WORLDWIDE PDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Sep 10, 2023 – 08:28 PM EDT

PDB ID	:	4KFJ
Title	:	Human dihydrofolate reductase complexed with NADPH and 5-{3-[3-methoxy-5-(isoquin-5-yl)phenyl]prop-1-yn-1-yl}6-ethylprimidine-2,4-diamine
Authors	:	Lamb, K.M.; Anderson, A.C.
Deposited on	:	2013-04-26
Resolution	:	1.76 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

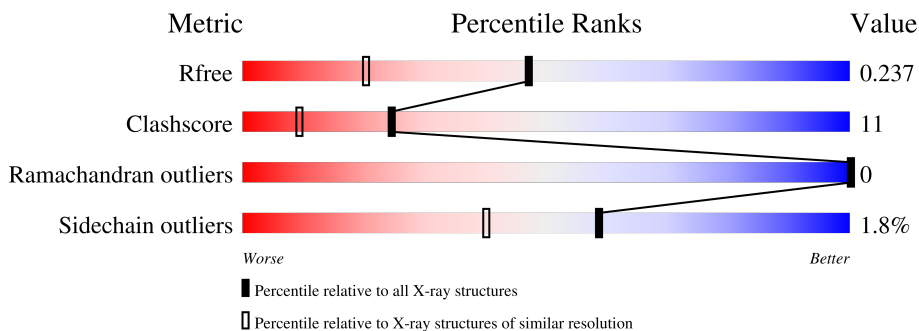|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 1.76 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	Percentile Ranks	Value
Rfree		0.237
Clashscore		11
Ramachandran outliers		0
Sidechain outliers		1.8%

Worse   *Better*

▌ Percentile relative to all X-ray structures

〚〛 Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	186	81% 18% •
1	B	186	90% 10%

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
3	1R0	A	202	-	-	X	-
5	CL	A	204	-	-	X	-
5	CL	B	204	-	-	X	-

WORLDWIDE wwPDB PROTEIN DATA BANK

2   Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 3697 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 Dihydrofolate reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	186	Total	C	N	O	S	4	13	0
			1580	1022	260	287	11			
1	B	186	Total	C	N	O	S	4	11	0
			1562	1005	261	286	10			

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$).

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

- Molecule 3 is 6-ethyl-5-{3-[3-(isoquinolin-5-yl)-5-methoxyphenyl]prop-1-yn-1-yl}pyrimidine-2,4-diamine (three-letter code: 1R0) (formula: $C_{25}H_{23}N_5O$).
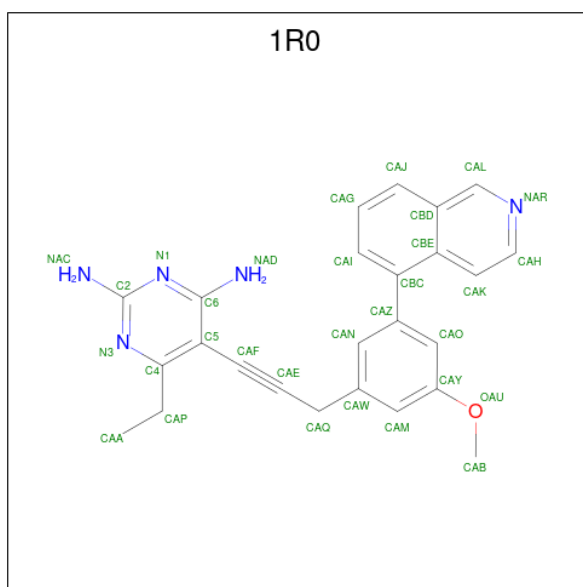
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total 31	C 25	N 5	O 1	0	0

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total 2	Mg 2	0	0
4	B	3	Total 3	Mg 3	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

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

- Molecule 6 is ETHANOL (three-letter code: EOH) (formula: C_2H_6O).

EOH
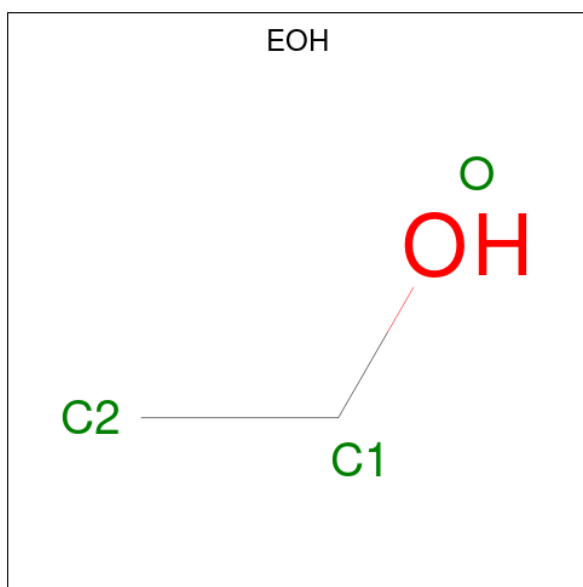
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	3	2	1	0	0

- Molecule 7 is FOLIC ACID (three-letter code: FOL) (formula: $C_{19}H_{19}N_7O_6$).

FOL
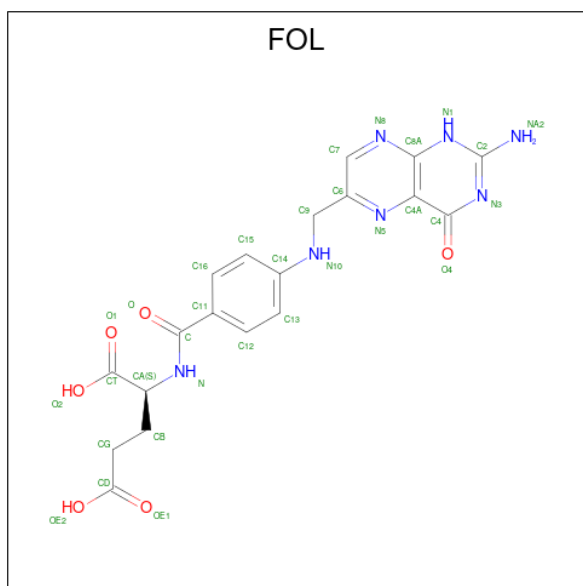
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	B	1	32	19	7	6	0	0

- Molecule 8 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	191	Total 191	O 191	0	0
8	B	195	Total 195	O 195	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. 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. 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: Dihydrofolate reductase
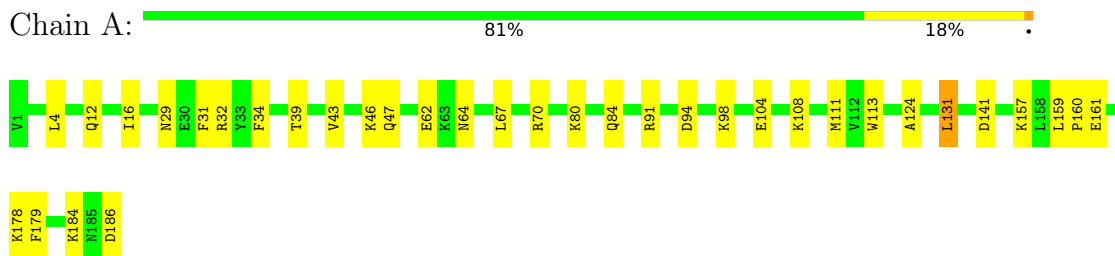
• Molecule 1: Dihydrofolate reductase
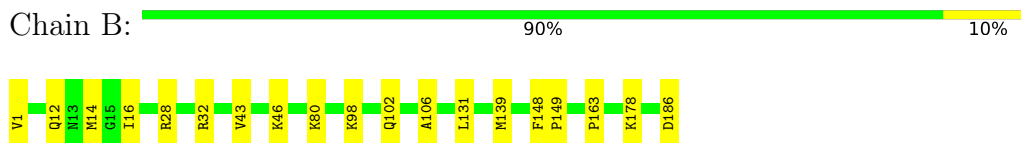
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	87.81Å 94.08Å 96.29Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.89 – 1.76 16.13 – 1.45	Depositor EDS
% Data completeness (in resolution range)	98.7 (19.89-1.76) 99.0 (16.13-1.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.54 (at 1.45Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, R_{free}	0.196 , 0.245 0.224 , 0.237	Depositor DCC
R_{free} test set	3496 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	19.0	Xtriage
Anisotropy	0.061	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 49.4	EDS
L-test for twinning[2]	$< |L| > = 0.51, < L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	3697	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.33% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: EOH, FOL, MG, CL, NDP, 1R0

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	0.54	0/1649	0.69	0/2220
1	B	0.57	0/1626	0.69	0/2190
All	All	0.56	0/3275	0.69	0/4410

There are no bond length outliers.

There are no bond angle outliers.

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	1580	0	1625	43	0
1	B	1562	0	1595	18	0
2	A	48	0	26	2	0
2	B	48	0	26	3	0
3	A	31	0	23	23	0
4	A	2	0	0	0	0
4	B	3	0	0	0	0
5	A	1	0	0	5	0
5	B	1	0	0	2	0
6	A	3	0	6	0	0
7	B	32	0	17	2	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	A	191	0	0	12	0
8	B	195	0	0	6	0
All	All	3697	0	3318	72	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 11.

All (72) 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)
3:A:202:1R0:H18	3:A:202:1R0:H17	1.22	1.10
3:A:202:1R0:H17	3:A:202:1R0:CAK	2.03	0.84
1:B:28[A]:ARG:HD2	1:B:32:ARG:HH21	1.42	0.81
3:A:202:1R0:H16	8:A:339:HOH:O	1.79	0.80
1:A:64:ASN:ND2	3:A:202:1R0:H19	1.97	0.79
3:A:202:1R0:CAB	8:A:339:HOH:O	2.31	0.78
2:B:201:NDP:H42N	7:B:202:FOL:C7	2.15	0.76
1:A:104[B]:GLU:HG2	8:A:428:HOH:O	1.86	0.74
1:A:34:PHE:HE2	3:A:202:1R0:H22	1.53	0.73
3:A:202:1R0:H18	3:A:202:1R0:CAO	2.13	0.73
1:A:64:ASN:HD22	3:A:202:1R0:H19	1.54	0.72
1:A:34:PHE:CE2	3:A:202:1R0:H23	2.24	0.72
1:B:14:MET:CE	8:B:483:HOH:O	2.37	0.72
8:A:411:HOH:O	1:B:163:PRO:HB2	1.95	0.66
2:B:201:NDP:H42N	7:B:202:FOL:C6	2.26	0.65
1:B:28[B]:ARG:NE	5:B:204:CL:CL	2.67	0.65
1:A:67:LEU:HD22	3:A:202:1R0:CAJ	2.28	0.64
1:A:84:GLN:NE2	8:A:416:HOH:O	2.30	0.63
1:B:14:MET:HE2	8:B:483:HOH:O	1.95	0.62
1:A:34:PHE:CE2	3:A:202:1R0:CAI	2.83	0.61
1:A:34:PHE:HE2	3:A:202:1R0:CAG	2.13	0.61
1:B:14:MET:HE1	8:B:483:HOH:O	2.00	0.60
1:A:16:ILE:O	2:A:201:NDP:H2N	2.01	0.60
1:A:31[A]:PHE:HD2	8:A:338:HOH:O	1.85	0.59
1:A:111[B]:MET:HE2	1:A:113:TRP:HE1	1.69	0.58
1:A:34:PHE:CE2	3:A:202:1R0:H22	2.36	0.57
1:B:139[B]:MET:HE1	1:B:178:LYS:HE3	1.86	0.57
1:A:160:PRO:HG2	1:A:161:GLU:OE1	2.05	0.56
1:B:149:PRO:HG3	8:B:381:HOH:O	2.05	0.56
1:A:34:PHE:CE2	3:A:202:1R0:CAG	2.88	0.56
1:A:178:LYS:HE3	5:A:204:CL:CL	2.43	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:178:LYS:CE	5:A:204:CL:CL	2.91	0.56
1:A:31[A]:PHE:HE1	3:A:202:1R0:CBE	2.19	0.55
1:A:29:ASN:CG	1:A:32[B]:ARG:HH21	2.09	0.55
1:A:179:PHE:O	5:A:204:CL:CL	2.62	0.55
1:A:4:LEU:HB2	1:A:131[B]:LEU:HD13	1.89	0.55
1:A:47:GLN:HG3	8:A:409:HOH:O	2.07	0.54
1:A:124:ALA:O	1:A:131[B]:LEU:HD21	2.08	0.53
1:B:16:ILE:O	2:B:201:NDP:H2N	2.09	0.52
1:B:28[B]:ARG:HG2	5:B:204:CL:CL	2.47	0.52
1:A:32[B]:ARG:HG2	8:A:389:HOH:O	2.10	0.52
1:A:12:GLN:HB3	1:A:141:ASP:OD1	2.11	0.51
1:B:12:GLN:NE2	8:B:470:HOH:O	2.28	0.50
1:A:67:LEU:HD22	3:A:202:1R0:CAG	2.42	0.49
1:A:111[B]:MET:CE	1:A:113:TRP:HE1	2.25	0.49
1:A:64:ASN:ND2	3:A:202:1R0:CAH	2.72	0.48
1:B:80:LYS:O	1:B:80:LYS:HG3	2.14	0.48
1:B:28[B]:ARG:O	1:B:32:ARG:HG3	2.17	0.45
1:A:94[A]:ASP:HB2	8:A:472:HOH:O	2.17	0.45
2:A:201:NDP:H8A	2:A:201:NDP:H52A	1.99	0.45
1:A:43:VAL:HG11	1:A:46:LYS:HD2	2.00	0.44
3:A:202:1R0:H13	8:A:329:HOH:O	2.18	0.44
1:A:4:LEU:HB2	1:A:131[A]:LEU:HG	2.01	0.43
1:B:148:PHE:HA	1:B:149:PRO:HD3	1.73	0.43
1:A:70:ARG:HH22	3:A:202:1R0:H21	1.83	0.43
1:B:1:VAL:N	8:B:487:HOH:O	2.51	0.43
1:A:178:LYS:HE2	5:A:204:CL:CL	2.56	0.43
1:B:43:VAL:HG11	1:B:46:LYS:HD2	2.01	0.43
1:A:178:LYS:HG2	5:A:204:CL:CL	2.57	0.42
1:A:62:GLU:O	1:A:62:GLU:HG3	2.15	0.41
1:A:31[A]:PHE:CE1	3:A:202:1R0:CBE	3.02	0.41
1:A:29:ASN:CG	1:A:32[B]:ARG:NH2	2.74	0.41
1:A:131[B]:LEU:HD23	1:A:184:LYS:HE3	2.03	0.41
1:B:102:GLN:O	1:B:106:ALA:HB2	2.21	0.40
1:A:34:PHE:HE2	3:A:202:1R0:CAI	2.30	0.40
3:A:202:1R0:H15	8:A:339:HOH:O	2.08	0.40
1:A:157[B]:LYS:HE2	1:A:159:LEU:CD2	2.51	0.40
3:A:202:1R0:H5	8:A:324:HOH:O	2.21	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	197/186 (106%)	194 (98%)	3 (2%)	0	100	100
1	B	195/186 (105%)	192 (98%)	3 (2%)	0	100	100
All	All	392/372 (105%)	386 (98%)	6 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	181/168 (108%)	176 (97%)	5 (3%)	43	20
1	B	179/168 (106%)	176 (98%)	3 (2%)	60	42
All	All	360/336 (107%)	352 (98%)	8 (2%)	59	29

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	80	LYS
1	A	91	ARG
1	A	131[A]	LEU
1	A	131[B]	LEU
1	A	186	ASP
1	B	131[A]	LEU
1	B	131[B]	LEU
1	B	186	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	64	ASN
1	A	84	GLN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5   Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6   Ligand geometry ⓘ

Of 12 ligands modelled in this entry, 7 are monoatomic - leaving 5 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	1R0	A	202	-	34,34,34	2.23	7 (20%)	43,47,47	2.87	20 (46%)
7	FOL	B	202	-	34,34,34	1.97	9 (26%)	44,47,47	1.95	14 (31%)
2	NDP	A	201	-	45,52,52	1.79	6 (13%)	53,80,80	1.11	3 (5%)
6	EOH	A	205	-	2,2,2	0.33	0	1,1,1	0.39	0
2	NDP	B	201	-	45,52,52	1.76	6 (13%)	53,80,80	1.22	6 (11%)

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
7	FOL	B	202	-	-	2/22/22/22	0/3/3/3
2	NDP	A	201	-	-	6/30/77/77	0/5/5/5
3	1R0	A	202	-	-	4/13/14/14	0/4/4/4
2	NDP	B	201	-	-	5/30/77/77	0/5/5/5

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202	1R0	CAP-C4	-8.63	1.36	1.51
2	B	201	NDP	O7N-C7N	5.91	1.38	1.24
2	A	201	NDP	O7N-C7N	5.83	1.38	1.24
2	A	201	NDP	C4N-C3N	-5.37	1.39	1.49
7	B	202	FOL	C7-N8	5.35	1.40	1.31
2	B	201	NDP	C4N-C3N	-5.24	1.39	1.49
7	B	202	FOL	C11-C	-4.61	1.40	1.50
2	A	201	NDP	C2A-N3A	4.47	1.39	1.32
7	B	202	FOL	O4-C4	4.38	1.35	1.24
7	B	202	FOL	C9-C6	-4.33	1.42	1.51
3	A	202	1R0	CAF-CAE	-4.24	1.14	1.19
3	A	202	1R0	CAL-NAR	4.07	1.39	1.32
2	B	201	NDP	C2A-N3A	4.05	1.38	1.32
3	A	202	1R0	CBC-CAZ	-3.77	1.43	1.49
2	B	201	NDP	C6N-C5N	3.65	1.39	1.33
2	B	201	NDP	C4N-C5N	-3.60	1.39	1.48
2	A	201	NDP	C4N-C5N	-3.51	1.39	1.48
3	A	202	1R0	C5-C6	-3.31	1.38	1.42
2	A	201	NDP	C6N-C5N	3.18	1.39	1.33
3	A	202	1R0	CAQ-CAW	-2.75	1.42	1.51
2	A	201	NDP	C2A-N1A	2.62	1.38	1.33
7	B	202	FOL	C4A-N5	2.47	1.36	1.33
2	B	201	NDP	C2A-N1A	2.46	1.38	1.33
7	B	202	FOL	C8A-N8	-2.44	1.33	1.37
7	B	202	FOL	C6-N5	2.14	1.36	1.32
3	A	202	1R0	CAN-CAW	2.08	1.42	1.39
7	B	202	FOL	CA-N	2.08	1.50	1.45
7	B	202	FOL	CG-CD	2.01	1.55	1.50

All (43) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	202	1R0	CAH-CAK-CBE	5.90	124.79	119.81

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	202	1R0	CAA-CAP-C4	-5.89	100.37	114.88
3	A	202	1R0	CAZ-CAO-CAY	5.73	127.40	119.94
2	B	201	NDP	N3A-C2A-N1A	-5.28	120.43	128.68
3	A	202	1R0	NAD-C6-N1	5.12	124.27	117.03
3	A	202	1R0	C5-C6-NAD	-5.10	115.74	121.62
3	A	202	1R0	CAP-C4-C5	-4.76	119.27	122.66
7	B	202	FOL	N1-C2-N3	-4.61	121.07	127.22
2	A	201	NDP	N3A-C2A-N1A	-4.59	121.50	128.68
3	A	202	1R0	C2-N3-C4	4.56	120.04	116.24
7	B	202	FOL	C8A-C4A-C4	-3.90	117.37	119.95
3	A	202	1R0	CAN-CAZ-CBC	3.82	126.95	120.70
3	A	202	1R0	CAK-CAH-NAR	-3.67	119.03	123.81
3	A	202	1R0	CAL-CBD-CBE	3.54	121.18	117.78
3	A	202	1R0	CAZ-CBC-CBE	3.43	127.87	122.03
7	B	202	FOL	C2-N1-C8A	3.39	119.22	115.36
7	B	202	FOL	C9-C6-N5	3.37	122.64	116.66
3	A	202	1R0	CAJ-CBD-CAL	-3.35	116.62	122.63
3	A	202	1R0	C2-N1-C6	3.33	120.67	116.99
7	B	202	FOL	N8-C8A-N1	3.19	119.47	115.82
7	B	202	FOL	C6-C7-N8	-3.16	120.03	123.13
7	B	202	FOL	C7-N8-C8A	3.14	119.84	116.69
3	A	202	1R0	CAW-CAQ-CAE	-3.00	107.70	113.65
3	A	202	1R0	N1-C2-N3	-2.99	120.73	125.42
2	B	201	NDP	C3N-C2N-N1N	-2.98	118.85	123.10
7	B	202	FOL	C2-N3-C4	2.90	120.54	115.93
7	B	202	FOL	CB-CA-N	2.72	116.36	110.88
2	A	201	NDP	O7N-C7N-C3N	-2.71	115.80	120.90
7	B	202	FOL	C7-C6-N5	-2.65	119.11	120.85
3	A	202	1R0	CAQ-CAW-CAM	-2.65	116.90	120.76
2	A	201	NDP	C3N-C2N-N1N	-2.61	119.37	123.10
2	B	201	NDP	PN-O3-PA	2.44	141.20	132.83
7	B	202	FOL	O1-CT-CA	-2.41	114.34	122.26
3	A	202	1R0	CAO-CAZ-CAN	-2.34	114.85	118.31
3	A	202	1R0	CAJ-CBD-CBE	2.34	122.20	119.12
3	A	202	1R0	CAK-CBE-CBD	-2.29	114.93	117.89
2	B	201	NDP	O2B-C2B-C1B	-2.22	102.13	110.10
7	B	202	FOL	C13-C12-C11	-2.16	118.27	120.78
7	B	202	FOL	NA2-C2-N1	2.13	121.26	117.79
2	B	201	NDP	O4D-C1D-N1N	-2.06	104.02	108.06
3	A	202	1R0	CAI-CBC-CBE	-2.03	115.27	118.66
2	B	201	NDP	C1D-N1N-C2N	-2.02	117.74	121.11
7	B	202	FOL	C12-C13-C14	2.02	122.64	120.30

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	201	NDP	C2B-O2B-P2B-O2X
3	A	202	1R0	CAN-CAZ-CBC-CBE
3	A	202	1R0	CAN-CAZ-CBC-CAI
3	A	202	1R0	CAO-CAZ-CBC-CBE
3	A	202	1R0	CAO-CAZ-CBC-CAI
2	A	201	NDP	PA-O3-PN-O5D
2	B	201	NDP	PA-O3-PN-O5D
2	B	201	NDP	C2B-O2B-P2B-O2X
2	B	201	NDP	O4D-C1D-N1N-C2N
2	A	201	NDP	C2D-C1D-N1N-C2N
2	A	201	NDP	C4D-C5D-O5D-PN
2	B	201	NDP	C4D-C5D-O5D-PN
2	A	201	NDP	O4D-C1D-N1N-C2N
7	B	202	FOL	CT-CA-N-C
7	B	202	FOL	CB-CA-N-C
2	A	201	NDP	C2N-C3N-C7N-N7N
2	B	201	NDP	C2N-C3N-C7N-N7N

There are no ring outliers.

4 monomers are involved in 28 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	202	1R0	23	0
7	B	202	FOL	2	0
2	A	201	NDP	2	0
2	B	201	NDP	3	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 then 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 1R0 A 202

Bond lengths

Bond angles

Torsions

Rings

Ligand FOL B 202

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP A 201

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP B 201

Bond lengths

Bond angles

Torsions

Rings
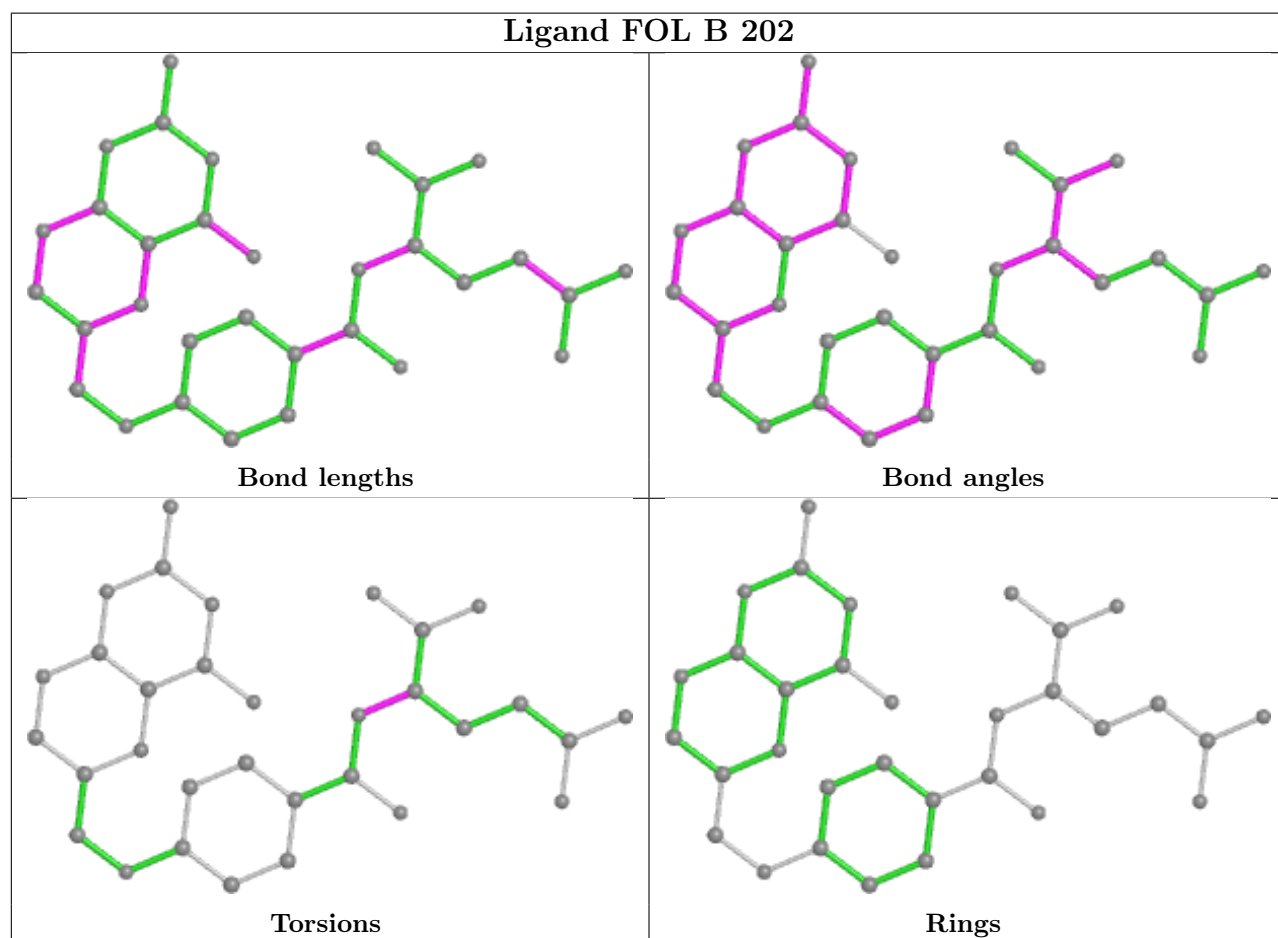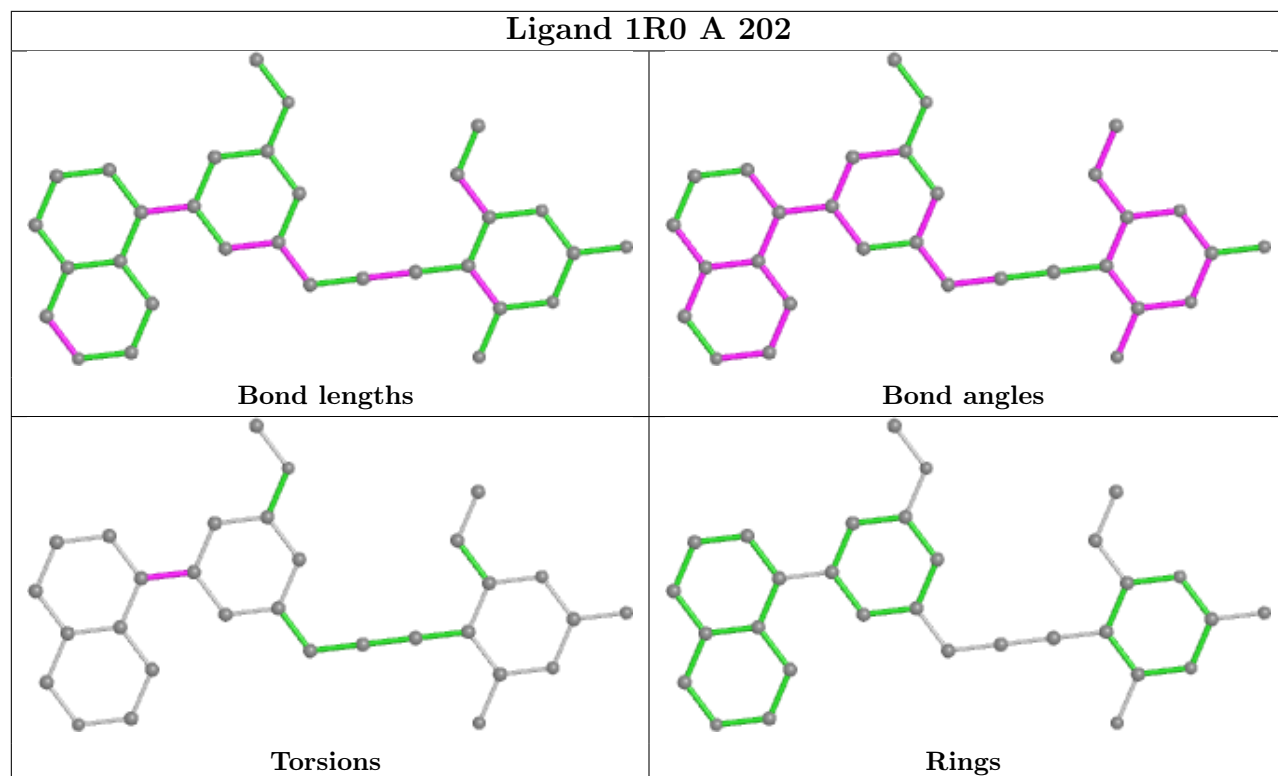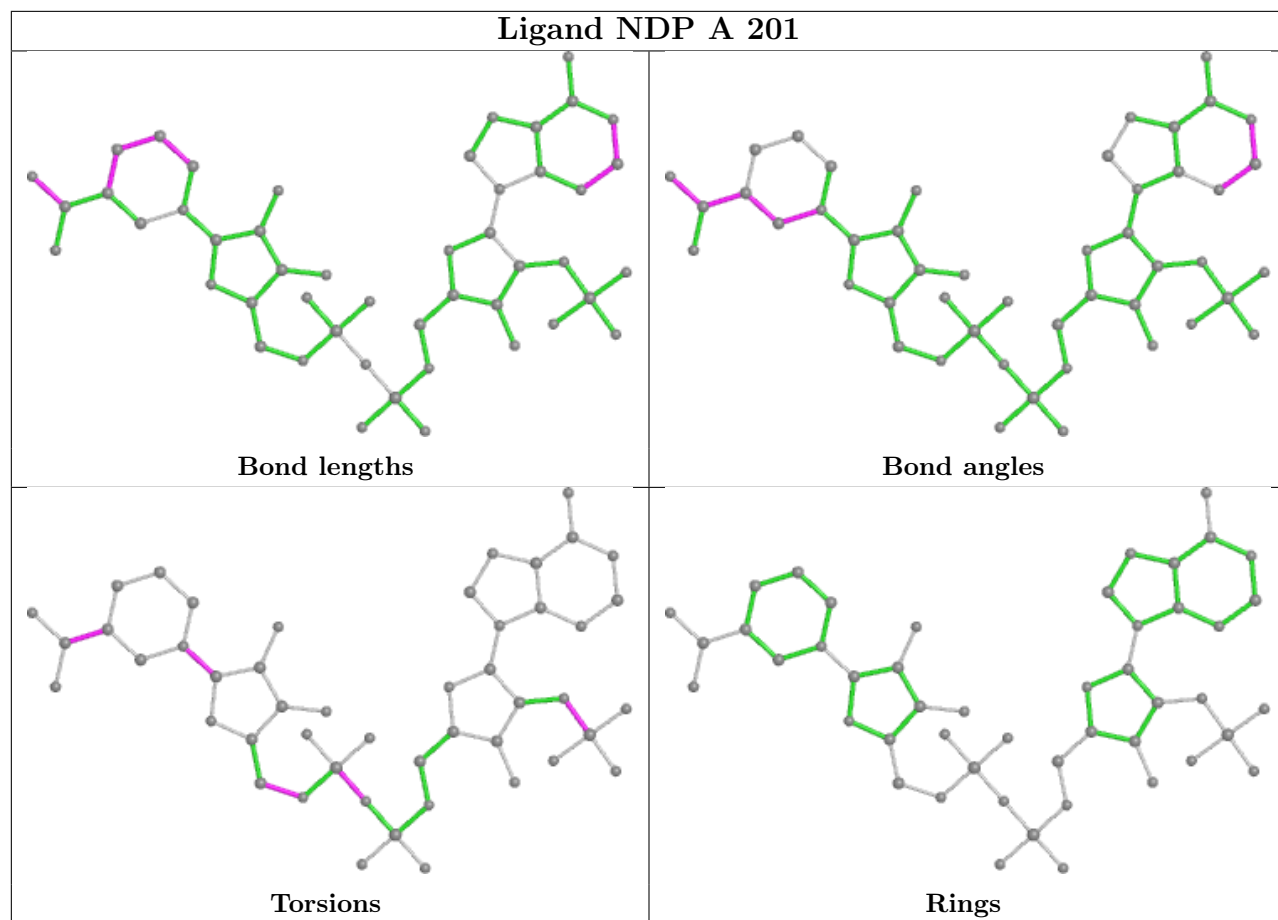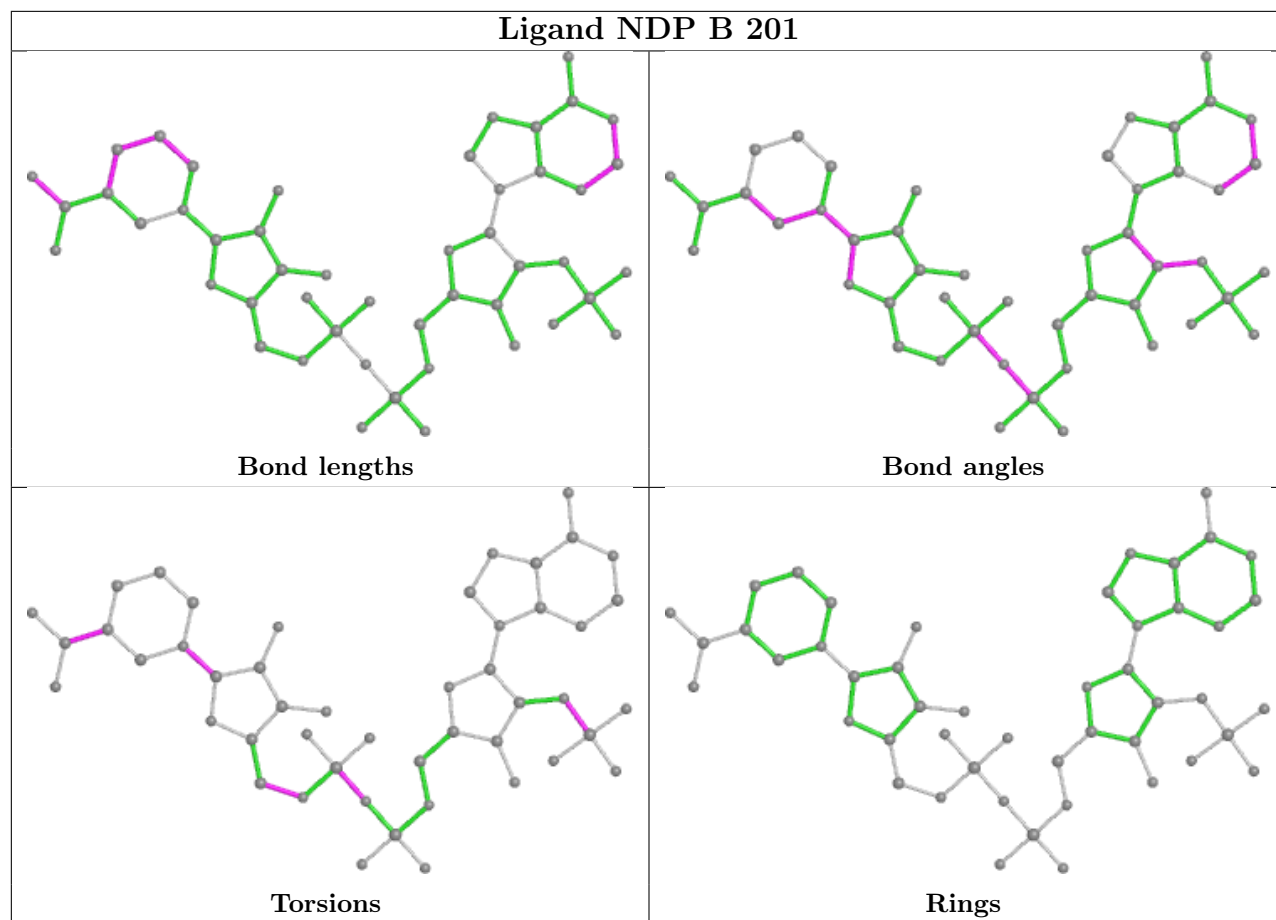
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Fit of model and data ⓘ

6.1   Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3   Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4   Ligands ⓘ

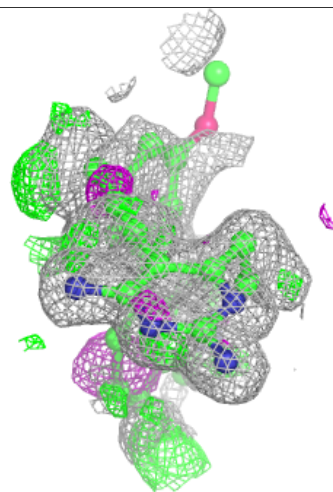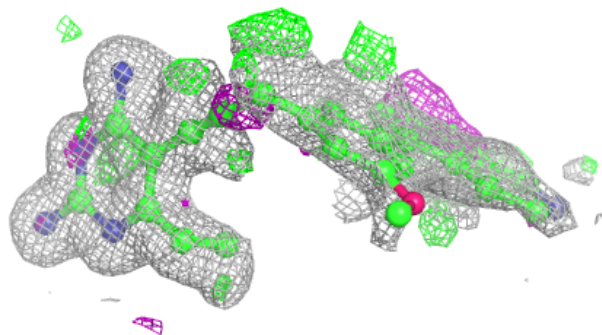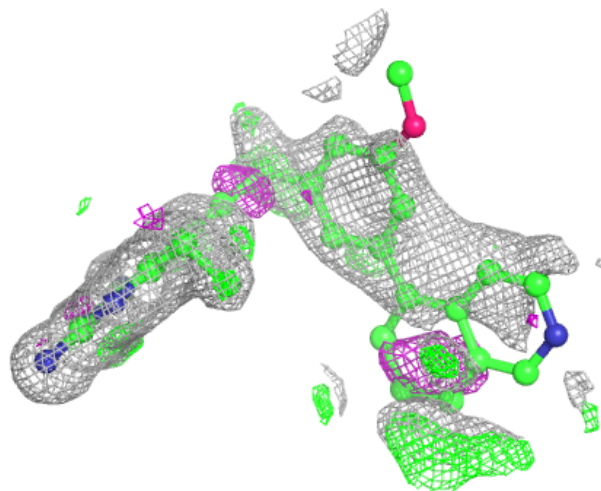Unable to reproduce the depositors R factor - this section is therefore empty.

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.
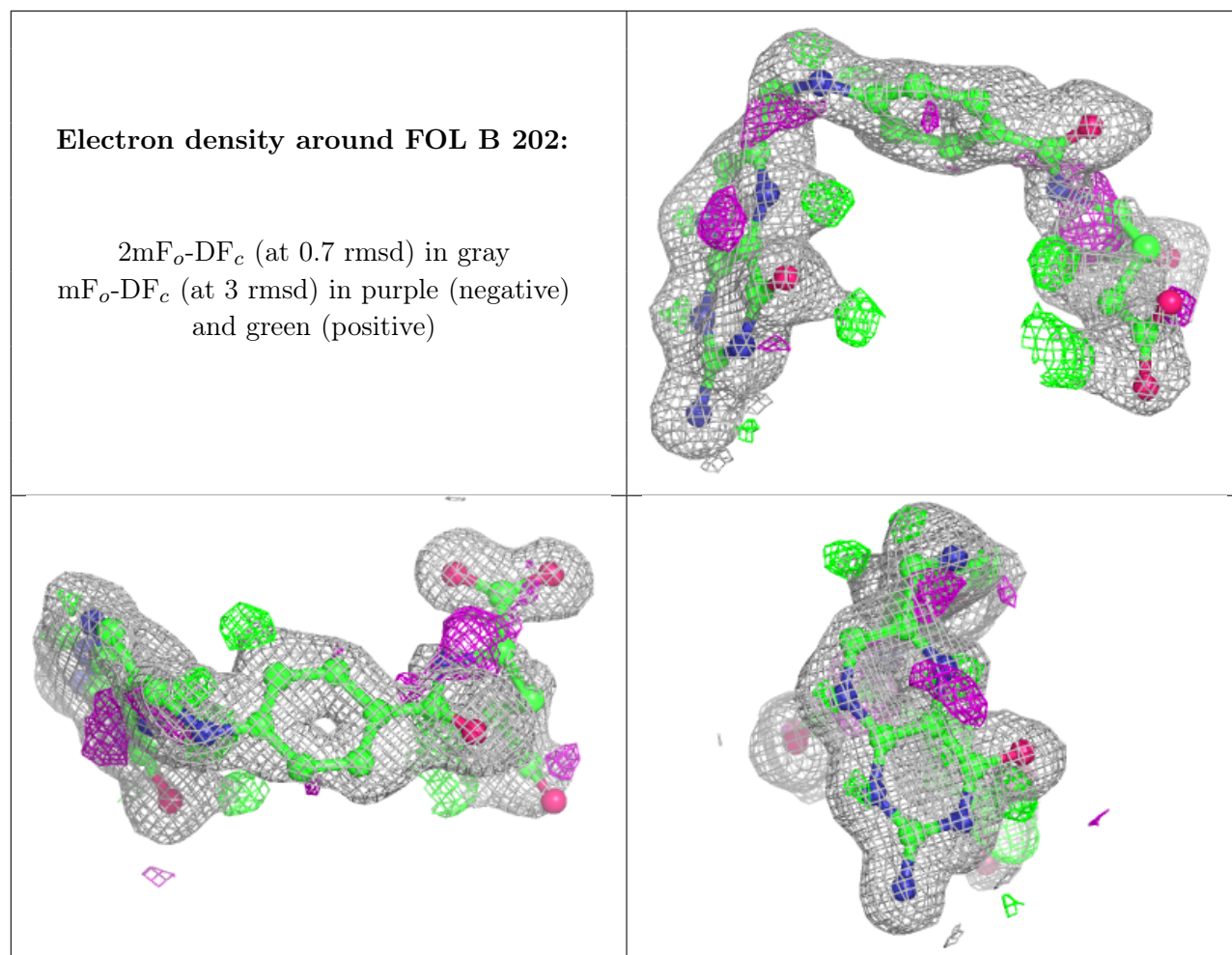

Electron density around NDP A 201:

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

Electron density around NDP B 201:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
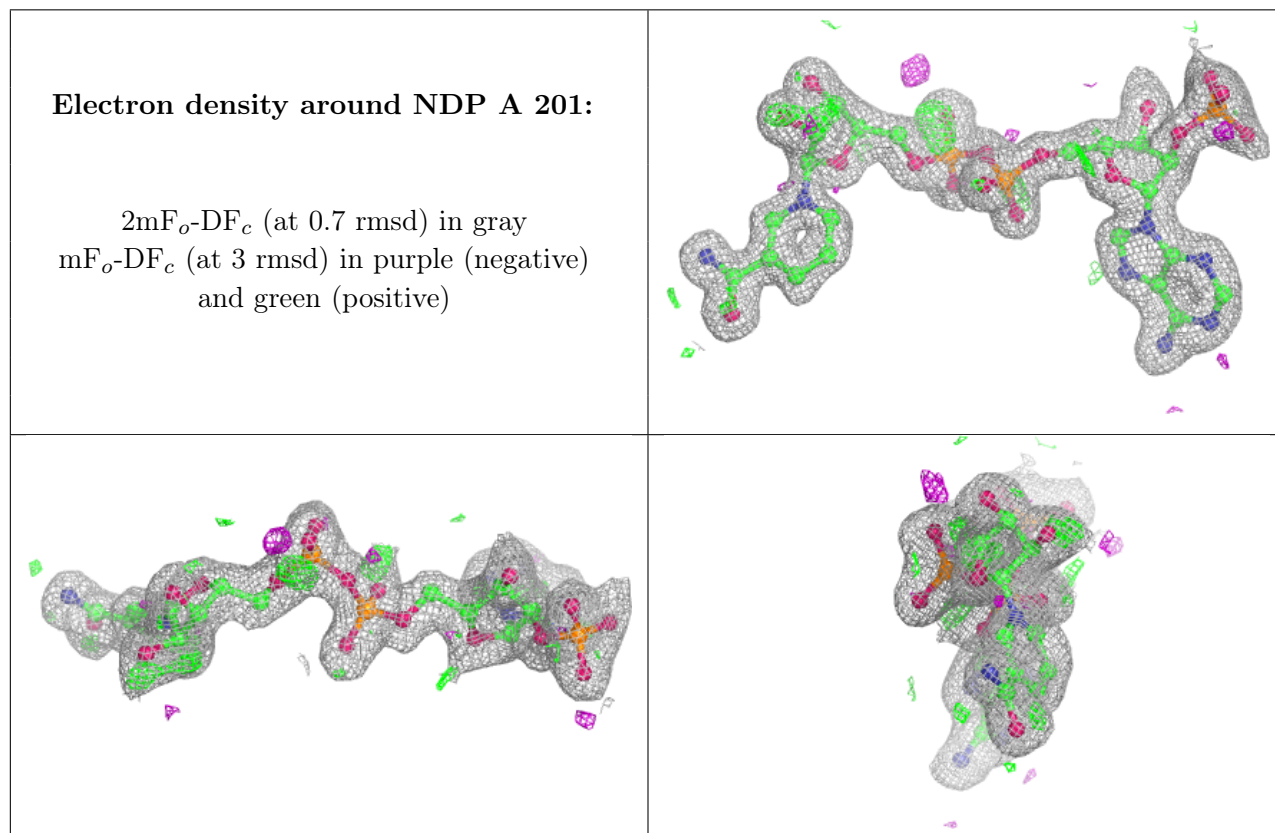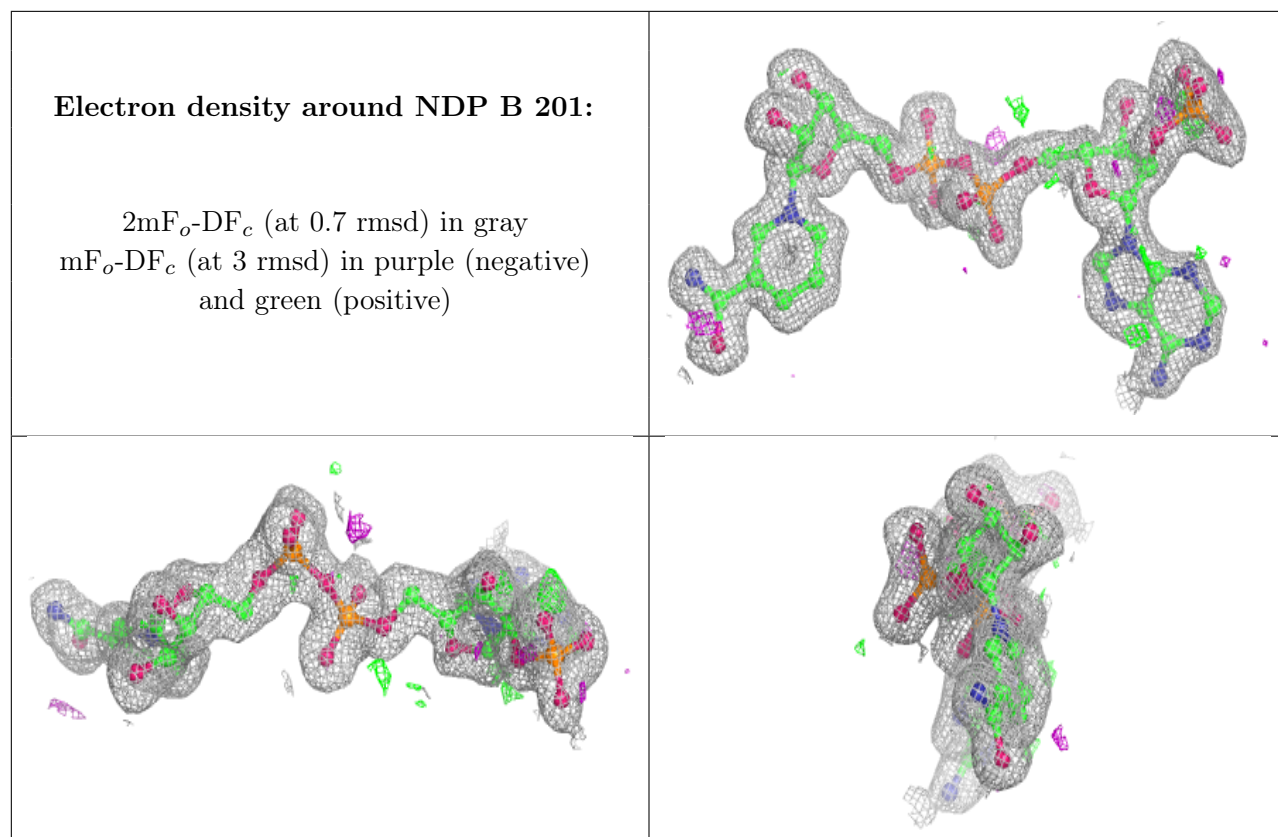
Electron density around 1R0 A 202:

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

Electron density around FOL B 202:

$2mF_o$-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 ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.