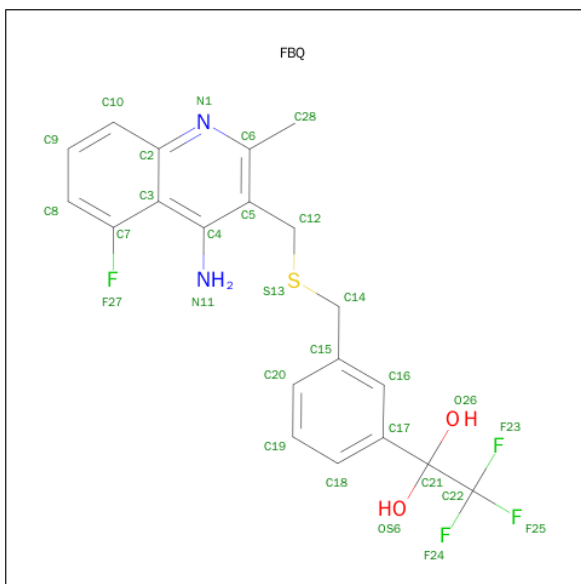


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		

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

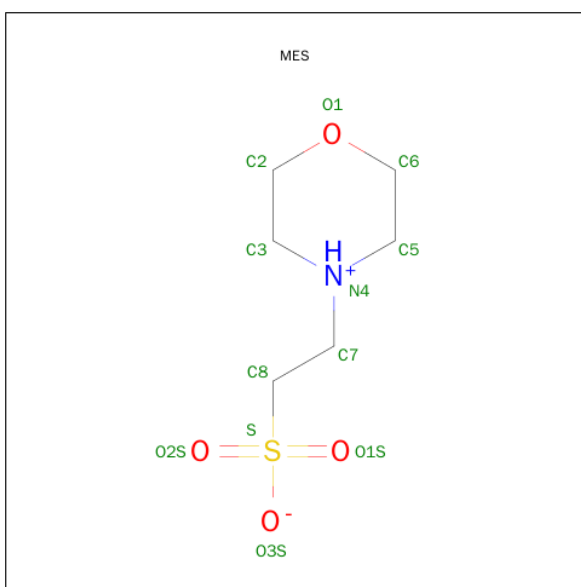
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 4 is 1-[3-({[(4-AMINO-5-FLUORO-2-METHYLQUINOLIN-3-YL)METHYL]THIO}METHYL)PHENYL]-2,2,2-TRIFLUOROETHANE-1,1-DIOL (three-letter code: FBQ) (formula: C<sub>20</sub>H<sub>18</sub>F<sub>4</sub>N<sub>2</sub>O<sub>2</sub>S).



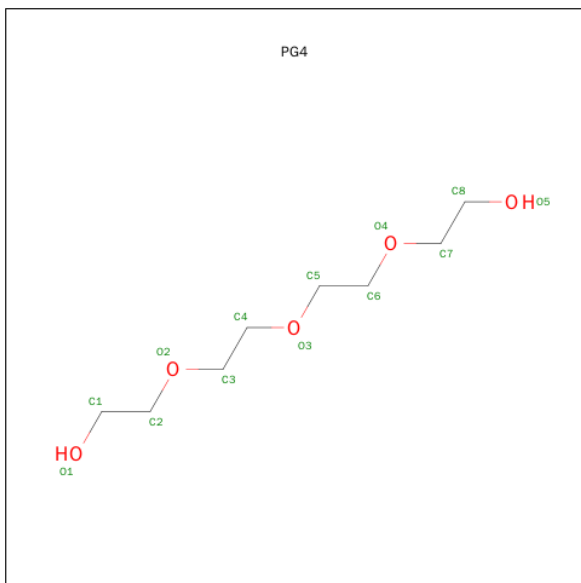
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
4	A	1	28	20	4	2	1	0	0

- Molecule 5 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 6 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: C<sub>8</sub>H<sub>18</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			13	8	5		

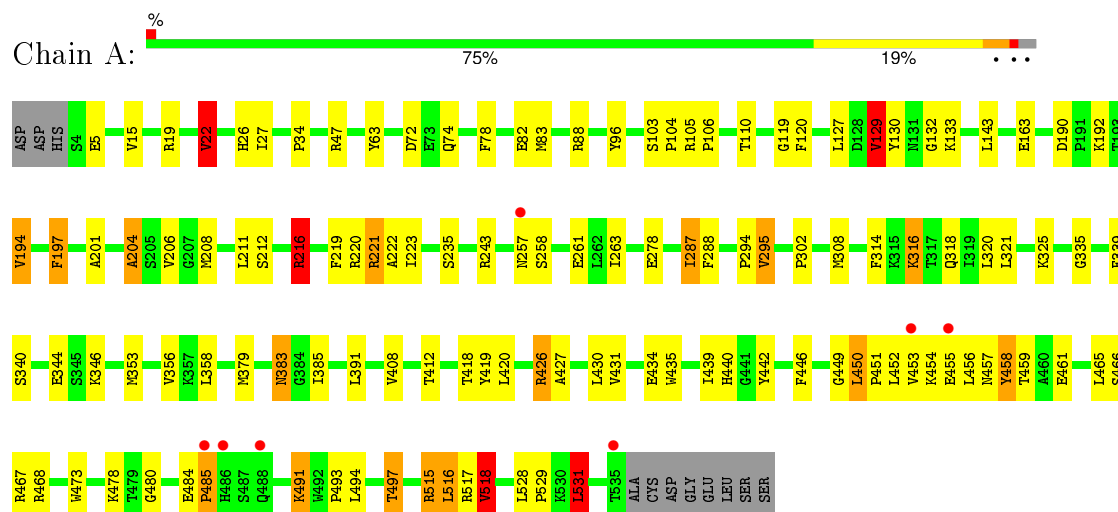
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	171	Total	O	0	0
			171	171		

### 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 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 ( $\text{RSRZ} > 2$ ). 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: ACETYLCHOLINESTERASE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	112.33Å 112.33Å 137.07Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.31 – 2.50 29.31 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.3 (29.31-2.50) 98.4 (29.31-2.50)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.40 (at 2.51Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.183 , 0.214 0.180 , 0.211	Depositor DCC
$R_{free}$ test set	1690 reflections (5.17%)	DCC
Wilson B-factor (Å <sup>2</sup> )	37.7	Xtriage
Anisotropy	0.479	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 37.8	EDS
Estimated twinning fraction	0.022 for -h,-k,l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 34409 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	4510	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.54% 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: FBQ, PG4, MES, NAG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	1.00	3/4367 (0.1%)	0.96	15/5929 (0.3%)

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

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	219	PHE	CD2-CE2	5.54	1.50	1.39
1	A	204	ALA	CA-CB	5.43	1.63	1.52
1	A	325	LYS	CE-NZ	5.08	1.61	1.49

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	216	ARG	NE-CZ-NH2	-8.07	116.26	120.30
1	A	518	VAL	CB-CA-C	-7.09	97.92	111.40
1	A	531	LEU	CA-CB-CG	6.89	131.14	115.30
1	A	221	ARG	NE-CZ-NH2	-6.50	117.05	120.30
1	A	516	LEU	CA-CB-CG	6.41	130.03	115.30
1	A	515	ARG	NE-CZ-NH2	-5.99	117.31	120.30
1	A	518	VAL	CG1-CB-CG2	5.72	120.06	110.90
1	A	22	VAL	CB-CA-C	-5.55	100.86	111.40
1	A	517	ARG	NE-CZ-NH1	-5.51	117.55	120.30
1	A	430	LEU	CA-CB-CG	5.46	127.85	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	216	ARG	NE-CZ-NH1	5.39	123.00	120.30
1	A	129	VAL	CB-CA-C	-5.35	101.24	111.40
1	A	295	VAL	CB-CA-C	-5.20	101.52	111.40
1	A	458	TYR	N-CA-C	-5.19	96.98	111.00
1	A	72	ASP	CB-CG-OD1	5.18	122.96	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	63	TYR	Sidechain

## 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	4244	0	4095	88	0
2	A	14	0	13	0	0
3	A	28	0	25	0	0
4	A	28	0	17	2	0
5	A	12	0	13	0	0
6	A	13	0	18	1	0
7	A	171	0	0	8	0
All	All	4510	0	4181	89	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 10.

All (89) 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:110:THR:OG1	1:A:478:LYS:HG2	1.78	0.83
1:A:452:LEU:HD13	1:A:467:ARG:NH2	2.00	0.77
1:A:383:ASN:HD22	1:A:383:ASN:C	1.88	0.76
1:A:22:VAL:HG13	1:A:133:LYS:HG3	1.69	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:427:ALA:HB2	1:A:442:TYR:CZ	2.23	0.72
1:A:427:ALA:HA	1:A:442:TYR:OH	1.90	0.71
1:A:515:ARG:NH2	7:A:2163:HOH:O	2.25	0.70
1:A:455:GLU:CD	1:A:455:GLU:H	1.96	0.69
1:A:302:PRO:HD2	1:A:308:MET:SD	2.34	0.68
1:A:27:ILE:C	1:A:27:ILE:HD12	2.18	0.64
1:A:419:TYR:CZ	1:A:494:LEU:HD13	2.32	0.64
1:A:190:ASP:OD1	1:A:192:LYS:HG2	1.97	0.64
1:A:223:ILE:HA	1:A:320:LEU:O	1.98	0.63
1:A:451:PRO:HA	1:A:458:TYR:CD1	2.35	0.62
1:A:528:LEU:HB3	1:A:529:PRO:HD3	1.80	0.62
1:A:439:ILE:HG22	1:A:440:HIS:N	2.14	0.62
1:A:484:GLU:OE1	1:A:484:GLU:HA	2.00	0.62
1:A:211:LEU:HD23	1:A:314:PHE:HB3	1.82	0.60
1:A:132:GLY:HA3	1:A:143:LEU:HD23	1.84	0.59
1:A:412:THR:HG22	1:A:497:THR:HG22	1.86	0.58
1:A:132:GLY:HA3	1:A:143:LEU:CD2	2.32	0.58
1:A:287:ILE:HD11	1:A:335:GLY:HA3	1.86	0.58
1:A:408:VAL:HG23	1:A:418:THR:HG21	1.88	0.56
1:A:346:LYS:HG2	1:A:385:ILE:HD13	1.88	0.54
1:A:426:ARG:HH21	1:A:434:GLU:HG3	1.72	0.54
1:A:484:GLU:OE1	1:A:485:PRO:HD2	2.08	0.54
1:A:22:VAL:CG1	1:A:133:LYS:HG3	2.36	0.54
1:A:197:PHE:CB	1:A:223:ILE:HB	2.39	0.53
1:A:468:ARG:HD3	7:A:2154:HOH:O	2.09	0.51
1:A:453:VAL:HG22	1:A:456:LEU:HG	1.92	0.51
1:A:461:GLU:CD	1:A:461:GLU:H	2.13	0.51
1:A:383:ASN:C	1:A:383:ASN:ND2	2.63	0.50
1:A:449:GLY:HA2	1:A:466:SER:OG	2.11	0.50
1:A:197:PHE:HB2	1:A:223:ILE:HB	1.94	0.49
1:A:316:LYS:NZ	7:A:2116:HOH:O	2.44	0.49
1:A:19:ARG:CZ	1:A:26:HIS:HB2	2.42	0.49
1:A:204:ALA:O	1:A:208:MET:HG3	2.12	0.49
1:A:201:ALA:H	4:A:1539:FBQ:HO62	1.60	0.48
1:A:531:LEU:CD1	1:A:531:LEU:C	2.83	0.48
1:A:129:VAL:HG22	7:A:2022:HOH:O	2.14	0.48
1:A:439:ILE:CG2	1:A:440:HIS:N	2.77	0.47
1:A:194:VAL:HG13	7:A:2064:HOH:O	2.12	0.47
1:A:450:LEU:HD23	1:A:450:LEU:N	2.29	0.47
1:A:452:LEU:HD13	1:A:467:ARG:CZ	2.45	0.47
1:A:353:MET:HA	1:A:356:VAL:HG13	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:339:PHE:HD1	1:A:435:TRP:CH2	2.32	0.46
1:A:258:SER:OG	1:A:261:GLU:CG	2.63	0.46
1:A:456:LEU:O	1:A:457:ASN:HB2	2.15	0.46
1:A:258:SER:OG	1:A:261:GLU:HG2	2.16	0.46
1:A:127:LEU:HD12	1:A:130:TYR:CE2	2.51	0.46
1:A:34:PRO:HB3	1:A:96:TYR:CE2	2.51	0.46
1:A:103:SER:HA	1:A:104:PRO:C	2.36	0.46
1:A:450:LEU:N	1:A:450:LEU:CD2	2.79	0.45
1:A:287:ILE:HA	1:A:287:ILE:HD12	1.68	0.45
1:A:235:SER:HA	1:A:294:PRO:O	2.16	0.45
1:A:216:ARG:H	1:A:216:ARG:HG2	1.48	0.45
1:A:119:GLY:H	4:A:1539:FBQ:HO62	1.64	0.45
1:A:22:VAL:HG21	1:A:27:ILE:HG13	2.00	0.44
1:A:427:ALA:CB	1:A:442:TYR:CZ	2.99	0.44
1:A:321:LEU:O	1:A:420:LEU:HD12	2.17	0.44
1:A:78:PHE:O	1:A:82:GLU:HG2	2.17	0.43
1:A:206:VAL:CG1	1:A:222:ALA:HB1	2.48	0.43
1:A:221:ARG:HD3	1:A:318:GLN:OE1	2.18	0.43
1:A:220:ARG:HG3	1:A:221:ARG:HG3	1.99	0.43
1:A:320:LEU:HD23	1:A:320:LEU:C	2.39	0.43
1:A:74:GLN:NE2	7:A:2020:HOH:O	2.41	0.43
1:A:427:ALA:CA	1:A:442:TYR:OH	2.62	0.43
1:A:212:SER:O	1:A:216:ARG:HG2	2.18	0.43
1:A:19:ARG:NH2	1:A:26:HIS:HB2	2.34	0.42
1:A:426:ARG:NH2	1:A:434:GLU:HG3	2.33	0.42
1:A:459:THR:HB	1:A:461:GLU:OE2	2.19	0.42
1:A:454:LYS:HD3	1:A:454:LYS:HA	1.90	0.42
1:A:408:VAL:CG2	1:A:418:THR:HG21	2.49	0.42
1:A:5:GLU:OE2	1:A:104:PRO:HA	2.19	0.42
1:A:83:MET:CE	7:A:2145:HOH:O	2.68	0.42
1:A:515:ARG:O	1:A:518:VAL:HG22	2.19	0.42
1:A:119:GLY:O	1:A:120:PHE:HB2	2.20	0.42
1:A:491:LYS:O	1:A:493:PRO:HD3	2.20	0.42
1:A:426:ARG:HH21	1:A:434:GLU:CD	2.24	0.41
1:A:531:LEU:C	1:A:531:LEU:HD12	2.40	0.41
1:A:221:ARG:HD3	1:A:480:GLY:HA2	2.03	0.41
1:A:27:ILE:C	1:A:27:ILE:CD1	2.88	0.41
1:A:455:GLU:CD	1:A:455:GLU:N	2.71	0.41
6:A:1541:PG4:H51	6:A:1541:PG4:H72	1.82	0.41
1:A:452:LEU:HD21	1:A:467:ARG:HG3	2.02	0.41
1:A:83:MET:HE3	7:A:2145:HOH:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:105:ARG:HA	1:A:106:PRO:HD3	1.93	0.41
1:A:163:GLU:HB2	1:A:263:ILE:HD13	2.02	0.41
1:A:446:PHE:CE2	1:A:465:LEU:HD23	2.56	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	530/543 (98%)	506 (96%)	23 (4%)	1 (0%)	52 75

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	485	PRO

### 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	465/474 (98%)	435 (94%)	30 (6%)	21 39

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	VAL
1	A	22	VAL
1	A	47	ARG
1	A	88	ARG
1	A	129	VAL
1	A	194	VAL
1	A	197	PHE
1	A	216	ARG
1	A	243	ARG
1	A	257	ASN
1	A	278	GLU
1	A	287	ILE
1	A	288	PHE
1	A	295	VAL
1	A	316	LYS
1	A	340	SER
1	A	344	GLU
1	A	358	LEU
1	A	379	MET
1	A	383	ASN
1	A	391	LEU
1	A	426	ARG
1	A	431	VAL
1	A	450	LEU
1	A	473	TRP
1	A	491	LYS
1	A	497	THR
1	A	516	LEU
1	A	518	VAL
1	A	531	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	68	GLN
1	A	257	ASN
1	A	374	GLN
1	A	383	ASN
1	A	457	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	$\# Z  > 2$
3	NAG	A	1537	1,3	14,14,15	0.79	0	15,19,21	0.96	1 (6%)
3	NAG	A	1538	3	14,14,15	1.00	1 (7%)	15,19,21	1.05	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
3	NAG	A	1537	1,3	-	0/6/23/26	0/1/1/1
3	NAG	A	1538	3	-	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)
3	A	1538	NAG	C4-C5	2.18	1.57	1.53

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1538	NAG	C2-N2-C7	-3.11	119.05	123.04

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1537	NAG	C2-N2-C7	-3.10	119.06	123.04

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

4 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$
2	NAG	A	1536	1	14,14,15	1.33	3 (21%)	15,19,21	1.26	1 (6%)
4	FBQ	A	1539	1	30,30,31	3.00	19 (63%)	39,44,47	2.25	13 (33%)
5	MES	A	1540	-	11,12,12	6.51	7 (63%)	14,16,16	2.87	6 (42%)
6	PG4	A	1541	-	12,12,12	1.74	2 (16%)	11,11,11	0.69	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	A	1536	1	-	0/6/23/26	0/1/1/1
4	FBQ	A	1539	1	-	0/16/16/21	0/3/3/3
5	MES	A	1540	-	-	0/6/14/14	0/1/1/1
6	PG4	A	1541	-	-	0/10/10/10	0/0/0/0

All (31) bond length outliers are listed below:



Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1540	MES	C7-C8	-3.73	1.39	1.52
5	A	1540	MES	C3-C2	-2.80	1.39	1.50
4	A	1539	FBQ	C17-C21	-2.74	1.48	1.51
5	A	1540	MES	C7-N4	-2.36	1.41	1.47
4	A	1539	FBQ	C4-C3	-2.14	1.41	1.44
5	A	1540	MES	C5-C6	-2.08	1.41	1.50
2	A	1536	NAG	C1-C2	2.02	1.55	1.52
6	A	1541	PG4	O2-C2	2.05	1.50	1.42
4	A	1539	FBQ	C28-C6	2.16	1.54	1.50
4	A	1539	FBQ	O26-C21	2.21	1.46	1.42
4	A	1539	FBQ	F23-C22	2.30	1.39	1.33
2	A	1536	NAG	O5-C1	2.31	1.47	1.43
6	A	1541	PG4	O4-C7	2.35	1.52	1.42
2	A	1536	NAG	O5-C5	2.42	1.48	1.43
4	A	1539	FBQ	C16-C17	2.57	1.43	1.39
4	A	1539	FBQ	C20-C15	3.22	1.45	1.38
4	A	1539	FBQ	C4-C5	3.26	1.44	1.41
4	A	1539	FBQ	F24-C22	3.34	1.42	1.33
4	A	1539	FBQ	C19-C20	3.37	1.45	1.38
4	A	1539	FBQ	C9-C10	3.48	1.44	1.36
4	A	1539	FBQ	C5-C6	3.52	1.43	1.38
4	A	1539	FBQ	F25-C22	3.56	1.42	1.33
4	A	1539	FBQ	C22-C21	3.79	1.55	1.51
4	A	1539	FBQ	C7-C3	4.02	1.47	1.42
4	A	1539	FBQ	C8-C7	4.49	1.42	1.36
4	A	1539	FBQ	C12-S13	4.68	1.89	1.82
4	A	1539	FBQ	C18-C17	4.70	1.46	1.39
4	A	1539	FBQ	C6-N1	7.07	1.38	1.32
5	A	1540	MES	O2S-S	10.72	1.78	1.45
5	A	1540	MES	O1S-S	11.24	1.80	1.45
5	A	1540	MES	O3S-S	13.65	1.81	1.46

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1539	FBQ	C18-C17-C21	-3.74	116.32	120.80
4	A	1539	FBQ	C8-C7-C3	-3.55	121.04	124.72
2	A	1536	NAG	C2-N2-C7	-3.13	119.02	123.04
5	A	1540	MES	O3S-S-O2S	-2.98	104.67	111.61
4	A	1539	FBQ	C5-C6-N1	-2.66	118.86	122.16
4	A	1539	FBQ	F24-C22-C21	-2.48	106.34	112.28
5	A	1540	MES	O1-C2-C3	-2.47	106.17	111.84
5	A	1540	MES	O3S-S-O1S	-2.34	106.17	111.61

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1539	FBQ	C5-C12-S13	-2.30	106.26	112.98
4	A	1539	FBQ	C14-C15-C20	-2.02	116.79	120.88
4	A	1539	FBQ	C14-C15-C16	2.04	123.26	120.30
4	A	1539	FBQ	O26-C21-C17	2.34	115.65	110.73
4	A	1539	FBQ	F25-C22-F23	2.72	113.10	106.84
4	A	1539	FBQ	F27-C7-C3	2.79	121.88	118.47
5	A	1540	MES	O2S-S-C8	3.30	109.72	106.91
4	A	1539	FBQ	O26-C21-C22	3.81	114.40	107.51
5	A	1540	MES	C7-C8-S	4.11	125.25	112.51
4	A	1539	FBQ	C14-S13-C12	4.50	112.82	102.65
5	A	1540	MES	O1S-S-C8	7.65	113.43	106.91
4	A	1539	FBQ	C6-N1-C2	7.66	123.95	118.40

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1539	FBQ	2	0
6	A	1541	PG4	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	532/543 (97%)	-0.28	7 (1%) 79 82	23, 35, 55, 80	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	486	HIS	4.6
1	A	485	PRO	3.7
1	A	535	THR	3.7
1	A	257	ASN	3.3
1	A	488	GLN	3.2
1	A	455	GLU	2.3
1	A	453	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. 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(Å <sup>2</sup> )	Q<0.9
3	NAG	A	1538	14/15	0.81	0.46	-	72,74,76,77	0
3	NAG	A	1537	14/15	0.89	0.22	-	48,53,59,66	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(Å <sup>2</sup> )	Q<0.9
6	PG4	A	1541	13/13	0.89	0.19	6.92	45,60,65,66	0
5	MES	A	1540	12/12	0.88	0.24	3.85	87,87,88,88	0
4	FBQ	A	1539	28/29	0.97	0.12	-0.31	26,32,35,39	0
2	NAG	A	1536	14/15	0.85	0.20	-	63,66,69,69	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.