



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 06:39 PM UTC

PDB ID : 3MVY / pdb_00003mvy
Title : X-ray structure of the diatomic oxo-intermediate NikA/1-Int', prior hydroxylation
Authors : Cavazza, C.; Bochot, C.; Rousselot-Pailley, P.; Carpentier, P.; Cherrier, M.V.; Martin, L.; Marchi-Delapierre, C.; Fontecilla-Camps, J.C.; Menage, S.
Deposited on : 2010-05-05
Resolution : 2.50 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

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

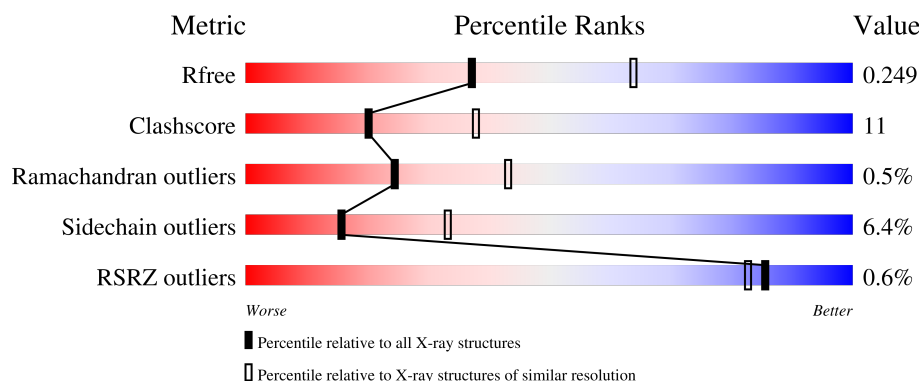
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	502	 77% 20% ..
1	B	502	 74% 21% ..

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	ACT	B	509	-	-	X	-

2 Entry composition [i](#)

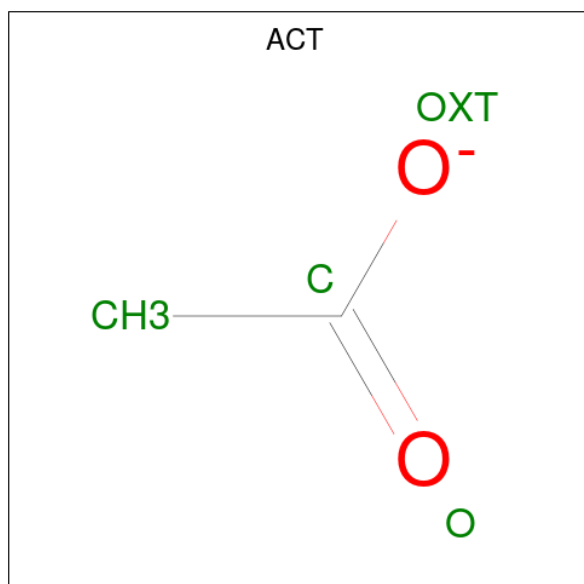
There are 9 unique types of molecules in this entry. The entry contains 8373 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Nickel-binding periplasmic protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	498	Total	C	N	O	S	4	2	0
			3955	2535	670	740	10			
1	B	497	Total	C	N	O	S	0	0	0
			3925	2516	662	737	10			

- Molecule 2 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).



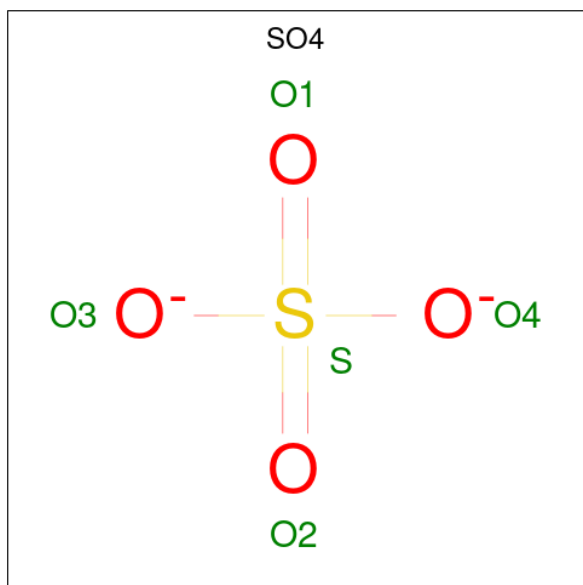
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		

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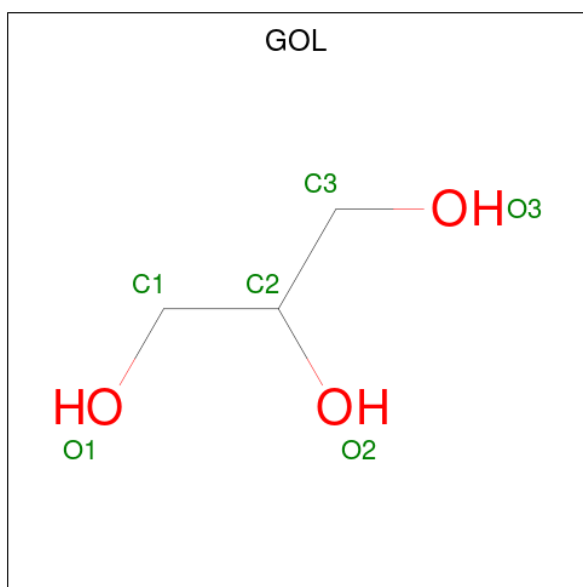
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).

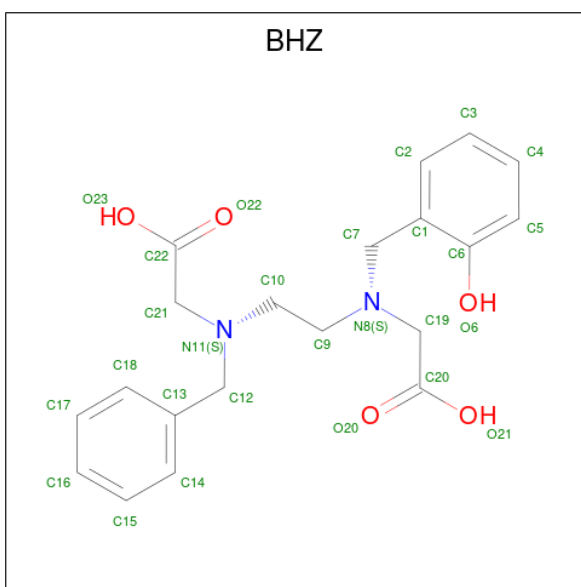


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is FE (III) ION (CCD ID: FE) (formula: Fe).

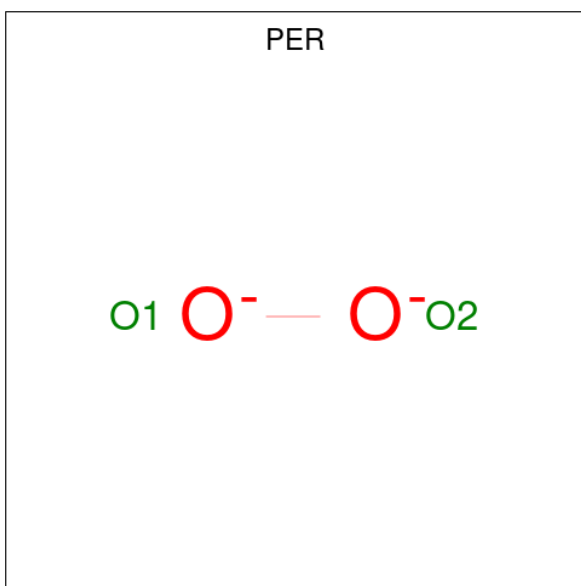
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Fe	0	0
			1	1		
5	B	1	Total	Fe	0	0
			1	1		

- Molecule 6 is 2-[2-[carboxymethyl(phenylmethyl)amino]ethyl-[(2-hydroxyphenyl)methyl]amino]ethanoic acid (CCD ID: BHZ) (formula: C₂₀H₂₄N₂O₅).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N	O	0	0
			27	20	2	5		
6	B	1	Total	C	N	O	0	0
			27	20	2	5		

- Molecule 7 is PEROXIDE ION (CCD ID: PER) (formula: O₂).



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

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	2	Total 2	Cl 2	0	0

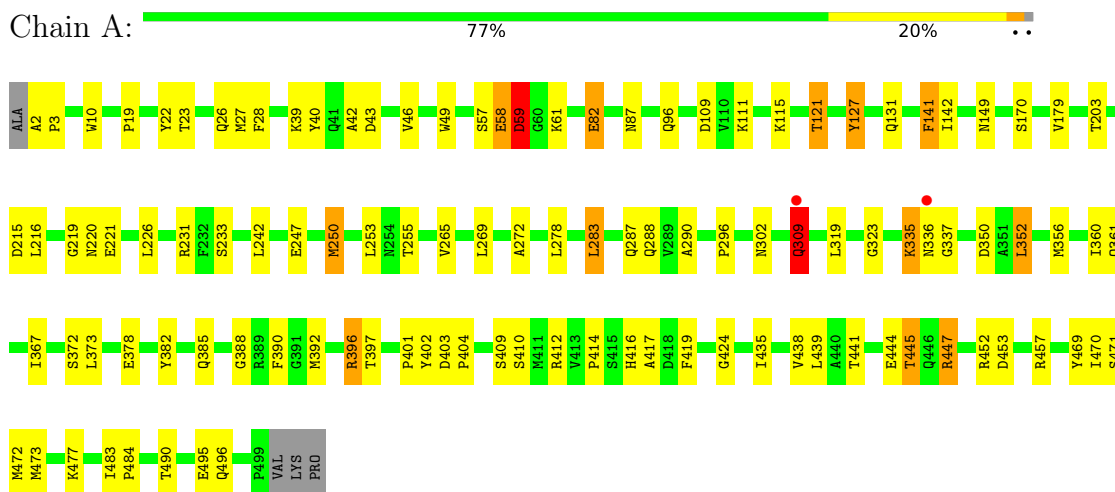
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	193	Total 193	O 193	0	0
9	B	157	Total 157	O 157	0	0

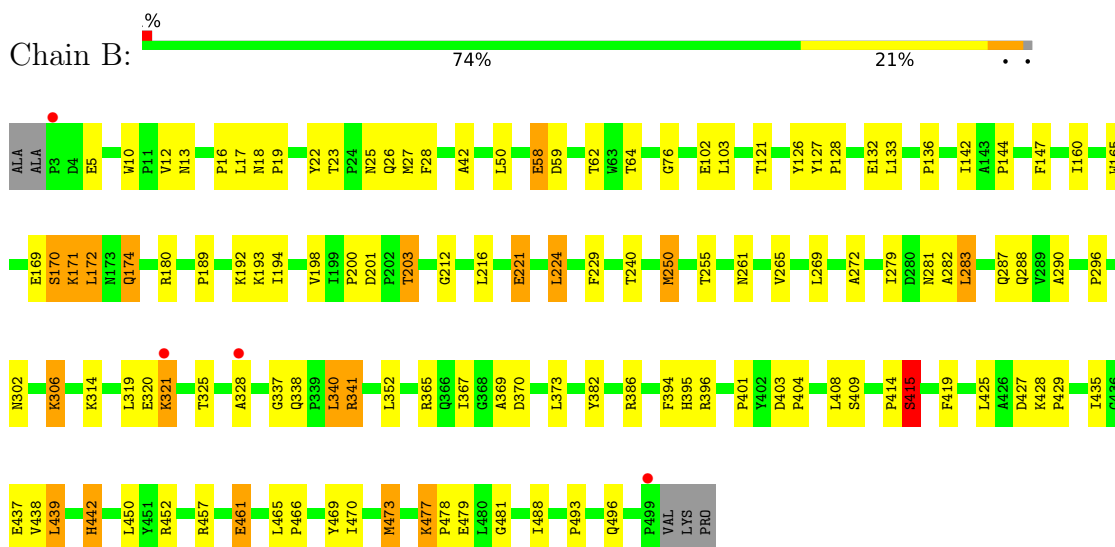
3 Residue-property plots

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: Nickel-binding periplasmic protein



• Molecule 1: Nickel-binding periplasmic protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	86.98Å 95.17Å 125.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.49 – 2.50 43.49 – 2.50	Depositor EDS
% Data completeness (in resolution range)	100.0 (43.49-2.50) 99.6 (43.49-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.88 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.173 , 0.249 0.177 , 0.249	Depositor DCC
R_{free} test set	1823 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	24.1	Xtriage
Anisotropy	0.108	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 36.4	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	0.94	EDS
Total number of atoms	8373	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.14% 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: PER, SO4, FE, CL, BHZ, GOL, ACT

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	0.93	2/4065 (0.0%)	1.03	6/5540 (0.1%)
1	B	0.89	2/4029 (0.0%)	1.02	4/5492 (0.1%)
All	All	0.91	4/8094 (0.0%)	1.02	10/11032 (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 (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	483	ILE	CA-C	7.32	1.58	1.53
1	B	160	ILE	CA-CB	6.23	1.60	1.53
1	B	198	VAL	CA-CB	5.62	1.60	1.53
1	A	309	GLN	C-O	-5.05	1.16	1.23

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	224	LEU	CA-C-N	-7.72	112.04	119.76
1	B	224	LEU	C-N-CA	-7.72	112.04	119.76
1	A	141	PHE	N-CA-C	7.38	120.44	108.41
1	B	442	HIS	N-CA-C	-6.97	105.31	113.88
1	A	58	GLU	N-CA-C	-6.70	103.90	111.07
1	B	437	GLU	N-CA-C	6.03	117.93	111.36
1	A	337	GLY	CA-C-N	6.01	131.20	121.83

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	337	GLY	C-N-CA	6.01	131.20	121.83
1	A	410	SER	N-CA-C	5.56	119.16	112.38
1	A	483	ILE	N-CA-C	5.28	113.09	107.76

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	59	ASP	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	3955	0	3895	87	0
1	B	3925	0	3846	98	3
2	A	16	0	12	0	0
2	B	12	0	9	3	0
3	A	5	0	0	0	0
4	A	36	0	48	6	0
4	B	12	0	16	1	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	27	0	21	1	0
6	B	27	0	21	1	0
7	A	2	0	0	0	0
7	B	2	0	0	0	0
8	A	2	0	0	0	0
9	A	193	0	0	9	3
9	B	157	0	0	10	0
All	All	8373	0	7868	179	3

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 11.

All (179) 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:59:ASP:HB3	1:A:61:LYS:H	1.02	1.14
1:A:149:ASN:H	4:A:508:GOL:H11	1.07	1.10
1:A:59:ASP:HB3	1:A:61:LYS:N	1.80	0.97
1:A:335:LYS:O	1:A:336:ASN:CB	2.13	0.93
1:A:220:ASN:HB3	4:A:515:GOL:H11	1.50	0.91
1:A:57:SER:OG	1:A:59:ASP:HB2	1.71	0.90
1:A:453:ASP:O	1:A:457:ARG:HG3	1.71	0.90
1:B:250:MET:CE	1:B:396:ARG:HA	2.02	0.90
1:B:414:PRO:O	1:B:415:SER:HB2	1.70	0.89
1:B:425:LEU:HD22	1:B:461:GLU:HG3	1.54	0.88
1:A:87:ASN:HD21	1:A:142:ILE:H	1.23	0.87
1:A:323:GLY:O	1:A:335:LYS:HB2	1.77	0.85
1:B:314:LYS:NZ	2:B:509:ACT:H2	1.93	0.84
1:B:337:GLY:C	1:B:338:GLN:HG2	2.01	0.84
1:B:337:GLY:O	1:B:338:GLN:HG2	1.82	0.80
1:B:10:TRP:HE1	1:B:26:GLN:HE21	1.29	0.80
1:B:250:MET:HE1	1:B:396:ARG:HA	1.63	0.79
1:A:335:LYS:O	1:A:336:ASN:HB3	1.83	0.78
1:A:149:ASN:N	4:A:508:GOL:H11	1.93	0.78
1:A:335:LYS:O	1:A:335:LYS:HG2	1.83	0.78
1:B:425:LEU:CD2	1:B:461:GLU:HG3	2.13	0.77
1:B:314:LYS:HZ1	2:B:509:ACT:H2	1.50	0.77
1:A:10:TRP:HE1	1:A:26:GLN:HE21	1.33	0.76
1:B:180:ARG:HD3	1:B:192:LYS:HA	1.69	0.74
1:A:444:GLU:HG3	9:A:619:HOH:O	1.86	0.74
1:B:180:ARG:NH1	1:B:189:PRO:O	2.21	0.73
1:A:378:GLU:HG2	1:A:382:TYR:CE2	2.24	0.72
1:A:445:THR:HB	1:B:478:PRO:HB2	1.73	0.71
1:B:320:GLU:OE1	1:B:325:THR:HG22	1.89	0.71
1:A:43:ASP:HB3	9:B:517:HOH:O	1.90	0.70
1:B:27:MET:HG3	9:B:518:HOH:O	1.91	0.70
1:B:10:TRP:HE1	1:B:26:GLN:NE2	1.88	0.70
1:B:382:TYR:CE2	1:B:386:ARG:HD2	2.27	0.70
1:A:444:GLU:HG2	1:B:481:GLY:CA	2.21	0.69
1:A:335:LYS:O	1:A:336:ASN:HB2	1.91	0.67
1:B:457:ARG:O	1:B:461:GLU:HB2	1.95	0.66
1:A:444:GLU:HG2	1:B:481:GLY:HA2	1.79	0.65
1:B:496:GLN:HG2	9:B:653:HOH:O	1.96	0.65
1:B:19:PRO:HG3	1:B:142:ILE:HB	1.79	0.65
1:A:82:GLU:HB2	9:A:712:HOH:O	1.97	0.64
1:A:253:LEU:HD22	1:A:392:MET:HG2	1.79	0.64
1:B:58:GLU:HG2	1:B:59:ASP:N	2.12	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:416:HIS:HE1	9:A:622:HOH:O	1.81	0.64
1:A:131:GLN:HG3	9:A:685:HOH:O	1.97	0.64
1:A:231[A]:ARG:HG3	9:A:569:HOH:O	1.97	0.64
1:A:356:MET:O	1:A:360:ILE:HG12	1.98	0.63
1:A:59:ASP:CB	1:A:61:LYS:H	1.94	0.62
1:B:250:MET:HE3	1:B:396:ARG:HA	1.80	0.62
1:B:306:LYS:HD3	9:B:586:HOH:O	1.98	0.62
1:A:444:GLU:CG	1:B:481:GLY:HA2	2.29	0.61
1:A:361:GLN:HE22	4:A:509:GOL:H2	1.64	0.61
1:A:253:LEU:CD2	1:A:392:MET:HG2	2.32	0.60
1:A:385:GLN:HG2	1:A:417:ALA:HB2	1.84	0.60
1:A:490:THR:HA	4:A:515:GOL:H31	1.84	0.59
1:B:144:PRO:HA	1:B:147:PHE:CE2	2.39	0.58
1:B:409:SER:HB2	1:B:439:LEU:HD21	1.85	0.57
1:B:414:PRO:O	1:B:415:SER:CB	2.44	0.57
1:B:341:ARG:HG3	1:B:341:ARG:HH11	1.69	0.57
1:A:233:SER:O	1:B:452:ARG:NH2	2.37	0.57
1:A:278:LEU:HD23	1:A:278:LEU:C	2.29	0.57
1:A:287:GLN:HE21	1:A:470:ILE:HA	1.69	0.57
1:A:296:PRO:HB3	1:A:302:ASN:HD22	1.70	0.56
1:B:283:LEU:CD2	1:B:352:LEU:HD11	2.36	0.56
1:A:309:GLN:H	1:A:309:GLN:CD	2.10	0.56
1:B:180:ARG:HD3	1:B:192:LYS:HD2	1.88	0.56
1:B:314:LYS:HZ2	2:B:509:ACT:H2	1.69	0.56
1:A:87:ASN:ND2	1:A:141:PHE:HA	2.21	0.54
1:B:470:ILE:C	1:B:470:ILE:HD12	2.32	0.54
1:A:226:LEU:HD21	1:A:473:MET:HE1	1.89	0.54
6:A:511:BHZ:H18	6:A:511:BHZ:O6	2.07	0.54
1:B:201:ASP:OD1	1:B:203:THR:HB	2.08	0.54
1:A:350:ASP:C	1:A:350:ASP:OD1	2.52	0.53
1:A:109:ASP:HB3	1:A:121:THR:HG23	1.91	0.53
1:B:250:MET:HE3	1:B:395:HIS:C	2.33	0.53
1:B:341:ARG:HG3	1:B:370:ASP:HB3	1.91	0.53
1:A:10:TRP:HE1	1:A:26:GLN:NE2	2.04	0.53
1:B:171:LYS:O	1:B:172:LEU:O	2.27	0.52
1:A:221:GLU:OE2	1:A:396:ARG:NH2	2.40	0.52
1:A:115:LYS:HA	9:A:676:HOH:O	2.09	0.51
1:A:414:PRO:HA	1:A:419:PHE:CD1	2.45	0.51
1:B:250:MET:HB2	1:B:466:PRO:HA	1.91	0.51
1:B:5:GLU:HG2	1:B:193:LYS:HB3	1.93	0.51
1:B:282:ALA:C	1:B:283:LEU:HD23	2.35	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:477:LYS:HE2	9:A:574:HOH:O	2.11	0.50
1:B:221:GLU:HG3	1:B:470:ILE:HG21	1.92	0.50
1:B:18:ASN:H	1:B:25:ASN:HD21	1.59	0.50
1:A:42:ALA:HB3	1:B:42:ALA:HB3	1.94	0.50
1:A:42:ALA:CB	1:B:42:ALA:HB3	2.41	0.50
1:B:62:THR:HG23	1:B:121:THR:HG22	1.94	0.50
1:B:250:MET:HE1	1:B:396:ARG:CA	2.39	0.50
1:B:272:ALA:HB2	1:B:367:ILE:HD13	1.94	0.50
1:A:27:MET:HE1	1:A:402:TYR:OH	2.13	0.49
1:A:272:ALA:HB2	1:A:367:ILE:HD13	1.94	0.49
1:B:17:LEU:H	1:B:25:ASN:ND2	2.09	0.49
1:B:102:GLU:HB3	1:B:126:TYR:OH	2.13	0.49
1:A:396:ARG:HG2	1:A:397:THR:O	2.13	0.49
1:B:428:LYS:HB3	1:B:429:PRO:HD3	1.94	0.49
1:B:250:MET:CE	1:B:396:ARG:CA	2.85	0.48
1:A:453:ASP:OD2	1:A:457:ARG:HD2	2.14	0.48
1:B:126:TYR:CZ	1:B:128:PRO:HG2	2.49	0.48
1:A:215:ASP:OD2	1:A:477:LYS:HE3	2.14	0.48
1:B:493:PRO:HB2	1:B:496:GLN:HE21	1.79	0.47
1:B:200:PRO:HD2	9:B:553:HOH:O	2.14	0.47
1:A:290:ALA:HA	1:A:469:TYR:CE2	2.49	0.47
1:A:219:GLY:CA	1:A:472:MET:HE3	2.45	0.47
1:B:403:ASP:HA	1:B:404:PRO:HA	1.74	0.47
1:A:2:ALA:N	1:A:3:PRO:HD3	2.30	0.47
1:B:438:VAL:HG12	1:B:450:LEU:HB2	1.97	0.47
1:B:408:LEU:O	1:B:435:ILE:HD13	2.15	0.46
1:B:296:PRO:HB3	1:B:302:ASN:HD22	1.80	0.46
1:B:427:ASP:HA	9:B:564:HOH:O	2.15	0.46
1:A:409:SER:O	1:A:412[B]:ARG:HB2	2.15	0.46
1:A:470:ILE:HD12	1:A:470:ILE:C	2.40	0.46
1:B:103:LEU:HB2	1:B:132:GLU:OE2	2.15	0.46
1:A:265:VAL:O	1:A:269:LEU:HG	2.15	0.46
1:A:484:PRO:HG2	1:A:496:GLN:HB2	1.98	0.46
1:B:473:MET:HB3	1:B:473:MET:HE2	1.53	0.46
6:B:507:BHZ:O20	9:B:669:HOH:O	2.21	0.46
1:B:27:MET:HE1	9:B:547:HOH:O	2.16	0.46
1:A:57:SER:HG	1:A:59:ASP:HB2	1.75	0.46
1:B:401:PRO:HD3	1:B:488:ILE:HG12	1.98	0.46
1:A:2:ALA:N	1:A:3:PRO:CD	2.79	0.46
1:A:388:GLY:HA2	1:A:390:PHE:CE2	2.51	0.46
1:A:226:LEU:CD2	1:A:473:MET:HE1	2.45	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:495:GLU:H	1:A:495:GLU:CD	2.24	0.45
1:A:28:PHE:CD2	1:A:28:PHE:C	2.94	0.45
1:A:219:GLY:HA2	1:A:472:MET:HE3	1.99	0.45
1:A:250:MET:HE1	1:A:397:THR:HG23	1.99	0.45
1:A:42:ALA:HB3	1:B:42:ALA:CB	2.47	0.45
1:B:172:LEU:O	1:B:174:GLN:N	2.45	0.45
1:A:283:LEU:HD12	1:A:352:LEU:HD21	1.98	0.45
1:B:27:MET:HE2	1:B:136:PRO:HB2	1.99	0.45
1:B:365:ARG:HG3	1:B:365:ARG:HH11	1.81	0.45
1:A:87:ASN:ND2	1:A:142:ILE:H	2.03	0.45
1:A:111:LYS:HE3	1:A:111:LYS:HB2	1.80	0.44
1:A:287:GLN:HE22	1:A:471:SER:H	1.66	0.44
1:B:394:PHE:HB3	4:B:510:GOL:H2	1.99	0.44
1:B:425:LEU:HD22	1:B:461:GLU:CG	2.38	0.44
1:B:203:THR:CG2	9:B:546:HOH:O	2.65	0.44
1:A:121:THR:HG22	9:A:650:HOH:O	2.17	0.44
1:B:221:GLU:CD	1:B:396:ARG:HH12	2.25	0.44
1:B:283:LEU:HD13	1:B:287:GLN:HG3	1.99	0.44
1:B:283:LEU:CD1	1:B:287:GLN:HG3	2.48	0.43
1:A:378:GLU:HG2	1:A:382:TYR:CZ	2.53	0.43
1:B:144:PRO:HA	1:B:147:PHE:CD2	2.53	0.43
1:B:212:GLY:HA2	1:B:477:LYS:HZ1	1.82	0.43
1:B:10:TRP:CE2	1:B:28:PHE:HE1	2.37	0.43
1:B:169:GLU:HG2	1:B:170:SER:H	1.82	0.43
1:B:10:TRP:NE1	1:B:26:GLN:HE21	2.07	0.43
1:A:247:GLU:OE2	9:A:602:HOH:O	2.21	0.43
1:B:22:TYR:O	1:B:23:THR:C	2.61	0.43
1:B:171:LYS:O	1:B:172:LEU:C	2.62	0.43
1:B:229:PHE:CE1	1:B:240:THR:HB	2.53	0.43
1:B:290:ALA:HA	1:B:469:TYR:CE2	2.54	0.43
1:A:255:THR:O	1:A:424:GLY:HA3	2.19	0.43
1:B:465:LEU:C	1:B:465:LEU:HD23	2.44	0.43
1:B:165:TRP:CH2	1:B:194:ILE:HD11	2.54	0.42
1:B:16:PRO:O	1:B:17:LEU:HB2	2.19	0.42
1:B:281:ASN:HD22	1:B:281:ASN:HA	1.63	0.42
1:A:242:LEU:HD12	1:A:473:MET:HB3	2.02	0.42
1:A:441:THR:O	1:A:447:ARG:NH1	2.47	0.42
1:A:435:ILE:O	1:A:438:VAL:HG12	2.20	0.42
1:B:203:THR:HG22	9:B:546:HOH:O	2.19	0.42
1:B:265:VAL:O	1:B:269:LEU:HG	2.19	0.42
1:B:180:ARG:CD	1:B:192:LYS:HA	2.45	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:425:LEU:HD21	1:B:461:GLU:HG3	1.98	0.42
1:A:149:ASN:H	4:A:508:GOL:C1	2.00	0.41
1:A:39:LYS:HD2	1:A:49:TRP:CZ3	2.55	0.41
1:A:403:ASP:HA	1:A:404:PRO:HA	1.81	0.41
1:B:171:LYS:HB3	1:B:174:GLN:HG3	2.03	0.41
1:B:172:LEU:C	1:B:174:GLN:H	2.29	0.41
1:A:127:TYR:CD1	1:A:127:TYR:C	2.99	0.41
1:B:340:LEU:HD13	1:B:369:ALA:HB2	2.03	0.41
1:A:19:PRO:HG3	1:A:142:ILE:HB	2.03	0.40
1:A:22:TYR:O	1:A:23:THR:C	2.63	0.40
1:A:40:TYR:CE1	1:A:401:PRO:HB3	2.56	0.40
1:B:12:VAL:HG23	1:B:13:ASN:O	2.22	0.40
1:B:255:THR:O	1:B:261:ASN:HA	2.21	0.40
1:B:414:PRO:HA	1:B:419:PHE:CD1	2.56	0.40

All (3) 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:B:321:LYS:CE	9:A:617:HOH:O[3_555]	0.76	1.44
1:B:321:LYS:NZ	9:A:617:HOH:O[3_555]	0.84	1.36
1:B:321:LYS:CD	9:A:617:HOH:O[3_555]	1.70	0.50

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	498/502 (99%)	477 (96%)	20 (4%)	1 (0%)	43	63
1	B	495/502 (99%)	473 (96%)	18 (4%)	4 (1%)	16	31
All	All	993/1004 (99%)	950 (96%)	38 (4%)	5 (0%)	24	43

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	59	ASP
1	B	172	LEU
1	B	415	SER
1	B	328	ALA
1	B	76	GLY

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	420/425 (99%)	396 (94%)	24 (6%)	18	39
1	B	416/425 (98%)	387 (93%)	29 (7%)	14	29
All	All	836/850 (98%)	783 (94%)	53 (6%)	16	34

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	VAL
1	A	58	GLU
1	A	82	GLU
1	A	96	GLN
1	A	121	THR
1	A	127	TYR
1	A	170	SER
1	A	179	VAL
1	A	203	THR
1	A	216	LEU
1	A	250	MET
1	A	283	LEU
1	A	288	GLN
1	A	309	GLN
1	A	319	LEU
1	A	335	LYS
1	A	352	LEU
1	A	372	SER

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Mol	Chain	Res	Type
1	A	373	LEU
1	A	396	ARG
1	A	439	LEU
1	A	445	THR
1	A	447	ARG
1	A	452	ARG
1	B	50	LEU
1	B	58	GLU
1	B	64	THR
1	B	127	TYR
1	B	133	LEU
1	B	170	SER
1	B	171	LYS
1	B	174	GLN
1	B	203	THR
1	B	216	LEU
1	B	221	GLU
1	B	224	LEU
1	B	250	MET
1	B	279	ILE
1	B	283	LEU
1	B	288	GLN
1	B	306	LYS
1	B	319	LEU
1	B	321	LYS
1	B	340	LEU
1	B	341	ARG
1	B	373	LEU
1	B	415	SER
1	B	439	LEU
1	B	442	HIS
1	B	461	GLU
1	B	473	MET
1	B	477	LYS
1	B	479	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	26	GLN
1	A	87	ASN
1	A	149	ASN

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Mol	Chain	Res	Type
1	A	168	GLN
1	A	197	ASN
1	A	287	GLN
1	A	302	ASN
1	A	361	GLN
1	A	366	GLN
1	A	385	GLN
1	A	416	HIS
1	A	446	GLN
1	B	25	ASN
1	B	26	GLN
1	B	106	GLN
1	B	234	GLN
1	B	281	ASN
1	B	302	ASN
1	B	336	ASN
1	B	385	GLN
1	B	416	HIS
1	B	420	GLN
1	B	442	HIS
1	B	496	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 24 ligands modelled in this entry, 4 are monoatomic - leaving 20 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
2	ACT	A	503	-	3,3,3	0.60	0	3,3,3	1.64	1 (33%)
4	GOL	A	518	-	5,5,5	0.49	0	5,5,5	0.80	0
2	ACT	A	505	-	3,3,3	0.80	0	3,3,3	1.60	1 (33%)
6	BHZ	B	507	5	28,28,28	1.19	3 (10%)	36,36,36	1.34	4 (11%)
2	ACT	B	509	-	3,3,3	0.80	0	3,3,3	1.63	1 (33%)
2	ACT	B	503	-	3,3,3	0.79	0	3,3,3	1.39	0
4	GOL	B	510	-	5,5,5	0.52	0	5,5,5	0.84	0
7	PER	B	508	5	1,1,1	0.20	0	-		
7	PER	A	512	5	1,1,1	0.21	0	-		
6	BHZ	A	511	5	28,28,28	0.89	0	36,36,36	1.36	5 (13%)
4	GOL	B	505	-	5,5,5	0.38	0	5,5,5	0.49	0
4	GOL	A	509	-	5,5,5	0.38	0	5,5,5	0.32	0
4	GOL	A	507	-	5,5,5	0.51	0	5,5,5	0.40	0
2	ACT	A	517	-	3,3,3	0.96	0	3,3,3	0.89	0
2	ACT	A	504	-	3,3,3	0.90	0	3,3,3	1.76	1 (33%)
2	ACT	B	504	-	3,3,3	0.82	0	3,3,3	1.42	0
4	GOL	A	508	-	5,5,5	0.48	0	5,5,5	0.85	0
4	GOL	A	515	-	5,5,5	0.55	0	5,5,5	1.57	1 (20%)
4	GOL	A	516	-	5,5,5	0.42	0	5,5,5	0.31	0
3	SO4	A	506	-	4,4,4	0.22	0	6,6,6	0.26	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
4	GOL	A	508	-	-	2/4/4/4	-
4	GOL	B	505	-	-	2/4/4/4	-
4	GOL	A	509	-	-	4/4/4/4	-
4	GOL	A	518	-	-	4/4/4/4	-
4	GOL	A	507	-	-	3/4/4/4	-
4	GOL	B	510	-	-	2/4/4/4	-
4	GOL	A	516	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	A	515	-	-	4/4/4/4	-
6	BHZ	B	507	5	-	5/21/21/21	0/2/2/2
6	BHZ	A	511	5	-	2/21/21/21	0/2/2/2

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	507	BHZ	C12-C13	2.72	1.56	1.51
6	B	507	BHZ	C7-C1	2.67	1.56	1.51
6	B	507	BHZ	O23-C22	-2.01	1.24	1.30

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	507	BHZ	C7-C1-C6	4.12	124.53	120.45
6	A	511	BHZ	C12-N11-C10	-3.52	103.93	111.28
6	A	511	BHZ	C7-C1-C6	2.66	123.08	120.45
6	B	507	BHZ	C12-N11-C21	-2.47	106.80	111.77
2	A	504	ACT	OXT-C-O	-2.32	113.40	122.03
2	A	503	ACT	OXT-C-CH3	2.25	124.48	115.05
6	B	507	BHZ	C19-N8-C9	-2.20	106.61	111.91
6	B	507	BHZ	C21-N11-C10	-2.19	106.64	111.91
6	A	511	BHZ	C18-C13-C14	2.15	121.43	118.23
6	A	511	BHZ	C1-C7-N8	-2.15	108.93	112.75
4	A	515	GOL	C3-C2-C1	-2.11	104.05	111.80
6	A	511	BHZ	C12-N11-C21	-2.05	107.64	111.77
2	A	505	ACT	OXT-C-O	-2.05	114.43	122.03
2	B	509	ACT	OXT-C-O	-2.03	114.51	122.03

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	509	GOL	O1-C1-C2-C3
4	A	509	GOL	C1-C2-C3-O3
4	A	518	GOL	O1-C1-C2-C3
4	B	510	GOL	O1-C1-C2-C3
4	A	518	GOL	O2-C2-C3-O3
4	A	507	GOL	O1-C1-C2-C3
4	A	515	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
4	A	516	GOL	O1-C1-C2-C3
4	A	518	GOL	C1-C2-C3-O3
4	B	505	GOL	C1-C2-C3-O3
6	B	507	BHZ	N11-C21-C22-O22
6	B	507	BHZ	N11-C21-C22-O23
4	A	507	GOL	O1-C1-C2-O2
4	A	509	GOL	O1-C1-C2-O2
4	A	509	GOL	O2-C2-C3-O3
4	A	516	GOL	O1-C1-C2-O2
4	A	518	GOL	O1-C1-C2-O2
4	B	510	GOL	O1-C1-C2-O2
6	B	507	BHZ	N8-C19-C20-O21
4	A	515	GOL	O2-C2-C3-O3
6	A	511	BHZ	N8-C19-C20-O21
6	B	507	BHZ	N8-C19-C20-O20
6	B	507	BHZ	C22-C21-N11-C12
4	A	507	GOL	C1-C2-C3-O3
4	A	515	GOL	O1-C1-C2-C3
6	A	511	BHZ	N8-C19-C20-O20
4	A	508	GOL	O1-C1-C2-C3
4	B	505	GOL	O2-C2-C3-O3
4	A	508	GOL	O1-C1-C2-O2
4	A	515	GOL	O1-C1-C2-O2

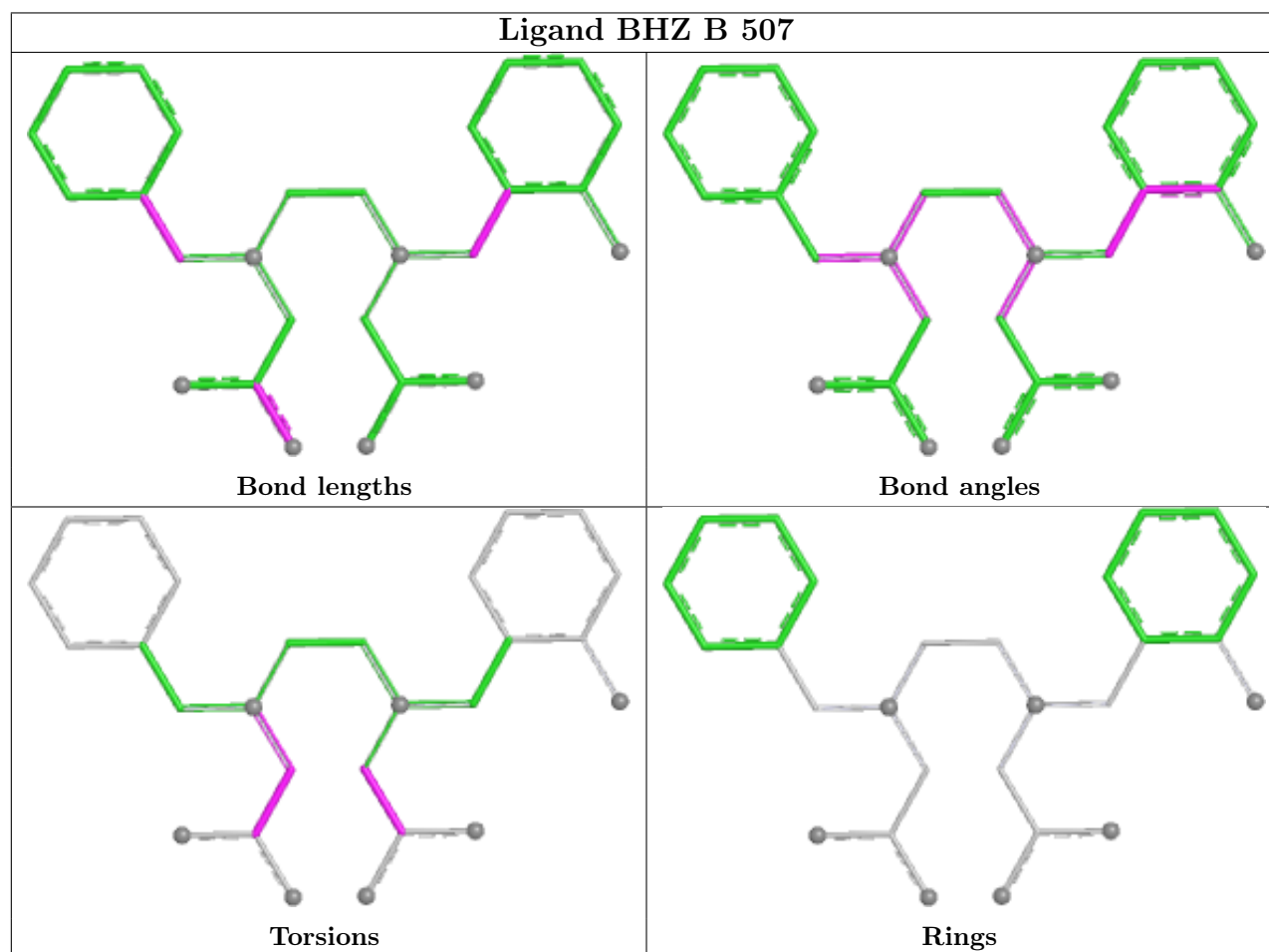
There are no ring outliers.

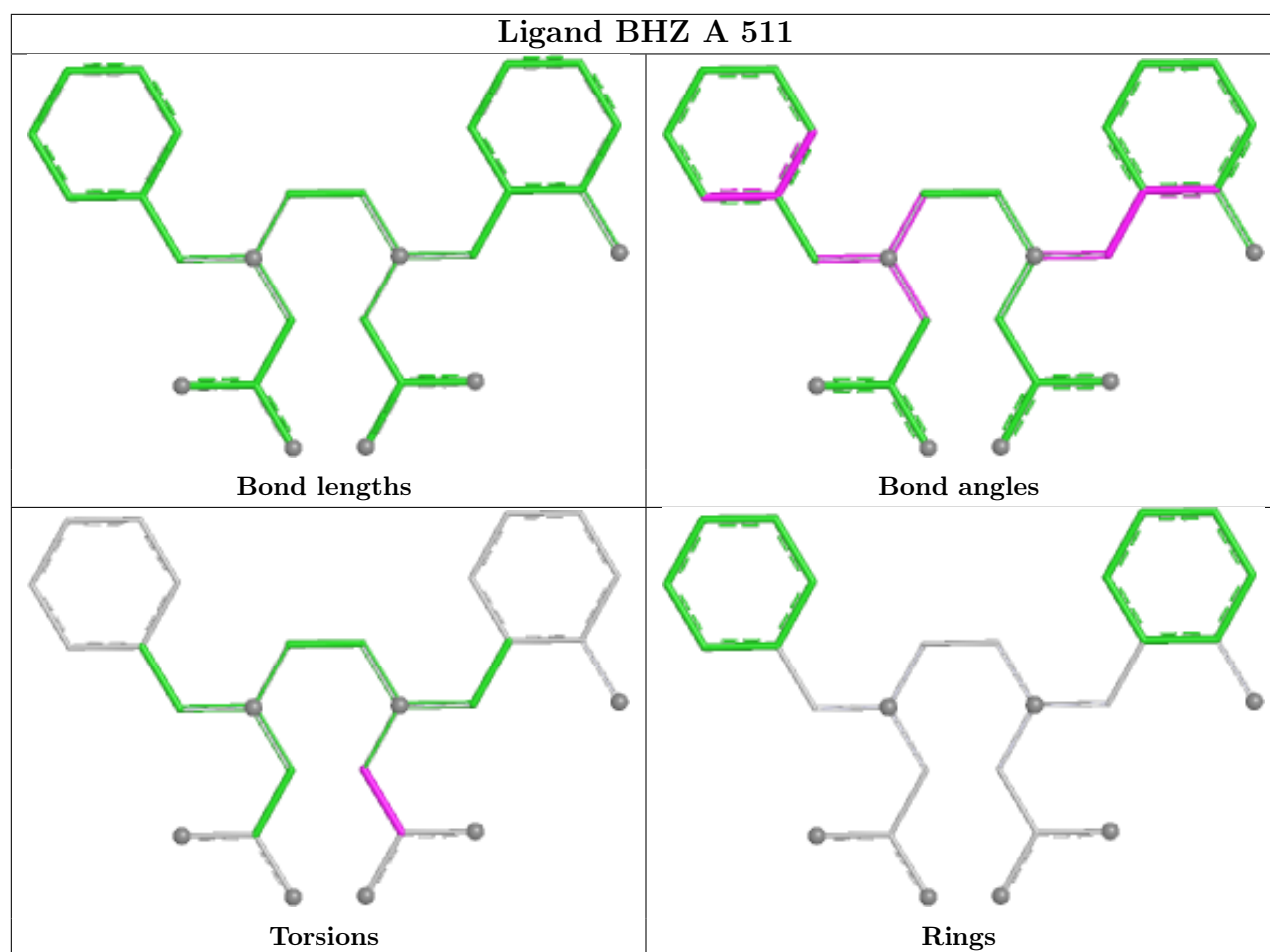
7 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	507	BHZ	1	0
2	B	509	ACT	3	0
4	B	510	GOL	1	0
6	A	511	BHZ	1	0
4	A	509	GOL	1	0
4	A	508	GOL	3	0
4	A	515	GOL	2	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	498/502 (99%)	-0.62	2 (0%) 88 86	7, 16, 30, 43	3 (0%)
1	B	497/502 (99%)	-0.29	4 (0%) 82 80	9, 24, 46, 53	1 (0%)
All	All	995/1004 (99%)	-0.46	6 (0%) 85 83	7, 20, 42, 53	4 (0%)

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	336	ASN	3.6
1	B	3	PRO	3.0
1	B	499	PRO	2.9
1	A	309	GLN	2.4
1	B	321	LYS	2.4
1	B	328	ALA	2.2

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

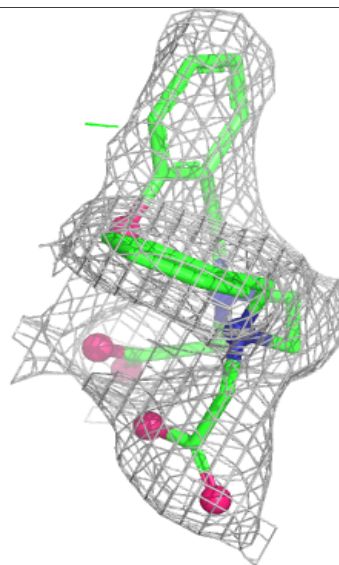
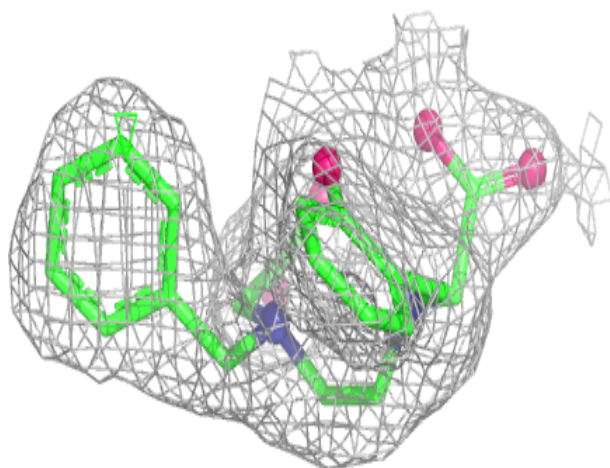
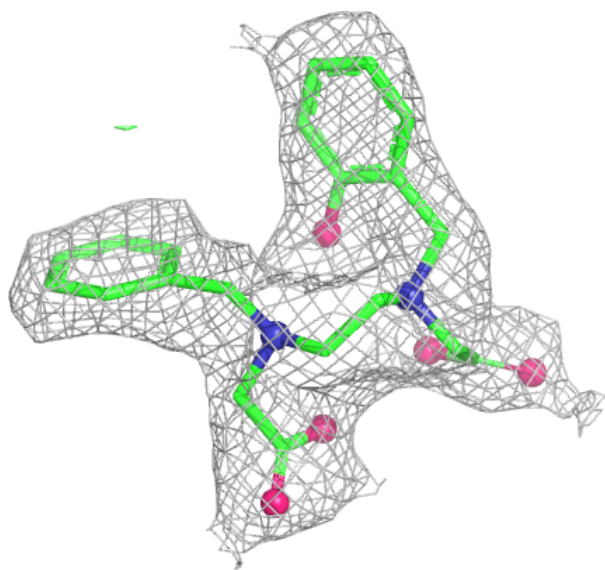
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	GOL	A	509	6/6	0.66	0.22	3,11,13,14	0
2	ACT	B	504	4/4	0.68	0.26	73,73,73,73	0
4	GOL	A	518	6/6	0.71	0.23	20,20,20,20	0
2	ACT	A	517	4/4	0.72	0.17	20,20,20,20	0
2	ACT	A	503	4/4	0.72	0.19	53,54,54,54	0
3	SO4	A	506	5/5	0.76	0.21	90,90,90,90	0
4	GOL	B	510	6/6	0.76	0.18	49,51,52,52	0
2	ACT	A	505	4/4	0.79	0.14	39,39,39,39	0
4	GOL	A	508	6/6	0.81	0.14	50,51,52,52	0
2	ACT	A	504	4/4	0.81	0.18	45,45,45,45	0
4	GOL	B	505	6/6	0.83	0.12	33,34,35,36	0
4	GOL	A	507	6/6	0.85	0.13	40,42,42,42	0
4	GOL	A	515	6/6	0.88	0.13	18,24,26,29	0
2	ACT	B	509	4/4	0.88	0.14	37,37,37,37	0
2	ACT	B	503	4/4	0.89	0.11	53,54,54,54	0
8	CL	A	514	1/1	0.94	0.12	42,42,42,42	0
6	BHZ	B	507	27/27	0.95	0.07	14,22,31,32	0
4	GOL	A	516	6/6	0.95	0.06	28,31,31,32	0
6	BHZ	A	511	27/27	0.96	0.07	16,18,31,32	0
8	CL	A	513	1/1	0.98	0.12	27,27,27,27	0
7	PER	A	512	2/2	0.99	0.04	20,20,20,22	0
7	PER	B	508	2/2	0.99	0.05	25,25,25,30	0
5	FE	A	510	1/1	1.00	0.01	14,14,14,14	0
5	FE	B	506	1/1	1.00	0.01	20,20,20,20	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.

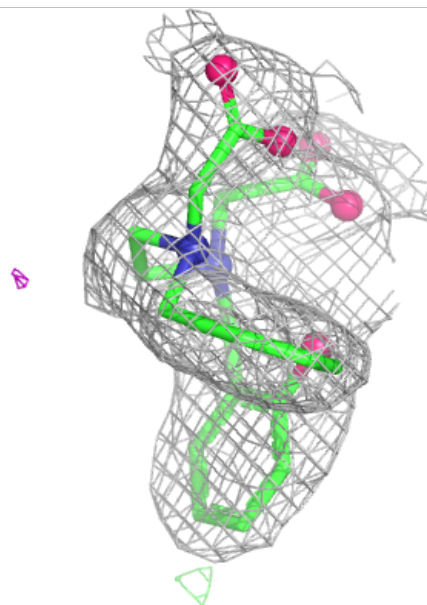
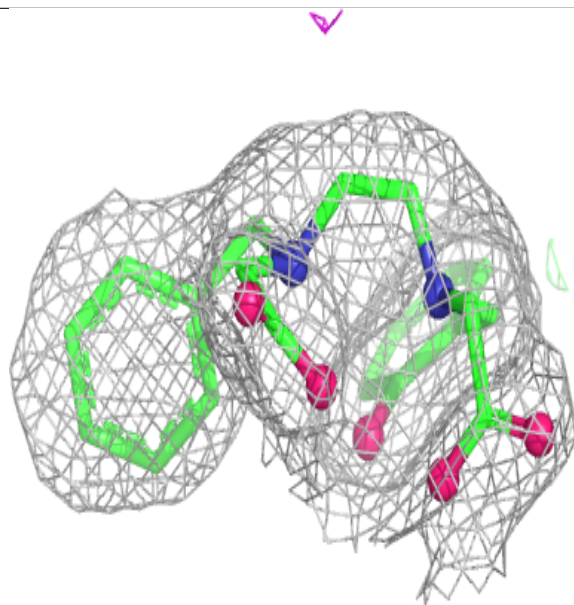
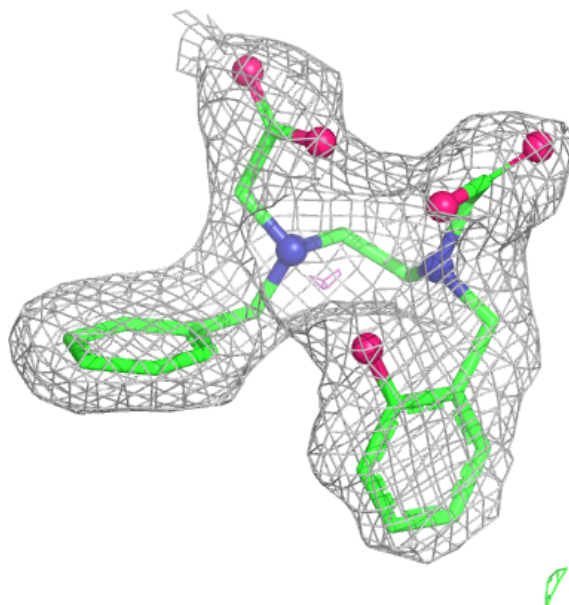
Electron density around BHZ B 507:

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



Electron density around BHZ A 511:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.