



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 15, 2026 – 12:55 AM UTC

PDB ID : 7HK6 / pdb_00007hk6
Title : Crystal Structure of N-methylhydantoinase in complex with 1-methylimidazole-2,4-dione, iodide soak
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Deposited on : 2024-10-10
Resolution : 2.62 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

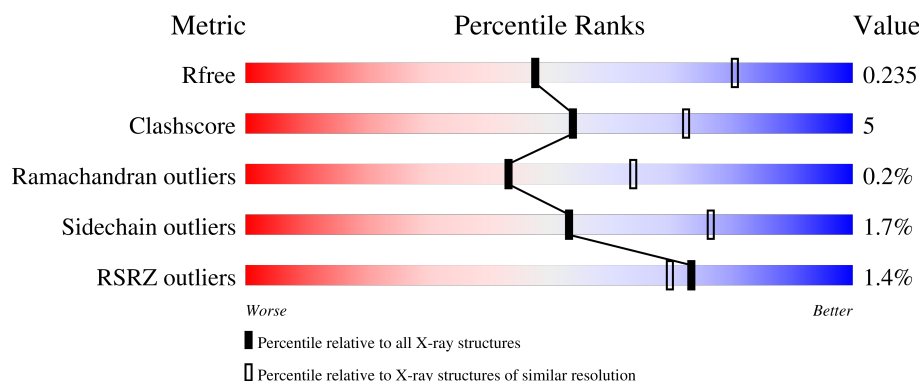
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.62 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	4951 (2.64-2.60)
Clashscore	190562	5303 (2.64-2.60)
Ramachandran outliers	187476	5217 (2.64-2.60)
Sidechain outliers	187428	5217 (2.64-2.60)
RSRZ outliers	180081	4950 (2.64-2.60)

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	1288	<div> <div>%</div> <div> <div></div> <div>86%</div> <div>12%</div> <div>..</div> </div> </div>
1	B	1288	<div> <div>2%</div> <div> <div></div> <div>86%</div> <div>12%</div> <div>.</div> </div> </div>

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 20005 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.

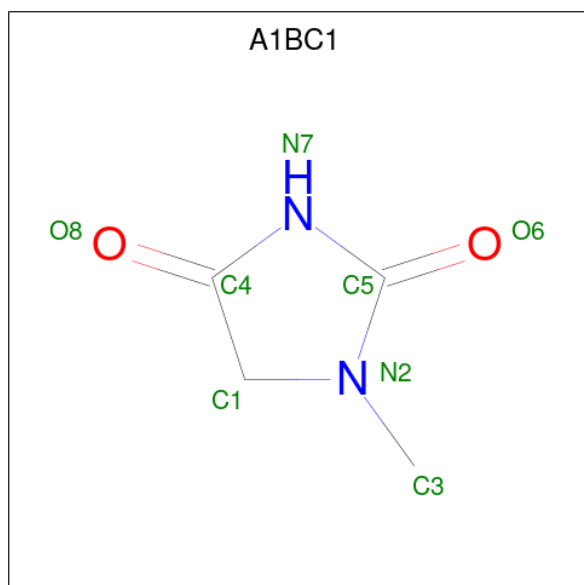
- Molecule 1 is a protein called N-methylhydantoinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1274	Total	C	N	O	S	0	3	0
			9772	6136	1692	1904	40			
1	B	1278	Total	C	N	O	S	0	1	0
			9787	6144	1695	1908	40			

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

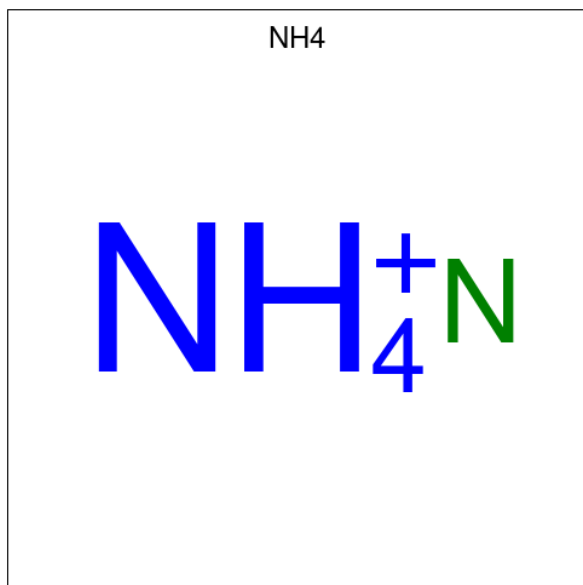
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		
2	B	1	Total	Ca	0	0
			1	1		

- Molecule 3 is 1-methylimidazolidine-2,4-dione (CCD ID: A1BC1) (formula: C₄H₆N₂O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			8	4	2	2		
3	B	1	Total	C	N	O	0	0
			8	4	2	2		

- Molecule 4 is AMMONIUM ION (CCD ID: NH4) (formula: H_4N).

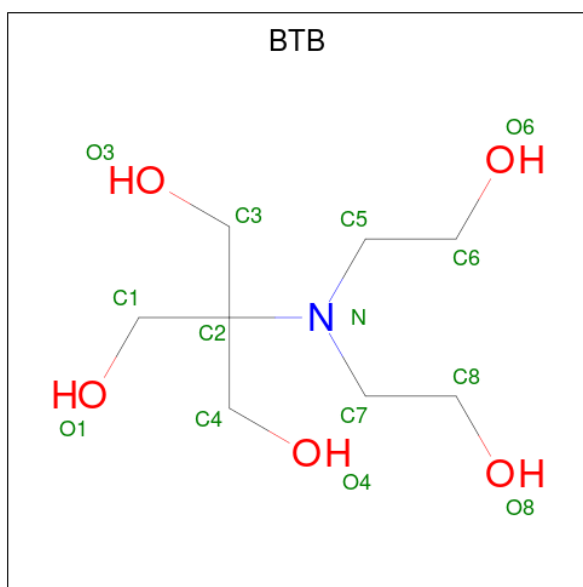


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	N	0	0
			1	1		
4	B	1	Total	N	0	0
			1	1		

- Molecule 5 is IODIDE ION (CCD ID: IOD) (formula: I).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	19	Total	I	0	0
			19	19		
5	B	20	Total	I	0	0
			20	20		

- Molecule 6 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPAN E-1,3-DIOL (CCD ID: BTB) (formula: $\text{C}_8\text{H}_{19}\text{NO}_5$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	204	Total O 204 204	0	0
7	B	169	Total O 169 169	0	0

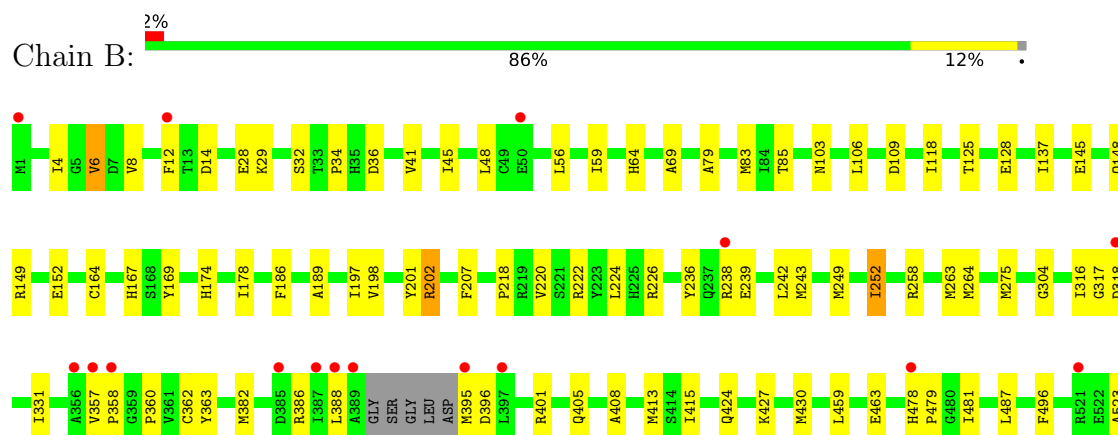
3 Residue-property plots [i](#)

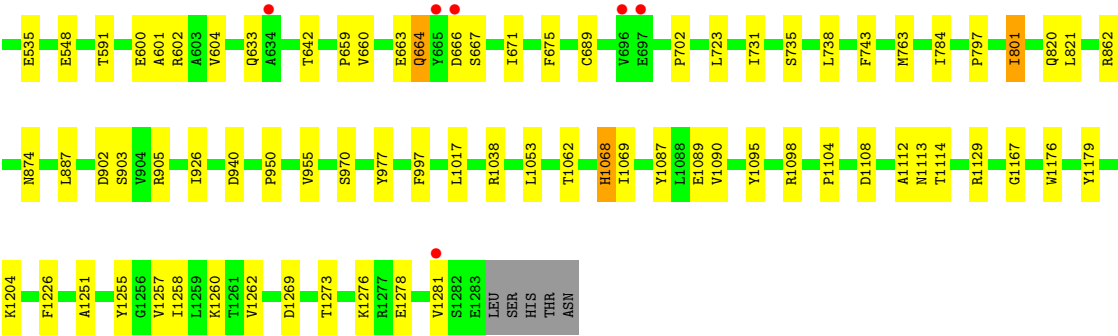
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: N-methylhydantoinase



• Molecule 1: N-methylhydantoinase





4 Data and refinement statistics

Property	Value	Source
Space group	P 42 21 2	Depositor
Cell constants a, b, c, α , β , γ	217.79Å 217.79Å 133.42Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.12 – 2.62 49.12 – 2.62	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.12-2.62) 94.8 (49.12-2.62)	Depositor EDS
R_{merge}	0.33	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.03 (at 2.61Å)	Xtriage
Refinement program	PHENIX dev_2363	Depositor
R, R_{free}	0.182 , 0.233 0.186 , 0.235	Depositor DCC
R_{free} test set	4706 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	47.4	Xtriage
Anisotropy	0.146	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 34.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	20005	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.94% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CA, NH4, BTB, A1BC1, IOD

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	0.39	0/9974	0.60	0/13540
1	B	0.37	0/9983	0.58	0/13553
All	All	0.38	0/19957	0.59	0/27093

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

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	693	THR	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	9772	0	9582	86	0
1	B	9787	0	9593	104	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	8	0	0	0	0
3	B	8	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	1	0
5	A	19	0	0	3	0
5	B	20	0	0	7	0
6	B	14	0	19	1	0
7	A	204	0	0	3	0
7	B	169	0	0	3	0
All	All	20005	0	19194	191	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 (191) 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:463:GLU:HG2	5:A:1319:IOD:I	2.47	0.85
1:B:331:ILE:HD11	1:B:430:MET:HG2	1.60	0.82
1:A:405:GLN:HG2	1:A:415:ILE:HD12	1.66	0.77
1:A:331:ILE:HD11	1:A:430:MET:HG2	1.71	0.71
1:A:634:ALA:HB1	1:A:697:GLU:HG3	1.73	0.71
1:B:357:VAL:HB	1:B:358:PRO:HD3	1.73	0.69
1:A:633:GLN:HG3	1:A:638:VAL:HG21	1.76	0.68
1:B:902:ASP:OD1	1:B:905:ARG:NH2	2.28	0.67
1:B:14:ASP:HB3	1:B:481:ILE:HD12	1.76	0.66
1:B:382:MET:HE3	1:B:459:LEU:HD11	1.79	0.64
1:A:357:VAL:HB	1:A:358:PRO:HD3	1.80	0.64
1:A:167:HIS:HA	1:A:169:TYR:CE1	2.33	0.63
1:B:405:GLN:HG2	1:B:415:ILE:HD12	1.80	0.63
1:A:805:ILE:HG12	1:A:889:LYS:HG3	1.80	0.63
1:A:647:ARG:NH1	1:A:664:GLN:OE1	2.26	0.63
1:B:317:GLY:HA3	5:B:1308:IOD:I	2.69	0.63
1:B:56:LEU:HA	1:B:59:ILE:HD12	1.80	0.62
1:B:479:PRO:HD2	1:B:664:GLN:NE2	2.14	0.62
1:A:436:GLN:NE2	7:A:1402:HOH:O	2.26	0.62
1:A:1233:ASN:ND2	7:A:1404:HOH:O	2.29	0.62
1:A:3:ARG:NH2	1:A:61:GLN:OE1	2.34	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1258:ILE:HD11	1:A:1276:LYS:HD3	1.83	0.60
1:B:238:ARG:HG2	1:B:239:GLU:H	1.66	0.60
1:B:424:GLN:OE1	5:B:1319:IOD:I	2.90	0.59
1:A:735:SER:HA	1:A:1114:THR:HB	1.85	0.59
1:B:167:HIS:HA	1:B:169:TYR:CE1	2.38	0.59
1:A:275:MET:HE3	1:A:304:GLY:HA2	1.84	0.58
1:B:36:ASP:OD1	1:B:226:ARG:NH1	2.33	0.58
1:B:600:GLU:OE2	1:B:602:ARG:NH1	2.33	0.58
1:A:368:THR:HG23	1:A:369:GLU:HG3	1.86	0.57
1:B:197:ILE:O	1:B:258[A]:ARG:NH1	2.37	0.57
1:A:317:GLY:HA3	5:A:1310:IOD:I	2.74	0.57
1:B:275:MET:HE3	1:B:304:GLY:HA2	1.86	0.56
1:B:1095:TYR:HB2	1:B:1104:PRO:HD2	1.87	0.56
1:B:664:GLN:HE21	1:B:667:SER:HB3	1.71	0.55
1:A:540:VAL:HG13	1:A:600:GLU:HB2	1.88	0.55
1:A:971:GLU:HA	1:A:1025:THR:HA	1.88	0.55
1:B:977:TYR:CE1	1:B:1204:LYS:HD3	2.41	0.55
1:A:664:GLN:HG3	1:A:667:SER:HB3	1.88	0.55
1:A:655:THR:HG22	1:A:678:THR:HG23	1.89	0.55
1:B:731:ILE:O	1:B:735:SER:HB2	2.07	0.55
1:A:111:PRO:HG2	1:A:318:ASP:HB2	1.90	0.54
1:A:1251:ALA:HA	1:A:1255:TYR:HD2	1.72	0.54
1:B:478:HIS:HB3	5:B:1320:IOD:I	2.78	0.53
1:B:1062:THR:HG22	1:B:1098:ARG:HG3	1.91	0.53
1:B:496:PHE:CE2	1:B:523:ALA:HA	2.44	0.53
1:A:28:GLU:HG2	1:A:47:LYS:HB3	1.91	0.53
1:A:370:PRO:HD3	1:A:403:ALA:HB1	1.91	0.53
1:A:701:THR:HG22	5:A:1315:IOD:I	2.79	0.52
1:B:664:GLN:NE2	5:B:1315:IOD:I	3.12	0.52
1:B:357:VAL:HB	1:B:358:PRO:CD	2.38	0.51
1:A:216:VAL:HG11	1:A:263:MET:HE2	1.92	0.51
1:A:243:MET:HE2	1:A:487:LEU:HD23	1.92	0.51
1:B:386:ARG:HD2	1:B:663:GLU:CD	2.36	0.51
1:A:36:ASP:OD2	1:A:39:GLU:HG3	2.10	0.50
1:B:243:MET:HE2	1:B:487:LEU:HD23	1.93	0.50
1:A:307:ARG:NH2	1:A:443:TYR:OH	2.40	0.50
1:B:148:GLN:O	1:B:152:GLU:HG3	2.12	0.50
1:B:128:GLU:HG2	1:B:174:HIS:ND1	2.26	0.50
1:B:887:LEU:C	1:B:887:LEU:HD23	2.37	0.50
1:A:382:MET:HE3	1:A:459:LEU:HD11	1.92	0.49
1:B:388:LEU:HG	1:B:395:MET:HG3	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:14:ASP:HB3	1:A:481:ILE:CD1	2.43	0.49
1:B:1069:ILE:HD11	1:B:1090:VAL:HG13	1.94	0.49
1:B:4:ILE:HD13	1:B:48:LEU:HD23	1.94	0.49
1:A:1:MET:H3	1:A:20:ASP:HB2	1.77	0.49
1:A:548:GLU:OE1	1:A:591:THR:OG1	2.24	0.49
1:B:14:ASP:HB3	1:B:481:ILE:CD1	2.42	0.49
1:A:15:LEU:HB3	1:A:48:LEU:HD22	1.95	0.49
1:B:224:LEU:HD22	1:B:252:ILE:HD13	1.95	0.48
1:A:1235:LEU:O	1:A:1239:GLU:HG2	2.13	0.48
1:B:6:VAL:HG21	1:B:41:VAL:HG13	1.95	0.48
1:A:85:THR:O	1:A:125:THR:HA	2.13	0.48
1:B:109:ASP:OD1	1:B:1098:ARG:NH2	2.47	0.48
1:B:264:MET:HA	5:B:1323:IOD:I	2.83	0.48
1:A:1068:HIS:CG	1:A:1069:ILE:N	2.81	0.48
1:A:357:VAL:HB	1:A:358:PRO:CD	2.43	0.48
1:B:926:ILE:O	4:B:1303:NH4:N	2.47	0.47
1:A:407:LEU:HA	1:A:410:LYS:HE3	1.96	0.47
1:B:145:GLU:O	1:B:149:ARG:HG2	2.15	0.47
1:B:360:PRO:HD2	1:B:363:TYR:CD2	2.49	0.47
1:B:955:VAL:HG11	1:B:1053:LEU:HD11	1.96	0.47
1:B:36:ASP:CG	1:B:226:ARG:HH12	2.20	0.47
6:B:1304:BTB:H42	6:B:1304:BTB:H72	1.71	0.47
1:B:103:ASN:OD1	1:B:1113:ASN:ND2	2.40	0.47
1:A:832:MET:HG3	1:A:835:ILE:HD13	1.97	0.47
1:B:479:PRO:HD2	1:B:664:GLN:HE22	1.80	0.46
1:B:548:GLU:OE1	1:B:591:THR:OG1	2.30	0.46
1:B:797:PRO:HB2	1:B:820:GLN:HG3	1.97	0.46
1:B:1108:ASP:OD2	1:B:1112:ALA:HB1	2.15	0.46
1:B:258[A]:ARG:NH2	7:B:1416:HOH:O	2.49	0.46
1:B:222:ARG:NH1	5:B:1312:IOD:I	3.19	0.46
1:B:821:LEU:HD13	1:B:874:ASN:ND2	2.31	0.46
1:A:32:SER:O	1:A:34:PRO:HD3	2.16	0.46
1:B:523:ALA:HB1	1:B:601:ALA:HB2	1.97	0.46
1:A:1205:VAL:HB	1:A:1208:ARG:HG3	1.97	0.46
1:A:664:GLN:CG	1:A:667:SER:HB3	2.45	0.45
1:B:950:PRO:HD2	1:B:970:SER:HB2	1.97	0.45
1:A:254:GLU:OE2	1:A:258[B]:ARG:NE	2.49	0.45
1:B:478:HIS:O	1:B:481:ILE:HG22	2.16	0.45
1:B:735:SER:HA	1:B:1114:THR:HB	1.98	0.45
1:A:119:LYS:NZ	7:A:1421:HOH:O	2.50	0.45
1:A:996:MET:HB3	1:A:1057:MET:HE1	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:427:LYS:HD2	1:B:463:GLU:O	2.17	0.45
1:B:1176:TRP:CD1	1:B:1176:TRP:H	2.34	0.45
1:A:456:ALA:HB1	1:A:459:LEU:HD12	1.98	0.45
1:B:318:ASP:HB2	7:B:1533:HOH:O	2.16	0.45
1:B:1069:ILE:O	1:B:1167:GLY:HA2	2.17	0.45
1:B:1179:TYR:HD2	1:B:1226:PHE:CE1	2.35	0.45
1:A:408:ALA:HB1	1:A:413:MET:O	2.17	0.45
1:B:83:MET:HE2	1:B:164:CYS:HB2	1.98	0.44
1:B:1260:LYS:HE3	1:B:1269:ASP:OD2	2.18	0.44
1:A:544:ASP:OD1	1:A:598:ARG:NH1	2.51	0.44
1:B:743:PHE:HZ	1:B:763:MET:HB3	1.82	0.44
1:A:1248:THR:HG23	1:A:1259:LEU:HD12	2.00	0.44
1:B:1258:ILE:HD11	1:B:1276:LYS:HD3	1.99	0.44
1:A:1095:TYR:HB2	1:A:1104:PRO:HD2	2.00	0.44
1:A:632:GLN:HA	1:A:636:LYS:O	2.18	0.44
1:A:837:ASP:HB2	1:A:1032:PRO:O	2.18	0.44
1:A:940:ASP:O	1:A:1204:LYS:HE3	2.17	0.44
1:A:106:LEU:HG	1:A:995:MET:HE3	1.99	0.44
1:A:238:ARG:HG2	1:A:239:GLU:H	1.83	0.44
1:A:1176:TRP:CD1	1:A:1176:TRP:H	2.36	0.44
1:B:1251:ALA:HA	1:B:1255:TYR:HD2	1.82	0.44
1:B:1257:VAL:HA	1:B:1273:THR:HG23	2.00	0.43
1:B:263:MET:SD	1:B:316:ILE:HG21	2.58	0.43
1:A:164:CYS:HB3	1:A:207:PHE:CD1	2.54	0.43
1:A:56:LEU:HA	1:A:59:ILE:HD12	2.00	0.43
1:A:435:GLU:HA	1:A:438:SER:OG	2.18	0.43
1:A:501:ARG:HA	1:A:594:VAL:O	2.18	0.43
1:A:291:ILE:O	1:A:455:GLY:HA3	2.19	0.43
1:A:851:TYR:CE2	1:A:856:ARG:HB2	2.54	0.43
1:A:145:GLU:O	1:A:149:ARG:HG2	2.18	0.43
1:A:363:TYR:O	1:A:365:ARG:HG3	2.19	0.43
1:A:544:ASP:OD2	1:A:598:ARG:NH1	2.50	0.43
1:B:79:ALA:HB2	1:B:218:PRO:HG2	2.01	0.43
1:B:224:LEU:HD23	1:B:224:LEU:HA	1.83	0.43
1:B:1068:HIS:CG	1:B:1069:ILE:N	2.87	0.43
1:B:83:MET:HB2	1:B:118:ILE:HG21	2.01	0.43
1:B:242:LEU:O	1:B:249:MET:HA	2.19	0.43
1:A:481:ILE:HG13	1:A:481:ILE:O	2.18	0.42
1:A:527:LEU:HD11	1:A:601:ALA:HB1	2.00	0.42
1:A:632:GLN:HE21	1:A:632:GLN:HB3	1.64	0.42
1:B:1129:ARG:HD3	7:B:1414:HOH:O	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:8:VAL:HG23	1:B:64:HIS:HE1	1.84	0.42
1:B:174:HIS:O	1:B:178:ILE:HG13	2.20	0.42
1:B:413:MET:HE3	1:B:702:PRO:HG2	2.02	0.42
1:B:463:GLU:CD	5:B:1317:IOD:I	3.33	0.42
1:B:784:ILE:O	1:B:801:ILE:HA	2.20	0.42
1:B:642:THR:HG23	1:B:659:PRO:C	2.45	0.42
1:B:1098:ARG:N	1:B:1098:ARG:HD3	2.35	0.42
1:A:257:LYS:HE3	1:A:257:LYS:HB2	1.69	0.42
1:A:1056:VAL:HG23	1:A:1057:MET:HG3	2.01	0.42
1:B:164:CYS:HB3	1:B:207:PHE:CD1	2.55	0.42
1:A:265:SER:O	1:A:268:VAL:HG12	2.19	0.41
1:B:56:LEU:HG	1:B:236:TYR:HB2	2.01	0.41
1:B:1276:LYS:O	1:B:1276:LYS:HG3	2.19	0.41
1:B:201:TYR:O	1:B:202:ARG:HB2	2.20	0.41
1:A:675:PHE:CD2	1:A:689:CYS:HA	2.56	0.41
1:B:12:PHE:CG	1:B:29:LYS:HE3	2.55	0.41
1:A:201:TYR:O	1:A:202:ARG:HB2	2.20	0.41
1:A:796:SER:N	1:A:797:PRO:HD2	2.35	0.41
1:A:1251:ALA:HA	1:A:1255:TYR:CD2	2.54	0.41
1:B:69:ALA:HB2	1:B:220:VAL:HG21	2.02	0.41
1:A:360:PRO:HD2	1:A:363:TYR:CE2	2.55	0.41
1:A:757:PRO:HB3	1:A:991:PHE:CD1	2.55	0.41
1:B:723:LEU:HD23	1:B:738:LEU:HD13	2.02	0.41
1:B:186:PHE:CZ	1:B:189:ALA:HB2	2.56	0.41
1:A:1071:PHE:HB3	1:A:1166:GLU:HB3	2.03	0.41
1:B:41:VAL:O	1:B:45:ILE:HG12	2.21	0.41
1:B:85:THR:O	1:B:125:THR:HA	2.20	0.41
1:B:106:LEU:HA	1:B:106:LEU:HD23	1.89	0.41
1:B:401:ARG:HG3	1:B:415:ILE:CD1	2.50	0.41
1:B:743:PHE:CZ	1:B:763:MET:HB3	2.56	0.41
1:A:379:LEU:HD22	1:A:630:THR:HB	2.03	0.41
1:A:627:ARG:HB2	1:A:644:PHE:CE1	2.56	0.41
1:B:28:GLU:HB2	1:B:48:LEU:HD13	2.04	0.41
1:B:1179:TYR:HD2	1:B:1226:PHE:CZ	2.39	0.41
1:A:1087:TYR:CZ	1:A:1089:GLU:HB2	2.56	0.40
1:B:1087:TYR:CZ	1:B:1089:GLU:HB2	2.56	0.40
1:A:1099[A]:GLN:HG3	1:A:1226:PHE:CE1	2.57	0.40
1:B:32:SER:O	1:B:34:PRO:HD3	2.21	0.40
1:A:363:TYR:C	1:A:365:ARG:H	2.30	0.40
1:B:660:VAL:HG22	1:B:671:ILE:HB	2.04	0.40
1:B:926:ILE:HG13	1:B:997:PHE:HE1	1.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:220:VAL:HG11	1:A:259:PRO:HB3	2.02	0.40
1:B:362:CYS:HA	1:B:396:ASP:O	2.21	0.40
1:B:666:ASP:OD1	1:B:666:ASP:N	2.54	0.40
1:B:408:ALA:HB1	1:B:413:MET:O	2.20	0.40
1:B:675:PHE:CD2	1:B:689:CYS:HA	2.57	0.40
1:B:940:ASP:O	1:B:1204:LYS:HE3	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	1273/1288 (99%)	1226 (96%)	44 (4%)	3 (0%)	43 64
1	B	1275/1288 (99%)	1230 (96%)	44 (4%)	1 (0%)	48 69
All	All	2548/2576 (99%)	2456 (96%)	88 (4%)	4 (0%)	43 64

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	202	ARG
1	A	691	ALA
1	B	202	ARG
1	A	108	GLN

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	1030/1039 (99%)	1013 (98%)	17 (2%)	53	76
1	B	1031/1039 (99%)	1014 (98%)	17 (2%)	55	78
All	All	2061/2078 (99%)	2027 (98%)	34 (2%)	53	78

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	ARG
1	A	6	VAL
1	A	137	ILE
1	A	198	VAL
1	A	252	ILE
1	A	436	GLN
1	A	535	GLU
1	A	588	LYS
1	A	604	VAL
1	A	632	GLN
1	A	664	GLN
1	A	697	GLU
1	A	801	ILE
1	A	862	ARG
1	A	1038	ARG
1	A	1068	HIS
1	A	1199	GLU
1	B	6	VAL
1	B	137	ILE
1	B	198	VAL
1	B	252	ILE
1	B	535	GLU
1	B	604	VAL
1	B	633	GLN
1	B	664	GLN
1	B	801	ILE
1	B	862	ARG
1	B	903	SER
1	B	1017	LEU
1	B	1038	ARG
1	B	1068	HIS
1	B	1262	VAL
1	B	1278	GLU
1	B	1281	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	GLN
1	A	228	GLN
1	A	230	GLN
1	A	280	GLN
1	A	405	GLN
1	A	436	GLN
1	A	518	GLN
1	A	526	GLN
1	A	585	HIS
1	A	632	GLN
1	A	874	ASN
1	A	921	GLN
1	B	280	GLN
1	B	493	GLN
1	B	518	GLN
1	B	570	GLN
1	B	664	GLN
1	B	807	HIS
1	B	874	ASN
1	B	921	GLN

5.3.3 RNA [i](#)

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](#)

Of 46 ligands modelled in this entry, 41 are monoatomic and 2 are modelled with single atom - leaving 3 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	A1BC1	A	1302	2	8,8,8	1.23	1 (12%)	10,11,11	1.87	2 (20%)
6	BTB	B	1304	-	13,13,13	2.18	5 (38%)	7,16,16	0.56	0
3	A1BC1	B	1302	2	8,8,8	1.30	2 (25%)	10,11,11	1.82	3 (30%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	A1BC1	B	1302	2	-	-	0/1/1/1
6	BTB	B	1304	-	-	2/21/21/21	-
3	A1BC1	A	1302	2	-	-	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	1304	BTB	C7-N	4.65	1.54	1.48
6	B	1304	BTB	C5-N	3.92	1.53	1.48
6	B	1304	BTB	C2-N	3.28	1.55	1.48
6	B	1304	BTB	C4-C2	2.47	1.56	1.53
3	B	1302	A1BC1	C5-N7	2.40	1.42	1.38
3	B	1302	A1BC1	C4-N7	2.36	1.41	1.37
3	A	1302	A1BC1	C4-N7	2.08	1.40	1.37
6	B	1304	BTB	C1-C2	2.01	1.55	1.53

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1302	A1BC1	C4-N7-C5	-4.53	108.50	112.47
3	B	1302	A1BC1	C4-N7-C5	-3.45	109.45	112.47
3	B	1302	A1BC1	O8-C4-C1	2.74	129.72	127.05
3	A	1302	A1BC1	C1-C4-N7	2.25	108.98	106.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1302	A1BC1	O8-C4-N7	-2.13	122.22	125.06

There are no chirality outliers.

All (2) torsion outliers are listed below:

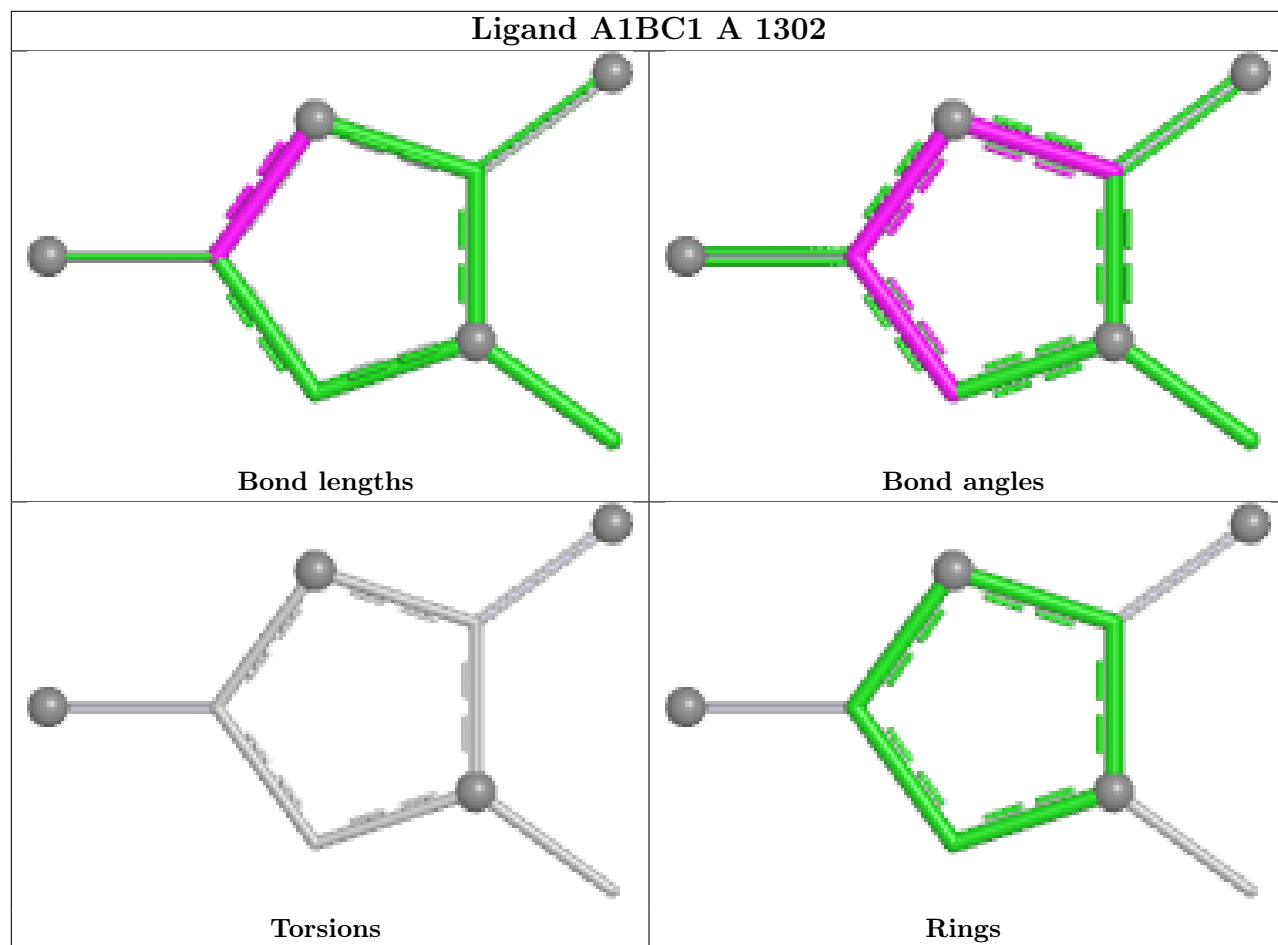
Mol	Chain	Res	Type	Atoms
6	B	1304	BTB	N-C5-C6-O6
6	B	1304	BTB	N-C7-C8-O8

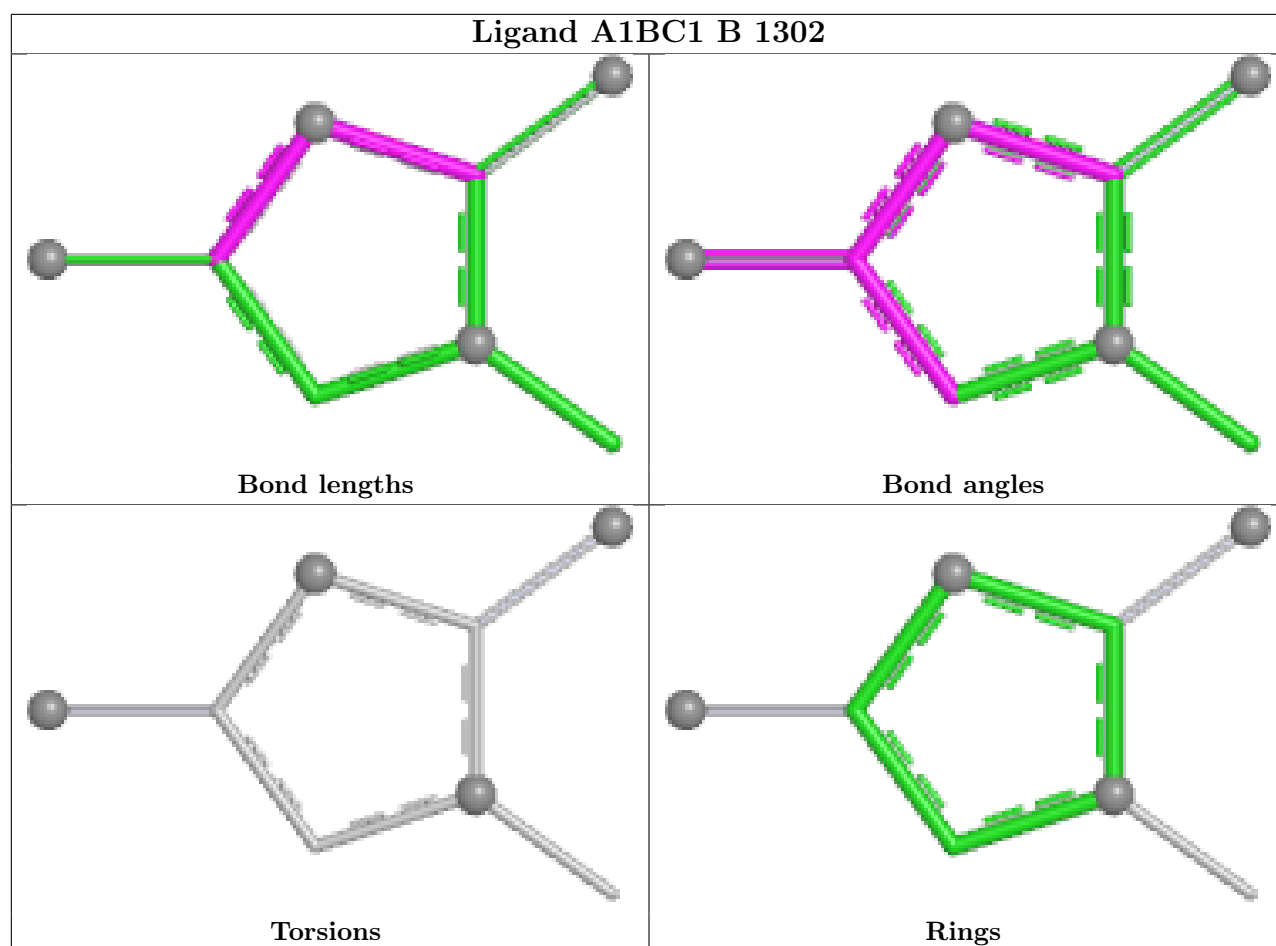
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	1304	BTB	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	1274/1288 (98%)	-0.19	14 (1%) 78 74	23, 48, 83, 119	3 (0%)
1	B	1278/1288 (99%)	-0.10	22 (1%) 69 65	30, 51, 90, 126	1 (0%)
All	All	2552/2576 (99%)	-0.15	36 (1%) 73 70	23, 50, 86, 126	4 (0%)

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	388	LEU	7.0
1	A	692	VAL	4.6
1	B	388	LEU	4.4
1	A	395	MET	4.1
1	B	389	ALA	4.0
1	A	387	ILE	3.9
1	B	665	TYR	3.5
1	A	665	TYR	3.1
1	B	385	ASP	3.1
1	B	395	MET	3.1
1	B	357	VAL	3.1
1	B	50	GLU	2.9
1	A	1280	ALA	2.9
1	B	1	MET	2.6
1	A	693	THR	2.6
1	B	696	VAL	2.6
1	A	695	THR	2.5
1	A	605	MET	2.4
1	B	634	ALA	2.4
1	B	12	PHE	2.4
1	A	385	ASP	2.3
1	B	356	ALA	2.3
1	B	397	LEU	2.3
1	B	318	ASP	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	357	VAL	2.3
1	B	387	ILE	2.2
1	B	478	HIS	2.2
1	B	521	ARG	2.2
1	B	358	PRO	2.2
1	B	666	ASP	2.2
1	B	697	GLU	2.1
1	B	1281	VAL	2.1
1	A	691	ALA	2.0
1	A	234	LEU	2.0
1	B	238	ARG	2.0
1	A	35	HIS	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
5	IOD	B	1313	1/1	0.84	0.13	160,160,160,160	0
5	IOD	A	1312	1/1	0.85	0.13	161,161,161,161	0
4	NH4	B	1303	1/1	0.88	0.13	43,43,43,43	0
6	BTB	B	1304	14/14	0.88	0.11	44,59,66,69	0
5	IOD	A	1322	1/1	0.91	0.31	144,144,144,144	0
5	IOD	A	1321	1/1	0.92	0.24	137,137,137,137	0
4	NH4	A	1303	1/1	0.92	0.20	33,33,33,33	0
5	IOD	B	1323	1/1	0.93	0.19	133,133,133,133	0
5	IOD	B	1324	1/1	0.93	0.24	142,142,142,142	0
5	IOD	B	1317	1/1	0.93	0.17	149,149,149,149	0
5	IOD	B	1319	1/1	0.94	0.24	153,153,153,153	0

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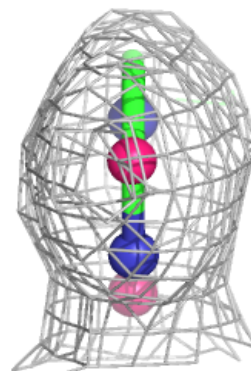
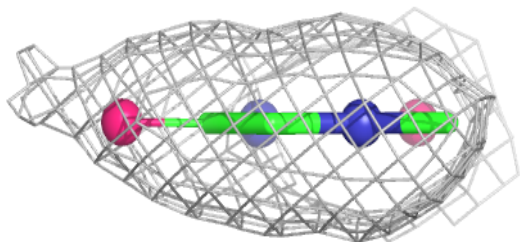
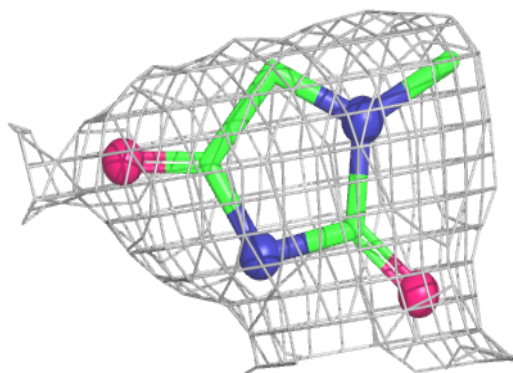
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	IOD	A	1319	1/1	0.94	0.22	144,144,144,144	0
5	IOD	B	1321	1/1	0.95	0.17	134,134,134,134	0
5	IOD	B	1312	1/1	0.95	0.10	111,111,111,111	0
5	IOD	A	1316	1/1	0.95	0.10	130,130,130,130	0
5	IOD	B	1320	1/1	0.95	0.18	143,143,143,143	0
5	IOD	A	1314	1/1	0.96	0.10	107,107,107,107	0
5	IOD	A	1320	1/1	0.96	0.32	132,132,132,132	0
5	IOD	B	1322	1/1	0.96	0.18	136,136,136,136	0
5	IOD	B	1314	1/1	0.96	0.17	131,131,131,131	0
5	IOD	A	1317	1/1	0.96	0.15	136,136,136,136	0
5	IOD	A	1318	1/1	0.96	0.16	136,136,136,136	0
5	IOD	B	1311	1/1	0.97	0.26	129,129,129,129	0
5	IOD	B	1315	1/1	0.97	0.14	103,103,103,103	0
5	IOD	B	1316	1/1	0.97	0.11	130,130,130,130	0
5	IOD	B	1306	1/1	0.97	0.17	99,99,99,99	0
5	IOD	B	1318	1/1	0.97	0.16	130,130,130,130	0
5	IOD	B	1308	1/1	0.97	0.15	122,122,122,122	0
5	IOD	B	1309	1/1	0.98	0.14	90,90,90,90	0
5	IOD	A	1309	1/1	0.98	0.10	84,84,84,84	0
5	IOD	A	1310	1/1	0.98	0.10	97,97,97,97	0
3	A1BC1	A	1302	8/8	0.98	0.06	30,33,35,41	0
3	A1BC1	B	1302	8/8	0.98	0.05	33,40,40,43	0
5	IOD	A	1315	1/1	0.98	0.17	114,114,114,114	0
5	IOD	A	1307	1/1	0.98	0.07	77,77,77,77	0
5	IOD	A	1308	1/1	0.98	0.10	102,102,102,102	0
2	CA	A	1301	1/1	0.99	0.03	37,37,37,37	0
5	IOD	A	1313	1/1	0.99	0.13	95,95,95,95	0
5	IOD	B	1310	1/1	0.99	0.14	99,99,99,99	0
2	CA	B	1301	1/1	0.99	0.04	36,36,36,36	0
5	IOD	A	1304	1/1	0.99	0.02	50,50,50,50	0
5	IOD	A	1306	1/1	0.99	0.03	77,77,77,77	0
5	IOD	B	1305	1/1	0.99	0.03	75,75,75,75	0
5	IOD	A	1311	1/1	0.99	0.04	78,78,78,78	0
5	IOD	B	1307	1/1	0.99	0.07	83,83,83,83	0
5	IOD	A	1305	1/1	1.00	0.05	52,52,52,52	0

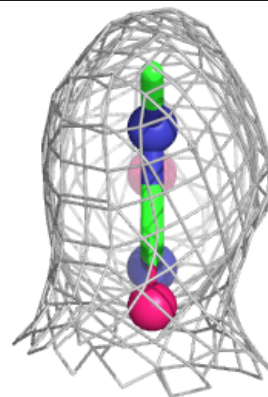
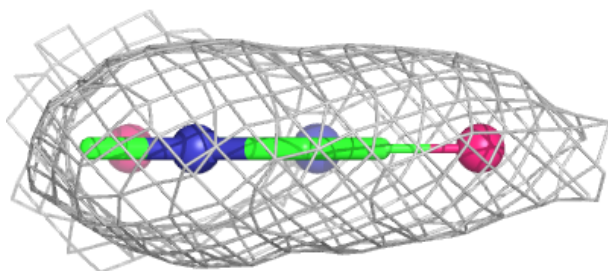
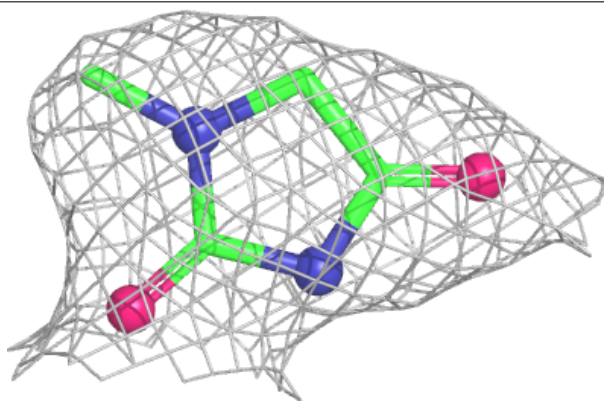
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1BC1 A 1302:

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

**Electron density around A1BC1 B 1302:**

$2mF_o-DF_c$ (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.