



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 26, 2024 – 09:55 AM EDT

PDB ID : 6TI8
Title : IRAK4 IN COMPLEX WITH inhibitor
Authors : Xue, Y.; Aagaard, A.; Degorce, S.L.
Deposited on : 2019-11-22
Resolution : 2.32 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

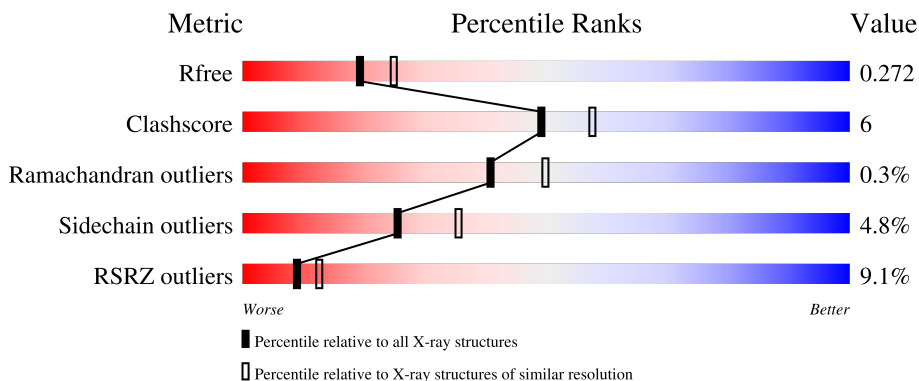
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.32 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}	130704	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)
RSRZ outliers	127900	5855 (2.34-2.30)

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	308	<div style="display: flex; align-items: center;"> <div style="width: 7%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 81%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: grey;"></div> </div>
1	B	308	<div style="display: flex; align-items: center;"> <div style="width: 10%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 75%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 15%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: grey;"></div> </div>
1	C	308	<div style="display: flex; align-items: center;"> <div style="width: 6%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 79%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 7%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 7%; height: 10px; background-color: grey;"></div> </div>
1	D	308	<div style="display: flex; align-items: center;"> <div style="width: 10%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 78%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 13%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: grey;"></div> </div>

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
1	SEP	A	346	-	-	-	X

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 9494 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.

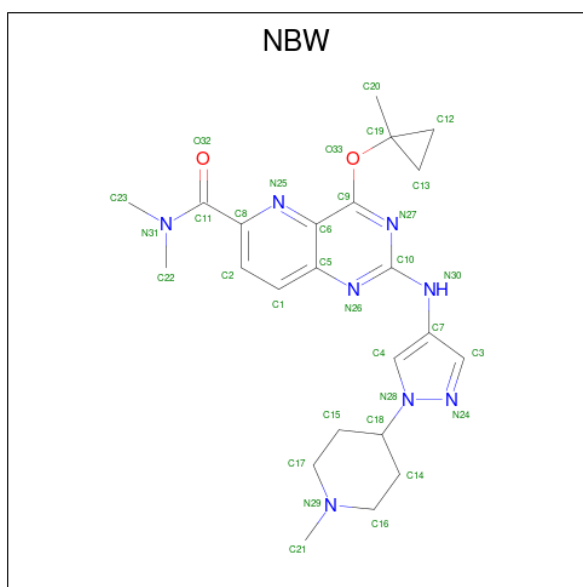
- Molecule 1 is a protein called Interleukin-1 receptor-associated kinase 4.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	284	2240	1407	375	442	2	14	0	0	0
1	B	282	2226	1398	373	439	2	14	0	0	0
1	C	285	2255	1416	380	443	2	14	0	1	0
1	D	284	2245	1410	378	441	2	14	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	153	GLY	-	expression tag	UNP Q9NWZ3
B	153	GLY	-	expression tag	UNP Q9NWZ3
C	153	GLY	-	expression tag	UNP Q9NWZ3
D	153	GLY	-	expression tag	UNP Q9NWZ3

- Molecule 2 is {N}, {N}-dimethyl-4-(1-methylcyclopropyl)oxy-2-[[1-(1-methylpiperidin-4-yl)pyrazol-4-yl]amino]pyrido[3,2-d]pyrimidine-6-carboxamide (three-letter code: NBW) (formula: C₂₃H₃₀N₈O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	33	23	8	2	0	0
2	B	1	33	23	8	2	0	0
2	C	1	33	23	8	2	0	0
2	D	1	33	23	8	2	0	0

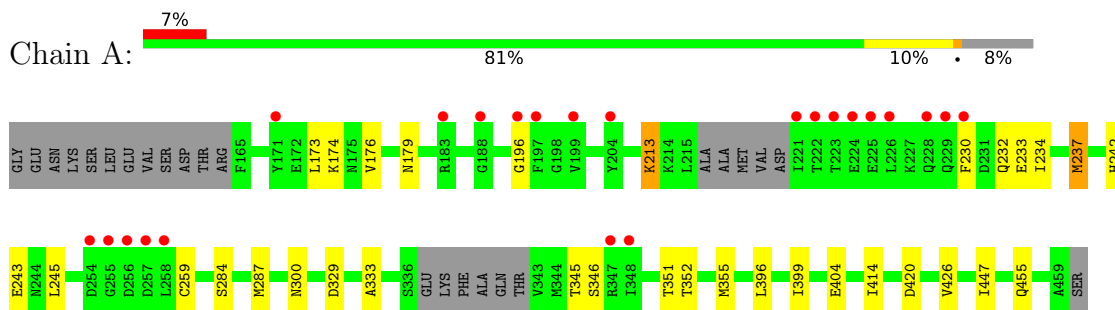
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	107	107	107	0	0
3	B	82	82	82	0	0
3	C	101	101	101	0	0
3	D	106	106	106	0	0

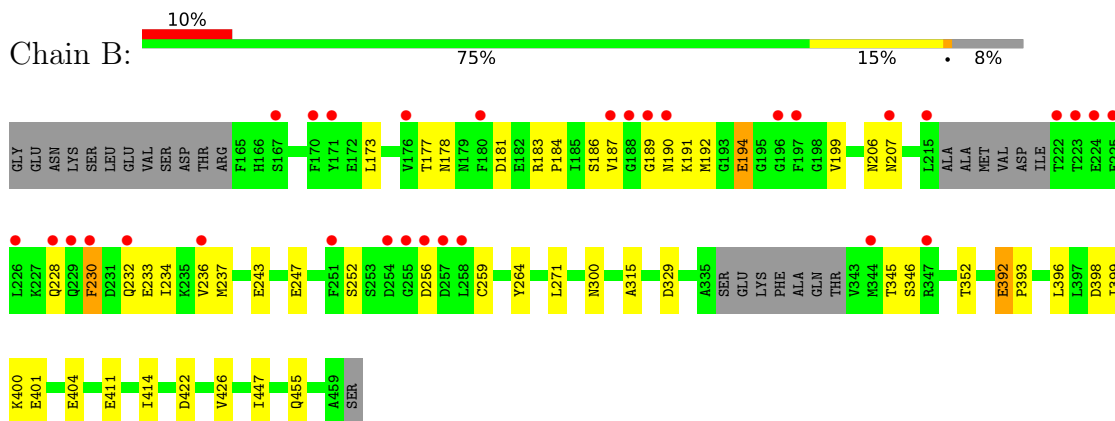
3 Residue-property plots [i](#)

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.

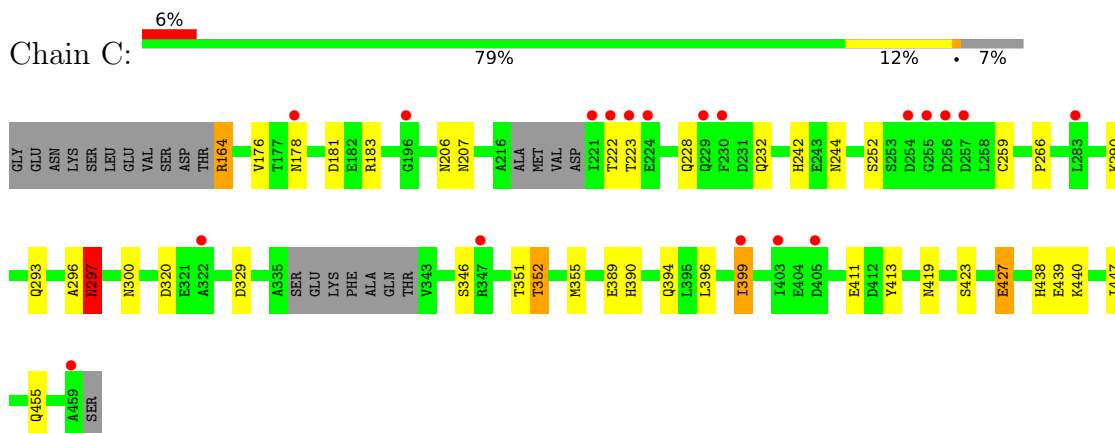
- Molecule 1: Interleukin-1 receptor-associated kinase 4



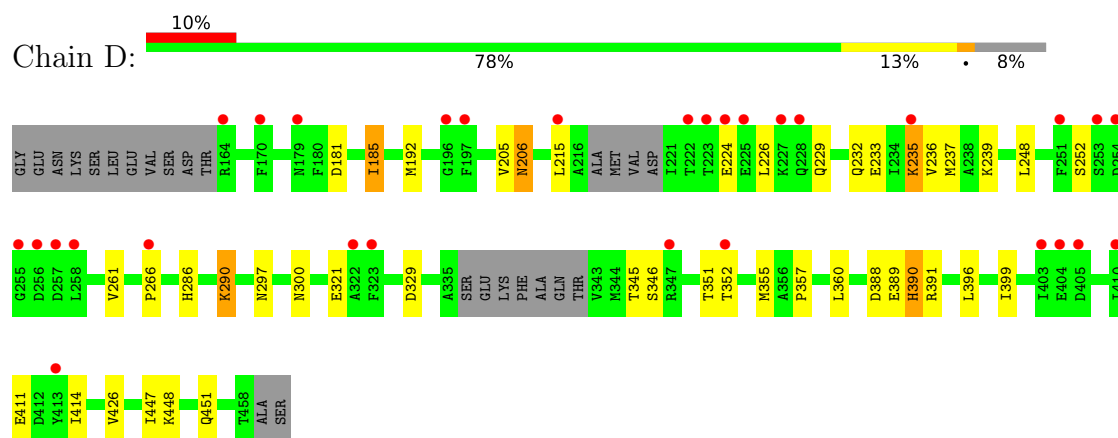
- Molecule 1: Interleukin-1 receptor-associated kinase 4



- Molecule 1: Interleukin-1 receptor-associated kinase 4



- Molecule 1: Interleukin-1 receptor-associated kinase 4



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	89.15Å 110.53Å 142.22Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.66 – 2.32 49.66 – 2.32	Depositor EDS
% Data completeness (in resolution range)	99.6 (49.66-2.32) 99.6 (49.66-2.32)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.18 (at 2.32Å)	Xtrriage
Refinement program	BUSTER 2.11.7	Depositor
R, R_{free}	0.249 , 0.281 0.234 , 0.272	Depositor DCC
R_{free} test set	3070 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	57.4	Xtrriage
Anisotropy	0.445	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 51.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9494	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 47.57 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 9.7340e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: SEP, NBW, TPO

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	0.49	0/2255	0.67	1/3038 (0.0%)
1	B	0.49	0/2241	0.68	0/3019
1	C	0.56	2/2273 (0.1%)	0.74	1/3062 (0.0%)
1	D	0.51	0/2260	0.70	0/3044
All	All	0.51	2/9029 (0.0%)	0.70	2/12163 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	297[A]	ASN	CA-C	6.60	1.70	1.52
1	C	297[B]	ASN	CA-C	6.60	1.70	1.52

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	296	ALA	C-N-CA	11.86	151.35	121.70
1	A	196	GLY	N-CA-C	-5.17	100.17	113.10

There are no chirality outliers.

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	2240	0	2205	14	0
1	B	2226	0	2189	38	0
1	C	2255	0	2223	27	1
1	D	2245	0	2213	27	0
2	A	33	0	0	1	0
2	B	33	0	0	1	0
2	C	33	0	0	1	0
2	D	33	0	0	0	0
3	A	107	0	0	0	0
3	B	82	0	0	0	0
3	C	101	0	0	1	0
3	D	106	0	0	0	0
All	All	9494	0	8830	106	1

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 6.

All (106) 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:D:235:LYS:HE2	1:D:239:LYS:HD2	1.40	1.03
1:B:184:PRO:HD2	1:B:187:VAL:CG2	1.88	1.03
1:C:389:GLU:N	1:C:389:GLU:OE1	1.92	1.03
1:B:191:LYS:NZ	1:B:194:GLU:OE1	1.96	0.98
1:C:164:ARG:HH11	1:C:164:ARG:HG3	1.30	0.95
1:B:398:ASP:O	1:B:401:GLU:HB2	1.66	0.94
1:A:232:GLN:NE2	1:A:333:ALA:O	2.01	0.94
1:B:184:PRO:HD2	1:B:187:VAL:HG21	1.46	0.94
1:D:235:LYS:CE	1:D:239:LYS:HD2	2.01	0.91
1:B:183:ARG:HH11	1:B:187:VAL:HG12	1.38	0.88
1:B:233:GLU:O	1:B:237:MET:HG2	1.73	0.88
1:D:389:GLU:HG3	1:D:390:HIS:ND1	1.90	0.86
1:D:388:ASP:OD2	1:D:391:ARG:HB2	1.77	0.84
1:C:438:HIS:HD2	1:C:440:LYS:H	1.28	0.82
1:D:389:GLU:HG3	1:D:390:HIS:CE1	2.15	0.81
1:B:184:PRO:HG2	1:B:187:VAL:HG23	1.67	0.77
1:D:232:GLN:O	1:D:236:VAL:HG23	1.84	0.77
1:D:185:ILE:HD12	1:D:192:MET:HA	1.67	0.76
1:B:191:LYS:NZ	1:B:194:GLU:CD	2.40	0.74
1:B:183:ARG:NH1	1:B:187:VAL:HG12	2.02	0.74
1:D:266:PRO:HG3	1:D:321:GLU:HG3	1.71	0.73
1:D:205:VAL:O	1:D:206:ASN:HB3	1.88	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:389:GLU:HA	1:C:394:GLN:HE21	1.58	0.69
1:A:230:PHE:O	1:A:234:ILE:HD12	1.92	0.69
1:A:284:SER:H	1:A:287:MET:HE3	1.60	0.67
1:B:184:PRO:CD	1:B:187:VAL:CG2	2.73	0.65
1:B:191:LYS:HZ1	1:B:194:GLU:CD	1.98	0.65
1:B:233:GLU:O	1:B:237:MET:CG	2.44	0.64
1:A:233:GLU:O	1:A:237:MET:HB2	1.99	0.61
1:C:352:THR:HA	1:C:355:MET:HE3	1.82	0.61
1:C:438:HIS:CD2	1:C:440:LYS:H	2.16	0.61
1:D:297:ASN:OD1	1:D:451:GLN:NE2	2.33	0.61
1:C:206:ASN:O	1:C:207:ASN:HB2	2.02	0.60
1:C:252:SER:HB3	1:C:259:CYS:HB2	1.84	0.60
1:B:207:ASN:HB3	1:D:448:LYS:HE2	1.84	0.59
1:D:389:GLU:CG	1:D:390:HIS:CE1	2.86	0.59
1:D:286:HIS:O	1:D:290:LYS:HD2	2.03	0.59
1:C:293:GLN:O	1:C:297[A]:ASN:HB2	2.04	0.58
1:C:164:ARG:HG3	1:C:164:ARG:NH1	2.07	0.57
1:B:252:SER:HB3	1:B:259:CYS:HB2	1.85	0.57
1:B:191:LYS:CE	1:B:194:GLU:OE1	2.53	0.56
1:D:396:LEU:O	1:D:399:ILE:HG12	2.06	0.56
1:B:396:LEU:O	1:B:399:ILE:HG12	2.06	0.56
1:C:390:HIS:N	1:C:390:HIS:CD2	2.73	0.56
1:B:422:ASP:CG	1:D:206:ASN:HD21	2.09	0.55
1:A:396:LEU:O	1:A:399:ILE:HG12	2.07	0.54
1:B:184:PRO:CG	1:B:187:VAL:HG23	2.37	0.54
1:B:184:PRO:HD2	1:B:187:VAL:HG23	1.86	0.54
1:B:191:LYS:HZ3	1:B:194:GLU:CD	2.09	0.54
1:A:420:ASP:HA	1:C:207:ASN:O	2.08	0.53
1:D:235:LYS:HE3	1:D:239:LYS:HE3	1.90	0.53
1:B:184:PRO:CD	1:B:187:VAL:HG21	2.29	0.52
1:C:244:ASN:OD1	1:C:297[B]:ASN:ND2	2.42	0.52
1:B:191:LYS:NZ	1:B:194:GLU:OE2	2.43	0.51
1:B:192:MET:SD	1:B:264:TYR:HE1	2.33	0.51
1:C:164:ARG:NH1	1:C:164:ARG:CG	2.73	0.51
1:C:389:GLU:CA	1:C:394:GLN:HE21	2.23	0.51
1:C:399:ILE:HG12	1:C:413:TYR:CZ	2.45	0.51
1:B:230:PHE:CZ	1:B:234:ILE:HD11	2.45	0.50
1:B:177:THR:O	1:B:190:ASN:OD1	2.30	0.50
1:C:266:PRO:HD2	1:C:320:ASP:HA	1.95	0.48
2:C:501:NBW:C3	2:C:501:NBW:N27	2.75	0.48
1:C:164:ARG:HH11	1:C:164:ARG:CG	2.10	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:184:PRO:HD2	1:B:187:VAL:CB	2.42	0.47
1:B:230:PHE:C	1:B:230:PHE:CD2	2.88	0.47
1:A:174:LYS:HG2	1:A:179:ASN:HA	1.96	0.47
1:D:390:HIS:ND1	1:D:390:HIS:N	2.60	0.47
1:B:392:GLU:HA	1:B:393:PRO:HA	1.80	0.46
1:D:266:PRO:CG	1:D:321:GLU:HG3	2.43	0.46
1:A:284:SER:H	1:A:287:MET:CE	2.27	0.46
1:C:242:HIS:HE1	1:C:297[B]:ASN:ND2	2.12	0.46
1:B:232:GLN:O	1:B:236:VAL:HG23	2.16	0.46
1:C:389:GLU:HA	1:C:394:GLN:NE2	2.29	0.46
2:A:501:NBW:N27	2:A:501:NBW:C3	2.77	0.45
1:C:423:SER:O	1:C:427:GLU:HB2	2.17	0.45
1:B:183:ARG:HH11	1:B:187:VAL:CG1	2.20	0.45
1:A:300:ASN:HA	1:A:447:ILE:HG21	1.99	0.45
1:D:235:LYS:CE	1:D:239:LYS:CD	2.86	0.45
1:C:396:LEU:HD12	1:C:399:ILE:HD13	2.00	0.44
1:B:414:ILE:HG12	1:B:426:VAL:HG11	1.98	0.44
1:B:271:LEU:HD22	1:B:315:ALA:HB2	2.00	0.44
1:A:242:HIS:HB3	1:A:245:LEU:HG	2.00	0.44
1:B:184:PRO:CD	1:B:187:VAL:HG23	2.45	0.44
1:C:352:THR:HA	1:C:355:MET:CE	2.47	0.44
1:D:351:THR:O	1:D:355:MET:HG3	2.18	0.43
1:D:215:LEU:HB3	1:D:226:LEU:HD21	1.99	0.43
1:D:235:LYS:HE3	1:D:239:LYS:CE	2.48	0.43
1:B:181:ASP:OD1	1:B:189:GLY:HA2	2.19	0.43
1:B:400:LYS:NZ	1:B:404:GLU:OE2	2.48	0.43
1:D:414:ILE:HG12	1:D:426:VAL:HG11	2.00	0.42
1:C:181:ASP:OD1	1:C:183:ARG:HD3	2.19	0.42
1:C:351:THR:O	1:C:355:MET:HG3	2.19	0.42
1:C:439:GLU:HG2	3:C:683:HOH:O	2.20	0.42
1:D:357:PRO:HA	1:D:360:LEU:HD12	2.01	0.42
1:A:351:THR:O	1:A:355:MET:HG3	2.20	0.42
2:B:501:NBW:C3	2:B:501:NBW:N27	2.82	0.42
1:A:414:ILE:HG12	1:A:426:VAL:HG11	2.02	0.41
1:D:248:LEU:HD12	1:D:261:VAL:O	2.20	0.41
1:A:213:LYS:O	1:A:259:CYS:HA	2.21	0.41
1:A:173:LEU:HA	1:A:176:VAL:HG22	2.03	0.41
1:B:178:ASN:HB3	1:B:190:ASN:OD1	2.21	0.41
1:D:290:LYS:HD2	1:D:290:LYS:N	2.36	0.41
1:C:300:ASN:HA	1:C:447:ILE:HG21	2.03	0.41
1:B:173:LEU:HD23	1:B:173:LEU:HA	1.93	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:300:ASN:HA	1:D:447:ILE:HG21	2.03	0.41
1:B:300:ASN:HA	1:B:447:ILE:HG21	2.02	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:178:ASN:O	1:C:183:ARG:NH1[2_365]	2.18	0.02

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	276/308 (90%)	268 (97%)	8 (3%)	0	100	100
1	B	274/308 (89%)	268 (98%)	5 (2%)	1 (0%)	34	41
1	C	278/308 (90%)	273 (98%)	5 (2%)	0	100	100
1	D	276/308 (90%)	270 (98%)	4 (1%)	2 (1%)	22	26
All	All	1104/1232 (90%)	1079 (98%)	22 (2%)	3 (0%)	41	50

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	181	ASP
1	B	206	ASN
1	D	206	ASN

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	246/266 (92%)	239 (97%)	7 (3%)	43	59
1	B	244/266 (92%)	231 (95%)	13 (5%)	22	31
1	C	247/266 (93%)	231 (94%)	16 (6%)	17	22
1	D	246/266 (92%)	234 (95%)	12 (5%)	25	34
All	All	983/1064 (92%)	935 (95%)	48 (5%)	25	34

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	213	LYS
1	A	237	MET
1	A	243	GLU
1	A	329	ASP
1	A	352	THR
1	A	404	GLU
1	A	455	GLN
1	B	186	SER
1	B	194	GLU
1	B	199	VAL
1	B	228	GLN
1	B	230	PHE
1	B	243	GLU
1	B	247	GLU
1	B	256	ASP
1	B	329	ASP
1	B	352	THR
1	B	392	GLU
1	B	411	GLU
1	B	455	GLN
1	C	164	ARG
1	C	176	VAL
1	C	222	THR
1	C	223	THR
1	C	228	GLN
1	C	232	GLN
1	C	290	LYS
1	C	297[A]	ASN

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Mol	Chain	Res	Type
1	C	297[B]	ASN
1	C	329	ASP
1	C	352	THR
1	C	399	ILE
1	C	411	GLU
1	C	419	ASN
1	C	427	GLU
1	C	455	GLN
1	D	185	ILE
1	D	224	GLU
1	D	229	GLN
1	D	233	GLU
1	D	235	LYS
1	D	237	MET
1	D	252	SER
1	D	290	LYS
1	D	329	ASP
1	D	352	THR
1	D	390	HIS
1	D	411	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	390	HIS
1	B	175	ASN
1	B	228	GLN
1	B	390	HIS
1	C	179	ASN
1	C	242	HIS
1	C	390	HIS
1	C	394	GLN
1	C	419	ASN
1	C	438	HIS
1	C	451	GLN
1	D	207	ASN
1	D	229	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

8 non-standard protein/DNA/RNA residues 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
1	TPO	D	345	1	8,10,11	1.21	1 (12%)	10,14,16	1.00	0
1	SEP	A	346	1	8,9,10	0.80	0	8,12,14	1.88	2 (25%)
1	TPO	A	345	1	8,10,11	1.11	0	10,14,16	1.14	1 (10%)
1	TPO	C	345	1	8,10,11	1.13	0	10,14,16	1.06	0
1	SEP	C	346	1	8,9,10	0.86	0	8,12,14	1.89	1 (12%)
1	SEP	D	346	1	8,9,10	0.78	0	8,12,14	2.12	2 (25%)
1	SEP	B	346	1	8,9,10	0.85	0	8,12,14	1.89	1 (12%)
1	TPO	B	345	1	8,10,11	1.16	0	10,14,16	1.10	1 (10%)

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
1	TPO	D	345	1	-	3/9/11/13	-
1	SEP	A	346	1	-	0/5/8/10	-
1	TPO	A	345	1	-	3/9/11/13	-
1	TPO	C	345	1	-	5/9/11/13	-
1	SEP	C	346	1	-	0/5/8/10	-
1	SEP	D	346	1	-	0/5/8/10	-
1	SEP	B	346	1	-	0/5/8/10	-
1	TPO	B	345	1	-	5/9/11/13	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	345	TPO	CB-CA	2.03	1.58	1.53

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	346	SEP	OG-CB-CA	4.92	112.93	108.14
1	B	346	SEP	OG-CB-CA	4.57	112.59	108.14
1	C	346	SEP	OG-CB-CA	4.45	112.47	108.14
1	A	346	SEP	OG-CB-CA	4.33	112.35	108.14
1	A	345	TPO	O3P-P-OG1	2.19	115.81	105.99
1	B	345	TPO	O3P-P-OG1	2.14	115.59	105.99
1	A	346	SEP	O2P-P-OG	2.11	112.34	106.73
1	D	346	SEP	O3P-P-OG	2.05	112.19	106.73

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	345	TPO	N-CA-CB-OG1
1	A	345	TPO	O-C-CA-CB
1	A	345	TPO	CB-OG1-P-O1P
1	B	345	TPO	N-CA-CB-OG1
1	B	345	TPO	O-C-CA-CB
1	C	345	TPO	N-CA-CB-OG1
1	C	345	TPO	O-C-CA-CB
1	D	345	TPO	N-CA-CB-OG1
1	D	345	TPO	O-C-CA-CB
1	B	345	TPO	CB-OG1-P-O1P
1	C	345	TPO	CB-OG1-P-O1P
1	B	345	TPO	CB-OG1-P-O2P
1	B	345	TPO	CB-OG1-P-O3P
1	C	345	TPO	CB-OG1-P-O2P
1	C	345	TPO	CB-OG1-P-O3P
1	D	345	TPO	CB-OG1-P-O2P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

There are no monosaccharides in this entry.

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	NBW	D	501	-	34,37,37	1.43	5 (14%)	40,55,55	1.87	10 (25%)
2	NBW	A	501	-	34,37,37	1.65	9 (26%)	40,55,55	2.44	12 (30%)
2	NBW	B	501	-	34,37,37	1.45	6 (17%)	40,55,55	1.99	15 (37%)
2	NBW	C	501	-	34,37,37	1.39	5 (14%)	40,55,55	1.88	11 (27%)

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	NBW	D	501	-	-	4/13/35/35	0/5/5/5
2	NBW	A	501	-	-	0/13/35/35	0/5/5/5
2	NBW	B	501	-	-	0/13/35/35	0/5/5/5
2	NBW	C	501	-	-	1/13/35/35	0/5/5/5

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	NBW	C11-N31	4.87	1.40	1.34
2	B	501	NBW	C11-N31	4.42	1.40	1.34
2	D	501	NBW	C11-N31	3.37	1.38	1.34
2	D	501	NBW	C3-C7	3.35	1.41	1.38
2	C	501	NBW	C3-C7	3.03	1.41	1.38
2	A	501	NBW	C6-C5	-2.98	1.38	1.42
2	A	501	NBW	C3-C7	2.97	1.41	1.38
2	A	501	NBW	C18-N28	-2.87	1.44	1.49
2	C	501	NBW	C12-C19	2.70	1.52	1.49
2	B	501	NBW	C3-C7	2.68	1.41	1.38
2	C	501	NBW	C11-N31	2.67	1.37	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	NBW	C12-C19	2.50	1.51	1.49
2	B	501	NBW	C18-N28	-2.43	1.45	1.49
2	B	501	NBW	C6-C5	-2.41	1.39	1.42
2	D	501	NBW	C18-N28	-2.37	1.45	1.49
2	D	501	NBW	C6-C5	-2.31	1.39	1.42
2	A	501	NBW	C1-C5	-2.30	1.37	1.41
2	D	501	NBW	C10-N30	2.30	1.41	1.36
2	C	501	NBW	C6-C5	-2.28	1.39	1.42
2	B	501	NBW	C10-N30	2.25	1.41	1.36
2	A	501	NBW	O33-C9	2.15	1.39	1.36
2	C	501	NBW	C18-N28	-2.14	1.46	1.49
2	A	501	NBW	C8-C11	-2.12	1.47	1.50
2	A	501	NBW	C10-N30	2.07	1.40	1.36
2	A	501	NBW	C13-C19	2.07	1.51	1.49

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	NBW	C19-O33-C9	-7.56	115.57	123.25
2	A	501	NBW	C16-C14-C18	-7.27	104.75	110.44
2	B	501	NBW	C19-O33-C9	-4.84	118.33	123.25
2	D	501	NBW	C21-N29-C17	-4.41	104.06	110.66
2	D	501	NBW	C17-C15-C18	-4.25	107.11	110.44
2	B	501	NBW	C4-N28-C18	4.15	129.16	125.48
2	C	501	NBW	C1-C5-C6	-4.01	114.94	119.40
2	C	501	NBW	C19-O33-C9	-3.95	119.23	123.25
2	D	501	NBW	C19-O33-C9	-3.91	119.28	123.25
2	A	501	NBW	C5-C6-N25	3.85	125.48	121.31
2	A	501	NBW	C21-N29-C17	-3.76	105.03	110.66
2	A	501	NBW	C4-N28-C18	3.74	128.80	125.48
2	B	501	NBW	C1-C5-C6	-3.59	115.41	119.40
2	A	501	NBW	C17-N29-C16	3.58	114.53	109.52
2	D	501	NBW	C4-N28-C18	3.36	128.46	125.48
2	C	501	NBW	C21-N29-C17	-3.32	105.70	110.66
2	B	501	NBW	C5-C6-N25	3.20	124.77	121.31
2	B	501	NBW	C16-C14-C18	-3.20	107.94	110.44
2	A	501	NBW	C21-N29-C16	-3.13	105.97	110.66
2	C	501	NBW	C4-N28-C18	3.07	128.21	125.48
2	D	501	NBW	C16-C14-C18	-2.92	108.16	110.44
2	C	501	NBW	C5-C6-N25	2.88	124.43	121.31
2	D	501	NBW	C5-C6-N25	2.88	124.42	121.31
2	D	501	NBW	C1-C5-C6	-2.84	116.24	119.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	501	NBW	C20-C19-C12	-2.81	114.25	119.99
2	D	501	NBW	C17-N29-C16	2.80	113.44	109.52
2	C	501	NBW	C1-C5-N26	2.71	122.83	118.69
2	A	501	NBW	C7-C4-N28	-2.71	104.33	107.59
2	A	501	NBW	C1-C5-C6	-2.68	116.42	119.40
2	B	501	NBW	C21-N29-C17	-2.68	106.66	110.66
2	B	501	NBW	C17-N29-C16	2.65	113.23	109.52
2	B	501	NBW	C1-C5-N26	2.64	122.72	118.69
2	B	501	NBW	C4-C7-C3	-2.63	104.79	106.02
2	C	501	NBW	C4-C7-C3	-2.62	104.80	106.02
2	B	501	NBW	C21-N29-C16	-2.55	106.85	110.66
2	A	501	NBW	O32-C11-C8	-2.47	114.23	119.00
2	C	501	NBW	C17-C15-C18	-2.47	108.51	110.44
2	C	501	NBW	C12-C19-C13	-2.47	59.12	61.21
2	C	501	NBW	C12-C13-C19	2.45	60.69	59.40
2	B	501	NBW	C15-C18-C14	2.38	114.70	110.16
2	B	501	NBW	N26-C10-N27	-2.29	122.61	126.23
2	B	501	NBW	C12-C13-C19	2.27	60.59	59.40
2	A	501	NBW	N26-C10-N27	-2.25	122.68	126.23
2	A	501	NBW	C15-C17-N29	2.23	114.22	111.22
2	B	501	NBW	C15-C17-N29	2.14	114.09	111.22
2	D	501	NBW	C12-C19-C13	-2.08	59.45	61.21
2	D	501	NBW	C4-C7-C3	-2.05	105.06	106.02
2	B	501	NBW	C12-C19-C13	-2.02	59.50	61.21

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	501	NBW	C8-C11-N31-C23
2	D	501	NBW	O32-C11-N31-C23
2	C	501	NBW	C8-C11-N31-C23
2	D	501	NBW	C12-C19-O33-C9
2	D	501	NBW	C13-C19-O33-C9

There are no ring outliers.

3 monomers are involved in 3 short contacts:

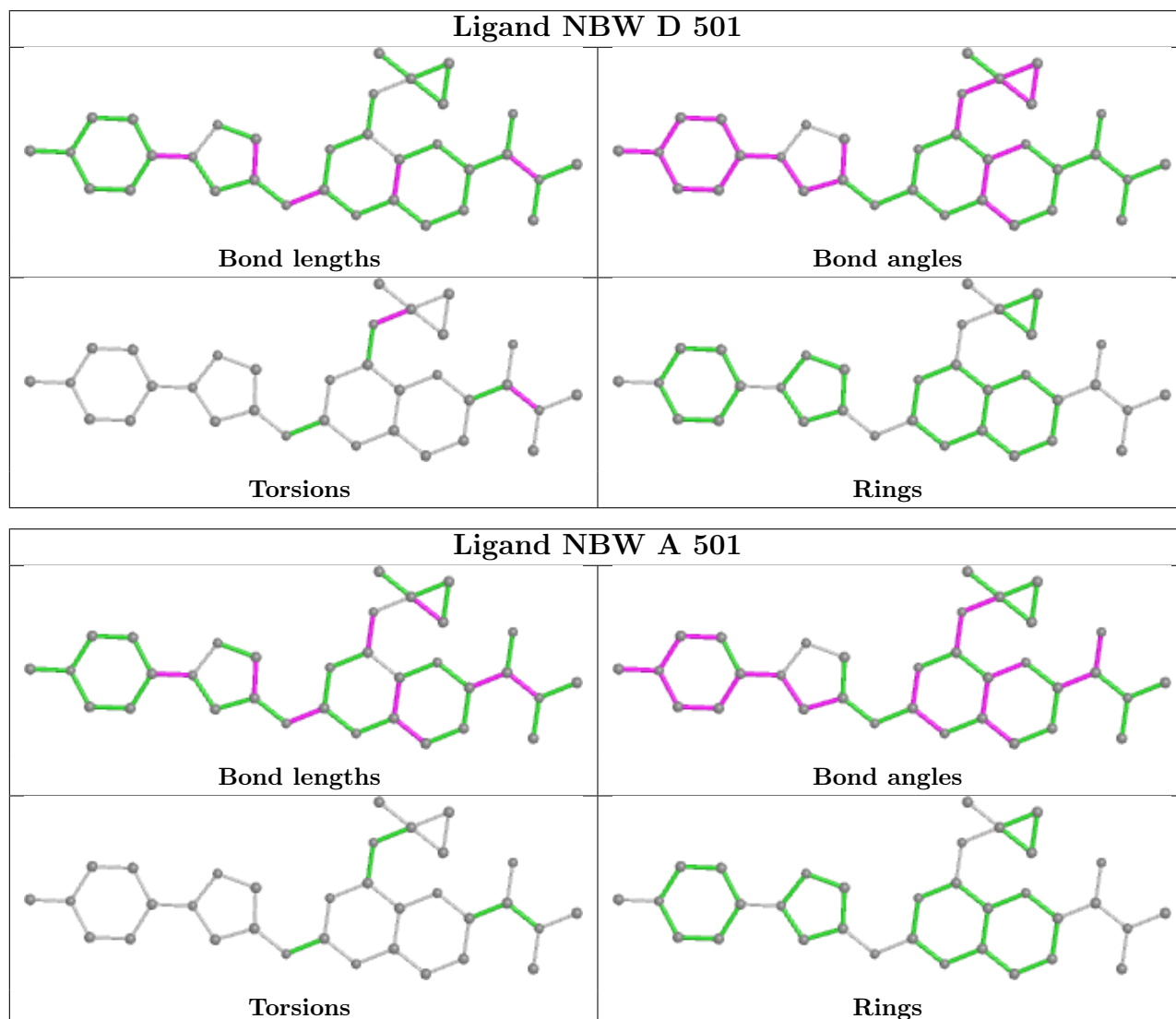
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	NBW	1	0
2	B	501	NBW	1	0

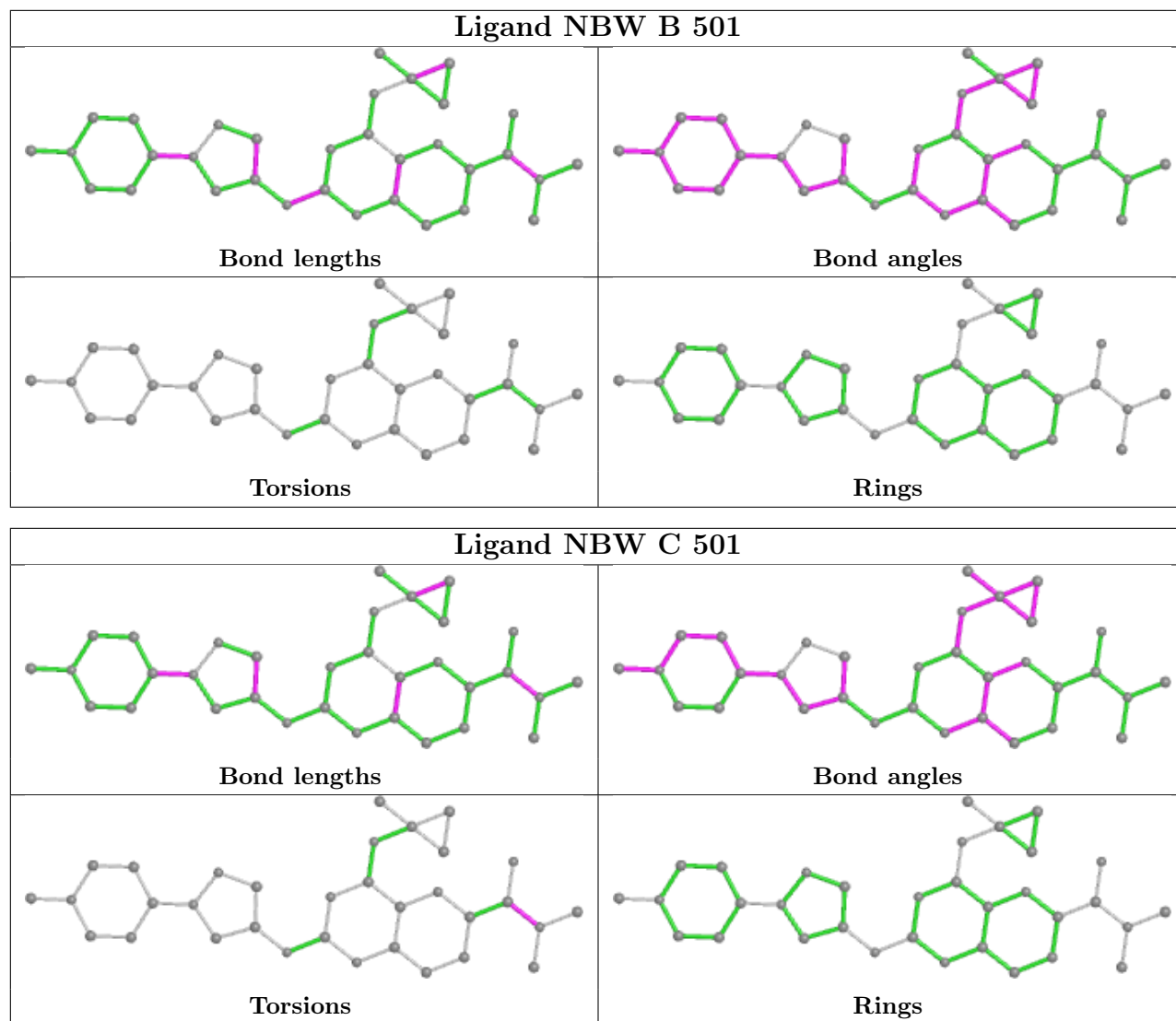
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	501	NBW	1	0

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	282/308 (91%)	0.69	23 (8%) 11 15	39, 62, 115, 193	0
1	B	280/308 (90%)	0.69	31 (11%) 5 8	39, 66, 121, 197	0
1	C	283/308 (91%)	0.56	19 (6%) 17 23	35, 58, 104, 153	1 (0%)
1	D	282/308 (91%)	0.73	30 (10%) 6 9	40, 62, 101, 135	0
All	All	1127/1232 (91%)	0.67	103 (9%) 9 12	35, 62, 114, 197	1 (0%)

All (103) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	223	THR	11.4
1	A	256	ASP	8.5
1	B	223	THR	8.0
1	A	222	THR	7.3
1	B	224	GLU	7.3
1	A	255	GLY	6.9
1	C	257	ASP	6.7
1	A	224	GLU	6.5
1	B	225	GLU	5.9
1	D	255	GLY	5.6
1	B	344	MET	5.6
1	B	232	GLN	5.0
1	A	258	LEU	4.8
1	C	256	ASP	4.7
1	A	230	PHE	4.7
1	A	225	GLU	4.6
1	D	197	PHE	4.5
1	A	257	ASP	4.4
1	D	256	ASP	4.3
1	B	230	PHE	4.3
1	B	196	GLY	4.3

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Mol	Chain	Res	Type	RSRZ
1	A	226	LEU	4.2
1	C	224	GLU	4.0
1	B	256	ASP	3.9
1	B	197	PHE	3.9
1	B	176	VAL	3.9
1	A	348	ILE	3.8
1	A	197	PHE	3.7
1	B	254	ASP	3.6
1	D	254	ASP	3.6
1	B	171	TYR	3.6
1	B	258	LEU	3.5
1	B	222	THR	3.5
1	A	347	ARG	3.5
1	C	223	THR	3.5
1	C	459	ALA	3.5
1	B	207	ASN	3.4
1	B	257	ASP	3.3
1	A	221	ILE	3.3
1	C	405	ASP	3.2
1	B	251	PHE	3.2
1	D	322	ALA	3.2
1	D	196	GLY	3.1
1	C	229	GLN	3.1
1	D	215	LEU	3.1
1	A	183	ARG	3.1
1	D	223	THR	3.1
1	C	403	ILE	3.1
1	A	188	GLY	3.0
1	B	255	GLY	3.0
1	B	167	SER	3.0
1	D	224	GLU	3.0
1	C	347	ARG	3.0
1	D	347	ARG	2.9
1	C	230	PHE	2.9
1	B	190	ASN	2.9
1	D	251	PHE	2.8
1	B	347	ARG	2.8
1	B	189	GLY	2.8
1	C	399	ILE	2.8
1	D	253	SER	2.7
1	B	215	LEU	2.7
1	B	188	GLY	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	405	ASP	2.6
1	B	228	GLN	2.6
1	A	228	GLN	2.6
1	D	164	ARG	2.5
1	D	222	THR	2.5
1	B	180	PHE	2.5
1	B	236	VAL	2.5
1	C	222	THR	2.5
1	B	226	LEU	2.5
1	D	410	ILE	2.4
1	B	170	PHE	2.4
1	D	323	PHE	2.4
1	A	254	ASP	2.4
1	D	413	TYR	2.4
1	C	322	ALA	2.4
1	D	235	LYS	2.3
1	C	254	ASP	2.3
1	D	404	GLU	2.3
1	D	228	GLN	2.2
1	C	255	GLY	2.2
1	B	187	VAL	2.2
1	A	196	GLY	2.2
1	A	171	TYR	2.2
1	D	403	ILE	2.2
1	C	221	ILE	2.1
1	D	258	LEU	2.1
1	D	227	LYS	2.1
1	A	204	TYR	2.1
1	D	257	ASP	2.1
1	A	229	GLN	2.1
1	C	196	GLY	2.1
1	D	170	PHE	2.1
1	A	199	VAL	2.1
1	C	178	ASN	2.1
1	D	266	PRO	2.1
1	B	229	GLN	2.0
1	D	225	GLU	2.0
1	C	283	LEU	2.0
1	D	179	ASN	2.0
1	D	352	THR	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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(Å ²)	Q<0.9
1	TPO	D	345	11/12	0.73	0.21	112,118,121,124	0
1	SEP	A	346	10/11	0.75	0.41	127,134,142,143	0
1	SEP	D	346	10/11	0.77	0.17	119,126,135,137	0
1	SEP	B	346	10/11	0.80	0.37	129,134,142,143	0
1	SEP	C	346	10/11	0.81	0.17	115,121,129,131	0
1	TPO	A	345	11/12	0.85	0.17	118,123,127,128	0
1	TPO	C	345	11/12	0.86	0.19	109,114,117,120	0
1	TPO	B	345	11/12	0.89	0.21	119,122,127,128	0

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

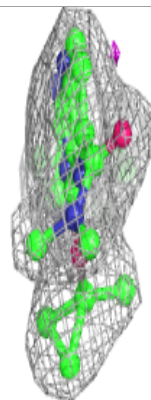
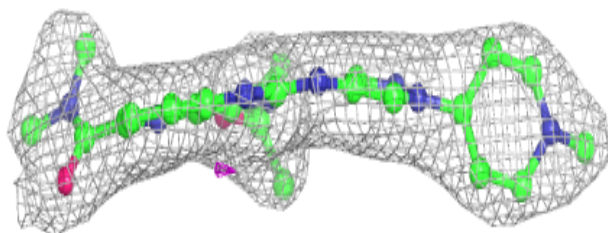
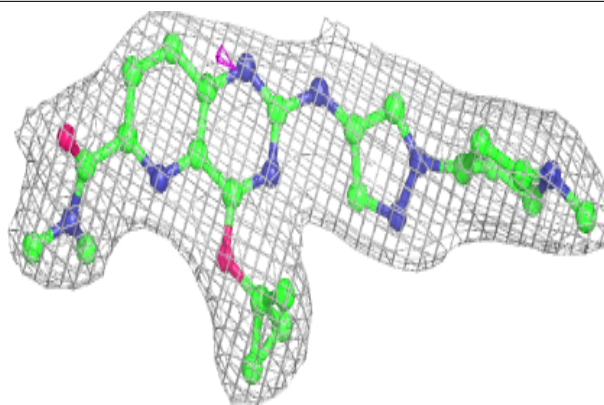
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NBW	B	501	33/33	0.94	0.14	38,45,50,51	0
2	NBW	A	501	33/33	0.95	0.14	33,41,53,55	0
2	NBW	D	501	33/33	0.95	0.18	37,42,46,47	0
2	NBW	C	501	33/33	0.96	0.17	30,43,58,58	0

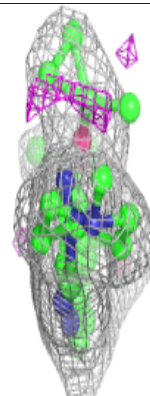
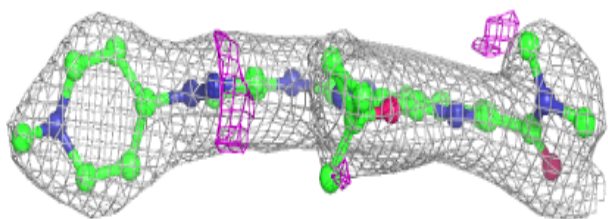
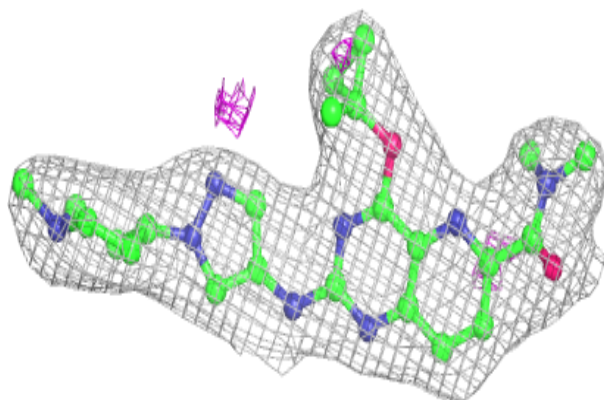
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NBW B 501:

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

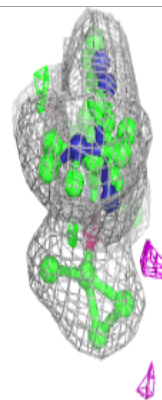
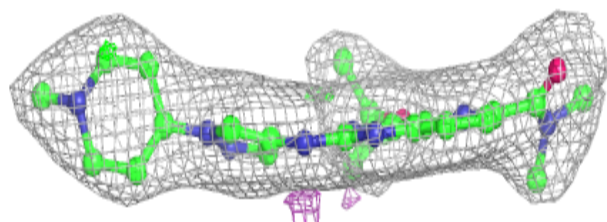
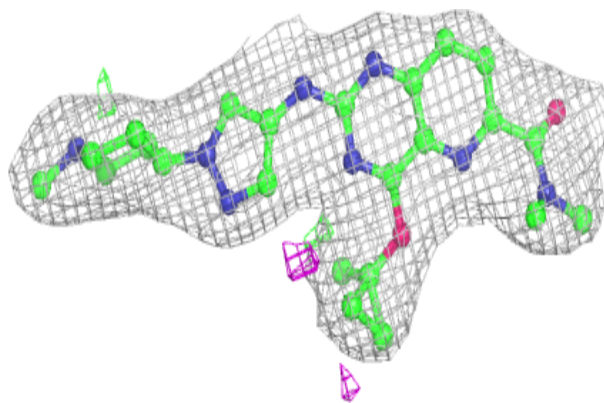
**Electron density around NBW A 501:**

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

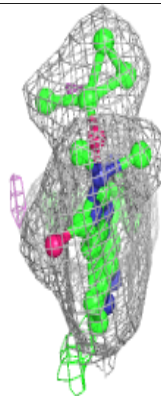
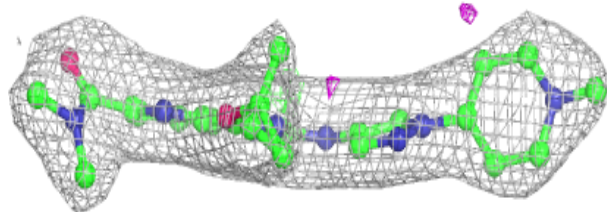
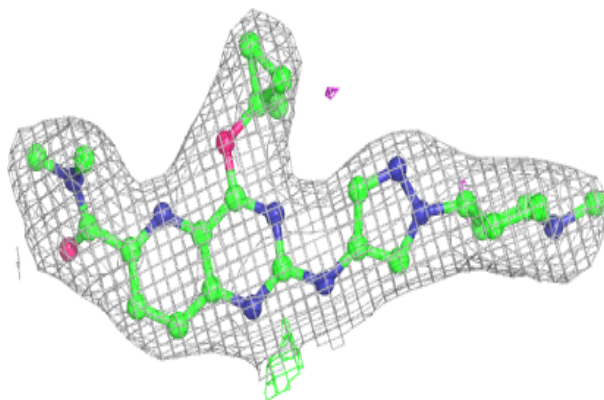


Electron density around NBW D 501:

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

**Electron density around NBW C 501:**

$2mF_o-DF_c$ (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.