



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 02:32 PM UTC

PDB ID : 4D2W / pdb_00004d2w
Title : Structure of MELK in complex with inhibitors
Authors : Johnson, C.N.; Berdini, V.; Beke, L.; Bonnet, P.; Brehmer, D.; Coyle, J.E.;
Day, P.J.; Frederickson, M.; Freyne, E.J.E.; Gilissen, R.A.H.J.; Hamlett,
C.C.F.; Howard, S.; Meerpoel, L.; McMenamin, R.; Patel, S.; Rees, D.C.;
Sharff, A.; Sommen, F.; Wu, T.; Linders, J.T.M.
Deposited on : 2014-05-13
Resolution : 1.92 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](#) ①) 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

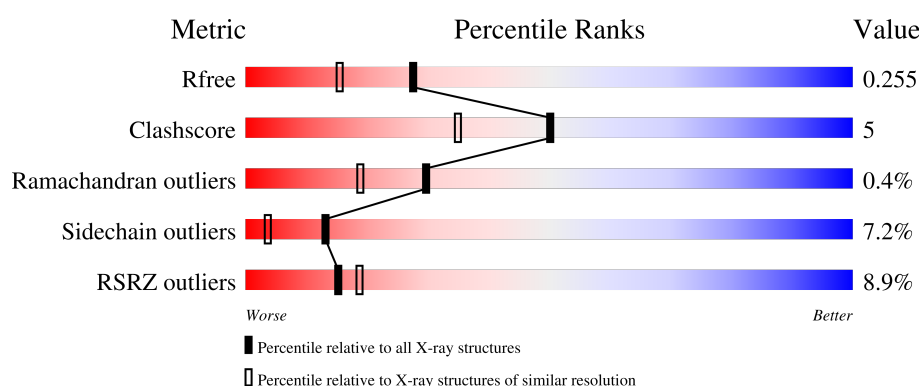
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.92 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	1188 (1.92-1.92)
Clashscore	190562	1209 (1.92-1.92)
Ramachandran outliers	187476	1195 (1.92-1.92)
Sidechain outliers	187428	1195 (1.92-1.92)
RSRZ outliers	180081	1188 (1.92-1.92)

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	356	<div> <div>5%</div> <div> <div></div> <div>74%</div> <div>13%</div> <div>•</div> <div>12%</div> </div> </div>
1	B	356	<div> <div>10%</div> <div> <div></div> <div>76%</div> <div>12%</div> <div>•</div> <div>9%</div> </div> </div>
1	C	356	<div> <div>10%</div> <div> <div></div> <div>71%</div> <div>15%</div> <div>•</div> <div>12%</div> </div> </div>
1	D	356	<div> <div>7%</div> <div> <div></div> <div>78%</div> <div>11%</div> <div>•</div> <div>8%</div> </div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 11529 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 MATERNAL EMBRYONIC LEUCINE ZIPPER KINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	314	Total	C	N	O	S	0	1	0
			2547	1641	429	459	18			
1	B	323	Total	C	N	O	S	0	2	0
			2618	1688	442	471	17			
1	C	313	Total	C	N	O	S	0	0	0
			2542	1640	429	456	17			
1	D	326	Total	C	N	O	S	0	3	0
			2661	1716	452	475	18			

There are 108 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP Q14680
A	-18	GLY	-	expression tag	UNP Q14680
A	-17	SER	-	expression tag	UNP Q14680
A	-16	SER	-	expression tag	UNP Q14680
A	-15	HIS	-	expression tag	UNP Q14680
A	-14	HIS	-	expression tag	UNP Q14680
A	-13	HIS	-	expression tag	UNP Q14680
A	-12	HIS	-	expression tag	UNP Q14680
A	-11	HIS	-	expression tag	UNP Q14680
A	-10	HIS	-	expression tag	UNP Q14680
A	-9	SER	-	expression tag	UNP Q14680
A	-8	SER	-	expression tag	UNP Q14680
A	-7	GLY	-	expression tag	UNP Q14680
A	-6	LEU	-	expression tag	UNP Q14680
A	-5	VAL	-	expression tag	UNP Q14680
A	-4	PRO	-	expression tag	UNP Q14680
A	-3	ARG	-	expression tag	UNP Q14680
A	-2	GLY	-	expression tag	UNP Q14680
A	-1	SER	-	expression tag	UNP Q14680
A	0	HIS	-	expression tag	UNP Q14680
A	167	ALA	THR	engineered mutation	UNP Q14680

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Chain	Residue	Modelled	Actual	Comment	Reference
A	171	ALA	SER	engineered mutation	UNP Q14680
A	213	THR	ASN	engineered mutation	UNP Q14680
A	214	ALA	VAL	engineered mutation	UNP Q14680
A	215	ALA	MET	engineered mutation	UNP Q14680
A	218	VAL	TYR	engineered mutation	UNP Q14680
A	219	ALA	LYS	engineered mutation	UNP Q14680
B	-19	MET	-	expression tag	UNP Q14680
B	-18	GLY	-	expression tag	UNP Q14680
B	-17	SER	-	expression tag	UNP Q14680
B	-16	SER	-	expression tag	UNP Q14680
B	-15	HIS	-	expression tag	UNP Q14680
B	-14	HIS	-	expression tag	UNP Q14680
B	-13	HIS	-	expression tag	UNP Q14680
B	-12	HIS	-	expression tag	UNP Q14680
B	-11	HIS	-	expression tag	UNP Q14680
B	-10	HIS	-	expression tag	UNP Q14680
B	-9	SER	-	expression tag	UNP Q14680
B	-8	SER	-	expression tag	UNP Q14680
B	-7	GLY	-	expression tag	UNP Q14680
B	-6	LEU	-	expression tag	UNP Q14680
B	-5	VAL	-	expression tag	UNP Q14680
B	-4	PRO	-	expression tag	UNP Q14680
B	-3	ARG	-	expression tag	UNP Q14680
B	-2	GLY	-	expression tag	UNP Q14680
B	-1	SER	-	expression tag	UNP Q14680
B	0	HIS	-	expression tag	UNP Q14680
B	167	ALA	THR	engineered mutation	UNP Q14680
B	171	ALA	SER	engineered mutation	UNP Q14680
B	213	THR	ASN	engineered mutation	UNP Q14680
B	214	ALA	VAL	engineered mutation	UNP Q14680
B	215	ALA	MET	engineered mutation	UNP Q14680
B	218	VAL	TYR	engineered mutation	UNP Q14680
B	219	ALA	LYS	engineered mutation	UNP Q14680
C	-19	MET	-	expression tag	UNP Q14680
C	-18	GLY	-	expression tag	UNP Q14680
C	-17	SER	-	expression tag	UNP Q14680
C	-16	SER	-	expression tag	UNP Q14680
C	-15	HIS	-	expression tag	UNP Q14680
C	-14	HIS	-	expression tag	UNP Q14680
C	-13	HIS	-	expression tag	UNP Q14680
C	-12	HIS	-	expression tag	UNP Q14680
C	-11	HIS	-	expression tag	UNP Q14680

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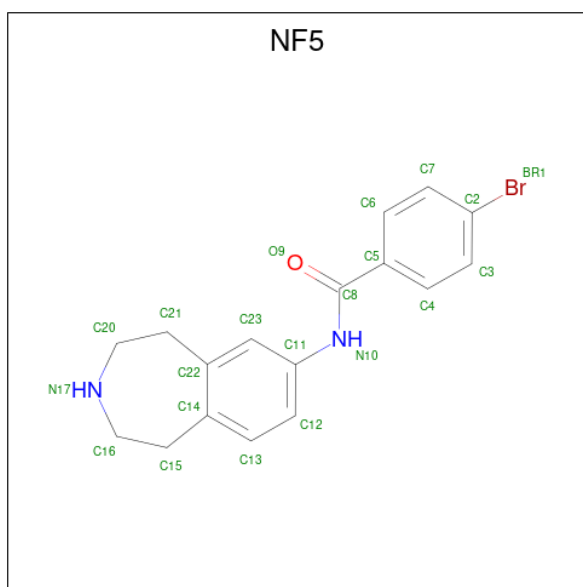
Chain	Residue	Modelled	Actual	Comment	Reference
C	-10	HIS	-	expression tag	UNP Q14680
C	-9	SER	-	expression tag	UNP Q14680
C	-8	SER	-	expression tag	UNP Q14680
C	-7	GLY	-	expression tag	UNP Q14680
C	-6	LEU	-	expression tag	UNP Q14680
C	-5	VAL	-	expression tag	UNP Q14680
C	-4	PRO	-	expression tag	UNP Q14680
C	-3	ARG	-	expression tag	UNP Q14680
C	-2	GLY	-	expression tag	UNP Q14680
C	-1	SER	-	expression tag	UNP Q14680
C	0	HIS	-	expression tag	UNP Q14680
C	167	ALA	THR	engineered mutation	UNP Q14680
C	171	ALA	SER	engineered mutation	UNP Q14680
C	213	THR	ASN	engineered mutation	UNP Q14680
C	214	ALA	VAL	engineered mutation	UNP Q14680
C	215	ALA	MET	engineered mutation	UNP Q14680
C	218	VAL	TYR	engineered mutation	UNP Q14680
C	219	ALA	LYS	engineered mutation	UNP Q14680
D	-19	MET	-	expression tag	UNP Q14680
D	-18	GLY	-	expression tag	UNP Q14680
D	-17	SER	-	expression tag	UNP Q14680
D	-16	SER	-	expression tag	UNP Q14680
D	-15	HIS	-	expression tag	UNP Q14680
D	-14	HIS	-	expression tag	UNP Q14680
D	-13	HIS	-	expression tag	UNP Q14680
D	-12	HIS	-	expression tag	UNP Q14680
D	-11	HIS	-	expression tag	UNP Q14680
D	-10	HIS	-	expression tag	UNP Q14680
D	-9	SER	-	expression tag	UNP Q14680
D	-8	SER	-	expression tag	UNP Q14680
D	-7	GLY	-	expression tag	UNP Q14680
D	-6	LEU	-	expression tag	UNP Q14680
D	-5	VAL	-	expression tag	UNP Q14680
D	-4	PRO	-	expression tag	UNP Q14680
D	-3	ARG	-	expression tag	UNP Q14680
D	-2	GLY	-	expression tag	UNP Q14680
D	-1	SER	-	expression tag	UNP Q14680
D	0	HIS	-	expression tag	UNP Q14680
D	167	ALA	THR	engineered mutation	UNP Q14680
D	171	ALA	SER	engineered mutation	UNP Q14680
D	213	THR	ASN	engineered mutation	UNP Q14680
D	214	ALA	VAL	engineered mutation	UNP Q14680

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Chain	Residue	Modelled	Actual	Comment	Reference
D	215	ALA	MET	engineered mutation	UNP Q14680
D	218	VAL	TYR	engineered mutation	UNP Q14680
D	219	ALA	LYS	engineered mutation	UNP Q14680

- Molecule 2 is 4-bromo-N-(2,3,4,5-tetrahydro-1H-3-benzazepin-7-yl)benzamide (CCD ID: NF5) (formula: C₁₇H₁₇BrN₂O).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	Br	C	N	O	0	0
			21	1	17	2	1		
2	B	1	Total	Br	C	N	O	0	0
			21	1	17	2	1		
2	C	1	Total	Br	C	N	O	0	0
			21	1	17	2	1		
2	D	1	Total	Br	C	N	O	0	0
			21	1	17	2	1		

- Molecule 3 is water.

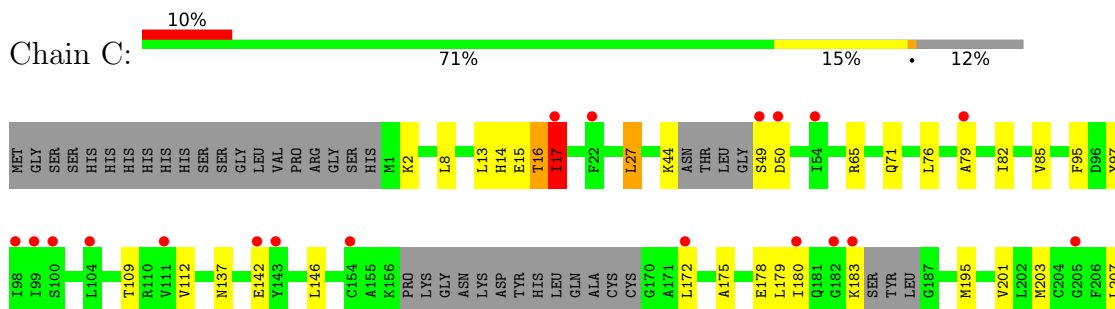
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	312	Total	O	0	0
			312	312		
3	B	270	Total	O	0	0
			270	270		
3	C	237	Total	O	0	0
			237	237		

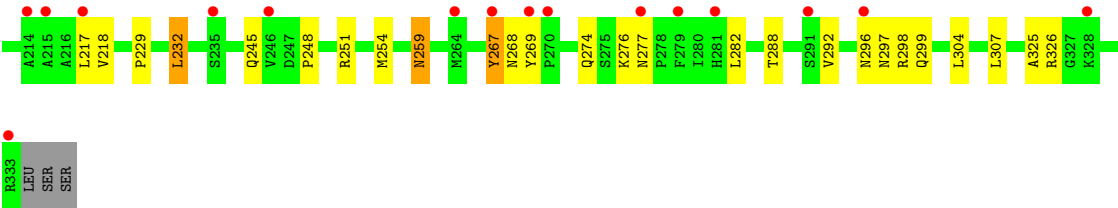
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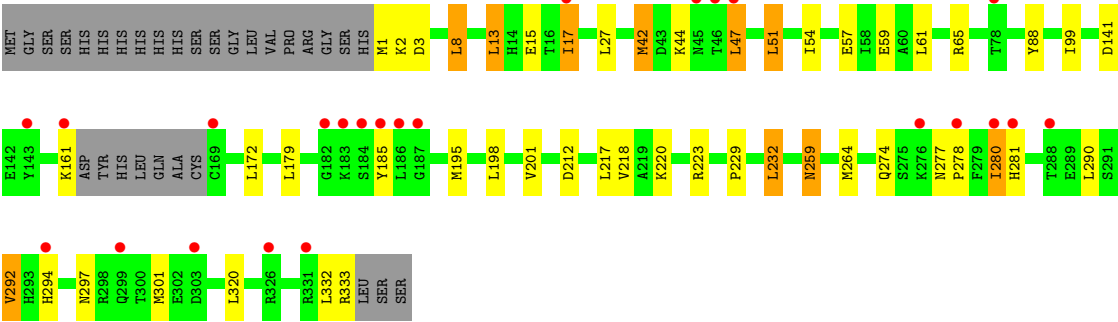
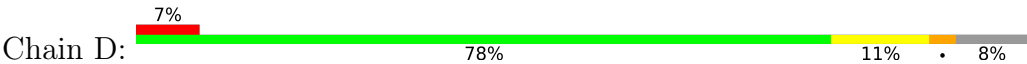
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	D	258	Total 258	O 258	0	0

• Molecule 1: MATERNAL EMBRYONIC LEUCINE ZIPPER KINASE





● Molecule 1: MATERNAL EMBRYONIC LEUCINE ZIPPER KINASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	65.96Å 74.95Å 78.22Å 85.74° 70.07° 89.94°	Depositor
Resolution (Å)	35.01 – 1.92 35.01 – 1.92	Depositor EDS
% Data completeness (in resolution range)	94.8 (35.01-1.92) 94.7 (35.01-1.92)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.44 (at 1.92Å)	Xtriage
Refinement program	BUSTER 2.11.5	Depositor
R, R_{free}	0.201 , 0.247 0.210 , 0.255	Depositor DCC
R_{free} test set	5074 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	32.4	Xtriage
Anisotropy	0.224	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 70.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11529	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.99% 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: NF5

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	1.06	2/2606 (0.1%)	1.17	2/3523 (0.1%)
1	B	1.00	1/2682 (0.0%)	1.23	9/3626 (0.2%)
1	C	0.96	0/2598	1.21	2/3509 (0.1%)
1	D	1.08	3/2728 (0.1%)	1.18	7/3687 (0.2%)
All	All	1.03	6/10614 (0.1%)	1.20	20/14345 (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	1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	277	ASN	CA-C	7.36	1.60	1.52
1	A	36	MET	SD-CE	-7.29	1.61	1.79
1	D	301	MET	SD-CE	6.73	1.96	1.79
1	A	195	MET	SD-CE	-5.74	1.65	1.79
1	D	264	MET	SD-CE	-5.38	1.66	1.79
1	D	195	MET	SD-CE	-5.37	1.66	1.79

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	212	ASP	CA-CB-CG	8.49	121.09	112.60
1	B	277	ASN	CA-CB-CG	7.56	120.16	112.60
1	A	154	CYS	N-CA-C	6.84	117.62	108.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	21	GLY	CA-C-N	6.05	133.10	121.54
1	B	21	GLY	C-N-CA	6.05	133.10	121.54
1	A	277	ASN	CA-CB-CG	5.83	118.43	112.60
1	D	1	MET	CA-C-N	5.79	130.40	121.19
1	D	1	MET	C-N-CA	5.79	130.40	121.19
1	B	297	ASN	CA-C-N	5.66	128.18	120.54
1	B	297	ASN	C-N-CA	5.66	128.18	120.54
1	D	141	ASP	CA-CB-CG	5.64	118.24	112.60
1	B	141	ASP	CA-CB-CG	5.52	118.12	112.60
1	D	297	ASN	CA-C-N	5.47	127.88	120.38
1	D	297	ASN	C-N-CA	5.47	127.88	120.38
1	B	97	TYR	CA-C-N	5.27	127.31	120.56
1	B	97	TYR	C-N-CA	5.27	127.31	120.56
1	D	292	VAL	N-CA-CB	5.16	118.32	110.58
1	C	97	TYR	CA-C-N	5.12	127.12	120.56
1	C	97	TYR	C-N-CA	5.12	127.12	120.56
1	D	59	GLU	CB-CG-CD	5.04	121.16	112.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	169	CYS	Peptide

5.2 Too-close contacts [i](#)

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	2547	0	2561	26	0
1	B	2618	0	2648	26	0
1	C	2542	0	2567	29	0
1	D	2661	0	2698	28	0
2	A	21	0	17	3	0
2	B	21	0	17	2	0
2	C	21	0	17	0	0
2	D	21	0	17	4	0
3	A	312	0	0	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	270	0	0	3	0
3	C	237	0	0	3	0
3	D	258	0	0	1	0
All	All	11529	0	10542	111	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 (111) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:1334:NF5:BR1	3:D:2038:HOH:O	2.30	1.03
1:D:220:LYS:HG2	1:D:223[A]:ARG:HH21	1.40	0.85
1:B:212:ASP:O	1:C:79:ALA:HB2	1.83	0.78
1:A:92:GLY:HA2	3:A:2118:HOH:O	1.86	0.76
1:A:177:PRO:O	1:A:181:GLN:HG2	1.86	0.75
1:C:245:GLN:O	1:C:251:ARG:HD3	1.86	0.75
1:C:288:THR:HG23	1:C:298:ARG:HH22	1.50	0.75
1:A:6:GLU:CD	1:A:76:LEU:HD11	2.15	0.71
1:B:17:ILE:O	1:C:17:ILE:HD12	1.89	0.71
1:C:16:THR:O	1:C:17:ILE:HB	1.90	0.69
1:B:40:LYS:HE2	1:B:42:MET:HE1	1.74	0.68
1:B:40:LYS:HE2	1:B:42:MET:CE	2.24	0.67
1:C:175:ALA:HB3	1:C:180:ILE:HD11	1.77	0.67
1:C:85:VAL:HG23	3:C:2059:HOH:O	1.96	0.65
1:C:248:PRO:HA	1:C:251:ARG:HG3	1.78	0.65
1:C:175:ALA:CB	1:C:180:ILE:HD11	2.26	0.65
1:D:57:GLU:HG3	1:D:61:LEU:HD23	1.79	0.65
1:A:79:ALA:HB2	1:D:212:ASP:O	1.98	0.64
2:B:1334:NF5:H23	3:B:2269:HOH:O	1.95	0.64
1:B:12:GLU:HB2	1:B:31:ILE:HD11	1.81	0.62
1:D:2:LYS:HD3	1:D:3:ASP:H	1.65	0.62
1:D:290:LEU:CD1	1:D:320:LEU:HD12	2.30	0.61
1:C:65:ARG:HG3	1:C:71:GLN:HE22	1.67	0.57
1:B:22:PHE:HE1	1:B:42:MET:HE2	1.69	0.57
1:C:325:ALA:HB2	3:C:2226:HOH:O	2.03	0.57
1:B:201:VAL:CG1	1:B:207:LEU:HD23	2.34	0.57
1:B:7[A]:LEU:HD23	1:B:7[A]:LEU:H	1.69	0.57
1:B:4:TYR:CE2	1:C:95:PHE:HZ	2.22	0.57
1:A:142:GLU:HG2	3:A:2112:HOH:O	2.05	0.56
1:C:109:THR:HG21	1:C:203:MET:HG3	1.88	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:1334:NF5:O9	2:D:1334:NF5:H12	2.06	0.55
1:B:139[A]:LEU:HD21	1:B:149:ILE:HD13	1.88	0.55
1:C:245:GLN:HB2	1:C:251:ARG:HG2	1.88	0.54
1:C:76:LEU:HD12	3:C:2059:HOH:O	2.07	0.54
1:B:4:TYR:HA	1:B:7[A]:LEU:HD21	1.90	0.54
1:C:201:VAL:HG11	1:C:207:LEU:HD23	1.90	0.53
1:D:65:ARG:HG2	1:D:277:ASN:HB3	1.89	0.53
1:A:129:ALA:H	1:A:155:ALA:HB3	1.73	0.53
1:D:57:GLU:HG3	1:D:61:LEU:CD2	2.37	0.53
1:B:297:ASN:OD1	1:B:300:THR:HG23	2.09	0.53
1:C:14:HIS:HB2	1:C:27:LEU:HB3	1.90	0.53
1:A:65:ARG:HG3	1:A:71:GLN:HE22	1.75	0.52
1:B:195:MET:HE1	1:B:254:MET:HE1	1.92	0.52
1:C:201:VAL:CG1	1:C:207:LEU:HD23	2.39	0.52
1:B:50:ASP:O	1:B:54:ILE:HG12	2.11	0.51
1:D:8:LEU:HD11	1:D:13:LEU:HD22	1.92	0.51
1:C:178:GLU:HB2	1:C:183:LYS:HB3	1.93	0.50
1:D:17[B]:ILE:HD11	1:D:27:LEU:HD11	1.94	0.50
1:A:27:LEU:HD13	1:A:88:TYR:CE1	2.47	0.49
2:A:1334:NF5:H23	3:A:2118:HOH:O	2.13	0.49
1:B:65:ARG:HD3	3:B:2057:HOH:O	2.12	0.49
1:C:267:TYR:C	1:C:269:TYR:H	2.20	0.49
3:A:2041:HOH:O	2:D:1334:NF5:H21	2.12	0.48
1:A:109:THR:HG21	1:A:203:MET:HG3	1.96	0.48
2:B:1334:NF5:O9	2:B:1334:NF5:H12	2.14	0.48
1:D:229:PRO:HD2	1:D:232:LEU:HD22	1.96	0.47
1:A:245:GLN:O	1:A:251:ARG:HD3	2.14	0.47
1:D:259:ASN:HD22	1:D:259:ASN:H	1.62	0.47
1:B:276:LYS:C	1:B:277:ASN:HD22	2.23	0.47
1:A:7:LEU:O	1:A:7:LEU:HD13	2.15	0.46
1:A:142:GLU:HG3	1:A:143:TYR:CE2	2.50	0.46
1:B:229:PRO:HD2	1:B:232:LEU:HD22	1.97	0.46
1:D:2:LYS:HG2	1:D:3:ASP:N	2.30	0.46
1:D:47:LEU:HD11	1:D:51:LEU:HD23	1.96	0.46
1:D:280:ILE:HG22	1:D:281:HIS:H	1.80	0.46
1:B:43:ASP:HB3	1:B:46:THR:HG22	1.97	0.46
1:C:259:ASN:HD22	1:C:259:ASN:H	1.63	0.46
1:A:7:LEU:HD13	1:A:7:LEU:C	2.41	0.46
1:A:6:GLU:OE1	1:A:76:LEU:HD11	2.16	0.46
1:C:276:LYS:C	1:C:277:ASN:HD22	2.24	0.46
1:B:109:THR:HG21	1:B:203:MET:HG3	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:201:VAL:HG11	1:B:207:LEU:HD23	1.97	0.45
1:A:27:LEU:CD1	1:A:88:TYR:CE1	3.00	0.45
1:D:42:MET:HE2	1:D:54:ILE:HD12	1.98	0.45
1:C:195:MET:HE1	1:C:254:MET:HE1	1.99	0.45
1:D:2:LYS:CG	1:D:3:ASP:N	2.79	0.45
1:D:47:LEU:HD21	1:D:51:LEU:HB2	1.98	0.45
1:A:276:LYS:C	1:A:277:ASN:HD22	2.24	0.45
1:A:210:ASP:OD2	1:D:2:LYS:HG3	2.16	0.45
1:D:278:PRO:HG3	1:D:281:HIS:HD2	1.82	0.44
1:B:112:VAL:HG13	1:B:146:LEU:HD11	1.99	0.44
1:B:178:GLU:HA	1:B:181:GLN:HG2	1.99	0.44
3:A:2031:HOH:O	1:D:99:ILE:HD11	2.17	0.43
1:D:290:LEU:HD11	1:D:320:LEU:HD12	2.00	0.43
1:C:137:ASN:HD22	1:C:137:ASN:HA	1.64	0.43
1:B:259:ASN:H	1:B:259:ASN:HD22	1.66	0.43
1:D:2:LYS:CD	1:D:3:ASP:H	2.30	0.43
1:A:86:LEU:HD13	2:A:1334:NF5:BR1	2.74	0.43
2:A:1334:NF5:H21	3:A:2118:HOH:O	2.18	0.43
1:A:112:VAL:HG13	1:A:146:LEU:HD11	1.99	0.43
1:A:293:HIS:HB2	3:A:2272:HOH:O	2.18	0.43
1:D:172:LEU:HD21	1:D:218:VAL:HG23	2.01	0.43
1:B:131:ARG:HA	3:B:2129:HOH:O	2.18	0.42
1:D:44:LYS:HA	1:D:47:LEU:HD22	2.00	0.42
1:D:2:LYS:CG	1:D:3:ASP:H	2.31	0.42
1:A:4:TYR:O	1:A:8:LEU:HD23	2.20	0.42
1:A:7:LEU:HD12	1:A:8:LEU:HD22	2.00	0.42
1:C:229:PRO:HD2	1:C:232:LEU:HD22	2.00	0.42
1:A:195:MET:HE1	1:A:254:MET:HE1	2.02	0.42
1:C:112:VAL:HG13	1:C:146:LEU:HD11	2.01	0.42
1:B:44:LYS:HA	1:B:47:LEU:HD12	2.02	0.42
1:D:57:GLU:O	1:D:61:LEU:HD23	2.20	0.42
1:D:198:LEU:HA	1:D:201:VAL:HG12	2.02	0.41
1:C:44:LYS:HD2	1:C:82:ILE:HG13	2.02	0.41
1:C:267:TYR:CD1	1:C:267:TYR:N	2.88	0.41
1:A:201:VAL:HG11	1:A:207:LEU:HD23	2.02	0.41
1:A:259:ASN:HD22	1:A:259:ASN:H	1.68	0.41
1:D:88:TYR:CE1	2:D:1334:NF5:H13	2.56	0.41
1:B:139[A]:LEU:CD2	1:B:149:ILE:HD13	2.51	0.41
1:C:172:LEU:HD21	1:C:218:VAL:HG23	2.04	0.40
1:A:137:ASN:HD22	1:A:137:ASN:HA	1.66	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	307/356 (86%)	296 (96%)	11 (4%)	0	100	100
1	B	319/356 (90%)	303 (95%)	15 (5%)	1 (0%)	36	26
1	C	305/356 (86%)	292 (96%)	10 (3%)	3 (1%)	12	4
1	D	325/356 (91%)	312 (96%)	12 (4%)	1 (0%)	36	26
All	All	1256/1424 (88%)	1203 (96%)	48 (4%)	5 (0%)	30	19

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	22	PHE
1	C	16	THR
1	C	17	ILE
1	C	268	ASN
1	D	280	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	278/314 (88%)	258 (93%)	20 (7%)	13	4
1	B	286/314 (91%)	265 (93%)	21 (7%)	13	3
1	C	277/314 (88%)	254 (92%)	23 (8%)	10	2
1	D	291/314 (93%)	271 (93%)	20 (7%)	14	4
All	All	1132/1256 (90%)	1048 (93%)	84 (7%)	13	3

All (84) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	LEU
1	A	15	GLU
1	A	17	ILE
1	A	50	ASP
1	A	51	LEU
1	A	76	LEU
1	A	112	VAL
1	A	179	LEU
1	A	181	GLN
1	A	217	LEU
1	A	232	LEU
1	A	251	ARG
1	A	259	ASN
1	A	282	LEU
1	A	292	VAL
1	A	295	ARG
1	A	304	LEU
1	A	307	LEU
1	A	332	LEU
1	A	333	ARG
1	B	7[A]	LEU
1	B	7[B]	LEU
1	B	13	LEU
1	B	40	LYS
1	B	59	GLU
1	B	65	ARG
1	B	156	LYS
1	B	161	LYS
1	B	212	ASP
1	B	217	LEU
1	B	230	LYS
1	B	232	LEU
1	B	238	LEU
1	B	251	ARG
1	B	259	ASN
1	B	282	LEU
1	B	292	VAL
1	B	300	THR
1	B	304	LEU
1	B	307	LEU
1	B	332	LEU
1	C	2	LYS

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Mol	Chain	Res	Type
1	C	8	LEU
1	C	13	LEU
1	C	15	GLU
1	C	17	ILE
1	C	27	LEU
1	C	49	SER
1	C	50	ASP
1	C	142	GLU
1	C	179	LEU
1	C	217	LEU
1	C	232	LEU
1	C	259	ASN
1	C	267	TYR
1	C	274	GLN
1	C	282	LEU
1	C	292	VAL
1	C	296	ASN
1	C	297	ASN
1	C	299	GLN
1	C	304	LEU
1	C	307	LEU
1	C	326	ARG
1	D	8	LEU
1	D	13	LEU
1	D	15	GLU
1	D	17[A]	ILE
1	D	17[B]	ILE
1	D	42	MET
1	D	47	LEU
1	D	51	LEU
1	D	161	LYS
1	D	179	LEU
1	D	185	TYR
1	D	217	LEU
1	D	232	LEU
1	D	259	ASN
1	D	274	GLN
1	D	292	VAL
1	D	294[A]	HIS
1	D	294[B]	HIS
1	D	332	LEU
1	D	333	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (34) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	71	GLN
1	A	137	ASN
1	A	256	ASN
1	A	259	ASN
1	A	277	ASN
1	A	312	HIS
1	B	71	GLN
1	B	101	GLN
1	B	137	ASN
1	B	181	GLN
1	B	256	ASN
1	B	259	ASN
1	B	277	ASN
1	B	293	HIS
1	B	294	HIS
1	B	312	HIS
1	C	71	GLN
1	C	80	ASN
1	C	137	ASN
1	C	181	GLN
1	C	241	GLN
1	C	256	ASN
1	C	259	ASN
1	C	277	ASN
1	C	293	HIS
1	C	294	HIS
1	C	312	HIS
1	D	137	ASN
1	D	160	ASN
1	D	256	ASN
1	D	259	ASN
1	D	265	GLN
1	D	281	HIS
1	D	312	HIS

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](#)

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	NF5	C	1334	-	23,23,23	0.32	0	30,31,31	0.69	1 (3%)
2	NF5	A	1334	-	23,23,23	0.32	0	30,31,31	0.65	0
2	NF5	B	1334	-	23,23,23	0.34	0	30,31,31	0.39	0
2	NF5	D	1334	-	23,23,23	0.35	0	30,31,31	0.61	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	NF5	C	1334	-	-	0/8/16/16	0/3/3/3
2	NF5	A	1334	-	-	0/8/16/16	0/3/3/3
2	NF5	B	1334	-	-	0/8/16/16	0/3/3/3
2	NF5	D	1334	-	-	0/8/16/16	0/3/3/3

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1334	NF5	C11-N10-C8	2.43	133.01	126.61

There are no chirality outliers.

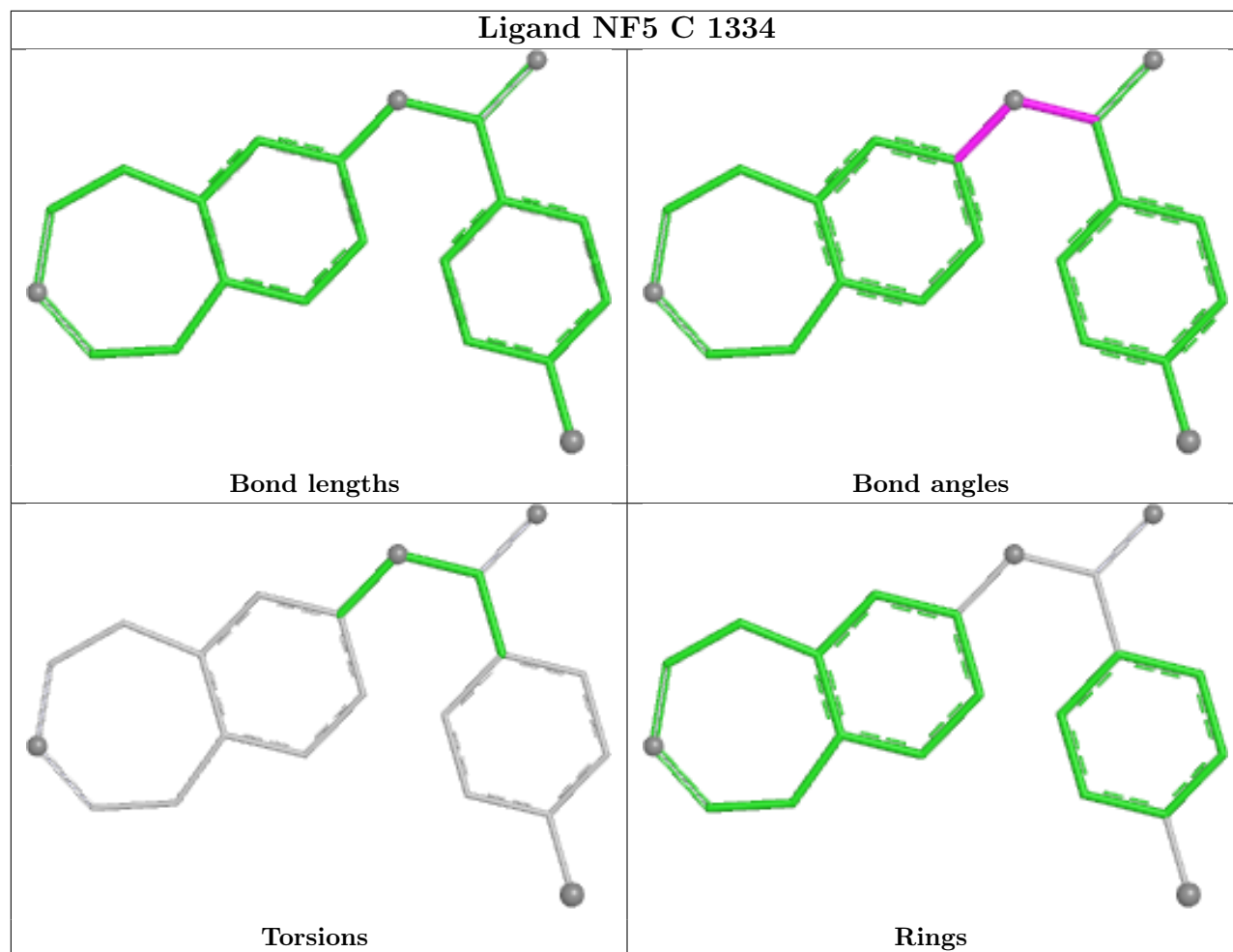
There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1334	NF5	3	0
2	B	1334	NF5	2	0
2	D	1334	NF5	4	0

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](#)

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, 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	314/356 (88%)	0.52	19 (6%) 27 31	18, 37, 66, 97	1 (0%)
1	B	323/356 (90%)	0.81	35 (10%) 11 14	16, 41, 79, 106	2 (0%)
1	C	313/356 (87%)	0.97	35 (11%) 10 13	27, 48, 78, 135	0
1	D	326/356 (91%)	0.58	24 (7%) 20 24	17, 36, 72, 103	3 (0%)
All	All	1276/1424 (89%)	0.72	113 (8%) 15 19	16, 40, 74, 135	6 (0%)

All (113) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	186	LEU	5.2
1	B	21	GLY	4.4
1	B	330	VAL	4.4
1	D	288	THR	4.4
1	C	143	TYR	4.1
1	B	278	PRO	4.1
1	A	155	ALA	4.0
1	B	182	GLY	3.9
1	C	267	TYR	3.8
1	C	246	VAL	3.7
1	D	169	CYS	3.5
1	C	264	MET	3.5
1	D	187	GLY	3.5
1	A	169	CYS	3.4
1	B	162	ASP	3.3
1	D	281	HIS	3.3
1	B	169	CYS	3.3
1	B	286	CYS	3.3
1	D	294[A]	HIS	3.3
1	B	46	THR	3.3
1	D	278	PRO	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	333	ARG	3.2
1	D	161	LYS	3.1
1	D	185	TYR	3.1
1	A	46	THR	3.1
1	B	48	GLY	3.1
1	C	214	ALA	3.0
1	C	333	ARG	3.0
1	C	180	ILE	3.0
1	C	111	VAL	3.0
1	D	17[A]	ILE	3.0
1	B	281	HIS	2.9
1	D	280	ILE	2.9
1	A	170	GLY	2.9
1	B	284	ASP	2.9
1	C	22	PHE	2.8
1	C	183	LYS	2.8
1	D	143	TYR	2.8
1	A	79	ALA	2.8
1	B	49	SER	2.7
1	D	182	GLY	2.7
1	A	183	LYS	2.7
1	A	303	ASP	2.7
1	B	13	LEU	2.7
1	B	47	LEU	2.6
1	C	296	ASN	2.6
1	D	47	LEU	2.6
1	B	187	GLY	2.6
1	C	182	GLY	2.6
1	C	142	GLU	2.6
1	D	78	THR	2.6
1	B	303	ASP	2.5
1	A	327	GLY	2.5
1	C	17	ILE	2.5
1	B	292	VAL	2.5
1	C	279	PHE	2.5
1	B	20	GLY	2.5
1	C	49	SER	2.5
1	D	184	SER	2.5
1	B	288	THR	2.5
1	C	235	SER	2.4
1	B	170	GLY	2.4
1	B	332	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	99	ILE	2.4
1	C	291	SER	2.4
1	C	217	LEU	2.4
1	C	328	LYS	2.3
1	C	172	LEU	2.3
1	B	14	HIS	2.3
1	B	1	MET	2.3
1	B	31	ILE	2.3
1	B	41	ILE	2.3
1	C	98	ILE	2.3
1	A	328	LYS	2.3
1	C	205	GLY	2.3
1	D	276	LYS	2.3
1	B	50	ASP	2.3
1	B	29	CYS	2.3
1	B	143	TYR	2.3
1	A	287	VAL	2.3
1	C	281	HIS	2.3
1	B	42	MET	2.3
1	A	22	PHE	2.2
1	C	270	PRO	2.2
1	D	46	THR	2.2
1	D	331	ARG	2.2
1	C	100	SER	2.2
1	C	269	TYR	2.2
1	A	53	ARG	2.2
1	D	326	ARG	2.2
1	D	183	LYS	2.2
1	A	82	ILE	2.1
1	B	43	ASP	2.1
1	D	303	ASP	2.1
1	A	292	VAL	2.1
1	A	187	GLY	2.1
1	B	277	ASN	2.1
1	C	154	CYS	2.1
1	C	104	LEU	2.1
1	C	277	ASN	2.1
1	C	50	ASP	2.1
1	C	54	ILE	2.1
1	B	324	LYS	2.1
1	B	287	VAL	2.1
1	D	45	ASN	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	299	GLN	2.1
1	A	153	LEU	2.1
1	C	215	ALA	2.1
1	B	22	PHE	2.0
1	A	298	ARG	2.0
1	C	79	ALA	2.0
1	B	280	ILE	2.0
1	A	297	ASN	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](#)

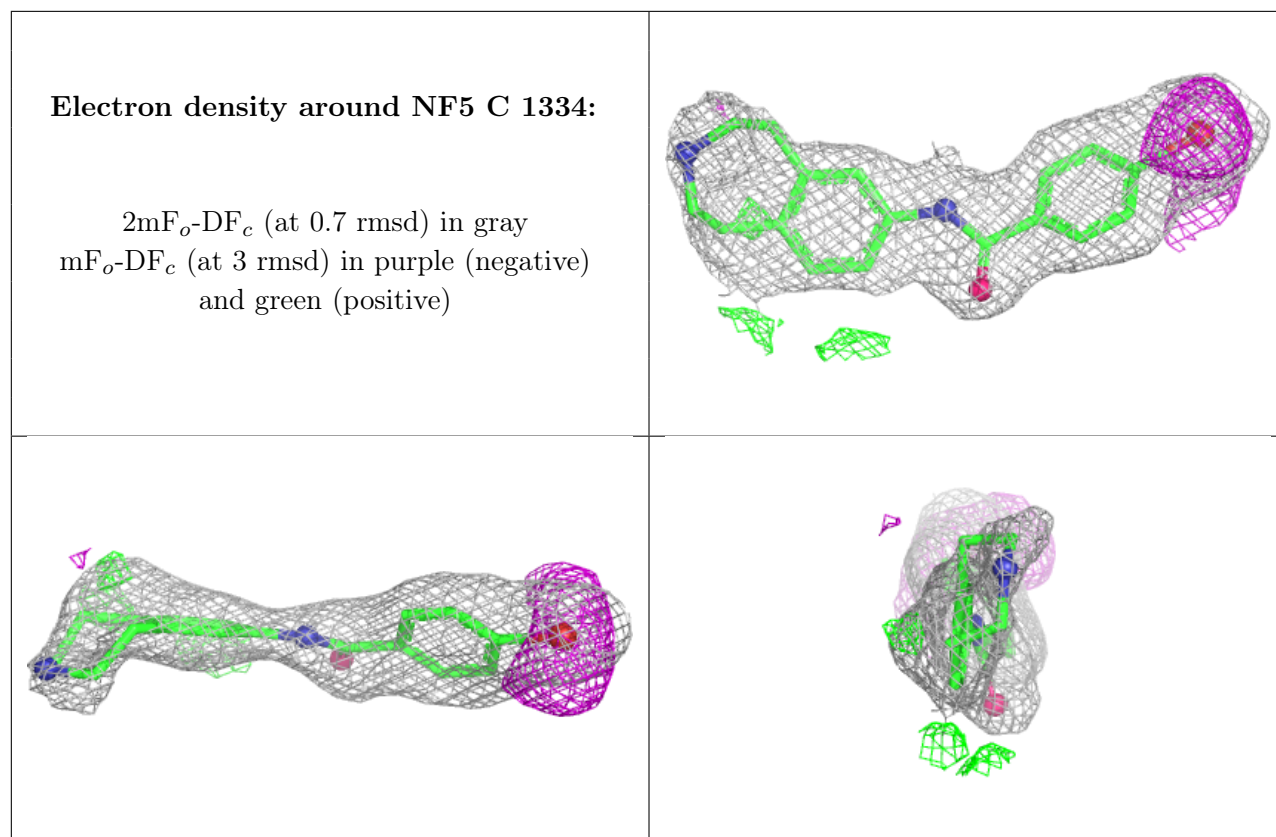
There are no oligosaccharides in this entry.

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(\AA^2)	Q<0.9
2	NF5	B	1334	21/21	0.90	0.12	32,49,56,65	0
2	NF5	D	1334	21/21	0.90	0.11	26,35,50,60	0
2	NF5	C	1334	21/21	0.93	0.12	24,48,56,58	0
2	NF5	A	1334	21/21	0.93	0.11	22,34,41,51	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.



6.5 Other polymers [i](#)

There are no such residues in this entry.