



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:11 AM UTC

PDB ID : 3O9K / pdb_00003o9k
Title : Influenza NA in complex with compound 6
Authors : Russell, R.J.; Kerry, P.S.
Deposited on : 2010-08-04
Resolution : 2.49 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
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
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

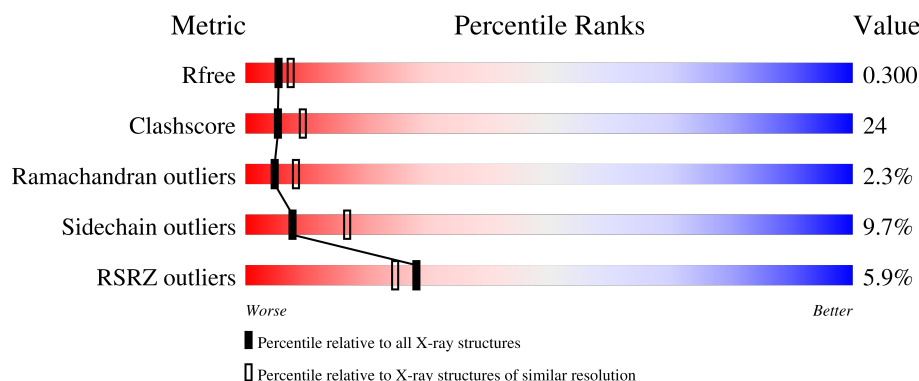
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.49 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (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 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	387	

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	ETT	A	1	X	-	-	-

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 3032 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.

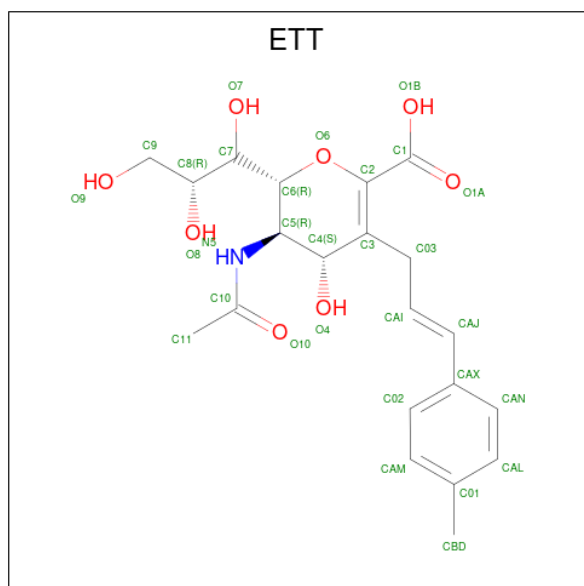
- Molecule 1 is a protein called Neuraminidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	387	3002	1880	525	573	24	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	296	ASN	GLY	conflict	UNP Q07599

- Molecule 2 is 5-acetamido-2,6-anhydro-3,5-dideoxy-3-[(2E)-3-(4-methylphenyl)prop-2-en-1-yl]-D-glycero-D-galacto-non-2-enonic acid (CCD ID: ETT) (formula: C₂₁H₂₇NO₈).

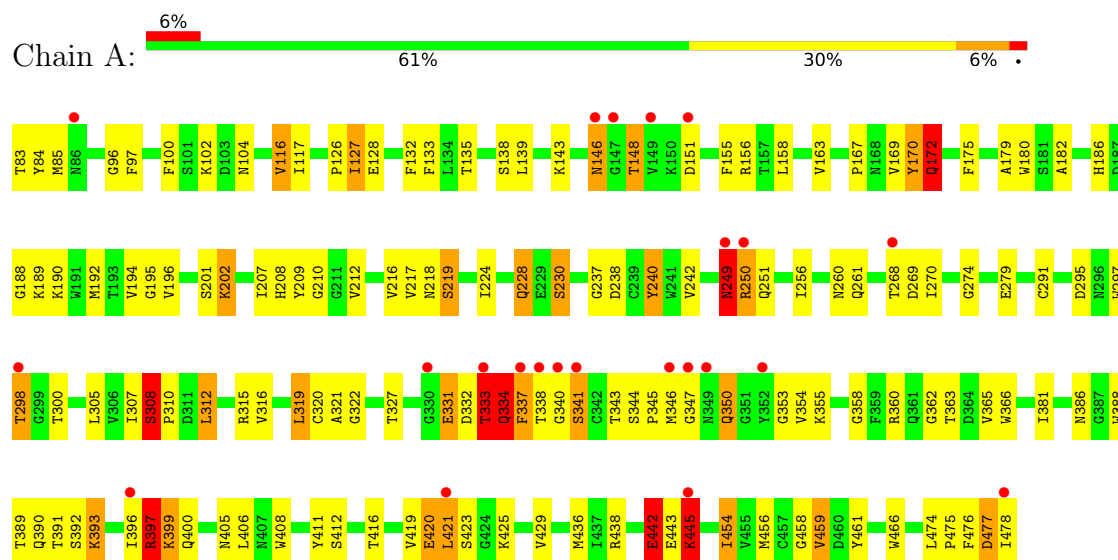


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	30	21	1	8	0	0

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: Neuraminidase



4 Data and refinement statistics

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, α , β , γ	90.49Å 90.49Å 107.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	21.51 – 2.49 21.51 – 2.50	Depositor EDS
% Data completeness (in resolution range)	91.2 (21.51-2.49) 91.2 (21.51-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.91 (at 2.50Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6.1_357)	Depositor
R, R_{free}	0.220 , 0.296 0.229 , 0.300	Depositor DCC
R_{free} test set	709 reflections (4.68%)	wwPDB-VP
Wilson B-factor (Å ²)	25.7	Xtriage
Anisotropy	1.573	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 31.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.52$, $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	0.042 for -h,k,-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	3032	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.64% 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: ETT

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	27/3077 (0.9%)	1.23	34/4177 (0.8%)

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	5

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	337	PHE	CB-CG	30.49	2.20	1.50
1	A	170	TYR	CB-CG	26.73	2.10	1.51
1	A	445	LYS	CB-CG	24.37	2.25	1.52
1	A	399	LYS	CB-CG	19.67	2.11	1.52
1	A	445	LYS	C-N	-18.41	1.08	1.33
1	A	396	ILE	C-N	14.83	1.54	1.33
1	A	345	PRO	C-N	14.51	1.59	1.33
1	A	421	LEU	CB-CG	-13.03	1.27	1.53
1	A	397	ARG	CB-CG	12.65	1.90	1.52
1	A	333	THR	CB-CG2	12.30	1.93	1.52
1	A	341	SER	C-N	11.63	1.50	1.33
1	A	310	PRO	N-CD	11.39	1.63	1.47
1	A	172	GLN	N-CA	10.22	1.59	1.46
1	A	170	TYR	CA-C	9.97	1.65	1.52
1	A	420	GLU	C-N	-8.77	1.22	1.33
1	A	399	LYS	N-CA	8.72	1.56	1.46
1	A	334	GLN	C-N	8.27	1.45	1.33
1	A	170	TYR	C-N	-8.24	1.22	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	172	GLN	CB-CG	8.17	1.76	1.52
1	A	172	GLN	C-O	8.10	1.34	1.24
1	A	397	ARG	C-O	-7.84	1.14	1.23
1	A	443	GLU	CA-CB	7.54	1.68	1.54
1	A	423	SER	C-N	-6.42	1.24	1.33
1	A	308	SER	CA-CB	6.31	1.62	1.53
1	A	423	SER	N-CA	6.25	1.54	1.46
1	A	172	GLN	CA-CB	-5.66	1.43	1.53
1	A	421	LEU	C-N	-5.10	1.27	1.33

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	337	PHE	CA-CB-CG	-23.53	90.27	113.80
1	A	308	SER	CB-CA-C	14.41	135.53	109.45
1	A	170	TYR	CA-CB-CG	-12.41	91.55	113.90
1	A	333	THR	CA-CB-CG2	-11.43	91.08	110.50
1	A	445	LYS	CA-C-N	10.79	141.91	122.92
1	A	445	LYS	C-N-CA	10.79	141.91	122.92
1	A	310	PRO	CA-N-CD	-10.28	97.61	112.00
1	A	420	GLU	O-C-N	-9.36	109.98	122.43
1	A	310	PRO	N-CA-CB	9.14	112.00	103.41
1	A	333	THR	OG1-CB-CG2	-8.39	92.51	109.30
1	A	310	PRO	N-CD-CG	8.29	115.64	103.20
1	A	420	GLU	CA-C-N	8.27	138.14	122.60
1	A	420	GLU	C-N-CA	8.27	138.14	122.60
1	A	397	ARG	N-CA-CB	8.26	125.91	111.13
1	A	445	LYS	CA-CB-CG	-8.22	97.65	114.10
1	A	334	GLN	O-C-N	-7.81	112.20	122.59
1	A	399	LYS	CA-CB-CG	-7.58	98.93	114.10
1	A	337	PHE	CB-CG-CD2	-7.14	108.56	120.70
1	A	337	PHE	CB-CG-CD1	7.08	132.74	120.70
1	A	170	TYR	CA-C-O	7.03	128.21	120.82
1	A	334	GLN	CA-CB-CG	6.94	127.98	114.10
1	A	443	GLU	CB-CA-C	6.74	124.91	110.07
1	A	228	GLN	N-CA-C	6.47	118.33	111.28
1	A	148	THR	N-CA-C	-6.21	105.19	112.89
1	A	170	TYR	CB-CG-CD1	-6.16	111.56	120.80
1	A	170	TYR	O-C-N	-5.96	115.94	122.07
1	A	170	TYR	N-CA-C	5.95	117.44	111.07
1	A	170	TYR	CB-CG-CD2	5.77	129.45	120.80
1	A	421	LEU	CB-CG-CD2	-5.73	93.51	110.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	406	LEU	N-CA-C	-5.56	106.08	112.92
1	A	169	VAL	N-CA-C	5.52	115.72	110.42
1	A	399	LYS	O-C-N	-5.42	116.97	123.31
1	A	172	GLN	CA-CB-CG	-5.39	103.33	114.10
1	A	399	LYS	N-CA-C	-5.25	99.89	108.76

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	172	GLN	Mainchain
1	A	334	GLN	Mainchain
1	A	420	GLU	Mainchain
1	A	442	GLU	Mainchain
1	A	445	LYS	Mainchain

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	3002	0	2862	143	0
2	A	30	0	9	0	0
All	All	3032	0	2871	143	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 24.

All (143) 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:172:GLN:CG	1:A:172:GLN:CB	1.77	1.61
1:A:397:ARG:CB	1:A:397:ARG:CG	1.90	1.47
1:A:333:THR:CB	1:A:333:THR:CG2	1.93	1.47
1:A:170:TYR:CB	1:A:170:TYR:CG	2.10	1.32
1:A:399:LYS:CB	1:A:399:LYS:CG	2.11	1.29

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:SER:HB3	1:A:346:MET:CE	1.61	1.29
1:A:337:PHE:CB	1:A:337:PHE:CG	2.20	1.23
1:A:341:SER:CB	1:A:346:MET:CE	2.23	1.16
1:A:445:LYS:CB	1:A:445:LYS:CG	2.25	1.15
1:A:363:THR:HG22	1:A:386:ASN:HA	1.26	1.07
1:A:341:SER:CB	1:A:346:MET:HE1	1.82	1.07
1:A:341:SER:HB3	1:A:346:MET:HE1	1.05	1.01
1:A:341:SER:CB	1:A:346:MET:HE2	1.88	1.01
1:A:341:SER:OG	1:A:346:MET:HE2	1.62	1.00
1:A:337:PHE:CE2	1:A:338:THR:O	2.17	0.98
1:A:333:THR:CG2	1:A:333:THR:CA	2.47	0.91
1:A:172:GLN:CG	1:A:172:GLN:CA	2.52	0.87
1:A:186:HIS:HD2	1:A:188:GLY:H	1.25	0.81
1:A:341:SER:N	1:A:346:MET:CE	2.46	0.79
1:A:333:THR:O	1:A:337:PHE:N	2.16	0.78
1:A:170:TYR:CG	1:A:170:TYR:CA	2.66	0.78
1:A:338:THR:O	1:A:346:MET:HG2	1.86	0.75
1:A:186:HIS:CD2	1:A:188:GLY:H	2.03	0.74
1:A:337:PHE:CG	1:A:337:PHE:CA	2.70	0.73
1:A:332:ASP:O	1:A:337:PHE:HB3	1.90	0.72
1:A:190:LYS:HE2	1:A:210:GLY:HA3	1.69	0.72
1:A:249:ASN:O	1:A:250:ARG:O	2.10	0.70
1:A:365:VAL:CG1	1:A:388:TRP:HE3	2.06	0.69
1:A:333:THR:CG2	1:A:333:THR:OG1	2.41	0.66
1:A:338:THR:HB	1:A:346:MET:SD	2.36	0.66
1:A:96:GLY:O	1:A:458:GLY:O	2.14	0.65
1:A:363:THR:CG2	1:A:386:ASN:HA	2.17	0.65
1:A:156:ARG:HG2	1:A:180:TRP:HA	1.79	0.65
1:A:97:PHE:H	1:A:400:GLN:HE22	1.45	0.65
1:A:341:SER:N	1:A:346:MET:HE3	2.11	0.65
1:A:333:THR:C	1:A:337:PHE:H	2.04	0.64
1:A:363:THR:HG23	1:A:389:THR:OG1	1.97	0.64
1:A:408:TRP:CH2	1:A:442:GLU:HG2	2.32	0.64
1:A:230:SER:HB3	1:A:355:LYS:HZ1	1.63	0.63
1:A:170:TYR:CG	1:A:170:TYR:N	2.67	0.63
1:A:127:ILE:HG22	1:A:128:GLU:HG2	1.81	0.62
1:A:337:PHE:CD2	1:A:338:THR:O	2.53	0.61
1:A:228:GLN:HE21	1:A:242:VAL:H	1.48	0.61
1:A:337:PHE:CZ	1:A:346:MET:HG2	2.36	0.61
1:A:337:PHE:CE1	1:A:346:MET:HB3	2.36	0.60
1:A:333:THR:C	1:A:337:PHE:N	2.61	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:SER:CA	1:A:346:MET:HE1	2.31	0.59
1:A:132:PHE:HB3	1:A:158:LEU:HD11	1.85	0.59
1:A:477:ASP:O	1:A:478:ILE:HB	2.03	0.58
1:A:297:TRP:HB3	1:A:298:THR:HG22	1.85	0.58
1:A:341:SER:CA	1:A:346:MET:CE	2.80	0.58
1:A:399:LYS:CG	1:A:399:LYS:CA	2.80	0.58
1:A:476:PHE:O	1:A:478:ILE:HG13	2.04	0.57
1:A:133:PHE:CE2	1:A:167:PRO:HB3	2.39	0.57
1:A:230:SER:HB3	1:A:355:LYS:NZ	2.22	0.55
1:A:365:VAL:HG11	1:A:388:TRP:HE3	1.68	0.55
1:A:429:VAL:HG13	1:A:458:GLY:HA3	1.89	0.55
1:A:438:ARG:HB3	1:A:474:LEU:HD11	1.89	0.55
1:A:340:GLY:C	1:A:346:MET:HE3	2.31	0.55
1:A:333:THR:CG2	1:A:333:THR:HA	2.36	0.54
1:A:117:ILE:HD13	1:A:167:PRO:HG3	1.90	0.54
1:A:458:GLY:O	1:A:459:VAL:HB	2.08	0.54
1:A:186:HIS:HD2	1:A:188:GLY:N	2.01	0.53
1:A:179:ALA:HB2	1:A:195:GLY:HA3	1.91	0.53
1:A:102:LYS:NZ	1:A:104:ASN:ND2	2.57	0.53
1:A:201:SER:O	1:A:202:LYS:HG3	2.08	0.52
1:A:365:VAL:HG12	1:A:388:TRP:HE3	1.75	0.52
1:A:143:LYS:O	1:A:146:ASN:HB2	2.10	0.51
1:A:305:LEU:HB3	1:A:316:VAL:HG23	1.92	0.51
1:A:298:THR:O	1:A:347:GLY:O	2.29	0.51
1:A:445:LYS:CG	1:A:445:LYS:CA	2.87	0.51
1:A:158:LEU:HD22	1:A:182:ALA:HB1	1.93	0.51
1:A:238:ASP:OD1	1:A:260:ASN:HB2	2.10	0.50
1:A:319:LEU:HD21	1:A:365:VAL:HG11	1.93	0.50
1:A:83:THR:N	1:A:189:LYS:HZ3	2.09	0.50
1:A:102:LYS:HZ2	1:A:104:ASN:ND2	2.09	0.50
1:A:230:SER:HB3	1:A:355:LYS:CE	2.42	0.50
1:A:268:THR:HG22	1:A:269:ASP:O	2.12	0.50
1:A:397:ARG:CG	1:A:397:ARG:CA	2.83	0.49
1:A:332:ASP:O	1:A:337:PHE:CB	2.59	0.49
1:A:436:MET:HE2	1:A:454:ILE:HG22	1.94	0.49
1:A:172:GLN:CB	1:A:172:GLN:CD	2.75	0.49
1:A:192:MET:HA	1:A:208:HIS:O	2.13	0.48
1:A:240:TYR:CD1	1:A:240:TYR:N	2.81	0.48
1:A:337:PHE:CG	1:A:337:PHE:HA	2.47	0.48
1:A:445:LYS:HE3	1:A:445:LYS:HA	1.95	0.48
1:A:397:ARG:HH11	1:A:397:ARG:HG2	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:97:PHE:N	1:A:400:GLN:HE22	2.13	0.47
1:A:365:VAL:HG13	1:A:388:TRP:HB2	1.97	0.47
1:A:97:PHE:CE1	1:A:381:ILE:HD13	2.49	0.47
1:A:100:PHE:C	1:A:100:PHE:CD1	2.91	0.47
1:A:360:ARG:HG3	1:A:388:TRP:CG	2.50	0.47
1:A:390:GLN:C	1:A:392:SER:H	2.23	0.47
1:A:337:PHE:CG	1:A:338:THR:N	2.83	0.47
1:A:251:GLN:HE22	1:A:274:GLY:H	1.63	0.46
1:A:419:VAL:HG13	1:A:425:LYS:O	2.14	0.46
1:A:322:GLY:HA2	1:A:340:GLY:CA	2.46	0.46
1:A:102:LYS:HZ2	1:A:104:ASN:HD21	1.63	0.46
1:A:360:ARG:HG3	1:A:388:TRP:CD2	2.51	0.46
1:A:179:ALA:HB2	1:A:195:GLY:CA	2.45	0.46
1:A:100:PHE:C	1:A:100:PHE:HD1	2.24	0.45
1:A:256:ILE:CG1	1:A:270:ILE:HD11	2.45	0.45
1:A:327:THR:O	1:A:353:GLY:HA2	2.16	0.45
1:A:397:ARG:HG2	1:A:397:ARG:NH1	2.32	0.44
1:A:218:ASN:O	1:A:219:SER:C	2.60	0.44
1:A:163:VAL:O	1:A:163:VAL:HG13	2.16	0.44
1:A:190:LYS:HD3	1:A:209:TYR:CE1	2.53	0.44
1:A:476:PHE:C	1:A:478:ILE:N	2.75	0.44
1:A:279:GLU:OE2	1:A:411:TYR:OH	2.23	0.44
1:A:230:SER:HB3	1:A:355:LYS:HE2	1.99	0.44
1:A:291:CYS:SG	1:A:305:LEU:HD21	2.57	0.44
1:A:341:SER:OG	1:A:344:SER:O	2.29	0.44
1:A:268:THR:OG1	1:A:312:LEU:HB3	2.18	0.43
1:A:340:GLY:C	1:A:346:MET:CE	2.90	0.43
1:A:476:PHE:O	1:A:478:ILE:N	2.51	0.43
1:A:393:LYS:HB3	1:A:393:LYS:HE2	1.59	0.43
1:A:459:VAL:HG12	1:A:461:TYR:H	1.82	0.43
1:A:209:TYR:CZ	1:A:261:GLN:HA	2.54	0.43
1:A:175:PHE:CD2	1:A:175:PHE:C	2.97	0.43
1:A:295:ASP:C	1:A:295:ASP:OD2	2.61	0.43
1:A:170:TYR:CB	1:A:170:TYR:CD1	2.92	0.42
1:A:250:ARG:HA	1:A:297:TRP:CE2	2.54	0.42
1:A:307:ILE:HG22	1:A:308:SER:O	2.18	0.42
1:A:84:TYR:CD2	1:A:237:GLY:HA2	2.54	0.42
1:A:194:VAL:HG22	1:A:207:ILE:HG13	2.01	0.42
1:A:138:SER:C	1:A:139:LEU:HD23	2.44	0.42
1:A:320:CYS:O	1:A:321:ALA:C	2.63	0.42
1:A:337:PHE:CE1	1:A:346:MET:HG2	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:151:ASP:O	1:A:156:ARG:HD3	2.20	0.42
1:A:337:PHE:CZ	1:A:346:MET:HB3	2.54	0.41
1:A:251:GLN:NE2	1:A:297:TRP:HZ3	2.18	0.41
1:A:474:LEU:HB3	1:A:475:PRO:HA	2.02	0.41
1:A:135:THR:O	1:A:156:ARG:HA	2.21	0.41
1:A:216:VAL:CG1	1:A:217:VAL:N	2.82	0.41
1:A:291:CYS:HB2	1:A:305:LEU:CD2	2.49	0.41
1:A:354:VAL:HG22	1:A:355:LYS:N	2.36	0.41
1:A:456:MET:HE3	1:A:456:MET:HB3	1.94	0.41
1:A:256:ILE:HG13	1:A:270:ILE:HD11	2.03	0.41
1:A:300:THR:CG2	1:A:350:GLN:HB2	2.51	0.41
1:A:358:GLY:HA2	1:A:366:TRP:O	2.21	0.41
1:A:126:PRO:HD3	1:A:186:HIS:CD2	2.57	0.40
1:A:331:GLU:H	1:A:331:GLU:HG2	1.37	0.40
1:A:116:VAL:O	1:A:116:VAL:HG22	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	385/387 (100%)	343 (89%)	33 (9%)	9 (2%)	5 8

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	250	ARG
1	A	334	GLN
1	A	146	ASN
1	A	459	VAL
1	A	477	ASP
1	A	350	GLN

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Mol	Chain	Res	Type
1	A	249	ASN
1	A	362	GLY
1	A	224	ILE

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	330/330 (100%)	298 (90%)	32 (10%)	8 17

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	85	MET
1	A	116	VAL
1	A	127	ILE
1	A	148	THR
1	A	155	PHE
1	A	196	VAL
1	A	202	LYS
1	A	212	VAL
1	A	219	SER
1	A	230	SER
1	A	240	TYR
1	A	249	ASN
1	A	298	THR
1	A	308	SER
1	A	312	LEU
1	A	315	ARG
1	A	319	LEU
1	A	331	GLU
1	A	333	THR
1	A	334	GLN
1	A	343	THR
1	A	391	THR
1	A	393	LYS

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Mol	Chain	Res	Type
1	A	397	ARG
1	A	405	ASN
1	A	412	SER
1	A	416	THR
1	A	421	LEU
1	A	442	GLU
1	A	445	LYS
1	A	454	ILE
1	A	466	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	87	ASN
1	A	104	ASN
1	A	144	HIS
1	A	186	HIS
1	A	208	HIS
1	A	228	GLN
1	A	251	GLN
1	A	261	GLN
1	A	334	GLN
1	A	400	GLN
1	A	405	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

1 ligand is 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	ETT	A	1	-	29,31,31	3.25	12 (41%)	31,43,43	3.10	14 (45%)

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	ETT	A	1	-	1/1/9/12	7/24/44/44	0/2/2/2

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1	ETT	C8-C7	-11.28	1.33	1.53
2	A	1	ETT	O6-C2	5.74	1.46	1.36
2	A	1	ETT	C03-CAI	-5.22	1.33	1.50
2	A	1	ETT	O8-C8	-5.06	1.32	1.43
2	A	1	ETT	O7-C7	-4.24	1.32	1.43
2	A	1	ETT	C4-C5	4.14	1.57	1.53
2	A	1	ETT	C3-C2	3.11	1.37	1.34
2	A	1	ETT	C7-C6	-3.05	1.49	1.52
2	A	1	ETT	CAM-C02	2.33	1.42	1.38
2	A	1	ETT	O1A-C1	2.32	1.28	1.22
2	A	1	ETT	CAN-CAL	2.25	1.42	1.38
2	A	1	ETT	C6-C5	2.11	1.56	1.53

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1	ETT	O6-C6-C7	-10.56	87.41	105.98

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1	ETT	O7-C7-C6	5.48	121.30	109.44
2	A	1	ETT	CAX-CAJ-CAI	-5.03	114.67	126.99
2	A	1	ETT	O7-C7-C8	4.69	119.58	108.93
2	A	1	ETT	C03-CAI-CAJ	3.93	132.15	125.04
2	A	1	ETT	O4-C4-C3	-3.46	103.26	109.90
2	A	1	ETT	O9-C9-C8	-3.28	104.26	111.16
2	A	1	ETT	C8-C7-C6	3.21	119.08	113.05
2	A	1	ETT	O8-C8-C7	3.05	116.40	109.25
2	A	1	ETT	C4-C5-N5	-2.82	107.91	111.22
2	A	1	ETT	O10-C10-C11	-2.77	117.12	122.05
2	A	1	ETT	C6-C5-N5	2.59	115.04	110.91
2	A	1	ETT	C9-C8-C7	2.49	117.25	112.17
2	A	1	ETT	O8-C8-C9	2.25	114.14	109.03

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	1	ETT	C7

All (7) torsion outliers are listed below:

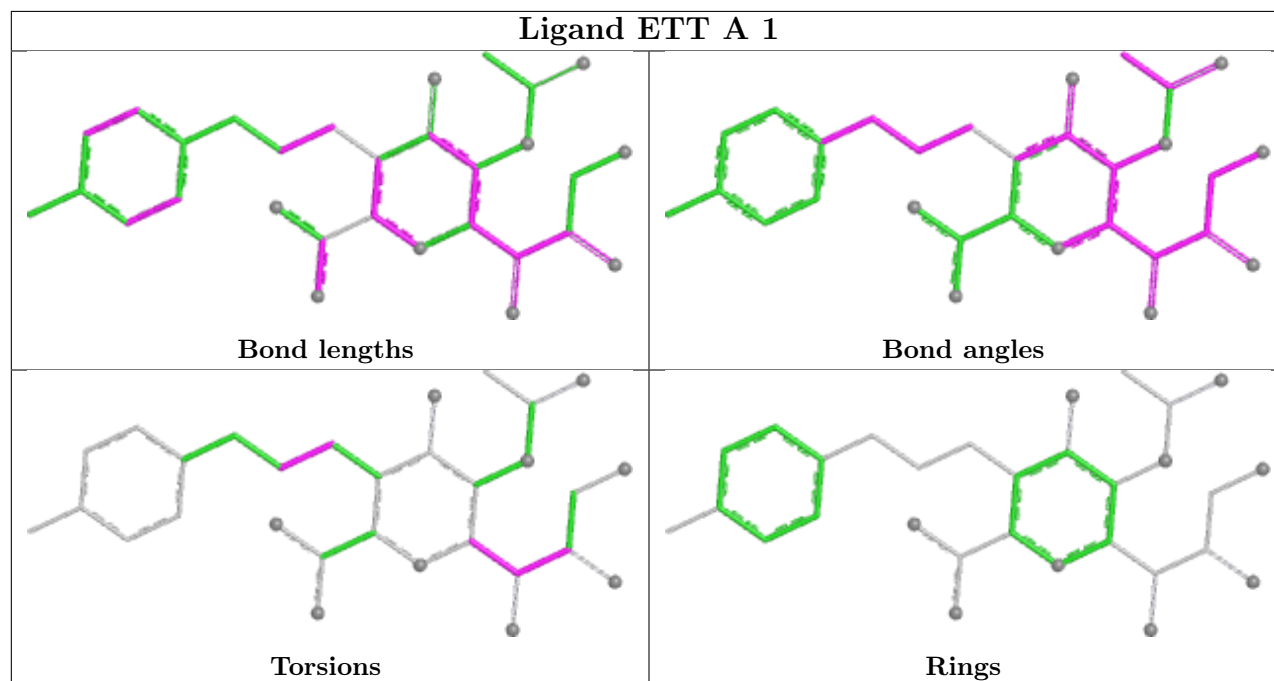
Mol	Chain	Res	Type	Atoms
2	A	1	ETT	C3-C03-CAI-CAJ
2	A	1	ETT	O7-C7-C8-C9
2	A	1	ETT	O6-C6-C7-O7
2	A	1	ETT	C5-C6-C7-O7
2	A	1	ETT	O7-C7-C8-O8
2	A	1	ETT	C6-C7-C8-O8
2	A	1	ETT	O6-C6-C7-C8

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	445:LYS	C	446:THR	N	1.08

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, 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	387/387 (100%)	0.63	23 (5%)	28 24	17, 29, 42, 60	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	338	THR	7.0
1	A	346	MET	6.2
1	A	340	GLY	5.8
1	A	349	ASN	5.2
1	A	341	SER	5.0
1	A	333	THR	3.9
1	A	445	LYS	3.8
1	A	478	ILE	3.1
1	A	347	GLY	3.1
1	A	352	TYR	2.8
1	A	330	GLY	2.7
1	A	421	LEU	2.7
1	A	151	ASP	2.3
1	A	396	ILE	2.3
1	A	250	ARG	2.2
1	A	146	ASN	2.1
1	A	249	ASN	2.1
1	A	149	VAL	2.1
1	A	86	ASN	2.1
1	A	337	PHE	2.1
1	A	147	GLY	2.1
1	A	268	THR	2.1
1	A	298	THR	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](#)

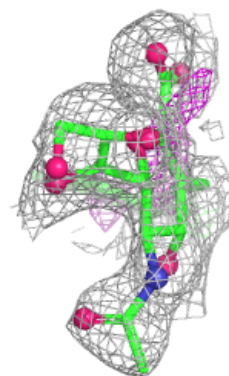
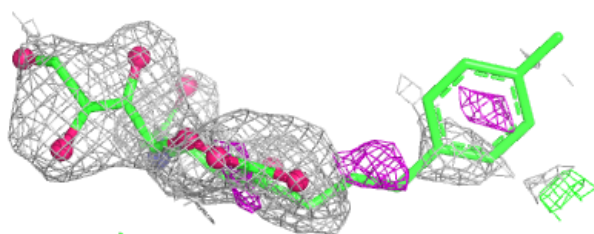
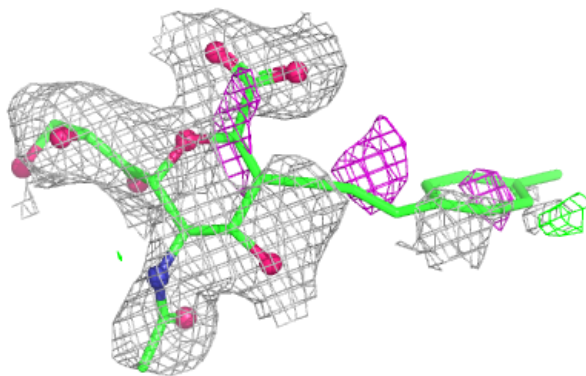
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	ETT	A	1	30/30	0.68	0.21	29,45,74,81	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around ETT A 1:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.