



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 04:06 AM UTC

PDB ID : 3AXK / pdb_00003axk
Title : Structure of rice Rubisco in complex with NADP(H)
Authors : Matsumura, H.; Mizohata, E.; Ishida, H.; Kogami, A.; Ueno, T.; Makino, A.;
Inoue, T.; Yokota, A.; Mae, T.; Kai, Y.
Deposited on : 2011-04-11
Resolution : 1.90 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

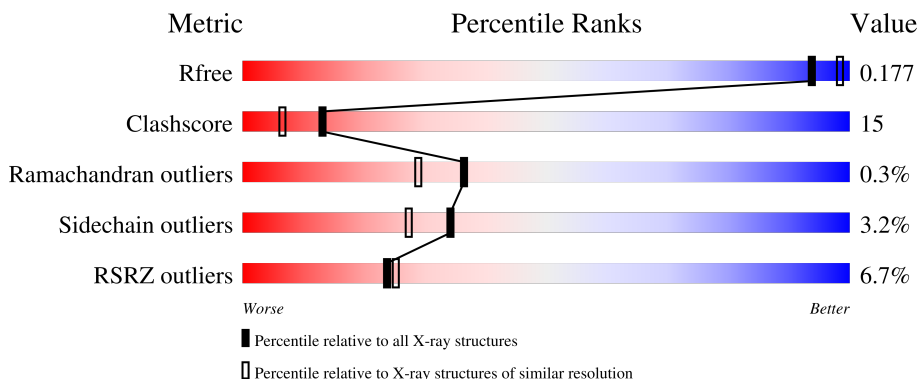
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

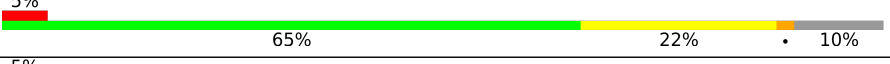
The reported resolution of this entry is 1.90 Å.

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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	477	
1	B	477	
2	S	129	
2	T	129	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 9992 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 Ribulose biphosphate carboxylase large chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	434	Total	C	N	O	S	0	0	0
			3384	2141	600	623	20			
1	B	430	Total	C	N	O	S	0	0	0
			3360	2125	597	618	20			

- Molecule 2 is a protein called Ribulose biphosphate carboxylase small chain, chloroplastic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	S	121	Total	C	N	O	S	0	0	1
			1004	664	161	173	6			
2	T	120	Total	C	N	O	S	0	0	1
			997	659	160	172	6			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
S	0	NME	-	amidation	UNP Q0INY7
S	112	CYS	LEU	conflict	UNP Q0INY7
T	0	NME	-	amidation	UNP Q0INY7
T	112	CYS	LEU	conflict	UNP Q0INY7

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).

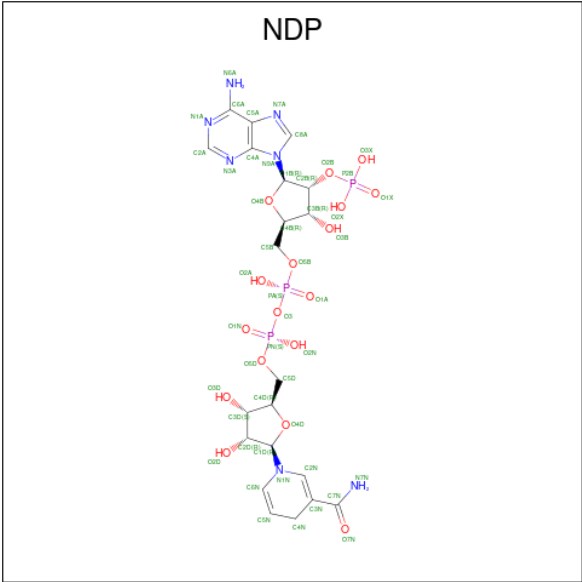


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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

- Molecule 5 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
5	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

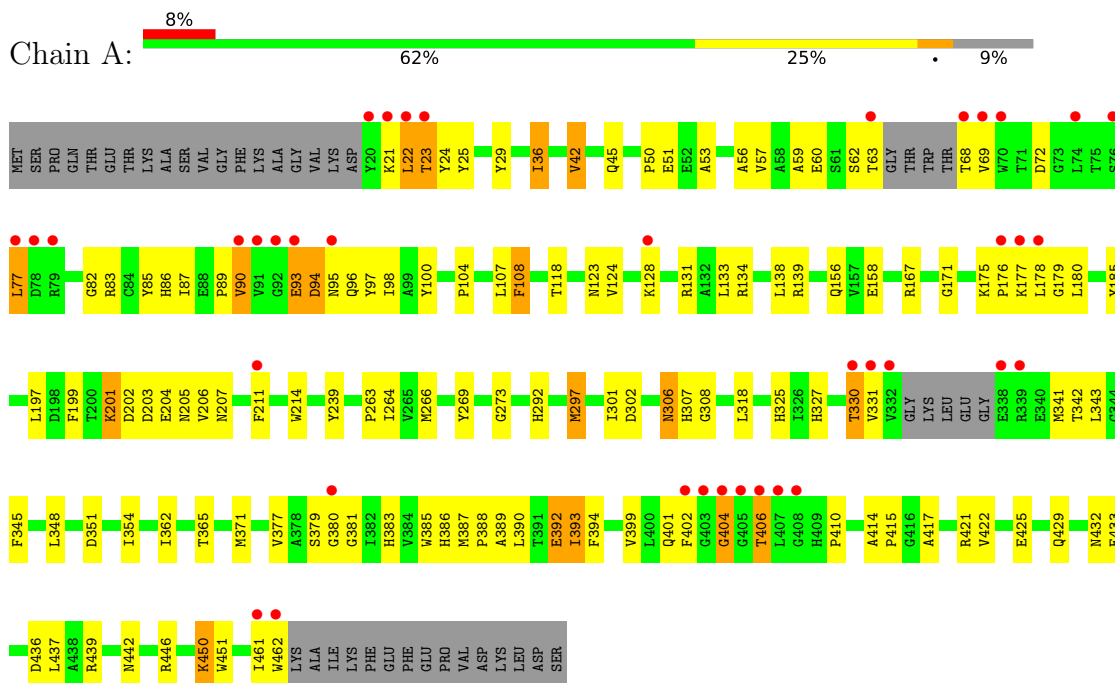
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	427	Total	O	0	0
			427	427		
6	S	162	Total	O	0	0
			162	162		
6	B	389	Total	O	0	0
			389	389		
6	T	147	Total	O	0	0
			147	147		

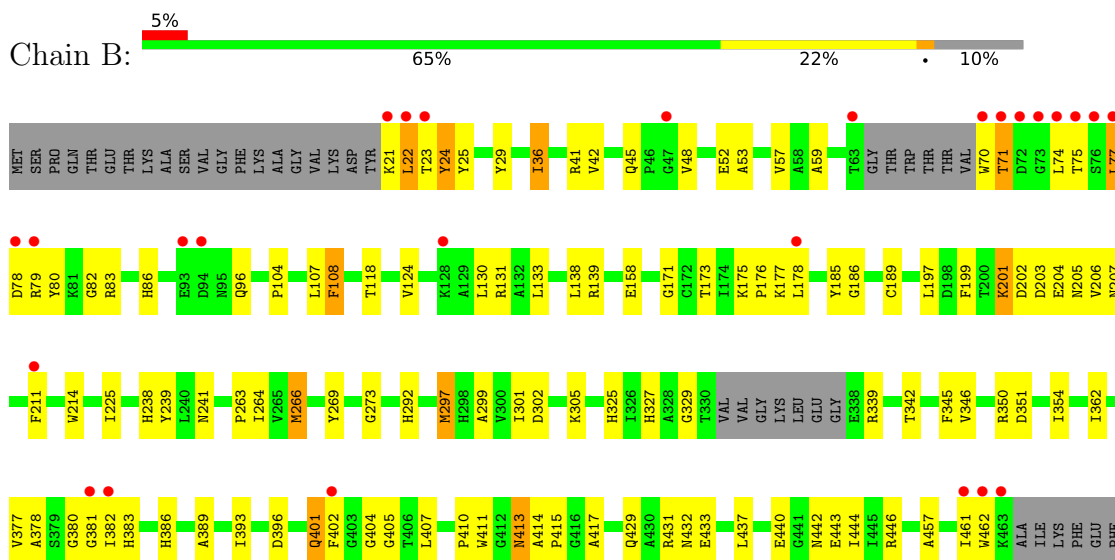
3 Residue-property plots

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: Ribulose biphosphate carboxylase large chain



- Molecule 1: Ribulose biphosphate carboxylase large chain



GLU
PRO
VAL
ASP
LYS
LEU
ASP
SER

- Molecule 2: Ribulose biphosphate carboxylase small chain, chloroplastic



ASN

- Molecule 2: Ribulose biphosphate carboxylase small chain, chloroplastic



4 Data and refinement statistics

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, α , β , γ	110.25Å 110.25Å 199.77Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.63 – 1.90 39.63 – 1.90	Depositor EDS
% Data completeness (in resolution range)	94.8 (39.63-1.90) 94.9 (39.63-1.90)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.47 (at 1.89Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.169 , 0.189 (Not available) , 0.177	Depositor DCC
R_{free} test set	3866 reflections (4.33%)	wwPDB-VP
Wilson B-factor (Å ²)	16.2	Xtriage
Anisotropy	0.049	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 64.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.029 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9992	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.86% 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: NME, MG, NDP, KCX, GOL

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	0.37	0/3453	0.96	20/4680 (0.4%)
1	B	0.38	0/3429	0.93	18/4644 (0.4%)
2	S	0.48	1/1036 (0.1%)	0.90	4/1405 (0.3%)
2	T	0.45	1/1028 (0.1%)	0.90	5/1393 (0.4%)
All	All	0.40	2/8946 (0.0%)	0.93	47/12122 (0.4%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	S	0	NME	C-N	-10.05	1.33	1.43
2	T	0	NME	C-N	-10.05	1.33	1.43

All (47) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	23	THR	N-CA-C	-12.18	96.47	112.68
1	B	124	VAL	N-CA-C	7.98	121.03	111.05
1	A	82	GLY	N-CA-C	-7.58	100.97	113.02
1	B	23	THR	N-CA-C	-7.46	103.63	112.89
1	B	269	TYR	N-CA-C	7.39	120.21	111.71
1	B	82	GLY	N-CA-C	-6.89	100.20	112.54
1	A	22	LEU	CA-CB-CG	-6.85	92.32	116.30
1	A	404	GLY	N-CA-C	-6.72	106.33	114.66
1	A	214	TRP	N-CA-C	6.69	118.23	111.07
1	B	264	ILE	N-CA-C	6.68	117.17	108.35
1	A	264	ILE	N-CA-C	6.47	116.89	108.35
2	T	111	GLN	N-CA-C	-6.37	100.13	110.20
2	S	14	THR	N-CA-C	6.31	119.98	110.64
1	A	302	ASP	N-CA-C	6.24	120.60	112.92
1	B	351	ASP	N-CA-C	6.22	118.56	110.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	269	TYR	N-CA-C	6.15	118.78	111.71
1	A	36	ILE	N-CA-C	-6.14	99.02	107.99
2	T	11	LYS	N-CA-C	6.08	119.07	110.14
1	B	301	ILE	N-CA-C	6.02	116.77	111.90
2	T	14	THR	N-CA-C	6.00	119.31	110.30
1	A	301	ILE	N-CA-C	5.86	116.85	111.81
1	A	124	VAL	N-CA-C	5.76	120.19	111.89
1	B	413	ASN	N-CA-C	5.72	117.19	111.07
1	A	393	ILE	N-CA-C	5.69	115.88	110.53
1	B	214	TRP	N-CA-C	5.63	118.14	111.33
1	B	36	ILE	N-CA-C	-5.61	100.33	108.36
2	T	39	VAL	N-CA-C	5.57	112.63	107.56
1	A	351	ASP	N-CA-C	5.51	118.00	110.55
1	B	301	ILE	CB-CA-C	-5.47	106.05	111.30
1	B	302	ASP	N-CA-C	5.44	120.02	113.17
1	A	371	MET	N-CA-C	-5.43	102.94	109.83
1	B	108	PHE	N-CA-C	5.40	118.62	109.76
1	A	93	GLU	N-CA-C	5.38	115.46	107.88
2	S	11	LYS	N-CA-C	5.38	118.03	109.81
1	A	42	VAL	N-CA-C	5.37	115.69	108.17
1	A	167	ARG	N-CA-C	5.35	112.94	108.13
1	A	365	THR	N-CA-C	-5.32	101.98	109.96
2	S	39	VAL	N-CA-C	5.31	113.12	107.76
1	A	263	PRO	N-CA-C	5.28	121.52	114.18
1	B	263	PRO	N-CA-C	5.26	121.49	114.18
1	B	350	ARG	N-CA-C	5.24	119.67	113.12
1	A	108	PHE	N-CA-C	5.22	118.33	109.76
1	B	24	TYR	N-CA-C	5.16	119.62	113.23
1	B	346	VAL	N-CA-C	-5.15	105.52	110.72
2	S	108	ARG	N-CA-C	-5.08	107.04	113.18
2	T	67	TRP	N-CA-C	-5.06	101.76	109.65
1	B	396	ASP	N-CA-C	5.05	116.79	111.28

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	3384	0	3283	126	0
1	B	3360	0	3260	100	0
2	S	1004	0	1003	31	0
2	T	997	0	996	17	0
3	A	12	0	16	1	0
3	B	12	0	16	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	96	0	52	12	0
6	A	427	0	0	8	0
6	B	389	0	0	21	0
6	S	162	0	0	7	0
6	T	147	0	0	2	0
All	All	9992	0	8626	259	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 15.

All (259) 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:B:189:CYS:HB2	6:B:705:HOH:O	1.46	1.12
1:A:331:VAL:HG11	1:A:393:ILE:HD13	1.32	1.10
1:B:382:ILE:HG12	6:B:1125:HOH:O	1.55	1.04
2:S:85:LYS:HA	2:S:85:LYS:HE3	1.40	1.00
1:A:404:GLY:H	5:A:479:NDP:H4D	1.28	0.95
1:A:156:GLN:CD	2:S:110:VAL:HG21	1.92	0.95
1:A:178:LEU:HD12	1:B:107:LEU:HD22	1.52	0.91
1:A:90:VAL:HG11	1:A:98:ILE:HG12	1.53	0.90
1:A:156:GLN:NE2	2:S:110:VAL:HG11	1.85	0.90
1:A:90:VAL:CG1	1:A:98:ILE:HG12	2.02	0.89
1:A:330:THR:HG23	1:A:379:SER:O	1.78	0.82
1:B:389:ALA:O	1:B:393:ILE:HD13	1.80	0.80
6:A:1096:HOH:O	1:B:383:HIS:HB3	1.81	0.79
1:A:201:KCX:HB3	1:A:239:TYR:CD2	2.21	0.76
1:A:331:VAL:CG1	1:A:393:ILE:HD13	2.14	0.76
1:B:104:PRO:HG2	1:B:107:LEU:HG	1.69	0.75
1:A:404:GLY:N	5:A:479:NDP:H4D	2.00	0.74
2:T:109:GLN:O	2:T:110:VAL:HG13	1.87	0.74
1:B:171:GLY:HA3	1:B:401:GLN:OE1	1.86	0.74
1:A:205:ASN:ND2	1:B:118:THR:HG22	2.04	0.73
1:A:156:GLN:CG	2:S:110:VAL:HG21	2.18	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:432:ASN:HD22	2:S:29:GLN:HE22	1.37	0.73
1:B:203:ASP:OD1	6:B:1112:HOH:O	2.05	0.72
2:S:85:LYS:HA	2:S:85:LYS:CE	2.18	0.72
1:A:90:VAL:HG22	1:A:97:TYR:HA	1.71	0.72
1:A:442:ASN:HB3	1:A:446:ARG:NH1	2.04	0.72
1:A:104:PRO:HG2	1:A:107:LEU:HG	1.70	0.72
1:A:205:ASN:HD22	1:B:118:THR:HG22	1.55	0.71
1:B:205:ASN:CG	6:B:1112:HOH:O	2.34	0.71
1:B:21:LYS:CB	1:B:25:TYR:HB3	2.21	0.70
1:A:156:GLN:HB2	6:A:861:HOH:O	1.92	0.69
1:A:442:ASN:HB3	1:A:446:ARG:HH12	1.57	0.69
1:A:90:VAL:HG22	1:A:97:TYR:CA	2.23	0.69
1:A:21:LYS:O	1:A:25:TYR:HB3	1.92	0.68
1:B:241:ASN:HA	1:B:266:MET:HG2	1.77	0.66
1:A:156:GLN:HE22	2:S:110:VAL:HG11	1.59	0.66
1:A:45:GLN:CD	1:A:131:ARG:HG2	2.21	0.66
1:B:177:LYS:HG2	1:B:178:LEU:HG	1.78	0.65
1:A:402:PHE:HB2	1:A:406:THR:CG2	2.27	0.65
1:A:330:THR:HG21	1:A:380:GLY:O	1.97	0.65
1:B:414:ALA:HB3	1:B:415:PRO:HD3	1.77	0.65
1:B:178:LEU:HD22	1:B:211:PHE:CZ	2.32	0.65
1:A:414:ALA:HB3	1:A:415:PRO:HD3	1.78	0.65
5:A:480:NDP:PN	1:B:381:GLY:H	2.20	0.65
1:B:432:ASN:HD22	2:T:29:GLN:HE22	1.45	0.64
2:T:81:THR:O	2:T:85:LYS:HG2	1.98	0.64
2:S:10:LYS:HB3	2:S:50:PHE:CZ	2.33	0.64
2:S:21:LEU:HA	6:S:1006:HOH:O	1.97	0.64
2:T:105:ASP:OD2	2:T:108:ARG:HG2	1.98	0.64
1:A:93:GLU:O	1:A:96:GLN:HB2	1.98	0.63
1:B:21:LYS:O	1:B:22:LEU:HD23	1.98	0.63
1:A:90:VAL:HG13	1:A:98:ILE:HG12	1.80	0.63
1:B:177:LYS:HD3	1:B:205:ASN:HD22	1.62	0.63
2:T:11:LYS:HG3	2:T:17:TYR:CE1	2.34	0.63
1:A:90:VAL:HG11	1:A:98:ILE:CG1	2.27	0.63
1:B:41:ARG:NH2	1:B:305:LYS:HZ2	1.98	0.62
1:A:45:GLN:OE1	1:A:131:ARG:HG2	1.99	0.62
6:A:690:HOH:O	1:B:75:THR:HG21	1.99	0.61
2:S:92:LYS:HD2	6:S:939:HOH:O	2.00	0.61
1:B:204:GLU:CD	6:B:1112:HOH:O	2.43	0.61
2:S:35:ARG:HD3	6:S:751:HOH:O	1.99	0.61
1:B:429:GLN:O	1:B:433:GLU:HG3	2.01	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:S:27:LEU:HD21	2:S:84:LEU:HD12	1.82	0.59
1:B:77:LEU:HD12	6:B:783:HOH:O	2.02	0.59
1:A:36:ILE:HD12	1:A:108:PHE:CE2	2.37	0.59
2:T:46:LYS:HE2	6:T:613:HOH:O	2.03	0.59
1:B:41:ARG:NH2	1:B:305:LYS:NZ	2.52	0.58
1:A:45:GLN:HA	1:A:131:ARG:HG3	1.85	0.58
1:B:42:VAL:HG22	1:B:133:LEU:CD1	2.34	0.58
1:B:329:GLY:O	1:B:378:ALA:HA	2.03	0.58
2:S:110:VAL:HG13	2:S:111:GLN:O	2.04	0.58
1:A:21:LYS:O	1:A:25:TYR:N	2.36	0.58
1:A:95:ASN:HB2	6:A:1001:HOH:O	2.04	0.57
1:A:461:ILE:HD11	1:A:462:TRP:CZ3	2.39	0.57
1:A:379:SER:HB3	1:A:401:GLN:HB2	1.86	0.57
1:B:204:GLU:HG2	6:B:1112:HOH:O	2.03	0.57
1:A:178:LEU:HD11	6:B:1121:HOH:O	2.05	0.57
1:B:79:ARG:NE	6:B:784:HOH:O	2.37	0.56
1:B:410:PRO:O	2:T:1:MET:HE2	2.05	0.56
1:A:343:LEU:HD21	1:A:393:ILE:HG23	1.87	0.56
2:T:27:LEU:O	2:T:31:GLU:HG2	2.06	0.56
1:A:450:LYS:HD2	1:A:450:LYS:N	2.19	0.56
1:A:392:GLU:HG2	1:A:437:LEU:HB2	1.88	0.56
2:S:10:LYS:HB3	2:S:50:PHE:CE1	2.39	0.56
3:B:504:GOL:H11	6:B:654:HOH:O	2.06	0.55
1:A:387:MET:HE1	1:A:402:PHE:CZ	2.42	0.55
1:A:389:ALA:O	1:A:393:ILE:HD12	2.07	0.55
1:A:197:LEU:HG	1:A:417:ALA:HB1	1.87	0.55
1:A:69:VAL:HG11	1:B:407:LEU:HB2	1.88	0.55
1:B:178:LEU:HD13	1:B:211:PHE:CZ	2.42	0.55
2:S:14:THR:HG22	2:S:15:LEU:HG	1.89	0.55
5:A:480:NDP:H3D	1:B:381:GLY:HA2	1.89	0.54
1:B:53:ALA:O	1:B:57:VAL:HG23	2.07	0.54
1:A:29:TYR:CG	1:A:83:ARG:HD2	2.43	0.54
1:A:436:ASP:CG	1:A:439:ARG:HD3	2.33	0.54
2:T:88:GLU:O	2:T:92:LYS:HD3	2.08	0.54
1:B:178:LEU:CD2	1:B:206:VAL:HG22	2.38	0.54
1:B:382:ILE:HA	1:B:386:HIS:ND1	2.24	0.53
1:A:381:GLY:H	5:A:479:NDP:PN	2.32	0.53
1:B:440:GLU:O	1:B:444:ILE:HG13	2.09	0.53
1:A:21:LYS:O	1:A:25:TYR:CB	2.55	0.53
1:A:123:ASN:HB2	6:A:671:HOH:O	2.09	0.53
2:S:92:LYS:HE2	6:S:1040:HOH:O	2.09	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:50:PRO:HG2	1:A:51:GLU:OE2	2.09	0.52
1:A:56:ALA:O	1:A:60:GLU:HG2	2.08	0.52
1:A:177:LYS:HG2	1:A:178:LEU:HG	1.91	0.52
2:S:85:LYS:HE2	6:S:1039:HOH:O	2.09	0.52
1:A:331:VAL:HG12	1:A:331:VAL:O	2.09	0.52
1:B:158:GLU:CD	1:B:325:HIS:HE2	2.18	0.52
1:B:48:VAL:HG13	1:B:52:GLU:OE2	2.09	0.52
1:A:383:HIS:CE1	1:A:385:TRP:HB2	2.45	0.52
1:A:410:PRO:HD3	1:A:461:ILE:HD13	1.90	0.52
1:B:45:GLN:HA	1:B:131:ARG:HG3	1.91	0.51
1:B:197:LEU:HG	1:B:417:ALA:HB1	1.91	0.51
1:A:297:MET:O	1:A:297:MET:HG3	2.09	0.51
1:B:45:GLN:OE1	1:B:131:ARG:HG2	2.10	0.51
1:B:411:TRP:CD1	2:T:1:MET:HG3	2.46	0.51
1:A:158:GLU:CD	1:A:325:HIS:HE2	2.18	0.51
1:B:36:ILE:HD12	1:B:108:PHE:CE2	2.45	0.51
1:B:327:HIS:HA	1:B:377:VAL:HB	1.93	0.51
5:A:480:NDP:H1D	6:B:1079:HOH:O	2.10	0.50
1:B:342:THR:HA	1:B:345:PHE:CE2	2.46	0.50
1:A:21:LYS:C	1:A:22:LEU:HG	2.34	0.50
1:A:178:LEU:HB3	1:A:211:PHE:CZ	2.46	0.50
1:A:429:GLN:O	1:A:433:GLU:HG3	2.10	0.50
1:A:439:ARG:HH11	1:A:439:ARG:HG2	1.76	0.50
1:B:173:THR:HA	1:B:201:KCX:HG3	1.93	0.50
1:B:185:TYR:OH	1:B:202:ASP:HA	2.12	0.50
1:A:63:THR:HG22	6:B:889:HOH:O	2.11	0.50
1:A:239:TYR:HB3	1:A:266:MET:HB2	1.94	0.50
5:A:480:NDP:H4D	1:B:404:GLY:H	1.76	0.50
1:A:342:THR:HA	1:A:345:PHE:CE2	2.47	0.50
1:B:292:HIS:HA	1:B:325:HIS:HB2	1.94	0.50
1:B:462:TRP:NE1	6:B:1079:HOH:O	2.38	0.50
1:A:461:ILE:HD11	1:A:462:TRP:CH2	2.46	0.49
1:B:178:LEU:HD13	1:B:211:PHE:HZ	1.76	0.49
1:B:461:ILE:HD11	1:B:462:TRP:CZ2	2.47	0.49
2:T:35:ARG:HD3	6:T:604:HOH:O	2.12	0.49
1:A:177:LYS:HE2	1:A:203:ASP:OD2	2.13	0.49
1:B:178:LEU:HD22	1:B:211:PHE:CE1	2.48	0.49
1:A:421:ARG:O	1:A:425:GLU:HG3	2.12	0.48
1:B:86:HIS:HE1	6:B:652:HOH:O	1.95	0.48
1:B:42:VAL:HG21	1:B:57:VAL:HG21	1.94	0.48
1:A:156:GLN:HG2	2:S:110:VAL:HG21	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:204:GLU:CG	6:B:1112:HOH:O	2.61	0.48
1:A:377:VAL:CG1	1:A:401:GLN:HG3	2.44	0.48
2:S:27:LEU:CD2	2:S:84:LEU:HD12	2.42	0.48
1:A:118:THR:HG22	1:B:205:ASN:OD1	2.14	0.47
1:A:133:LEU:H	1:A:307:HIS:CD2	2.31	0.47
2:T:61:TYR:CD1	2:T:61:TYR:C	2.91	0.47
2:S:11:LYS:HG3	2:S:17:TYR:CE1	2.48	0.47
1:B:175:LYS:HA	1:B:176:PRO:C	2.39	0.47
1:B:442:ASN:O	1:B:446:ARG:HG3	2.14	0.47
1:A:442:ASN:O	1:A:446:ARG:HG3	2.14	0.47
1:A:139:ARG:C	1:A:139:ARG:HD2	2.39	0.47
1:A:50:PRO:O	1:A:87:ILE:HD13	2.15	0.47
1:A:327:HIS:HA	1:A:377:VAL:HB	1.96	0.47
1:A:377:VAL:HG22	1:A:399:VAL:HB	1.97	0.47
1:A:24:TYR:CG	1:A:59:ALA:HB2	2.49	0.47
1:A:306:ASN:HD22	1:A:306:ASN:N	2.12	0.47
1:B:380:GLY:O	6:B:949:HOH:O	2.21	0.47
1:B:461:ILE:HD11	1:B:462:TRP:CE2	2.50	0.47
1:A:307:HIS:HE1	1:B:299:ALA:O	1.98	0.47
2:T:113:ILE:HG22	2:T:114:SER:N	2.30	0.46
1:A:306:ASN:HD22	1:A:306:ASN:H	1.63	0.46
2:S:85:LYS:HD3	6:S:1038:HOH:O	2.15	0.46
5:A:480:NDP:H4D	1:B:404:GLY:N	2.30	0.46
1:B:70:TRP:N	6:B:1118:HOH:O	2.48	0.46
1:B:178:LEU:HD23	1:B:206:VAL:HG22	1.98	0.46
1:A:318:LEU:HD13	1:A:318:LEU:C	2.39	0.46
1:A:211:PHE:HB3	6:B:699:HOH:O	2.14	0.46
1:A:178:LEU:HD22	1:A:211:PHE:HZ	1.81	0.46
6:A:897:HOH:O	2:S:110:VAL:HG22	2.16	0.46
2:S:74:MET:HE2	2:S:82:GLN:NE2	2.30	0.46
1:A:89:PRO:HA	1:A:97:TYR:CD2	2.51	0.45
1:A:177:LYS:HE2	1:A:203:ASP:CG	2.41	0.45
1:A:422:VAL:HG13	1:A:451:TRP:CH2	2.52	0.45
1:B:410:PRO:HD3	1:B:461:ILE:HD13	1.97	0.45
1:A:404:GLY:CA	5:A:479:NDP:H4D	2.46	0.45
5:A:480:NDP:O2N	6:B:1125:HOH:O	2.20	0.45
2:S:24:GLU:OE1	2:S:24:GLU:N	2.49	0.45
1:A:86:HIS:NE2	3:A:502:GOL:H11	2.31	0.45
1:A:179:GLY:HA2	1:B:80:TYR:CE2	2.51	0.45
1:B:21:LYS:CB	1:B:25:TYR:CB	2.93	0.45
1:B:393:ILE:N	1:B:393:ILE:HD12	2.32	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:386:HIS:O	1:A:390:LEU:HG	2.17	0.45
1:B:297:MET:O	1:B:297:MET:HG3	2.16	0.45
1:A:331:VAL:CG2	1:A:394:PHE:CE2	3.00	0.44
2:S:14:THR:O	2:S:15:LEU:HB2	2.16	0.44
1:B:339:ARG:NH2	1:B:393:ILE:HG13	2.32	0.44
1:A:45:GLN:HA	1:A:131:ARG:CG	2.47	0.44
1:B:71:THR:HA	1:B:74:LEU:CD2	2.48	0.44
1:A:68:THR:HB	5:A:480:NDP:H72N	1.82	0.44
1:B:239:TYR:HB3	1:B:266:MET:HB3	1.99	0.44
1:B:22:LEU:CD1	1:B:24:TYR:HD2	2.31	0.44
2:T:109:GLN:O	2:T:110:VAL:CG1	2.62	0.44
2:S:91:LYS:HE3	2:S:118:TYR:CD1	2.52	0.43
1:B:225:ILE:HD11	1:B:238:HIS:HB3	1.99	0.43
1:B:402:PHE:C	6:B:1123:HOH:O	2.60	0.43
1:B:431:ARG:HB2	1:B:437:LEU:HD11	1.99	0.43
2:S:30:ILE:HD13	2:S:83:VAL:HB	2.00	0.43
2:T:105:ASP:OD1	2:T:107:VAL:HG22	2.18	0.43
1:A:402:PHE:CB	1:A:406:THR:CG2	2.95	0.43
1:B:42:VAL:CG1	1:B:130:LEU:HD22	2.48	0.43
1:A:90:VAL:HG23	1:A:96:GLN:C	2.43	0.43
1:B:175:LYS:HB2	1:B:407:LEU:HD13	2.01	0.43
1:A:36:ILE:HD12	1:A:108:PHE:CZ	2.53	0.43
1:A:388:PRO:O	1:A:392:GLU:HB2	2.19	0.43
1:A:345:PHE:HA	1:A:348:LEU:HD12	2.00	0.43
1:B:22:LEU:HD12	1:B:24:TYR:HD2	1.83	0.43
1:B:432:ASN:HD22	2:T:29:GLN:NE2	2.15	0.43
1:A:439:ARG:HG2	1:A:439:ARG:NH1	2.34	0.43
1:B:186:GLY:O	1:B:189:CYS:HB3	2.19	0.43
1:A:201:KCX:OQ1	1:A:203:ASP:HA	2.19	0.43
1:A:354:ILE:CG2	1:A:362:ILE:HD13	2.49	0.43
1:B:407:LEU:HD23	1:B:413:ASN:OD1	2.19	0.42
1:A:178:LEU:HD22	1:A:211:PHE:CZ	2.55	0.42
6:A:1096:HOH:O	1:B:405:GLY:CA	2.67	0.42
1:A:354:ILE:N	1:A:354:ILE:HD12	2.34	0.42
1:B:70:TRP:N	6:B:1008:HOH:O	2.53	0.42
2:S:61:TYR:CD1	2:S:61:TYR:C	2.97	0.42
1:B:29:TYR:CG	1:B:83:ARG:HD2	2.55	0.42
1:B:139:ARG:HD2	1:B:139:ARG:C	2.45	0.42
1:A:204:GLU:HG2	1:A:205:ASN:N	2.34	0.41
1:A:51:GLU:CD	1:A:51:GLU:H	2.29	0.41
1:A:90:VAL:HG22	1:A:97:TYR:C	2.45	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:206:VAL:C	1:A:207:ASN:HD22	2.28	0.41
1:A:292:HIS:HA	1:A:325:HIS:HB2	2.02	0.41
1:B:377:VAL:HG11	1:B:401:GLN:HE21	1.85	0.41
1:A:42:VAL:HG22	1:A:133:LEU:CD1	2.50	0.41
1:A:133:LEU:H	1:A:307:HIS:HD2	1.68	0.41
1:A:134:ARG:HA	1:A:308:GLY:O	2.20	0.41
1:A:171:GLY:HA2	1:A:199:PHE:O	2.19	0.41
1:A:273:GLY:HA3	1:B:273:GLY:HA3	2.01	0.41
1:B:206:VAL:C	1:B:207:ASN:HD22	2.28	0.41
1:B:339:ARG:HH22	1:B:393:ILE:CD1	2.33	0.41
2:S:74:MET:CE	2:S:82:GLN:NE2	2.84	0.41
1:A:63:THR:HG21	1:A:77:LEU:HD12	2.02	0.41
2:S:31:GLU:HG3	6:S:771:HOH:O	2.21	0.41
1:B:171:GLY:HA2	1:B:199:PHE:O	2.19	0.41
5:A:480:NDP:H4D	1:B:404:GLY:CA	2.51	0.41
1:B:177:LYS:HD3	1:B:205:ASN:ND2	2.30	0.41
1:A:36:ILE:HD12	1:A:108:PHE:CD2	2.55	0.41
1:A:85:TYR:CZ	1:A:100:TYR:HB3	2.56	0.41
1:A:175:LYS:HA	1:A:176:PRO:C	2.46	0.41
1:A:185:TYR:OH	1:A:202:ASP:HA	2.21	0.41
2:T:27:LEU:HG	2:T:84:LEU:HD11	2.03	0.41
2:S:6:ILE:HG13	2:S:7:GLU:HG3	2.02	0.41
1:B:354:ILE:CG2	1:B:362:ILE:HD13	2.51	0.41
1:A:436:ASP:OD2	1:A:439:ARG:HD3	2.21	0.40
1:B:457:ALA:O	1:B:461:ILE:HG23	2.22	0.40
1:A:53:ALA:O	1:A:57:VAL:HG23	2.22	0.40
1:A:72:ASP:HB3	1:A:77:LEU:HD23	2.02	0.40
1:A:94:ASP:O	1:A:94:ASP:CG	2.65	0.40
1:A:341:MET:HE2	6:A:731:HOH:O	2.21	0.40
1:A:29:TYR:CD1	1:A:83:ARG:HD2	2.57	0.40
1:B:24:TYR:CD2	1:B:59:ALA:HB2	2.56	0.40
1:B:393:ILE:N	1:B:393:ILE:CD1	2.85	0.40
1:A:385:TRP:CD1	1:A:462:TRP:O	2.75	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	427/477 (90%)	408 (96%)	17 (4%)	2 (0%)	24	16
1	B	423/477 (89%)	408 (96%)	14 (3%)	1 (0%)	43	36
2	S	119/129 (92%)	112 (94%)	7 (6%)	0	100	100
2	T	118/129 (92%)	111 (94%)	7 (6%)	0	100	100
All	All	1087/1212 (90%)	1039 (96%)	45 (4%)	3 (0%)	36	29

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	94	ASP
1	B	22	LEU
1	A	62	SER

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	347/385 (90%)	335 (96%)	12 (4%)	32	24
1	B	344/385 (89%)	335 (97%)	9 (3%)	40	35
2	S	109/114 (96%)	102 (94%)	7 (6%)	16	8
2	T	108/114 (95%)	107 (99%)	1 (1%)	70	73
All	All	908/998 (91%)	879 (97%)	29 (3%)	34	27

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	THR
1	A	77	LEU
1	A	90	VAL
1	A	128	LYS
1	A	138	LEU
1	A	180	LEU
1	A	297	MET
1	A	306	ASN
1	A	330	THR
1	A	392	GLU
1	A	406	THR
1	A	450	LYS
2	S	10	LYS
2	S	24	GLU
2	S	56	HIS
2	S	82	GLN
2	S	84	LEU
2	S	85	LYS
2	S	110	VAL
1	B	71	THR
1	B	77	LEU
1	B	78	ASP
1	B	96	GLN
1	B	138	LEU
1	B	266	MET
1	B	297	MET
1	B	401	GLN
1	B	443	GLU
2	T	56	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	95	ASN
1	A	156	GLN
1	A	163	ASN
1	A	205	ASN
1	A	207	ASN
1	A	277	ASN
1	A	306	ASN
1	A	307	HIS
1	A	442	ASN
2	S	29	GLN

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Mol	Chain	Res	Type
2	S	55	ASN
2	S	82	GLN
2	S	109	GLN
1	B	86	HIS
1	B	95	ASN
1	B	156	GLN
1	B	163	ASN
1	B	205	ASN
1	B	207	ASN
1	B	277	ASN
1	B	304	GLN
1	B	429	GLN
1	B	442	ASN
2	T	29	GLN
2	T	55	ASN
2	T	109	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 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	KCX	B	201	1,4	10,11,12	0.87	0	6,12,14	1.72	2 (33%)
1	KCX	A	201	1,4	10,11,12	0.98	0	6,12,14	1.63	2 (33%)

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	KCX	B	201	1,4	-	0/9/10/12	-
1	KCX	A	201	1,4	-	6/9/10/12	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	201	KCX	OQ1-CX-NZ	-3.03	120.33	124.92
1	A	201	KCX	OQ1-CX-NZ	-3.01	120.36	124.92
1	B	201	KCX	CE-NZ-CX	2.71	126.57	121.98
1	A	201	KCX	CE-NZ-CX	2.40	126.05	121.98

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	201	KCX	N-CA-CB-CG
1	A	201	KCX	C-CA-CB-CG
1	A	201	KCX	O-C-CA-CB
1	A	201	KCX	OQ1-CX-NZ-CE
1	A	201	KCX	CE-CD-CG-CB
1	A	201	KCX	OQ2-CX-NZ-CE

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	201	KCX	1	0
1	A	201	KCX	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 2 are monoatomic - leaving 6 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	GOL	B	503	-	5,5,5	0.95	0	5,5,5	0.39	0
5	NDP	A	479	-	51,52,52	1.12	5 (9%)	71,80,80	0.96	2 (2%)
3	GOL	A	502	-	5,5,5	0.93	0	5,5,5	0.41	0
3	GOL	B	504	-	5,5,5	1.01	0	5,5,5	0.34	0
5	NDP	A	480	-	51,52,52	1.15	5 (9%)	71,80,80	1.00	3 (4%)
3	GOL	A	501	-	5,5,5	0.88	0	5,5,5	0.46	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
3	GOL	B	503	-	-	2/4/4/4	-
5	NDP	A	479	-	-	11/34/77/77	0/5/5/5
3	GOL	A	502	-	-	2/4/4/4	-
3	GOL	B	504	-	-	2/4/4/4	-
5	NDP	A	480	-	-	12/34/77/77	0/5/5/5
3	GOL	A	501	-	-	4/4/4/4	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	480	NDP	C4N-C3N	-3.50	1.43	1.50
5	A	479	NDP	C4N-C3N	-3.33	1.43	1.50
5	A	480	NDP	C4N-C5N	-2.79	1.41	1.49
5	A	479	NDP	C4N-C5N	-2.76	1.41	1.49
5	A	479	NDP	PA-O3	2.40	1.62	1.59
5	A	480	NDP	C6N-C5N	2.36	1.40	1.33
5	A	479	NDP	C6N-C5N	2.36	1.40	1.33
5	A	480	NDP	PN-O3	-2.34	1.57	1.59
5	A	480	NDP	C2N-C3N	2.26	1.41	1.35
5	A	479	NDP	C2N-C3N	2.10	1.41	1.35

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	479	NDP	C1D-N1N-C2N	-3.50	115.37	121.14
5	A	480	NDP	C1D-N1N-C2N	-3.48	115.41	121.14
5	A	480	NDP	C3N-C2N-N1N	-2.74	119.18	123.20
5	A	479	NDP	C3N-C2N-N1N	-2.65	119.32	123.20
5	A	480	NDP	C6N-N1N-C2N	-2.31	116.84	119.32

There are no chirality outliers.

All (33) torsion outliers are listed below:

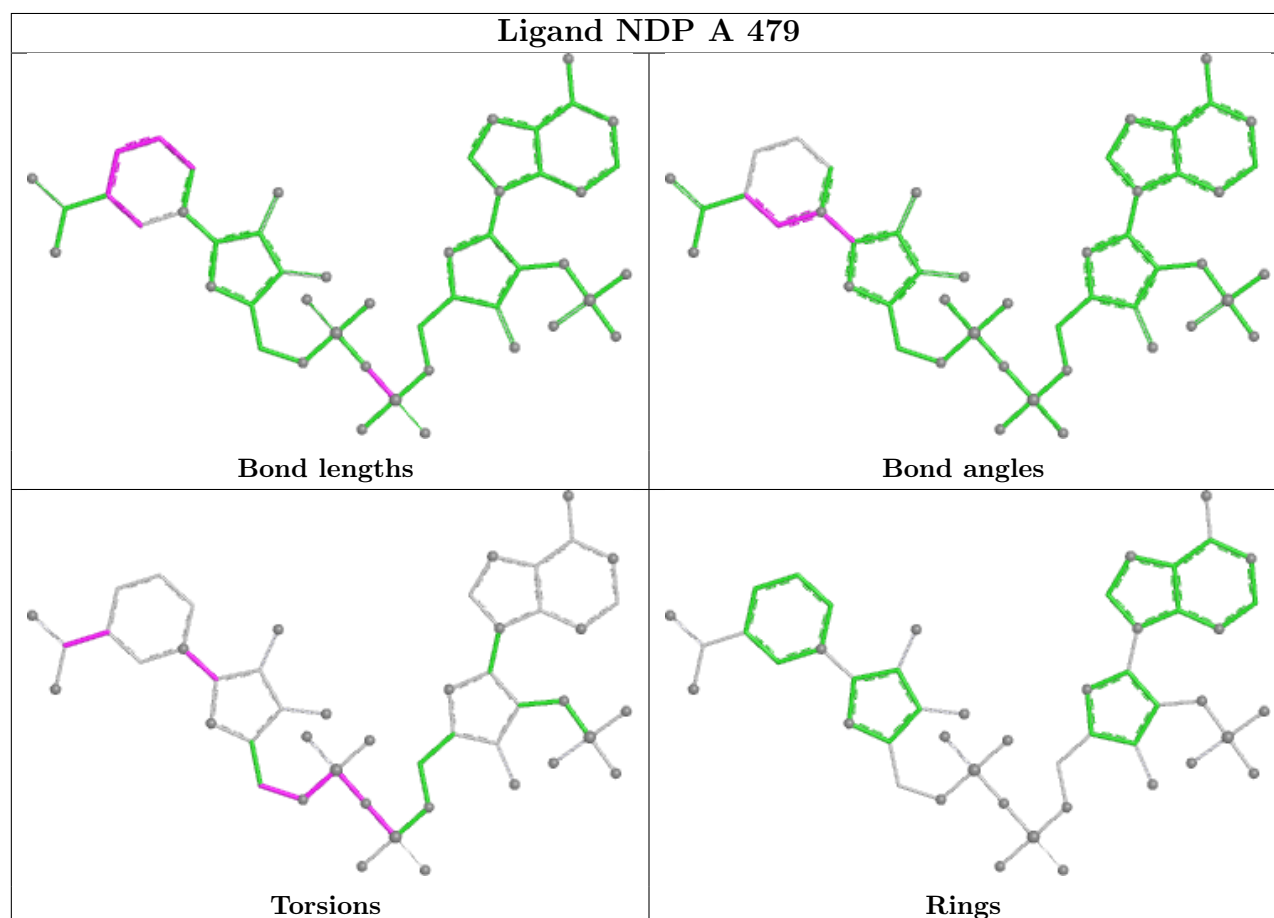
Mol	Chain	Res	Type	Atoms
3	A	501	GOL	C1-C2-C3-O3
3	B	503	GOL	O1-C1-C2-O2
3	B	503	GOL	O1-C1-C2-C3
5	A	479	NDP	PA-O3-PN-O5D
5	A	479	NDP	C5D-O5D-PN-O3
5	A	479	NDP	C5D-O5D-PN-O1N
5	A	479	NDP	C5D-O5D-PN-O2N
5	A	479	NDP	O4D-C1D-N1N-C6N
5	A	479	NDP	C2N-C3N-C7N-N7N
5	A	480	NDP	PA-O3-PN-O5D
5	A	480	NDP	C5D-O5D-PN-O3
5	A	480	NDP	C5D-O5D-PN-O1N
5	A	480	NDP	C5D-O5D-PN-O2N
5	A	480	NDP	O4D-C1D-N1N-C6N
5	A	480	NDP	C2N-C3N-C7N-N7N
5	A	479	NDP	C2D-C1D-N1N-C2N
5	A	480	NDP	C2D-C1D-N1N-C2N
5	A	479	NDP	C2D-C1D-N1N-C6N
3	B	504	GOL	O1-C1-C2-C3
5	A	480	NDP	C2D-C1D-N1N-C6N
3	A	501	GOL	O2-C2-C3-O3
3	B	504	GOL	O1-C1-C2-O2
5	A	480	NDP	C4D-C5D-O5D-PN
3	A	502	GOL	O2-C2-C3-O3
5	A	480	NDP	C2N-C3N-C7N-O7N
5	A	479	NDP	C4D-C5D-O5D-PN
3	A	501	GOL	O1-C1-C2-C3
3	A	502	GOL	C1-C2-C3-O3
5	A	480	NDP	PN-O3-PA-O2A
3	A	501	GOL	O1-C1-C2-O2
5	A	479	NDP	C2N-C3N-C7N-O7N
5	A	479	NDP	PN-O3-PA-O2A
5	A	480	NDP	O4D-C4D-C5D-O5D

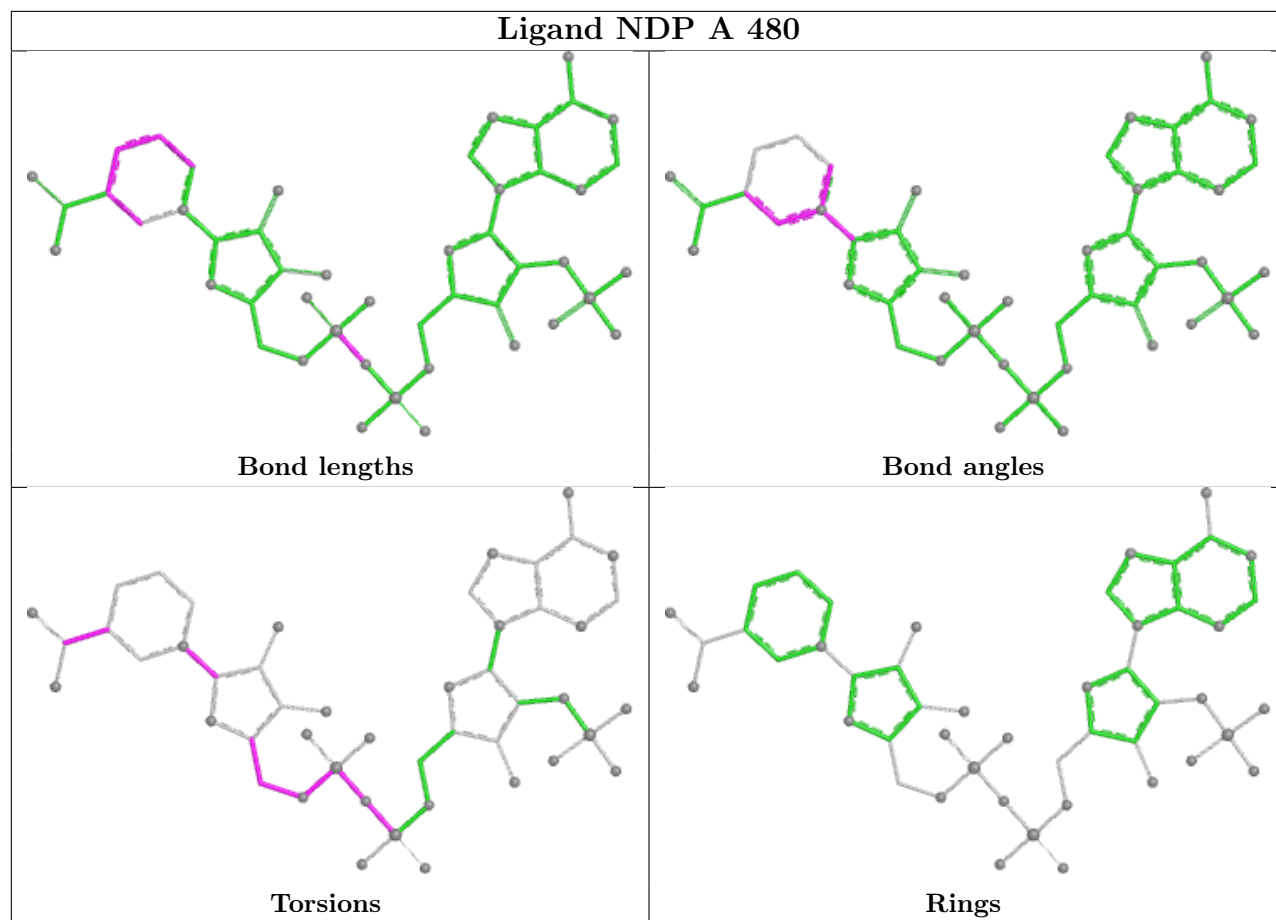
There are no ring outliers.

4 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	479	NDP	4	0
3	A	502	GOL	1	0
3	B	504	GOL	1	0
5	A	480	NDP	8	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	433/477 (90%)	0.10	38 (8%) 15 16	8, 14, 38, 53	0
1	B	429/477 (89%)	0.00	26 (6%) 27 29	8, 14, 36, 56	0
2	S	120/129 (93%)	0.26	7 (5%) 29 30	9, 20, 34, 49	0
2	T	119/129 (92%)	0.16	3 (2%) 58 62	11, 18, 30, 43	0
All	All	1101/1212 (90%)	0.08	74 (6%) 24 25	8, 15, 36, 56	0

All (74) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	331	VAL	8.4
1	A	332	VAL	8.4
1	A	92	GLY	6.9
1	A	22	LEU	6.1
1	A	68	THR	5.2
1	B	22	LEU	5.1
1	A	20	TYR	5.0
1	B	461	ILE	4.9
1	A	90	VAL	4.9
2	S	107	VAL	4.8
1	B	463	LYS	4.8
1	B	211	PHE	4.7
2	T	107	VAL	4.6
1	B	74	LEU	4.6
1	A	91	VAL	4.6
1	B	70	TRP	4.4
1	B	77	LEU	4.3
1	B	94	ASP	4.3
1	A	462	TRP	4.2
2	S	121	PRO	4.2
1	A	403	GLY	4.1

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Mol	Chain	Res	Type	RSRZ
1	B	63	THR	3.8
1	B	462	TRP	3.8
2	S	108	ARG	3.5
1	B	402	PHE	3.4
1	A	93	GLU	3.4
1	B	23	THR	3.4
1	A	405	GLY	3.4
1	A	79	ARG	3.4
1	A	406	THR	3.3
1	A	330	THR	3.2
1	A	178	LEU	3.2
1	B	71	THR	3.1
1	A	21	LYS	3.1
1	A	69	VAL	3.0
1	A	380	GLY	3.0
1	B	21	LYS	3.0
1	A	77	LEU	3.0
1	A	23	THR	3.0
2	S	109	GLN	2.9
1	A	211	PHE	2.8
2	T	108	ARG	2.8
1	A	408	GLY	2.7
1	B	76	SER	2.7
1	A	338	GLU	2.7
1	A	404	GLY	2.6
1	B	178	LEU	2.6
2	T	109	GLN	2.6
2	S	110	VAL	2.6
1	B	75	THR	2.5
1	B	73	GLY	2.5
1	A	63	THR	2.5
1	A	407	LEU	2.4
1	B	47	GLY	2.4
1	A	78	ASP	2.3
1	B	128	LYS	2.3
1	A	339	ARG	2.3
1	A	70	TRP	2.3
1	A	176	PRO	2.2
1	B	381	GLY	2.2
1	A	461	ILE	2.2
1	B	382	ILE	2.2
1	A	74	LEU	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	95	ASN	2.2
2	S	106	ASN	2.2
2	S	82	GLN	2.2
1	B	78	ASP	2.1
1	A	402	PHE	2.1
1	B	72	ASP	2.1
1	A	76	SER	2.1
1	B	79	ARG	2.1
1	A	128	LYS	2.1
1	A	177	LYS	2.1
1	B	93	GLU	2.1

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	KCX	B	201	12/13	0.91	0.09	13,19,24,25	0
1	KCX	A	201	12/13	0.93	0.09	10,17,23,23	0

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.

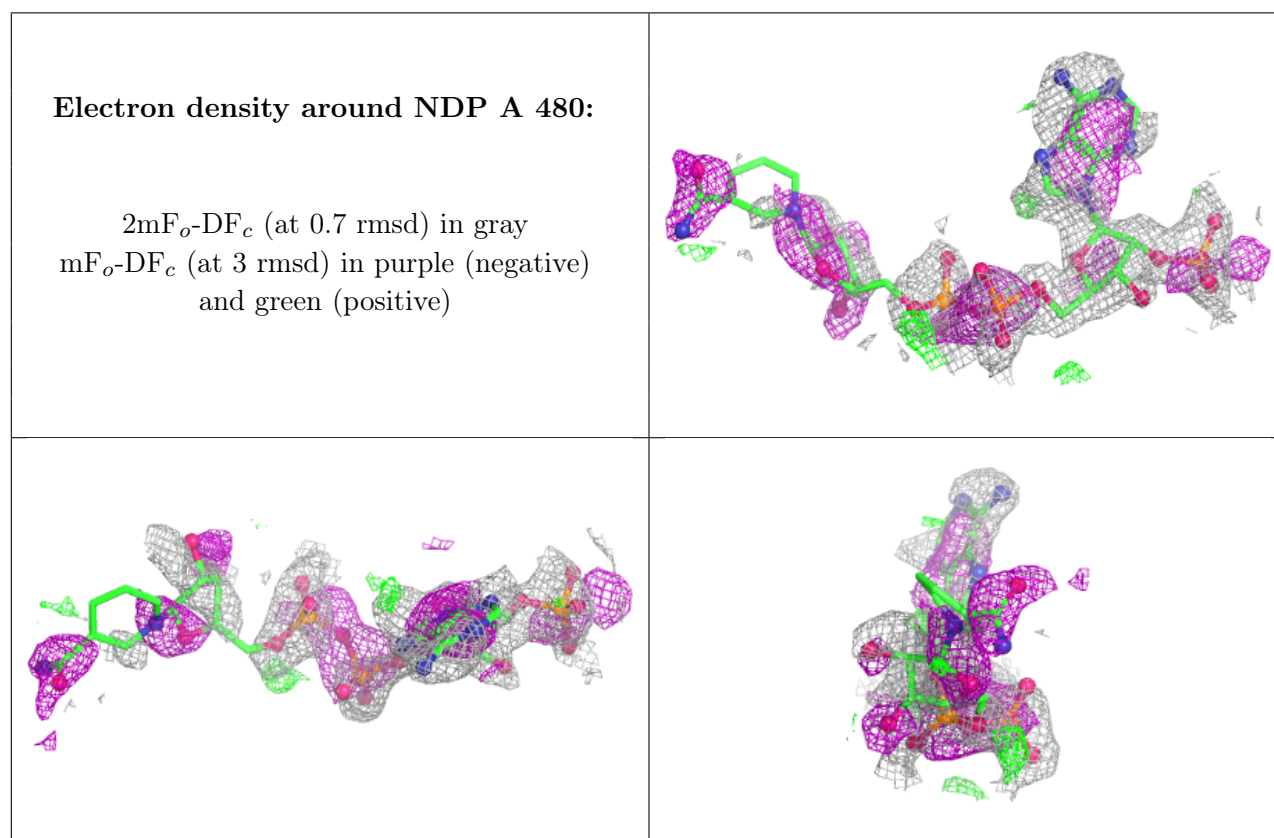
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	NDP	A	480	48/48	0.61	0.20	46,55,58,59	0
3	GOL	B	504	6/6	0.63	0.25	51,54,55,56	0
3	GOL	A	501	6/6	0.70	0.21	30,32,34,36	0
5	NDP	A	479	48/48	0.73	0.17	41,50,55,56	0
3	GOL	B	503	6/6	0.77	0.25	32,37,39,42	0

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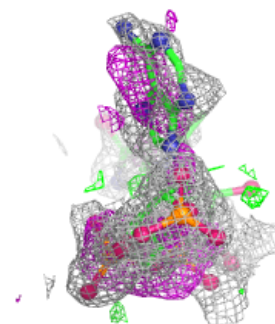
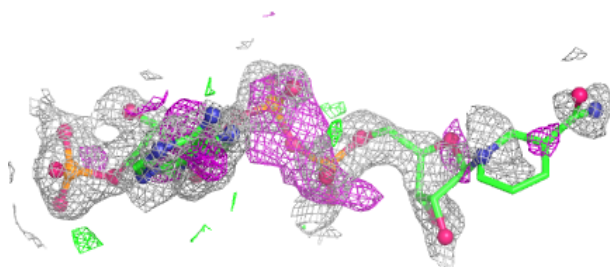
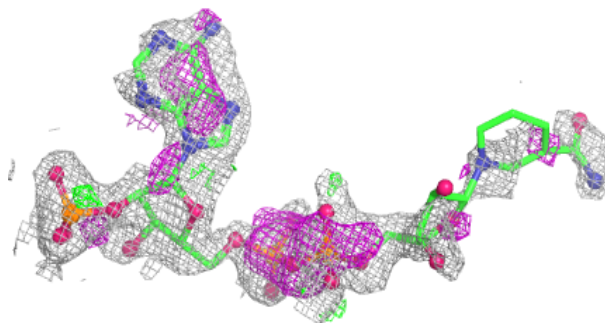
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	GOL	A	502	6/6	0.77	0.22	42,47,48,49	0
4	MG	B	478	1/1	0.96	0.09	23,23,23,23	0
4	MG	A	478	1/1	0.98	0.06	29,29,29,29	0

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 NDP A 479:

$2mF_o-DF_c$ (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.