



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:37 PM UTC

PDB ID : 6ADI / pdb_00006adi
Title : Crystal Structures of IDH2 R140Q in complex with AG-881
Authors : Ma, R.; Yun, C.H.
Deposited on : 2018-08-01
Resolution : 1.97 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

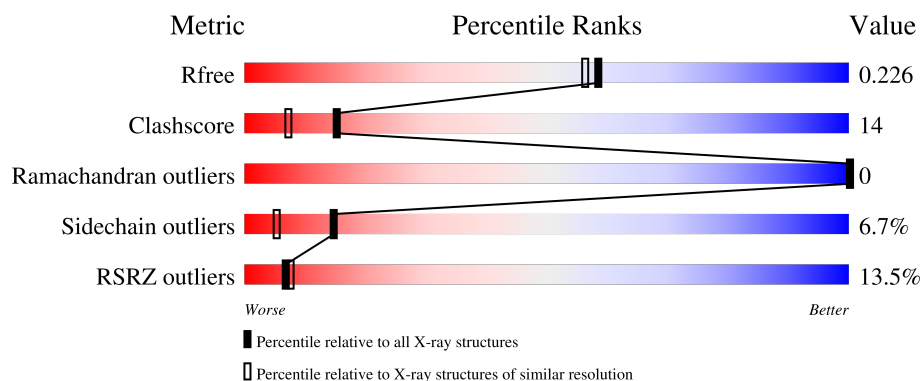
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.97 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	3494 (1.96-1.96)
Clashscore	190562	3612 (1.96-1.96)
Ramachandran outliers	187476	3587 (1.96-1.96)
Sidechain outliers	187428	3587 (1.96-1.96)
RSRZ outliers	180081	3495 (1.96-1.96)

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	419	2% 81% 16% .
1	B	419	25% 69% 24% . .

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7176 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 Isocitrate dehydrogenase [NADP], mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	418	Total	C	N	O	S	0	5	0
			3357	2135	588	616	18			
1	B	407	Total	C	N	O	S	0	0	0
			3201	2041	546	596	18			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	40	MET	-	initiating methionine	UNP P48735
A	140	GLN	ARG	engineered mutation	UNP P48735
A	453	HIS	-	expression tag	UNP P48735
A	454	HIS	-	expression tag	UNP P48735
A	455	HIS	-	expression tag	UNP P48735
A	456	HIS	-	expression tag	UNP P48735
A	457	HIS	-	expression tag	UNP P48735
A	458	HIS	-	expression tag	UNP P48735
B	40	MET	-	initiating methionine	UNP P48735
B	140	GLN	ARG	engineered mutation	UNP P48735
B	453	HIS	-	expression tag	UNP P48735
B	454	HIS	-	expression tag	UNP P48735
B	455	HIS	-	expression tag	UNP P48735
B	456	HIS	-	expression tag	UNP P48735
B	457	HIS	-	expression tag	UNP P48735
B	458	HIS	-	expression tag	UNP P48735

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).



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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Cl	F	N	0	1
			54	28	2	12	12		

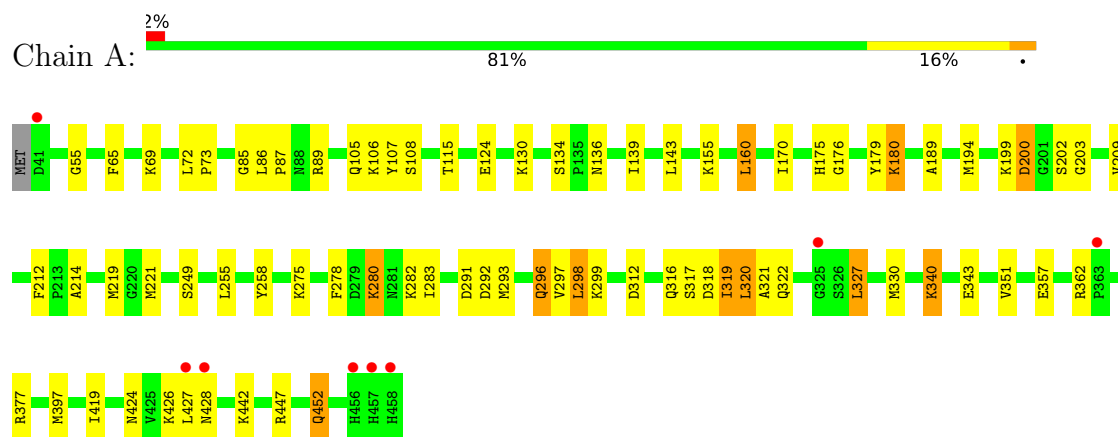
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	251	Total 251	O 251	0	0
4	B	217	Total 217	O 217	0	0

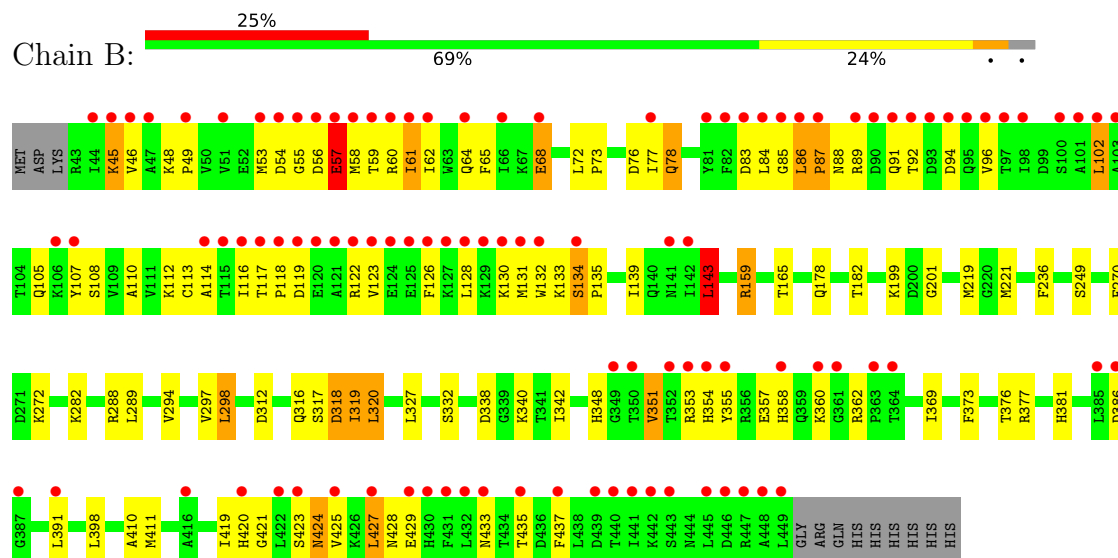
3 Residue-property plots [i](#)

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: Isocitrate dehydrogenase [NADP], mitochondrial



- Molecule 1: Isocitrate dehydrogenase [NADP], mitochondrial



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	57.78Å 118.42Å 126.08Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.61 – 1.97 39.61 – 1.97	Depositor EDS
% Data completeness (in resolution range)	98.4 (39.61-1.97) 98.3 (39.61-1.97)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.83 (at 1.97Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.206 , 0.226 0.207 , 0.226	Depositor DCC
R_{free} test set	3091 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	18.4	Xtriage
Anisotropy	0.118	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 46.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	7176	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.92% 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: 9UO, NDP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	1.19	0/3452	1.01	13/4663 (0.3%)
1	B	1.11	1/3274 (0.0%)	1.02	11/4430 (0.2%)
All	All	1.15	1/6726 (0.0%)	1.01	24/9093 (0.3%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	297	VAL	C-O	-5.50	1.18	1.24

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	139[A]	ILE	CA-C-O	-8.83	111.25	121.05
1	A	139[B]	ILE	CA-C-O	-8.83	111.25	121.05
1	A	424	ASN	N-CA-C	8.60	120.73	111.36
1	B	317	SER	N-CA-C	7.80	119.42	111.07
1	A	419	ILE	N-CA-C	7.50	117.58	110.53
1	A	199	LYS	CA-C-N	6.96	129.61	120.28
1	A	199	LYS	C-N-CA	6.96	129.61	120.28
1	A	139[A]	ILE	N-CA-C	-6.79	104.14	110.53
1	A	139[B]	ILE	N-CA-C	-6.79	104.14	110.53
1	A	317	SER	N-CA-C	6.50	118.02	111.07
1	B	419	ILE	N-CA-C	6.43	116.57	110.53
1	B	57	GLU	CB-CA-C	-6.29	109.33	116.63
1	B	57	GLU	N-CA-C	5.92	118.09	108.08
1	B	421	GLY	N-CA-C	-5.84	105.42	112.48
1	A	85	GLY	N-CA-C	-5.74	104.64	111.36
1	B	369	ILE	N-CA-C	5.60	116.34	110.62
1	A	203	GLY	N-CA-C	5.43	117.71	111.36
1	B	272	LYS	N-CA-C	5.35	117.20	111.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	55	GLY	N-CA-C	5.32	118.59	111.20
1	B	143	LEU	N-CA-C	5.28	117.11	111.36
1	B	87	PRO	N-CA-C	-5.24	106.24	113.53
1	B	424	ASN	N-CA-C	5.20	120.26	113.30
1	B	112	LYS	N-CA-C	5.03	117.59	109.40
1	A	322	GLN	N-CA-C	5.01	116.82	111.36

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	3357	0	3321	66	0
1	B	3201	0	3142	121	0
2	A	48	0	26	1	0
2	B	48	0	26	3	0
3	A	54	0	0	11	0
4	A	251	0	0	12	0
4	B	217	0	0	22	0
All	All	7176	0	6515	180	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 14.

All (180) 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:119:ASP:O	1:B:123:VAL:HG23	1.48	1.12
1:B:433:ASN:HB3	4:B:635:HOH:O	1.50	1.09
1:A:377[B]:ARG:HG2	1:A:377[B]:ARG:HH21	1.04	1.07
1:B:49:PRO:HG2	1:B:107:TYR:CD2	1.94	1.02
1:B:123:VAL:HA	1:B:128:LEU:HD12	1.40	1.01
1:A:377[B]:ARG:HD2	4:A:709:HOH:O	1.61	0.99
1:B:92:THR:HG21	1:B:96:VAL:HB	1.45	0.99

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:501:NDP:O1A	2:B:501:NDP:H51N	1.67	0.93
1:A:377[A]:ARG:HD2	4:A:663:HOH:O	1.70	0.91
1:B:118:PRO:HG2	1:B:132:TRP:HB2	1.55	0.89
1:B:119:ASP:HB3	1:B:122:ARG:HG2	1.53	0.88
1:A:377[B]:ARG:HH21	1:A:377[B]:ARG:CG	1.88	0.87
1:B:429:GLU:HA	4:B:715:HOH:O	1.76	0.86
1:A:136:ASN:HB2	4:A:607:HOH:O	1.74	0.85
1:B:58:MET:O	1:B:62:ILE:HG12	1.76	0.85
1:B:56:ASP:OD1	1:B:85:GLY:HA2	1.76	0.85
1:B:178:GLN:HG3	1:B:221:MET:HE1	1.59	0.83
1:A:377[B]:ARG:HG2	1:A:377[B]:ARG:NH2	1.82	0.83
1:B:49:PRO:HG2	1:B:107:TYR:HD2	1.40	0.83
1:B:320:LEU:HD12	4:B:754:HOH:O	1.79	0.81
1:A:255:LEU:HD13	1:B:219:MET:HE1	1.60	0.81
1:B:86:LEU:HA	1:B:89:ARG:HB2	1.64	0.79
1:B:78:GLN:HG3	4:B:609:HOH:O	1.83	0.77
1:A:258:TYR:CG	1:B:219:MET:HE2	2.20	0.76
1:A:219:MET:HE2	1:A:221:MET:HE2	1.68	0.74
1:B:55:GLY:O	1:B:60:ARG:CB	2.37	0.73
1:B:377:ARG:HB2	4:B:771:HOH:O	1.89	0.73
1:A:316:GLN:NE2	3:A:502[B]:9UO:C12	2.53	0.72
1:B:377:ARG:NE	4:B:601:HOH:O	2.22	0.72
1:B:57:GLU:OE2	1:B:116:ILE:HD11	1.89	0.71
1:B:49:PRO:HG2	1:B:107:TYR:CE2	2.25	0.70
1:A:340:LYS:HB2	1:A:340:LYS:NZ	2.06	0.69
1:B:119:ASP:CB	1:B:122:ARG:HG2	2.24	0.67
1:B:353:ARG:C	1:B:353:ARG:HD3	2.19	0.67
1:A:105:GLN:HG3	1:A:143:LEU:CD2	2.25	0.67
1:B:132:TRP:HE3	4:B:681:HOH:O	1.78	0.65
1:B:360:LYS:HD3	1:B:362:ARG:NH2	2.10	0.65
3:A:502[B]:9UO:F24	1:B:294:VAL:HG13	1.86	0.65
1:A:176:GLY:HA2	1:A:180:LYS:HG3	1.79	0.65
1:B:92:THR:HG21	1:B:96:VAL:CB	2.24	0.65
3:A:502[A]:9UO:C12	1:B:316:GLN:NE2	2.60	0.64
1:A:316:GLN:HE21	3:A:502[B]:9UO:C12	2.10	0.64
1:B:56:ASP:C	1:B:57:GLU:HG2	2.22	0.64
1:B:118:PRO:HG2	1:B:132:TRP:CB	2.28	0.63
1:B:55:GLY:HA3	1:B:113:CYS:SG	2.37	0.63
3:A:502[A]:9UO:F24	1:B:294:VAL:HG13	1.88	0.62
1:A:258:TYR:CD2	1:B:219:MET:HE2	2.34	0.62
1:B:159:ARG:HH21	1:B:165:THR:HA	1.64	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:357:GLU:OE1	1:A:362:ARG:HD2	1.99	0.62
1:B:357:GLU:OE1	1:B:362:ARG:NE	2.33	0.61
1:B:119:ASP:HB3	1:B:122:ARG:CG	2.26	0.61
1:A:318:ASP:CG	4:A:656:HOH:O	2.44	0.60
1:B:360:LYS:HD3	1:B:362:ARG:NH1	2.17	0.60
1:B:360:LYS:HD3	1:B:362:ARG:HH22	1.66	0.60
1:B:377:ARG:HD3	4:B:601:HOH:O	2.02	0.60
1:B:377:ARG:CD	4:B:601:HOH:O	2.49	0.59
1:B:377:ARG:HD3	4:B:771:HOH:O	2.02	0.59
1:B:357:GLU:OE1	1:B:357:GLU:HA	2.00	0.59
1:A:377[B]:ARG:CD	4:A:709:HOH:O	2.34	0.57
1:A:136:ASN:ND2	4:A:607:HOH:O	2.36	0.57
1:B:358:HIS:ND1	4:B:602:HOH:O	2.31	0.57
1:B:118:PRO:CG	1:B:132:TRP:HB2	2.33	0.56
1:B:59:THR:HG21	1:B:114:ALA:HB3	1.86	0.56
1:B:119:ASP:H	1:B:122:ARG:HB2	1.70	0.56
1:B:139:ILE:O	1:B:143:LEU:HB2	2.06	0.56
1:B:360:LYS:HD3	1:B:362:ARG:CZ	2.35	0.56
1:B:107:TYR:O	1:B:108:SER:HB2	2.06	0.56
1:A:278:PHE:CD2	1:A:283:ILE:HG13	2.41	0.56
1:A:377[B]:ARG:HD2	4:A:663:HOH:O	2.05	0.55
1:A:200:ASP:HB3	1:A:202:SER:H	1.72	0.55
1:A:115:THR:O	2:A:501:NDP:H2N	2.07	0.54
1:A:427:LEU:O	1:A:428:ASN:HB2	2.07	0.54
1:B:45:LYS:NZ	4:B:607:HOH:O	2.40	0.54
1:B:65:PHE:C	1:B:65:PHE:CD1	2.86	0.54
1:B:353:ARG:HD3	1:B:354:HIS:N	2.23	0.53
1:B:89:ARG:O	1:B:94:ASP:N	2.41	0.53
1:B:427:LEU:HD22	1:B:428:ASN:CG	2.34	0.53
1:B:425:VAL:N	4:B:608:HOH:O	2.42	0.53
1:A:319:ILE:HD12	1:B:294:VAL:HG12	1.90	0.52
1:A:105:GLN:HG3	1:A:143:LEU:HD23	1.91	0.52
1:B:351:VAL:HG12	1:B:354:HIS:CG	2.44	0.52
1:A:318:ASP:HB2	4:A:637:HOH:O	2.08	0.52
1:B:118:PRO:HG2	1:B:132:TRP:O	2.09	0.52
1:A:155:LYS:NZ	4:A:610:HOH:O	2.38	0.52
1:A:189:ALA:HB1	1:B:199:LYS:HE3	1.91	0.52
1:A:219:MET:CE	1:A:221:MET:HE2	2.39	0.52
1:B:119:ASP:O	1:B:123:VAL:N	2.39	0.51
1:B:126:PHE:HB3	1:B:128:LEU:HD21	1.93	0.51
1:B:318:ASP:HB2	4:B:630:HOH:O	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:442:LYS:HD3	4:A:750:HOH:O	2.10	0.51
1:B:46:VAL:HG22	1:B:391:LEU:HD22	1.91	0.51
1:B:86:LEU:N	1:B:87:PRO:CD	2.74	0.51
1:B:360:LYS:HD3	1:B:362:ARG:HH12	1.74	0.51
1:B:360:LYS:CD	1:B:362:ARG:HH22	2.24	0.51
1:A:170:ILE:HD12	1:A:320:LEU:HG	1.91	0.51
1:B:420:HIS:HB2	1:B:425:VAL:CG1	2.41	0.51
1:B:119:ASP:HB3	1:B:122:ARG:H	1.75	0.50
2:B:501:NDP:O1X	2:B:501:NDP:O3B	2.29	0.50
1:A:319:ILE:HD12	1:B:294:VAL:CG1	2.40	0.50
1:B:45:LYS:HA	1:B:76:ASP:HB3	1.94	0.50
1:B:88:ASN:O	1:B:92:THR:HG23	2.12	0.50
1:A:170:ILE:HD13	1:A:316:GLN:HB3	1.93	0.50
3:A:502[A]:9UO:F04	1:B:319:ILE:CD1	2.50	0.50
1:A:86:LEU:N	1:A:87:PRO:CD	2.76	0.49
1:B:48:LYS:HG3	1:B:386:ASP:OD2	2.13	0.49
1:B:320:LEU:CD1	4:B:754:HOH:O	2.48	0.48
1:B:373:PHE:HA	1:B:376:THR:OG1	2.12	0.48
1:B:126:PHE:CB	1:B:128:LEU:HD21	2.43	0.48
1:B:159:ARG:N	1:B:159:ARG:HD3	2.28	0.48
1:B:236:PHE:CZ	1:B:270:PHE:HB2	2.49	0.48
1:B:118:PRO:HG2	1:B:132:TRP:CA	2.44	0.47
1:A:340:LYS:NZ	1:A:340:LYS:CB	2.75	0.47
3:A:502[A]:9UO:C12	1:B:316:GLN:HE22	2.27	0.47
1:A:65:PHE:CD2	1:A:69:LYS:HG3	2.50	0.47
1:A:107:TYR:O	1:A:108:SER:HB2	2.13	0.47
3:A:502[B]:9UO:F04	1:B:319:ILE:CD1	2.52	0.47
1:A:255:LEU:HD13	1:B:219:MET:CE	2.40	0.46
1:A:170:ILE:CD1	1:A:320:LEU:HG	2.46	0.46
1:A:397:MET:HE1	1:A:452:GLN:CD	2.40	0.46
2:B:501:NDP:O1A	2:B:501:NDP:C5D	2.52	0.46
1:B:84:LEU:N	1:B:84:LEU:HD12	2.30	0.46
1:B:56:ASP:OD2	1:B:116:ILE:HG13	2.15	0.46
1:A:176:GLY:H	1:A:180:LYS:HZ3	1.64	0.46
1:A:340:LYS:HB2	1:A:340:LYS:HZ2	1.77	0.46
1:B:53:MET:HE3	1:B:110:ALA:HB1	1.97	0.45
1:B:119:ASP:C	1:B:123:VAL:HG23	2.33	0.45
1:B:123:VAL:HA	1:B:128:LEU:CD1	2.28	0.45
1:B:249:SER:HA	1:B:288:ARG:O	2.17	0.45
1:B:411:MET:HA	1:B:437:PHE:CE1	2.51	0.45
1:A:194:MET:HE2	1:A:209:VAL:HG22	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:57:GLU:O	1:B:61:ILE:HD12	2.17	0.45
1:A:105:GLN:CG	1:A:143:LEU:CD2	2.93	0.44
1:A:106:LYS:HD3	1:A:107:TYR:CZ	2.53	0.44
1:A:298:LEU:HG	1:B:319:ILE:HD11	1.98	0.44
1:B:72:LEU:HA	1:B:72:LEU:HD23	1.53	0.44
1:B:376:THR:CG2	1:B:398:LEU:HD23	2.48	0.44
1:B:54:ASP:HB2	1:B:83:ASP:HA	1.99	0.44
1:B:53:MET:HB3	1:B:84:LEU:HD13	1.99	0.44
1:A:280:LYS:HB2	1:A:280:LYS:HE2	1.58	0.44
1:A:160:LEU:HD23	1:B:298:LEU:HD13	1.99	0.44
1:A:321:ALA:HA	1:A:330:MET:HE3	2.00	0.44
3:A:502[A]:9UO:F04	1:B:319:ILE:HD13	2.08	0.43
1:A:321:ALA:HB1	1:A:327:LEU:HD13	1.99	0.43
1:B:424:ASN:C	4:B:608:HOH:O	2.61	0.43
1:A:72:LEU:N	1:A:73:PRO:CD	2.82	0.43
1:B:355:TYR:O	1:B:358:HIS:HB3	2.19	0.43
1:A:105:GLN:HG3	1:A:143:LEU:HD21	2.00	0.43
1:B:118:PRO:CG	1:B:132:TRP:O	2.66	0.43
1:B:410:ALA:HA	4:B:606:HOH:O	2.18	0.42
1:A:194:MET:CE	1:B:182:THR:HB	2.49	0.42
1:A:136:ASN:CB	4:A:607:HOH:O	2.47	0.42
1:B:134:SER:HA	1:B:135:PRO:HD2	1.89	0.42
1:B:64:GLN:CG	1:B:68:GLU:OE1	2.68	0.42
1:A:377[B]:ARG:HA	1:A:377[B]:ARG:HD3	1.87	0.42
1:A:175:HIS:CD2	1:A:180:LYS:HE2	2.55	0.42
3:A:502[B]:9UO:F04	1:B:319:ILE:HD13	2.10	0.42
1:B:423:SER:C	4:B:608:HOH:O	2.62	0.42
1:A:340:LYS:HB2	1:A:340:LYS:HZ3	1.85	0.41
3:A:502[A]:9UO:C12	1:B:316:GLN:HE21	2.33	0.41
1:B:342:ILE:HG12	1:B:381:HIS:CD2	2.55	0.41
1:A:179:TYR:CD1	1:A:179:TYR:N	2.88	0.41
1:B:201:GLY:HA2	4:B:755:HOH:O	2.19	0.41
1:B:433:ASN:C	4:B:635:HOH:O	2.63	0.41
1:B:92:THR:HG21	1:B:96:VAL:CG1	2.49	0.41
1:B:102:LEU:HD13	1:B:102:LEU:HA	1.91	0.41
1:B:64:GLN:HG3	1:B:68:GLU:OE1	2.21	0.41
1:B:118:PRO:HG2	1:B:132:TRP:C	2.46	0.41
1:A:292[B]:ASP:OD1	1:A:296:GLN:NE2	2.53	0.41
1:A:293:MET:O	1:A:297:VAL:HG23	2.20	0.41
1:B:312:ASP:O	1:B:316:GLN:HG2	2.20	0.41
1:B:338:ASP:HB3	4:B:770:HOH:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:105:GLN:NE2	4:B:617:HOH:O	2.54	0.41
1:A:89:ARG:HD2	4:A:692:HOH:O	2.21	0.40
1:A:312:ASP:O	1:A:316:GLN:HG2	2.21	0.40
1:B:327:LEU:HB3	1:B:348:HIS:HB3	2.03	0.40
1:A:212:PHE:HB3	1:A:214:ALA:O	2.21	0.40
1:B:282:LYS:HB3	1:B:282:LYS:HE3	1.84	0.40
1:B:72:LEU:N	1:B:73:PRO:HD2	2.36	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	421/419 (100%)	411 (98%)	10 (2%)	0	100	100
1	B	405/419 (97%)	396 (98%)	9 (2%)	0	100	100
All	All	826/838 (99%)	807 (98%)	19 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	362/360 (101%)	341 (94%)	21 (6%)	18	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	B	342/360 (95%)	316 (92%)	26 (8%)	12 4
All	All	704/720 (98%)	657 (93%)	47 (7%)	15 5

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	124	GLU
1	A	130	LYS
1	A	134	SER
1	A	160	LEU
1	A	180	LYS
1	A	200	ASP
1	A	275	LYS
1	A	280	LYS
1	A	282	LYS
1	A	291	ASP
1	A	296	GLN
1	A	298	LEU
1	A	299	LYS
1	A	319	ILE
1	A	320	LEU
1	A	327	LEU
1	A	340	LYS
1	A	343	GLU
1	A	351	VAL
1	A	426	LYS
1	A	452	GLN
1	B	45	LYS
1	B	57	GLU
1	B	61	ILE
1	B	68	GLU
1	B	77	ILE
1	B	78	GLN
1	B	86	LEU
1	B	91	GLN
1	B	102	LEU
1	B	117	THR
1	B	130	LYS
1	B	131	MET
1	B	133	LYS
1	B	134	SER
1	B	143	LEU

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Mol	Chain	Res	Type
1	B	159	ARG
1	B	289	LEU
1	B	298	LEU
1	B	318	ASP
1	B	319	ILE
1	B	320	LEU
1	B	332	SER
1	B	340	LYS
1	B	351	VAL
1	B	427	LEU
1	B	435	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	252	ASN
1	A	316	GLN
1	A	454	HIS
1	A	457	HIS
1	A	458	HIS
1	B	78	GLN
1	B	91	GLN
1	B	141	ASN
1	B	316	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

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
3	9UO	A	502[A]	-	26,28,28	2.43	6 (23%)	39,42,42	3.46	18 (46%)
2	NDP	A	501	-	51,52,52	1.37	6 (11%)	71,80,80	1.55	10 (14%)
2	NDP	B	501	-	51,52,52	1.32	6 (11%)	71,80,80	1.70	11 (15%)
3	9UO	A	502[B]	-	26,28,28	2.78	8 (30%)	39,42,42	4.09	17 (43%)

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	9UO	A	502[A]	-	-	0/24/24/24	0/2/2/2
2	NDP	A	501	-	-	8/34/77/77	0/5/5/5
2	NDP	B	501	-	-	10/34/77/77	0/5/5/5
3	9UO	A	502[B]	-	-	0/24/24/24	0/2/2/2

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	502[A]	9UO	C08-N07	7.83	1.43	1.34
3	A	502[B]	9UO	C11-N17	-7.04	1.24	1.34
3	A	502[B]	9UO	C08-N07	7.02	1.43	1.34
3	A	502[B]	9UO	C19-N20	6.93	1.42	1.34
3	A	502[A]	9UO	C11-N17	-5.23	1.27	1.34
3	A	502[A]	9UO	C19-N20	5.17	1.40	1.34
2	A	501	NDP	C5A-C4A	4.04	1.46	1.39
2	B	501	NDP	C5A-C4A	3.48	1.45	1.39
3	A	502[B]	9UO	C13-C14	-3.41	1.33	1.38
2	A	501	NDP	C5A-N7A	-3.39	1.32	1.39
2	B	501	NDP	C5A-N7A	-3.31	1.33	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	502[B]	9UO	C13-C12	2.93	1.43	1.38
3	A	502[B]	9UO	C10-N09	-2.86	1.27	1.34
2	A	501	NDP	PN-O3	2.73	1.62	1.59
2	A	501	NDP	C4A-N9A	-2.72	1.32	1.37
3	A	502[B]	9UO	C11-C10	2.54	1.56	1.48
3	A	502[A]	9UO	C13-C14	-2.51	1.34	1.38
2	B	501	NDP	C8A-N9A	-2.48	1.33	1.37
3	A	502[B]	9UO	C02-N07	-2.45	1.42	1.46
2	A	501	NDP	P2B-O2X	-2.44	1.45	1.54
2	A	501	NDP	C5A-C6A	2.37	1.47	1.41
2	B	501	NDP	C5A-C6A	2.24	1.47	1.41
3	A	502[A]	9UO	C11-C10	2.23	1.55	1.48
2	B	501	NDP	C4A-N9A	-2.21	1.33	1.37
3	A	502[A]	9UO	C10-N18	-2.15	1.29	1.34
2	B	501	NDP	C6N-C5N	2.05	1.39	1.33

All (56) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	502[B]	9UO	C08-N09-C10	14.91	124.01	114.50
3	A	502[A]	9UO	C19-N18-C10	11.40	121.77	114.50
3	A	502[A]	9UO	C08-N09-C10	11.30	121.70	114.50
3	A	502[B]	9UO	C19-N18-C10	9.41	120.50	114.50
3	A	502[B]	9UO	C11-C10-N18	6.80	126.82	117.47
2	B	501	NDP	C5A-C4A-N3A	-6.54	117.71	126.72
3	A	502[B]	9UO	N07-C08-N27	6.04	126.58	117.09
2	A	501	NDP	C5A-C4A-N3A	-5.78	118.75	126.72
3	A	502[B]	9UO	F05-C03-C02	-5.58	104.31	112.11
3	A	502[B]	9UO	C12-C11-C10	5.44	126.92	120.19
2	B	501	NDP	N3A-C4A-N9A	5.41	136.37	127.17
3	A	502[B]	9UO	N18-C10-N09	-5.17	116.62	125.13
2	A	501	NDP	N3A-C4A-N9A	4.81	135.35	127.17
3	A	502[A]	9UO	N18-C10-N09	-4.80	117.22	125.13
3	A	502[B]	9UO	C13-C12-C11	4.69	125.22	118.90
3	A	502[A]	9UO	C14-C13-C12	-4.54	114.41	120.24
3	A	502[A]	9UO	C11-C10-N09	4.49	123.64	117.47
3	A	502[A]	9UO	N20-C19-N27	4.40	124.00	117.09
3	A	502[B]	9UO	CL1-C15-N17	-4.39	106.14	115.45
3	A	502[B]	9UO	C12-C11-N17	-4.37	116.22	121.97
3	A	502[B]	9UO	C14-C13-C12	-4.29	114.73	120.24
3	A	502[B]	9UO	C23-C21-N20	4.21	114.70	110.25
3	A	502[A]	9UO	C13-C12-C11	4.11	124.44	118.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	NDP	C2A-N3A-C4A	3.88	121.31	111.83
3	A	502[A]	9UO	F05-C03-C02	-3.80	106.80	112.11
2	B	501	NDP	O3D-C3D-C2D	-3.57	100.38	111.82
2	A	501	NDP	C2A-N3A-C4A	3.34	119.99	111.83
2	B	501	NDP	C4A-C5A-N7A	-3.30	106.81	110.58
3	A	502[A]	9UO	N07-C08-N27	3.23	122.17	117.09
2	A	501	NDP	C4A-C5A-N7A	-3.23	106.89	110.58
3	A	502[B]	9UO	N07-C08-N09	-3.22	112.02	117.09
3	A	502[A]	9UO	N27-C08-N09	-3.20	121.01	126.26
3	A	502[B]	9UO	N27-C19-N18	-3.19	121.02	126.26
3	A	502[A]	9UO	F25-C23-C21	-3.14	107.72	112.11
3	A	502[B]	9UO	C14-C15-CL1	3.06	125.52	119.18
3	A	502[B]	9UO	N27-C08-N09	-2.98	121.37	126.26
2	B	501	NDP	C4A-N9A-C8A	2.94	108.82	105.74
2	B	501	NDP	N3A-C2A-N1A	-2.88	124.22	128.58
2	A	501	NDP	C4A-N9A-C8A	2.83	108.71	105.74
2	B	501	NDP	C5A-N7A-C8A	2.80	107.85	103.45
2	A	501	NDP	C1D-N1N-C2N	-2.76	116.59	121.14
2	A	501	NDP	C5A-N7A-C8A	2.70	107.70	103.45
3	A	502[A]	9UO	C12-C11-N17	-2.67	118.45	121.97
3	A	502[A]	9UO	C23-C21-N20	2.65	113.05	110.25
3	A	502[A]	9UO	C03-C02-N07	2.60	113.00	110.25
3	A	502[A]	9UO	N27-C19-N18	-2.54	122.09	126.26
2	A	501	NDP	N3A-C2A-N1A	-2.46	124.86	128.58
2	B	501	NDP	N9A-C8A-N7A	-2.36	110.59	113.94
2	A	501	NDP	N9A-C8A-N7A	-2.21	110.81	113.94
2	B	501	NDP	O3X-P2B-O2X	2.20	116.07	107.80
2	B	501	NDP	O2N-PN-O1N	2.15	122.45	112.44
3	A	502[A]	9UO	CL1-C15-N17	-2.14	110.92	115.45
3	A	502[B]	9UO	F06-C03-F05	2.11	111.47	106.87
3	A	502[A]	9UO	C12-C11-C10	2.09	122.78	120.19
3	A	502[A]	9UO	N20-C19-N18	-2.03	113.90	117.09
2	A	501	NDP	C2D-C1D-N1N	2.01	118.24	113.31

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	NDP	C5B-O5B-PA-O1A
2	A	501	NDP	C5B-O5B-PA-O3
2	A	501	NDP	C5D-O5D-PN-O3
2	A	501	NDP	C5D-O5D-PN-O2N

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Mol	Chain	Res	Type	Atoms
2	B	501	NDP	C5B-O5B-PA-O1A
2	B	501	NDP	C5B-O5B-PA-O2A
2	B	501	NDP	C5B-O5B-PA-O3
2	B	501	NDP	PA-O3-PN-O5D
2	B	501	NDP	C2D-C1D-N1N-C2N
2	B	501	NDP	C2D-C1D-N1N-C6N
2	B	501	NDP	O4D-C1D-N1N-C2N
2	B	501	NDP	O4D-C1D-N1N-C6N
2	A	501	NDP	C5B-O5B-PA-O2A
2	A	501	NDP	C5D-O5D-PN-O1N
2	A	501	NDP	C2D-C1D-N1N-C2N
2	A	501	NDP	O4D-C1D-N1N-C2N
2	B	501	NDP	O4B-C4B-C5B-O5B
2	B	501	NDP	C3B-C4B-C5B-O5B

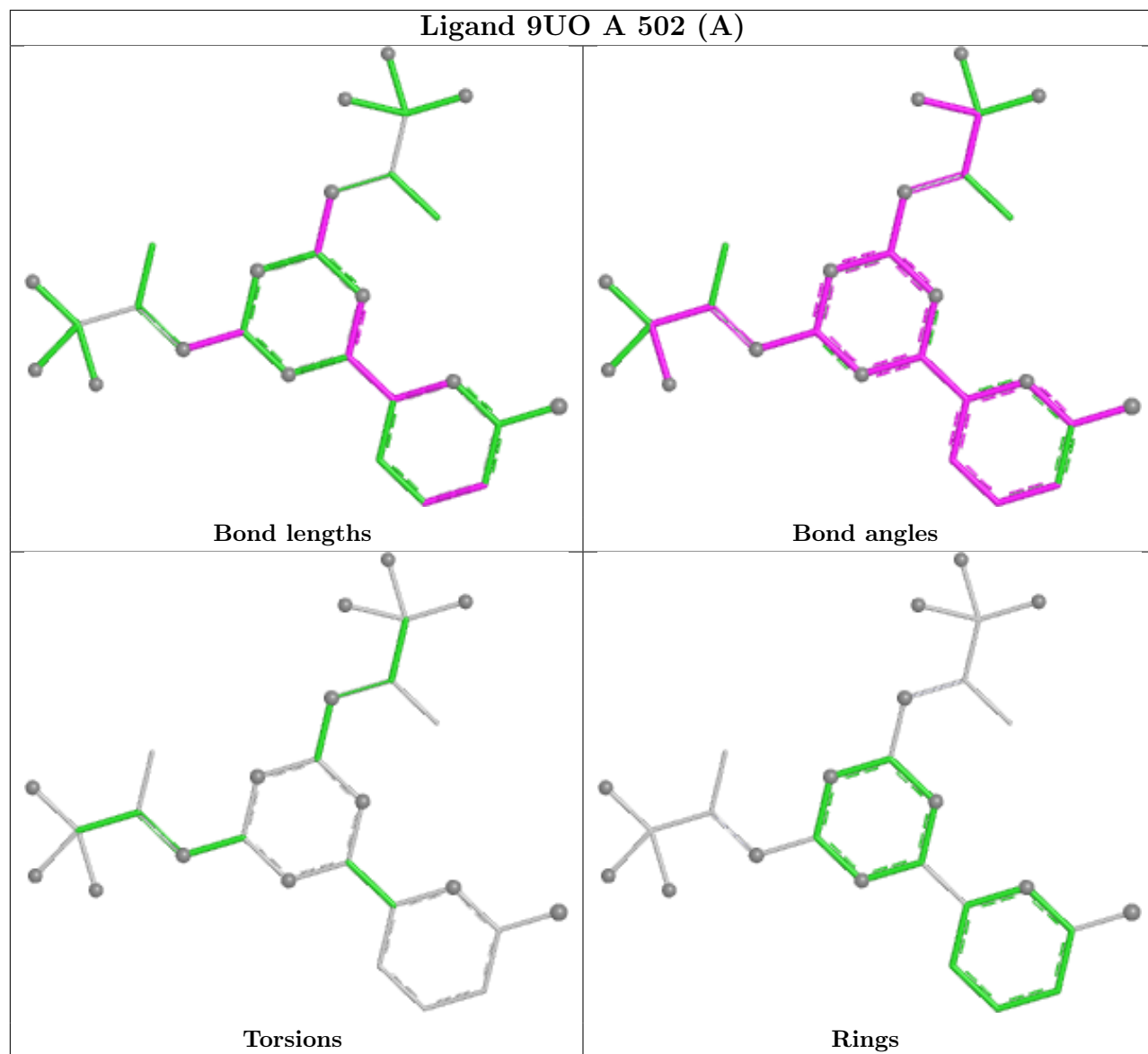
There are no ring outliers.

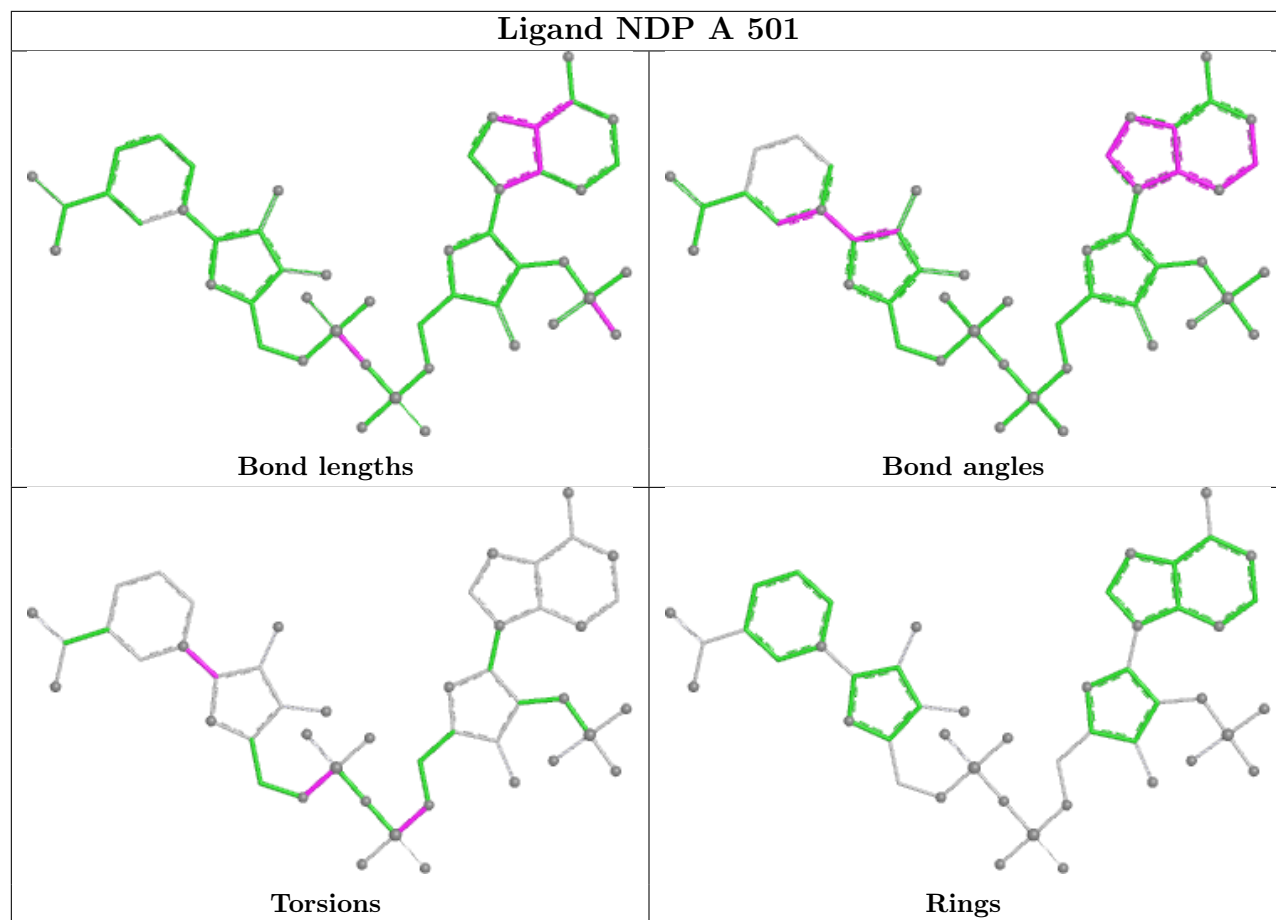
4 monomers are involved in 15 short contacts:

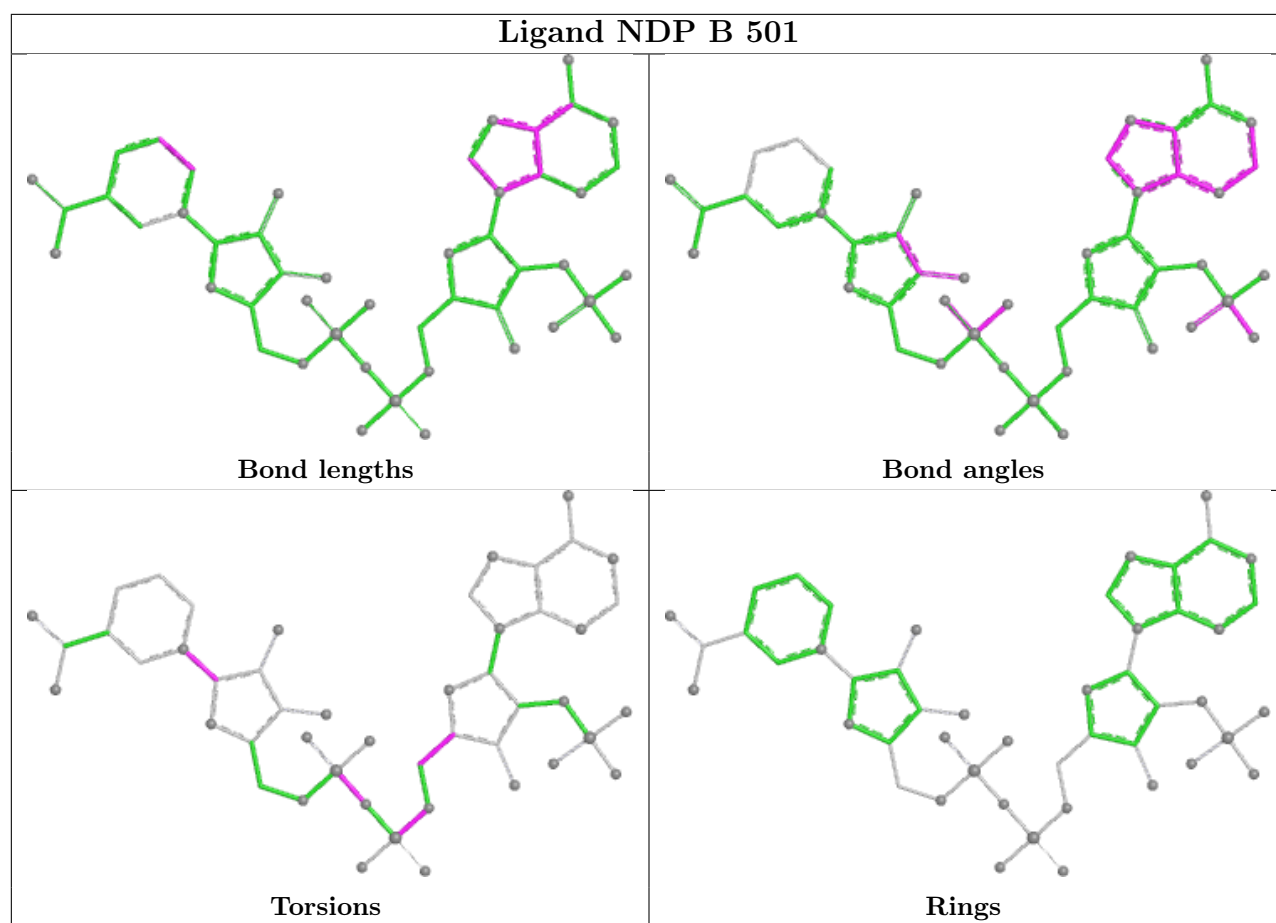
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	502[A]	9UO	6	0
2	A	501	NDP	1	0
2	B	501	NDP	3	0
3	A	502[B]	9UO	5	0

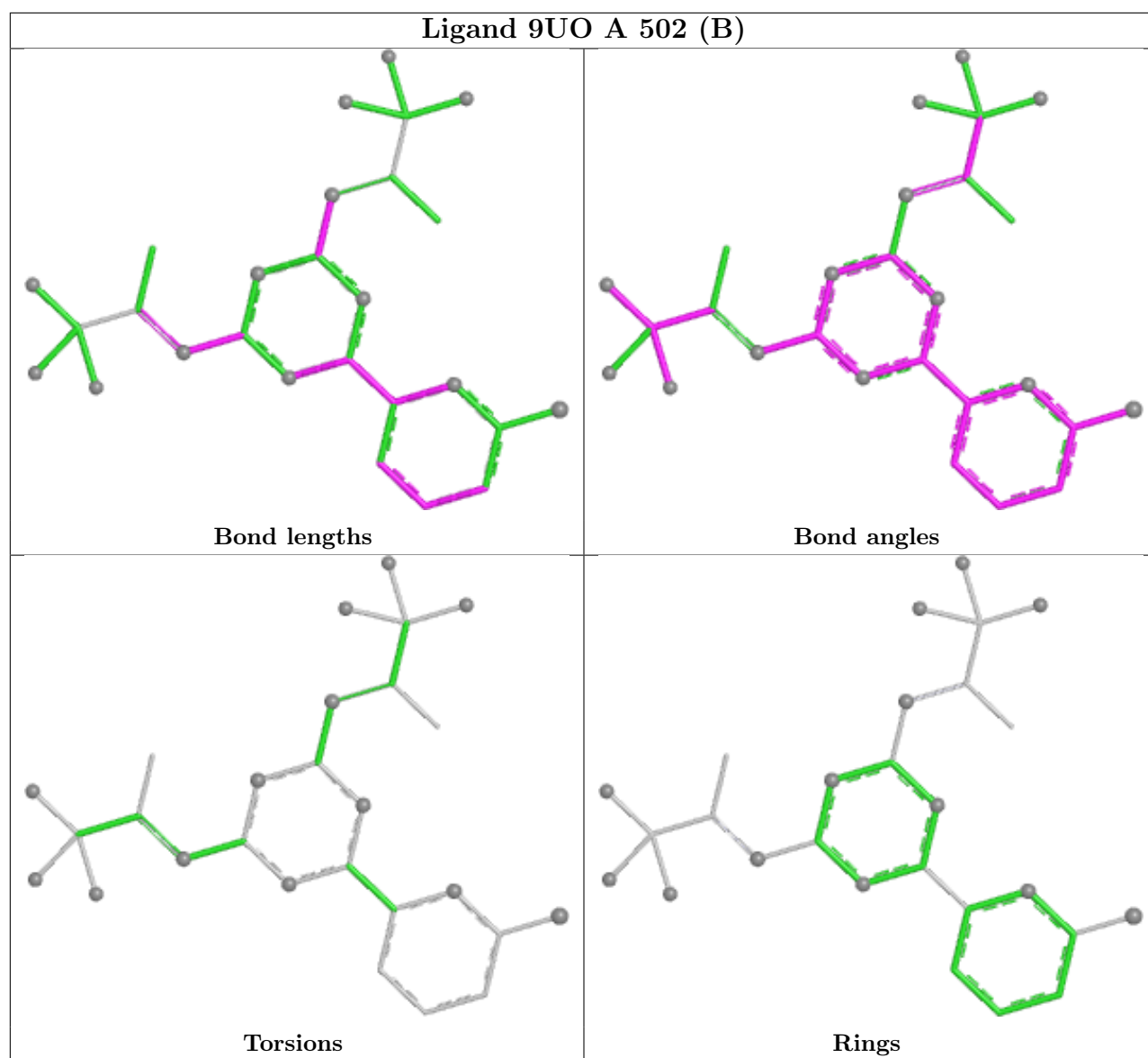
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

Ligand 9UO A 502 (A)









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	418/419 (99%)	0.04	8 (1%) 66 74	6, 18, 38, 54	5 (1%)
1	B	407/419 (97%)	0.96	103 (25%) 1 1	7, 27, 59, 79	0
All	All	825/838 (98%)	0.49	111 (13%) 7 7	6, 21, 53, 79	5 (0%)

All (111) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	86	LEU	8.5
1	B	87	PRO	7.2
1	B	121	ALA	6.6
1	B	116	ILE	5.9
1	B	96	VAL	5.4
1	B	55	GLY	5.4
1	B	123	VAL	5.3
1	B	126	PHE	5.2
1	B	132	TRP	4.8
1	B	92	THR	4.4
1	B	90	ASP	4.1
1	B	449	LEU	4.1
1	B	98	ILE	4.0
1	B	128	LEU	4.0
1	B	62	ILE	3.8
1	B	84	LEU	3.7
1	B	103	ALA	3.7
1	B	61	ILE	3.6
1	B	127	LYS	3.6
1	B	77	ILE	3.6
1	B	435	THR	3.5
1	B	427	LEU	3.4
1	A	363	PRO	3.4
1	B	115	THR	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	81	TYR	3.3
1	B	107	TYR	3.3
1	A	427	LEU	3.3
1	A	458	HIS	3.2
1	B	57	GLU	3.2
1	B	89	ARG	3.2
1	B	47	ALA	3.2
1	B	118	PRO	3.2
1	A	456	HIS	3.2
1	B	94	ASP	3.2
1	B	85	GLY	3.1
1	B	56	ASP	3.1
1	B	83	ASP	3.1
1	B	131	MET	3.1
1	B	49	PRO	3.0
1	B	129	LYS	3.0
1	B	445	LEU	3.0
1	B	125	GLU	3.0
1	B	51	VAL	2.9
1	B	130	LYS	2.9
1	B	364	THR	2.9
1	B	141	ASN	2.9
1	B	101	ALA	2.9
1	B	82	PHE	2.9
1	B	363	PRO	2.8
1	B	122	ARG	2.8
1	B	44	ILE	2.8
1	B	46	VAL	2.8
1	B	425	VAL	2.8
1	B	93	ASP	2.8
1	B	91	GLN	2.7
1	B	433	ASN	2.7
1	B	361	GLY	2.7
1	B	350	THR	2.7
1	B	353	ARG	2.7
1	B	448	ALA	2.6
1	B	66	ILE	2.6
1	B	443	SER	2.6
1	B	106	LYS	2.6
1	B	422	LEU	2.6
1	B	54	ASP	2.6
1	B	114	ALA	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	457	HIS	2.5
1	B	117	THR	2.5
1	B	360	LYS	2.5
1	B	352	THR	2.5
1	B	58	MET	2.5
1	B	442	LYS	2.5
1	B	387	GLY	2.5
1	B	64	GLN	2.5
1	B	60	ARG	2.4
1	B	437	PHE	2.4
1	B	355	TYR	2.4
1	B	142	ILE	2.4
1	B	45	LYS	2.4
1	B	441	ILE	2.4
1	B	102	LEU	2.3
1	B	120	GLU	2.3
1	B	95	GLN	2.3
1	B	124	GLU	2.3
1	B	59	THR	2.3
1	B	349	GLY	2.3
1	A	41	ASP	2.3
1	B	430	HIS	2.3
1	B	53	MET	2.3
1	B	134	SER	2.2
1	B	358	HIS	2.2
1	B	385	LEU	2.2
1	B	391	LEU	2.2
1	B	429	GLU	2.2
1	B	447	ARG	2.2
1	B	432	LEU	2.2
1	B	423	SER	2.2
1	B	354	HIS	2.1
1	B	446	ASP	2.1
1	B	97	THR	2.1
1	A	325	GLY	2.1
1	B	68	GLU	2.1
1	B	440	THR	2.1
1	B	119	ASP	2.1
1	B	386	ASP	2.1
1	B	439	ASP	2.1
1	B	420	HIS	2.0
1	A	428	ASN	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	416	ALA	2.0
1	B	100	SER	2.0
1	B	431	PHE	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](#)

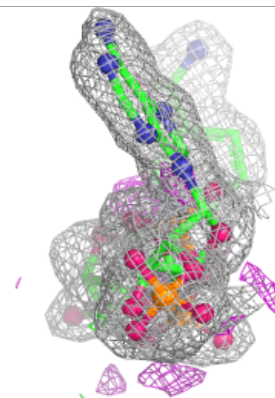
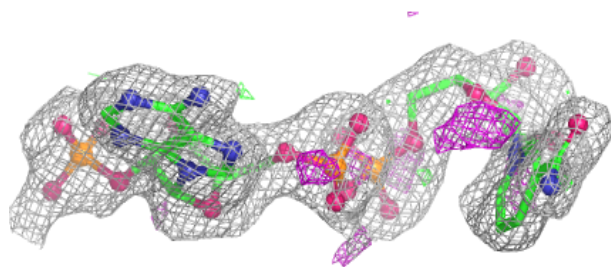
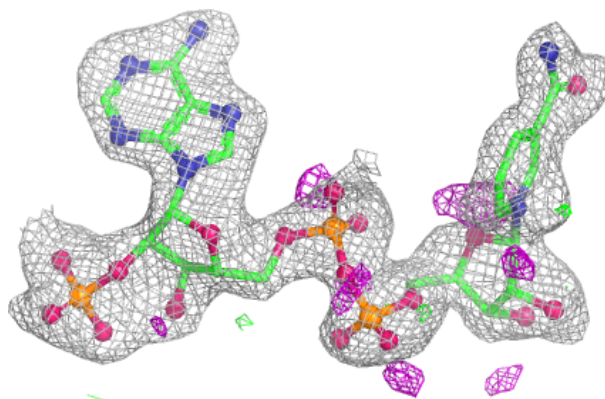
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NDP	B	501	48/48	0.87	0.11	26,41,48,53	0
3	9UO	A	502[A]	27/27	0.93	0.08	12,17,23,27	27
3	9UO	A	502[B]	27/27	0.93	0.08	11,17,23,26	27
2	NDP	A	501	48/48	0.95	0.07	13,24,30,38	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.

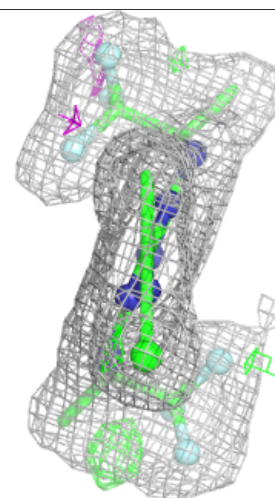
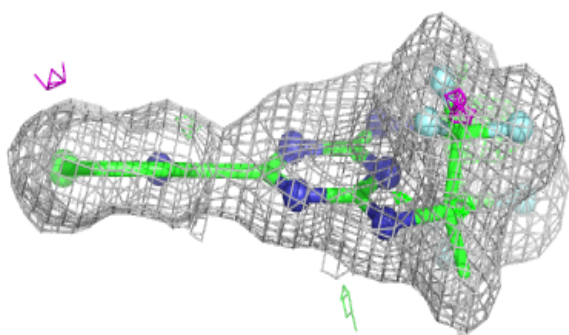
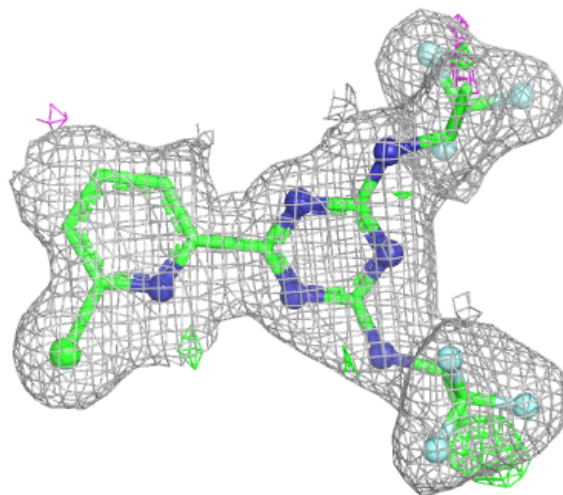
Electron density around NDP B 501:

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



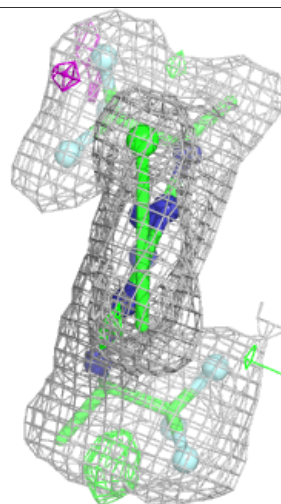
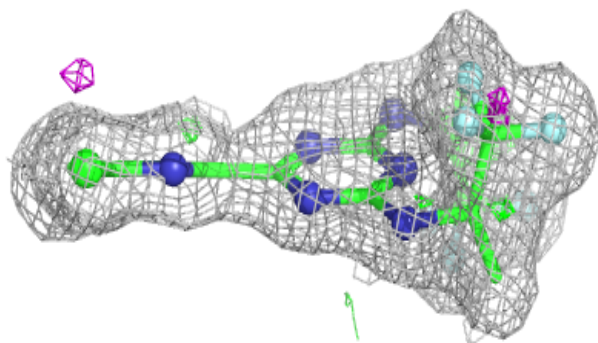
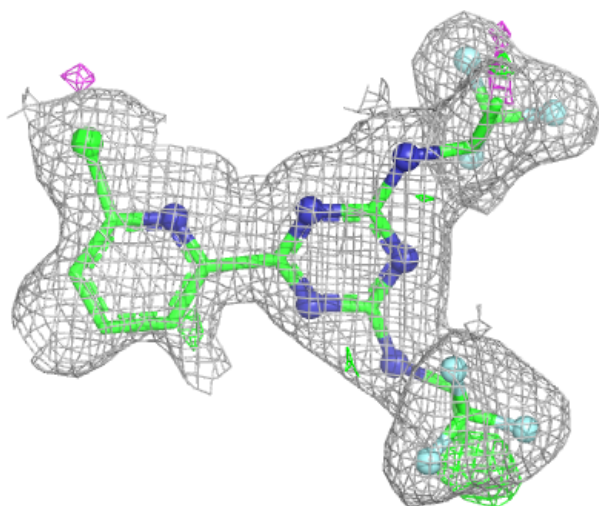
Electron density around 9UO A 502 (A):

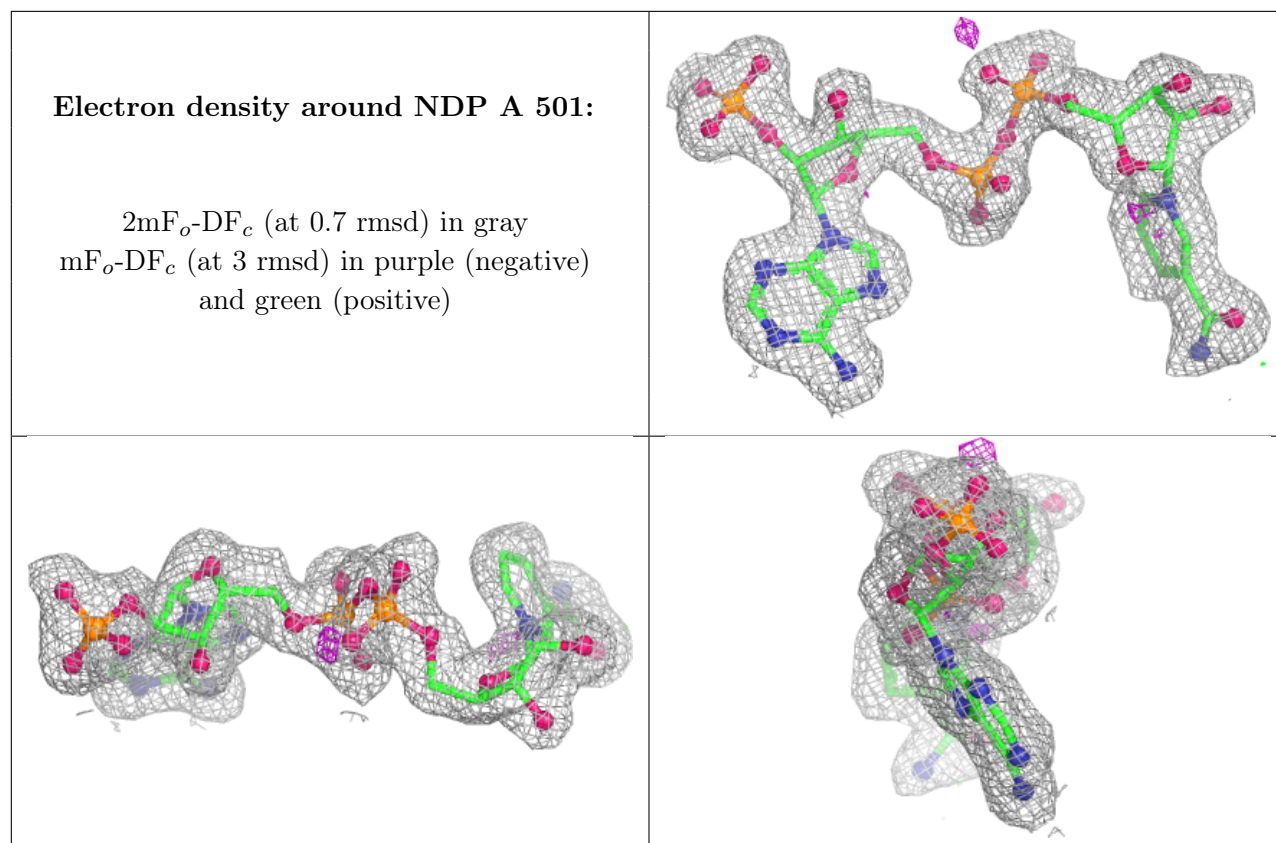
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around 9UO A 502 (B):

$2mF_o-DF_c$ (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.