WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Dec 18, 2023 – 05:07 am GMT

PDB ID	:	4CBQ
Title	:	Crystal structure of the thioredoxin reductase from Entamoeba histolytica with auranofin Au(I) bound to Cys286
Authors	:	Parsonage, D.; Kells, P.M.; Hirata, K.; Debnath, A.; Poole, L.B.; McKerrow, J.H.; Reed, S.L.; Podust, L.M.
Deposited on	:	2013-10-16
Resolution	:	1.94 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
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)	:	2.36

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 1.94 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.
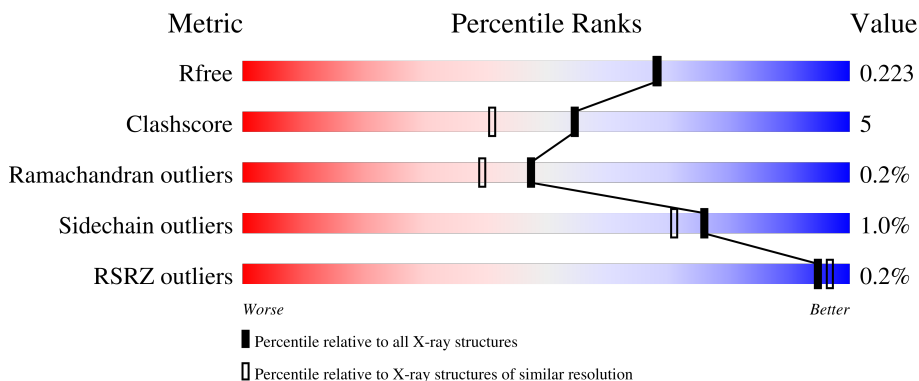
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4310 (1.96-1.92)
Clashscore	141614	1023 (1.94-1.94)
Ramachandran outliers	138981	1007 (1.94-1.94)
Sidechain outliers	138945	1007 (1.94-1.94)
RSRZ outliers	127900	4250 (1.96-1.92)

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% 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	314	86% 12% ••
1	B	314	89% 10% •

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 5405 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 THIOREDOXIN REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	312	Total	C	N	O	S	0	6	0
			2389	1509	410	453	17			
1	B	312	Total	C	N	O	S	0	5	0
			2377	1501	405	453	18			

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$).
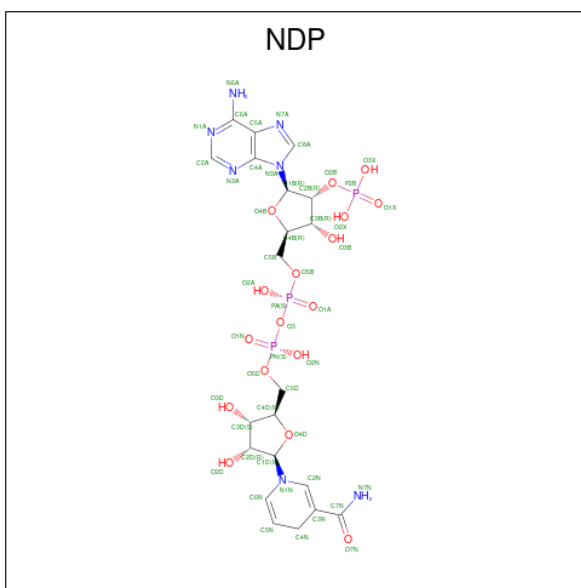
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
2	B	1	Total	C	N	O	P	0	0
			39	15	5	16	3		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

SO4

O1

O3 O⁻ — S — O⁻ O4

S

O2

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

- Molecule 4 is GOLD ION (three-letter code: AU) (formula: Au).

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

- Molecule 5 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).

FAD

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
5	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	2	Total	Cl	0	0
			2	2		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	224	Total	O	0	0
			224	224		
7	B	193	Total	O	0	0
			193	193		

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.
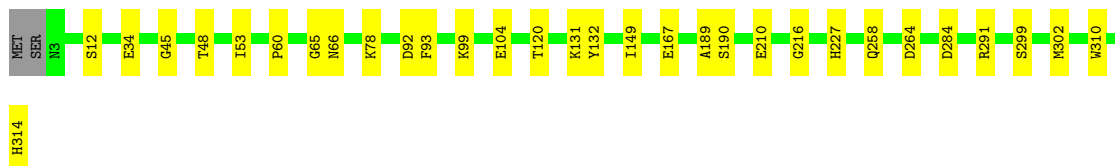
• Molecule 1: THIOREDOXIN REDUCTASE

Chain A:
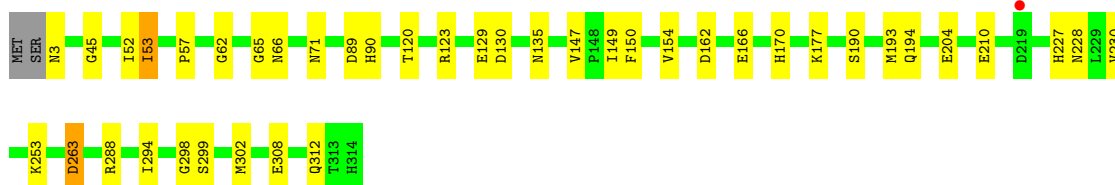
• Molecule 1: THIOREDOXIN REDUCTASE

Chain B:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	65.62Å　91.62Å　103.68Å 90.00°　90.00°　90.00°	Depositor
Resolution (Å)	68.75　–　1.94 68.66　–　1.94	Depositor EDS
% Data completeness (in resolution range)	98.8 (68.75-1.94) 98.8 (68.66-1.94)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.75 (at 1.94Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.168　,　0.218 0.176　,　0.223	Depositor DCC
R_{free} test set	2340 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	32.2	Xtriage
Anisotropy	0.243	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 45.5	EDS
L-test for twinning[2]	$< |L| > = 0.47$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	5405	wwPDB-VP
Average B, all atoms (Å^2)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.09% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 (i)

5.1   Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: AU, FAD, NDP, SO4, CL

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	0.85	0/2436	0.86	1/3297 (0.0%)
1	B	0.88	0/2423	0.86	3/3281 (0.1%)
All	All	0.87	0/4859	0.86	4/6578 (0.1%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	264	ASP	CB-CG-OD2	-6.22	112.71	118.30
1	A	162	ASP	CB-CG-OD1	5.84	123.55	118.30
1	B	92	ASP	CB-CG-OD1	5.41	123.17	118.30
1	B	264	ASP	CB-CG-OD1	5.32	123.09	118.30

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2389	0	2357	29	1
1	B	2377	0	2343	21	0
2	A	48	0	26	2	0
2	B	39	0	18	1	0
3	A	15	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	10	0	0	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	53	0	31	3	0
5	B	53	0	31	1	0
6	B	2	0	0	0	0
7	A	224	0	0	9	0
7	B	193	0	0	8	1
All	All	5405	0	4806	51	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (51) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:120:THR:HG22	7:A:2100:HOH:O	1.59	1.03
1:B:167:GLU:OE1	7:B:2087:HOH:O	2.05	0.73
1:A:135:ASN:OD1	7:A:2108:HOH:O	2.08	0.71
1:B:284:ASP:OD2	7:B:2036:HOH:O	2.11	0.67
1:B:149:ILE:HG23	7:B:2091:HOH:O	1.94	0.66
3:B:1317:SO4:O4	7:B:2082:HOH:O	2.11	0.66
1:A:89:ASP:HB3	1:A:90[A]:HIS:CD2	2.31	0.66
1:A:3:ASN:CB	7:A:2001:HOH:O	2.44	0.64
1:B:210:GLU:OE2	1:B:227:HIS:HD2	1.82	0.63
1:B:104:GLU:HG3	7:B:2070:HOH:O	1.98	0.63
1:A:190:SER:O	1:A:194:GLN:HG3	2.00	0.62
1:B:99:LYS:HE3	7:B:2065:HOH:O	2.03	0.59
1:A:170:HIS:HE1	7:A:2115:HOH:O	1.86	0.57
1:B:291:ARG:NH2	2:B:1315:NDP:H52N	2.19	0.57
1:A:52:ILE:HD12	1:A:52:ILE:O	2.06	0.56
1:A:45:GLY:HA2	5:A:1320:FAD:O3B	2.07	0.55
1:A:298:GLY:O	1:A:302[B]:MET:HG3	2.07	0.55
1:A:210:GLU:OE2	1:A:227:HIS:HD2	1.90	0.54
1:A:177:LYS:HD2	1:A:204:GLU:OE2	2.07	0.54
1:A:53:ILE:HD11	1:A:65:GLY:HA2	1.88	0.53
1:B:45:GLY:HA2	5:B:1321:FAD:O3B	2.09	0.53
1:A:299[A]:SER:HA	1:A:302[A]:MET:HE2	1.91	0.52
1:B:299[A]:SER:HA	1:B:302[A]:MET:HE2	1.90	0.52
1:B:310:TRP:O	1:B:314:HIS:HD2	1.92	0.52
1:A:147:VAL:HG22	1:A:150:PHE:CD2	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:93:PHE:H	1:B:258:GLN:NE2	2.09	0.50
1:A:312[B]:GLN:NE2	7:A:2212:HOH:O	2.43	0.50
1:A:228:ASN:OD1	1:A:230:VAL:HG22	2.12	0.48
2:A:1315:NDP:C7N	5:A:1320:FAD:HM73	2.43	0.48
1:B:120[B]:THR:HG22	7:B:2077:HOH:O	2.14	0.48
1:B:48:THR:HB	1:B:66:ASN:HD21	1.79	0.46
1:A:62:GLY:O	7:A:2050:HOH:O	2.20	0.46
7:A:2049:HOH:O	1:B:78:LYS:NZ	2.48	0.46
1:B:132:TYR:CZ	1:B:216:GLY:HA3	2.51	0.46
1:A:177:LYS:HD2	1:A:204:GLU:CD	2.37	0.45
1:B:227:HIS:HE1	7:B:2136:HOH:O	1.98	0.45
1:A:66:ASN:OD1	7:A:2052:HOH:O	2.21	0.45
1:A:149:ILE:HG23	7:A:2118:HOH:O	2.16	0.44
1:A:308:GLU:OE2	1:B:190:SER:HB3	2.17	0.44
1:B:12:SER:HB3	1:B:34:GLU:HB2	2.00	0.43
1:A:166:GLU:HG3	1:A:193:MET:CE	2.48	0.43
1:A:123:ARG:HB3	1:A:129:GLU:OE2	2.19	0.42
1:A:263[A]:ASP:C	1:A:263[A]:ASP:OD1	2.58	0.42
2:A:1315:NDP:N7N	5:A:1320:FAD:HM73	2.35	0.42
1:B:53:ILE:HD11	1:B:65:GLY:HA2	2.02	0.42
1:A:71:ASN:HB3	1:B:60:PRO:HD3	2.02	0.41
1:A:57:PRO:HD2	1:A:294:ILE:HD13	2.02	0.41
1:A:166:GLU:CG	1:A:193:MET:HE2	2.50	0.41
1:B:12:SER:HB3	1:B:34:GLU:CB	2.49	0.41
1:A:89:ASP:C	1:A:90[A]:HIS:CG	2.91	0.41
1:A:130:ASP:HB3	3:A:1317:SO4:O3	2.20	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:253:LYS:NZ	7:B:2161:HOH:O[3_544]	2.10	0.10

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	316/314 (101%)	308 (98%)	8 (2%)	0	100	100
1	B	315/314 (100%)	306 (97%)	8 (2%)	1 (0%)	41	32
All	All	631/628 (100%)	614 (97%)	16 (2%)	1 (0%)	47	39

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	189	ALA

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	252/251 (100%)	247 (98%)	5 (2%)	55	42
1	B	251/251 (100%)	250 (100%)	1 (0%)	91	91
All	All	503/502 (100%)	497 (99%)	6 (1%)	76	64

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	53	ILE
1	A	154	VAL
1	A	263[A]	ASP
1	A	263[B]	ASP
1	A	288	ARG
1	B	131	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	46	GLN

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Mol	Chain	Res	Type
1	A	194	GLN
1	A	208	ASN
1	A	227	HIS
1	A	251	ASN
1	A	292	GLN
1	B	66	ASN
1	B	194	GLN
1	B	208	ASN
1	B	227	HIS
1	B	258	GLN
1	B	314	HIS

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 13 ligands modelled in this entry, 4 are monoatomic - leaving 9 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	SO4	B	1317	-	4,4,4	0.45	0	6,6,6	0.53	0
3	SO4	A	1318	-	4,4,4	0.37	0	6,6,6	0.59	0
3	SO4	A	1317	-	4,4,4	0.44	0	6,6,6	0.45	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	NDP	A	1315	-	45,52,52	0.97	3 (6%)	53,80,80	1.85	12 (22%)
5	FAD	B	1321	-	53,58,58	1.52	7 (13%)	68,89,89	1.49	9 (13%)
5	FAD	A	1320	-	53,58,58	1.64	7 (13%)	68,89,89	1.49	14 (20%)
3	SO4	A	1316	-	4,4,4	0.34	0	6,6,6	1.02	0
2	NDP	B	1315	-	36,42,52	1.35	4 (11%)	43,65,80	1.90	11 (25%)
3	SO4	B	1316	-	4,4,4	0.41	0	6,6,6	0.39	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
5	FAD	A	1320	-	-	6/30/50/50	0/6/6/6
2	NDP	B	1315	-	-	10/23/56/77	0/4/4/5
2	NDP	A	1315	-	-	6/30/77/77	0/5/5/5
5	FAD	B	1321	-	-	5/30/50/50	0/6/6/6

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1320	FAD	C9A-C5X	5.80	1.50	1.41
5	B	1321	FAD	C9A-C5X	5.47	1.50	1.41
5	A	1320	FAD	O4B-C1B	4.58	1.47	1.41
5	A	1320	FAD	C4X-N5	3.70	1.37	1.30
5	A	1320	FAD	C2A-N3A	3.46	1.37	1.32
5	A	1320	FAD	C8-C7	3.35	1.49	1.40
2	B	1315	NDP	C4A-N3A	3.35	1.40	1.35
2	A	1315	NDP	C6N-C5N	3.22	1.39	1.33
2	B	1315	NDP	C5A-C4A	3.22	1.49	1.40
5	B	1321	FAD	C4X-N5	3.08	1.36	1.30
2	B	1315	NDP	C2A-N3A	3.05	1.37	1.32
5	B	1321	FAD	C8-C7	3.02	1.48	1.40
5	A	1320	FAD	C6-C7	2.70	1.43	1.39
5	A	1320	FAD	C5X-N5	-2.66	1.34	1.39
5	B	1321	FAD	C1'-C2'	-2.55	1.49	1.52
2	A	1315	NDP	C2A-N3A	2.47	1.36	1.32
2	B	1315	NDP	C2D-C3D	-2.36	1.49	1.53
5	B	1321	FAD	C4A-N3A	-2.29	1.32	1.35
2	A	1315	NDP	C5A-C4A	2.26	1.46	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	1321	FAD	C4X-C10	2.20	1.50	1.44
5	B	1321	FAD	C5'-C4'	2.13	1.54	1.51

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1315	NDP	O4D-C1D-C2D	-5.00	96.32	105.99
2	A	1315	NDP	C1B-N9A-C4A	-4.80	118.22	126.64
2	A	1315	NDP	N3A-C2A-N1A	-4.44	121.74	128.68
2	B	1315	NDP	C1D-O4D-C4D	-4.31	98.11	108.16
2	B	1315	NDP	O2A-PA-O1A	4.29	133.47	112.24
2	A	1315	NDP	C2D-C1D-N1N	-4.16	102.88	113.30
2	A	1315	NDP	C1D-N1N-C2N	-4.05	114.36	121.11
2	A	1315	NDP	O4D-C1D-N1N	3.80	115.49	108.06
5	B	1321	FAD	O2-C2-N1	-3.67	115.75	121.83
5	A	1320	FAD	C9A-C5X-N5	-3.44	118.70	122.43
2	B	1315	NDP	O2A-PA-O5B	-3.37	92.08	107.75
5	B	1321	FAD	C4-C4X-N5	3.37	123.03	118.23
5	A	1320	FAD	C4A-C5A-N7A	-3.36	105.89	109.40
2	B	1315	NDP	O3X-P2B-O2X	3.30	120.25	107.64
2	A	1315	NDP	PN-O3-PA	-3.22	121.77	132.83
2	A	1315	NDP	O2A-PA-O1A	3.17	127.89	112.24
5	B	1321	FAD	N3A-C2A-N1A	-3.16	123.74	128.68
2	B	1315	NDP	O2N-PN-O1N	3.13	127.70	112.24
5	B	1321	FAD	C4A-C5A-N7A	-3.12	106.15	109.40
5	A	1320	FAD	O4-C4-C4X	-3.03	118.57	126.60
2	A	1315	NDP	O2N-PN-O1N	2.92	126.69	112.24
5	B	1321	FAD	C9A-C5X-N5	-2.86	119.33	122.43
2	B	1315	NDP	N3A-C2A-N1A	-2.79	124.32	128.68
5	A	1320	FAD	C4-C4X-N5	2.67	122.04	118.23
2	B	1315	NDP	O2D-C2D-C3D	-2.67	106.21	111.27
5	A	1320	FAD	C5X-C9A-N10	2.67	120.71	117.95
2	B	1315	NDP	C1B-N9A-C4A	-2.61	122.06	126.64
2	A	1315	NDP	C2A-N1A-C6A	2.59	123.18	118.75
5	B	1321	FAD	O4-C4-C4X	-2.55	119.83	126.60
5	A	1320	FAD	O3B-C3B-C4B	2.51	118.31	111.05
5	A	1320	FAD	C1B-N9A-C4A	-2.44	122.35	126.64
5	A	1320	FAD	O5'-C5'-C4'	-2.37	103.03	109.36
5	A	1320	FAD	C4X-C4-N3	2.36	119.19	113.19
5	B	1321	FAD	O2'-C2'-C3'	2.35	114.82	109.10
5	B	1321	FAD	P-O3P-PA	2.35	140.90	132.83
5	A	1320	FAD	C7M-C7-C6	2.35	123.83	119.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	1320	FAD	C7M-C7-C8	-2.34	115.95	120.74
2	A	1315	NDP	O2B-P2B-O1X	-2.26	100.67	109.39
5	B	1321	FAD	C5X-C9A-N10	2.22	120.25	117.95
5	A	1320	FAD	N3A-C2A-N1A	-2.19	125.26	128.68
5	A	1320	FAD	C6-C5X-N5	2.16	122.28	118.51
2	A	1315	NDP	O7N-C7N-C3N	-2.16	116.84	120.90
2	A	1315	NDP	O5B-PA-O1A	-2.14	100.72	109.07
2	B	1315	NDP	C5B-C4B-C3B	-2.12	107.22	115.18
2	B	1315	NDP	O5D-PN-O1N	-2.09	100.92	109.07
5	A	1320	FAD	O2A-PA-O1A	2.04	122.33	112.24

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1315	NDP	O4D-C1D-N1N-C6N
2	B	1315	NDP	C5D-O5D-PN-O3
2	B	1315	NDP	O4D-C4D-C5D-O5D
5	B	1321	FAD	O4B-C4B-C5B-O5B
5	B	1321	FAD	C3B-C4B-C5B-O5B
2	A	1315	NDP	C1B-C2B-O2B-P2B
2	A	1315	NDP	C3B-C2B-O2B-P2B
2	A	1315	NDP	C3D-C4D-C5D-O5D
5	A	1320	FAD	C3B-C4B-C5B-O5B
2	B	1315	NDP	C3B-C2B-O2B-P2B
2	A	1315	NDP	O4D-C4D-C5D-O5D
2	B	1315	NDP	C3D-C4D-C5D-O5D
5	A	1320	FAD	O4B-C4B-C5B-O5B
2	B	1315	NDP	C1B-C2B-O2B-P2B
2	B	1315	NDP	PA-O3-PN-O5D
5	A	1320	FAD	PA-O3P-P-O5'
5	B	1321	FAD	PA-O3P-P-O5'
2	B	1315	NDP	C2B-O2B-P2B-O2X
2	B	1315	NDP	PN-O3-PA-O2A
5	A	1320	FAD	P-O3P-PA-O1A
5	B	1321	FAD	P-O3P-PA-O2A
2	B	1315	NDP	C5D-O5D-PN-O1N
5	A	1320	FAD	PA-O3P-P-O1P
5	A	1320	FAD	P-O3P-PA-O2A
5	B	1321	FAD	P-O3P-PA-O1A
2	A	1315	NDP	O4B-C4B-C5B-O5B
2	B	1315	NDP	O4B-C4B-C5B-O5B

There are no ring outliers.
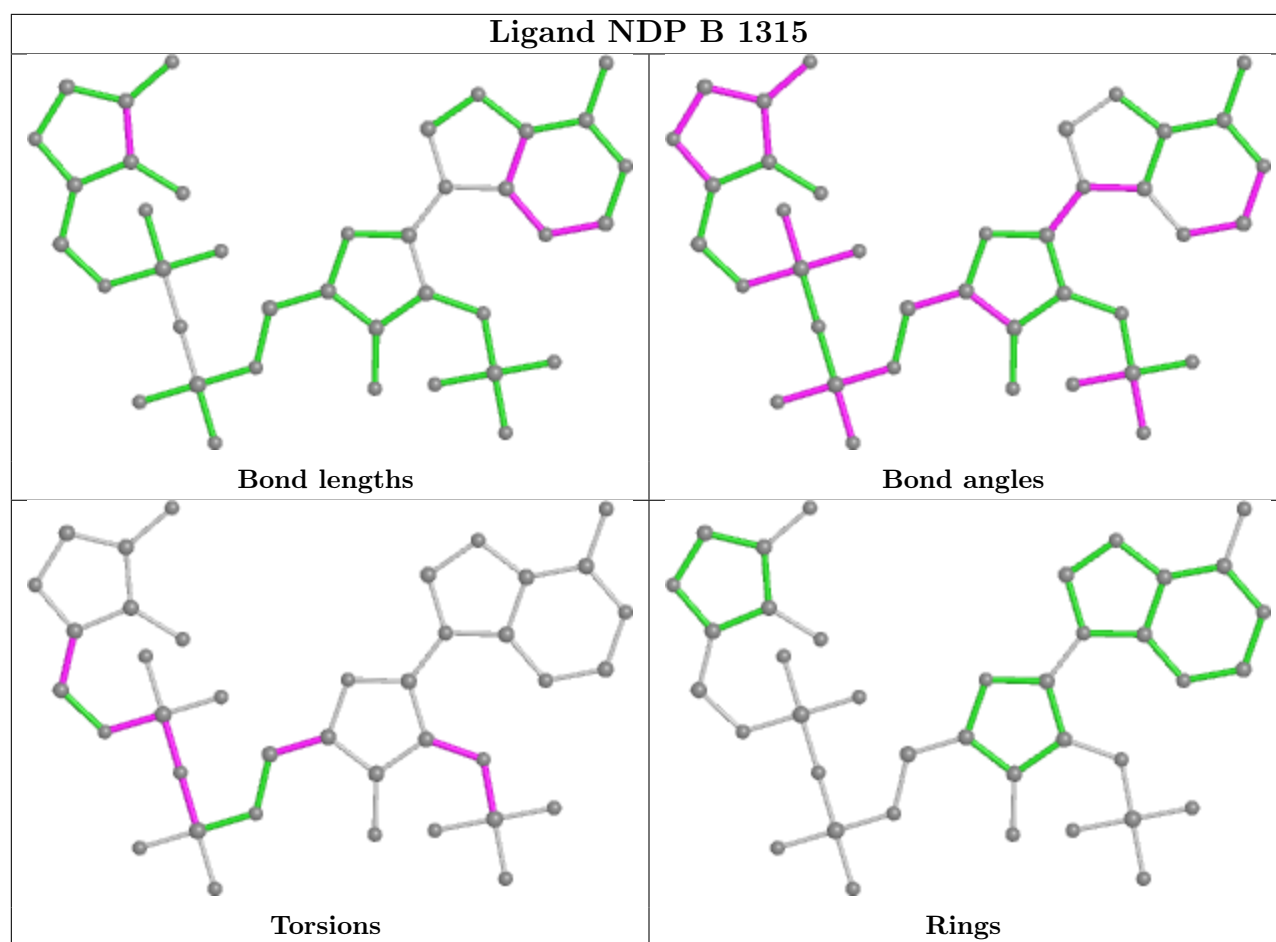
6 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1317	SO4	1	0
3	A	1317	SO4	1	0
2	A	1315	NDP	2	0
5	B	1321	FAD	1	0
5	A	1320	FAD	3	0
2	B	1315	NDP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 NDP A 1315

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD B 1321

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD A 1320

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP B 1315

Bond lengths

Bond angles

Torsions

Rings
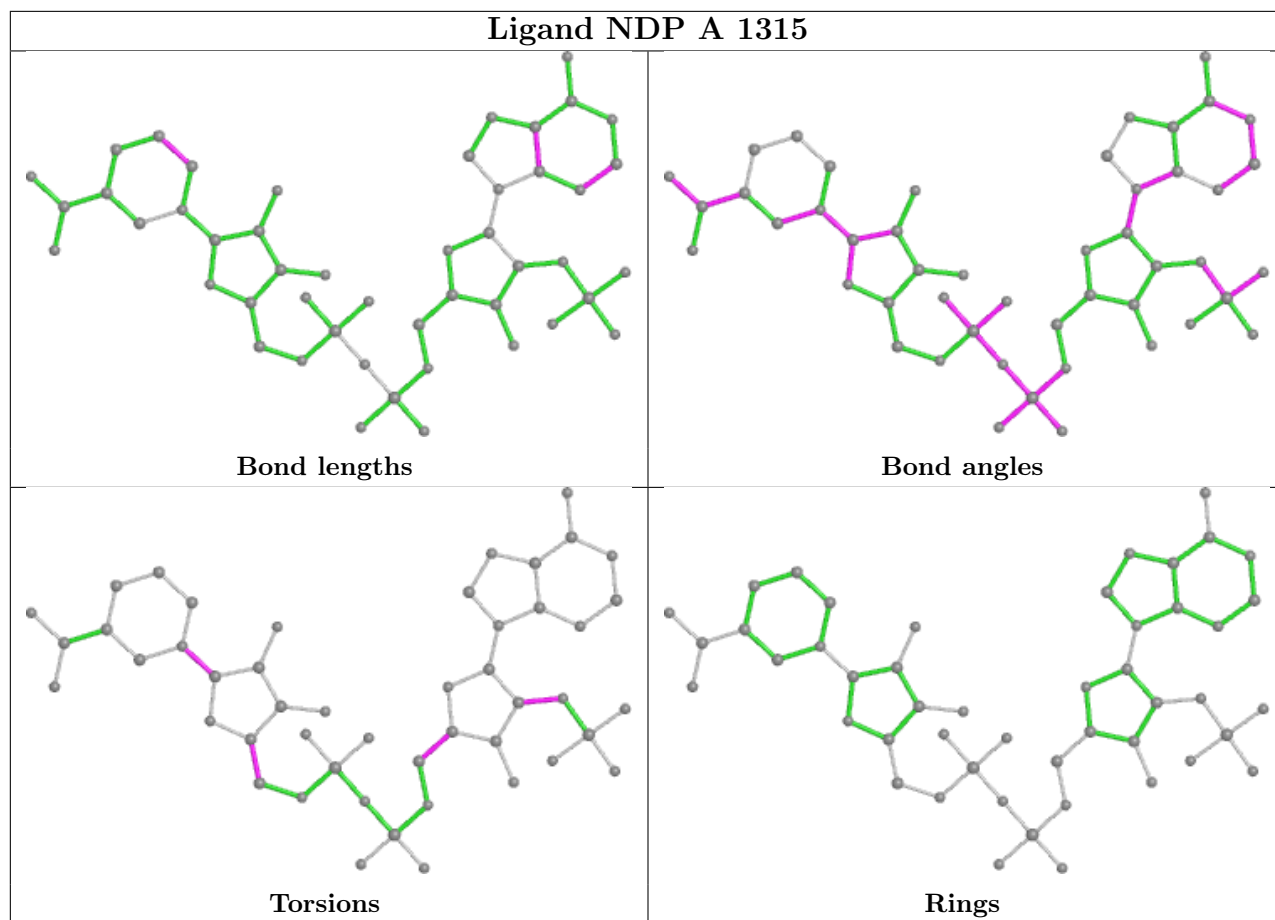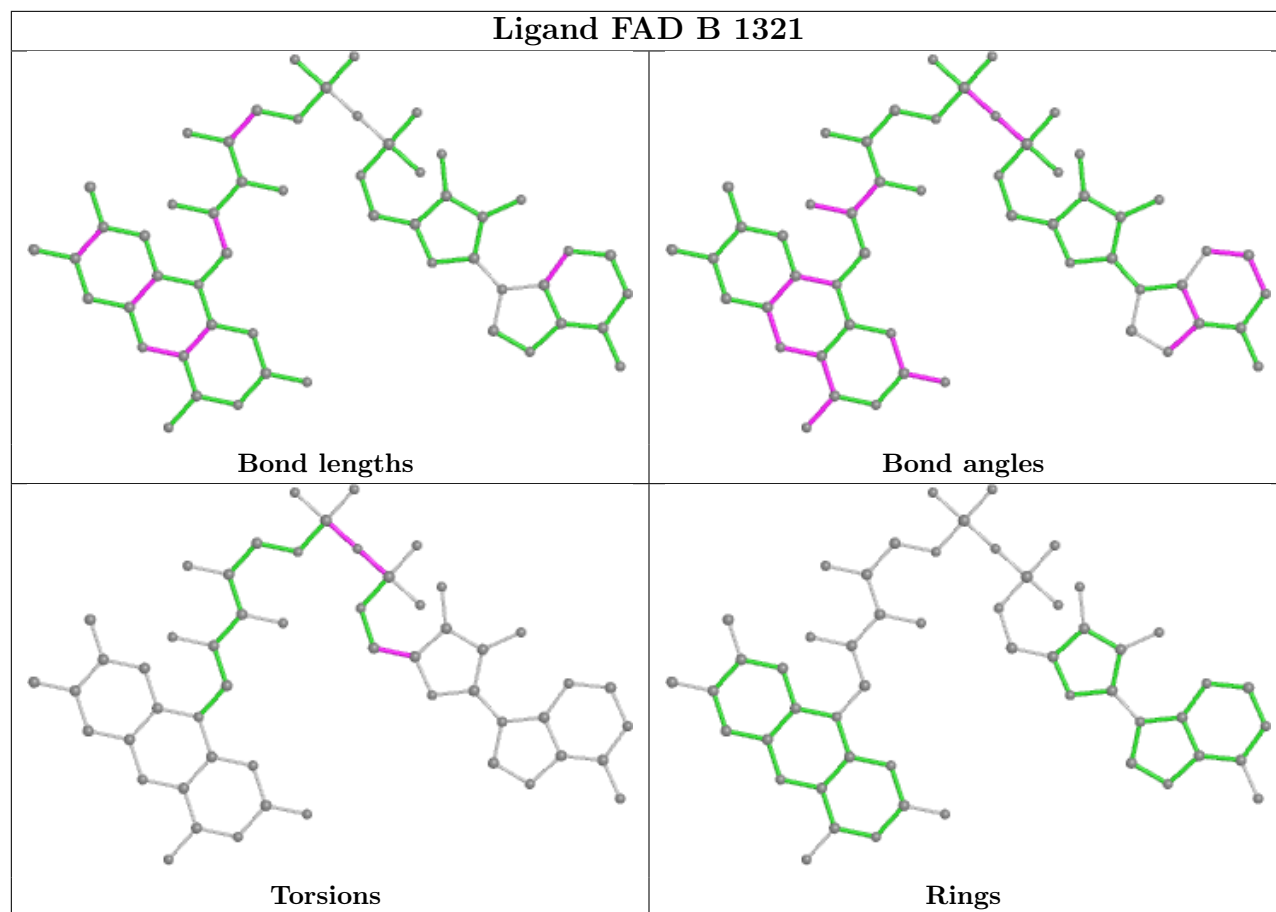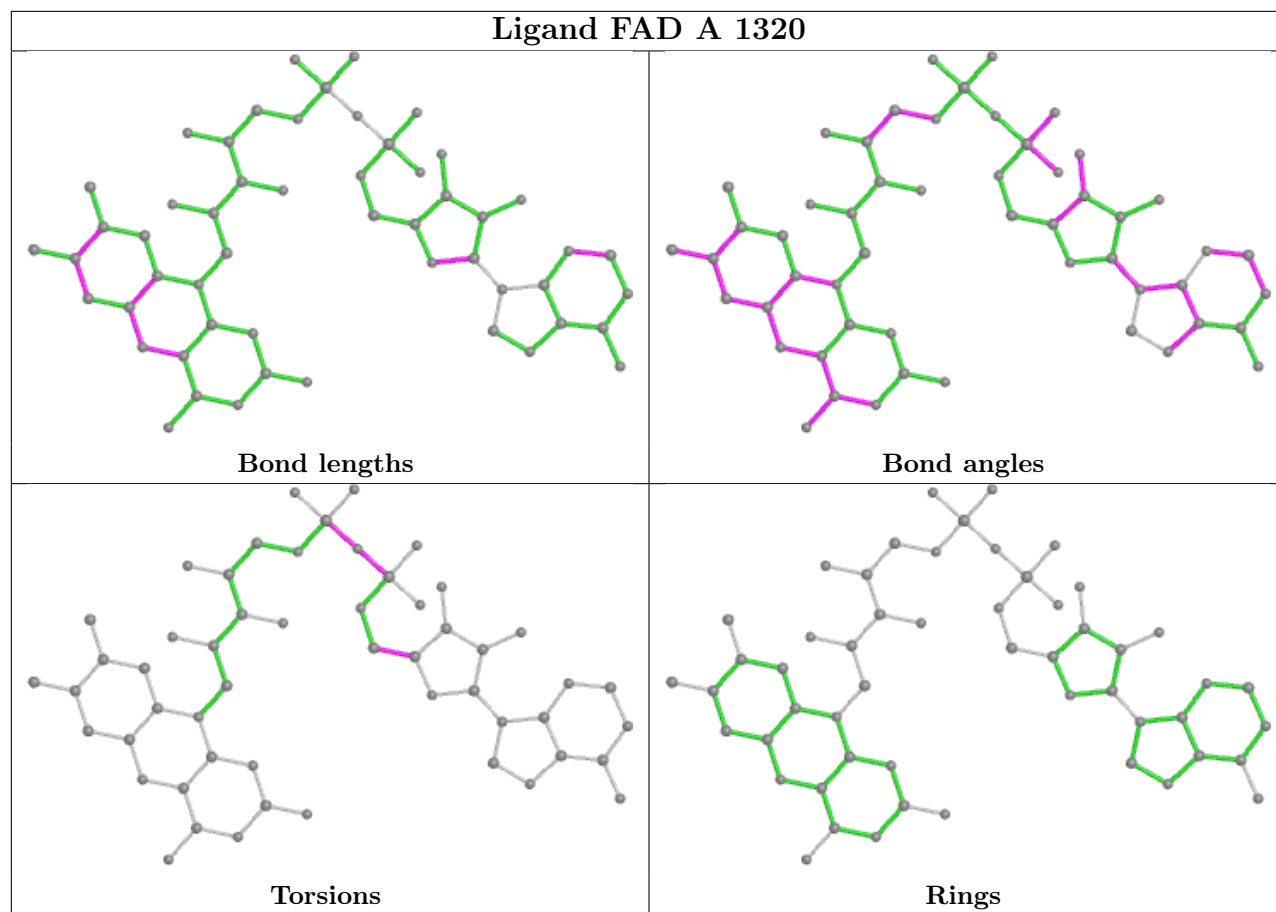
5.7 Other polymers ⓘ

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 ⓘ

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	312/314 (99%)	-0.26	1 (0%)	94	96	21, 33, 50, 60	0
1	B	312/314 (99%)	-0.27	0	100	100	22, 34, 50, 62	0
All	All	624/628 (99%)	-0.26	1 (0%)	95	97	21, 33, 50, 62	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	219	ASP	2.2

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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.
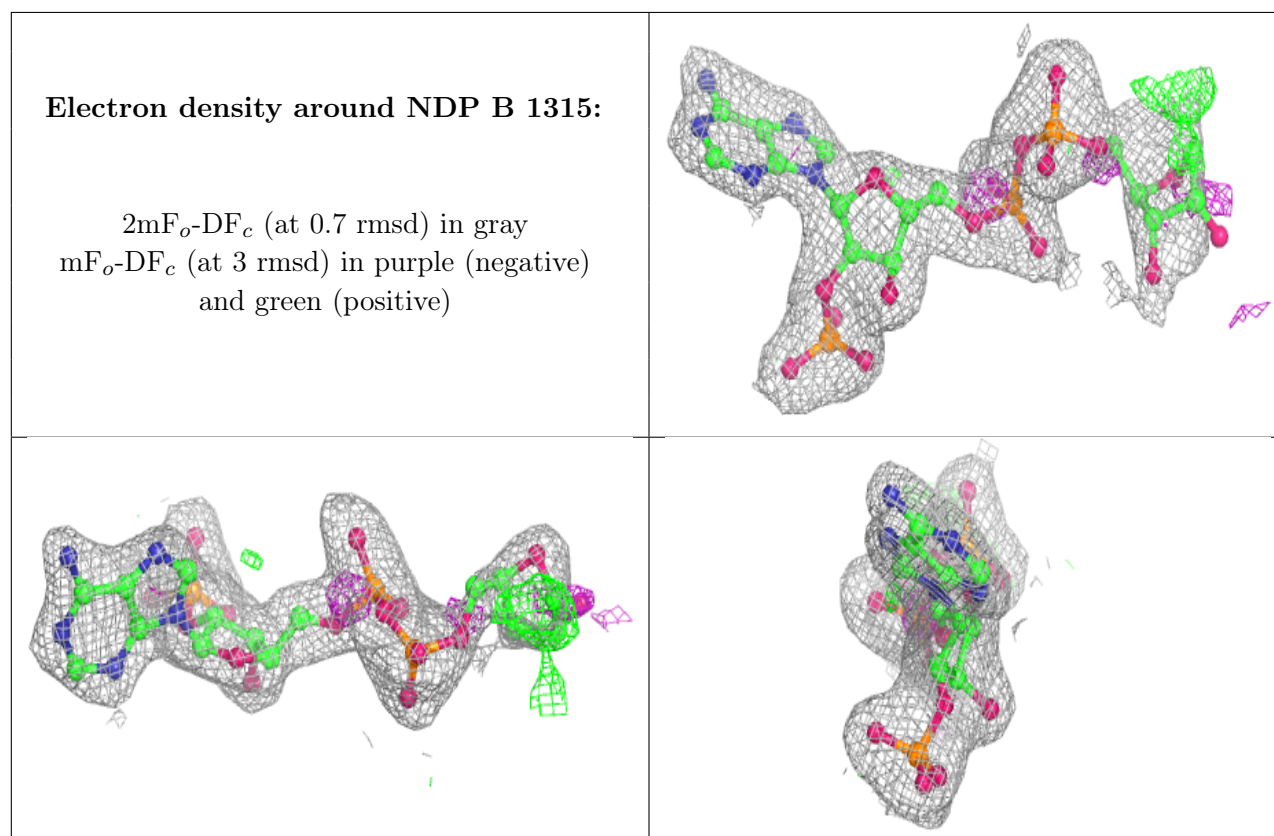
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	CL	B	1320	1/1	0.84	0.14	69,69,69,69	0
3	SO4	B	1316	5/5	0.92	0.27	69,75,81,89	0
3	SO4	A	1317	5/5	0.92	0.14	69,73,76,82	0
6	CL	B	1319	1/1	0.93	0.09	68,68,68,68	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	SO4	B	1317	5/5	0.93	0.15	54,56,62,70	0
2	NDP	B	1315	39/48	0.94	0.14	33,42,59,69	0
3	SO4	A	1318	5/5	0.94	0.24	59,77,81,82	0
5	FAD	B	1321	53/53	0.96	0.10	24,31,39,40	0
5	FAD	A	1320	53/53	0.97	0.09	23,27,42,43	0
2	NDP	A	1315	48/48	0.97	0.11	27,35,75,84	0
3	SO4	A	1316	5/5	0.97	0.09	44,47,52,53	0
4	AU	A	1319	1/1	0.97	0.07	47,47,47,47	1
4	AU	B	1318	1/1	0.98	0.04	47,47,47,47	1

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 1315:

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

Electron density around FAD B 1321:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
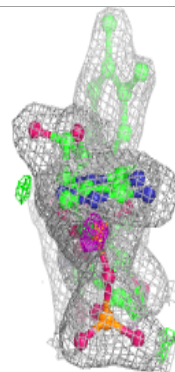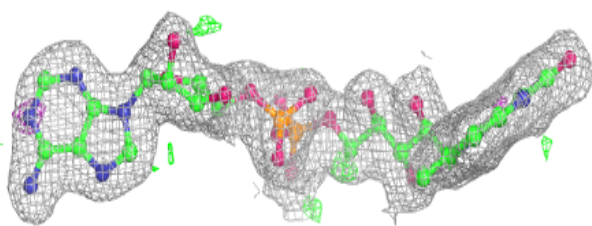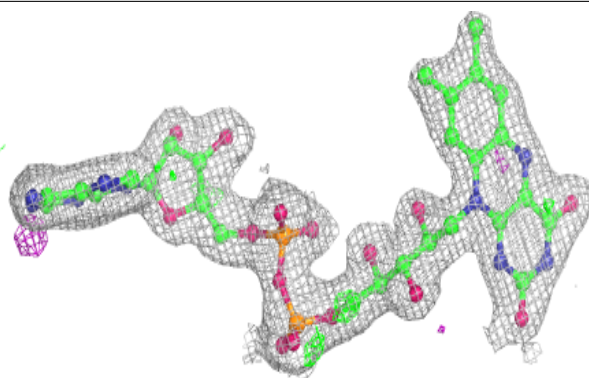
Electron density around FAD A 1320:

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

Electron density around NDP A 1315:

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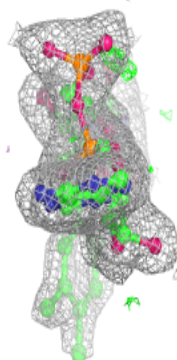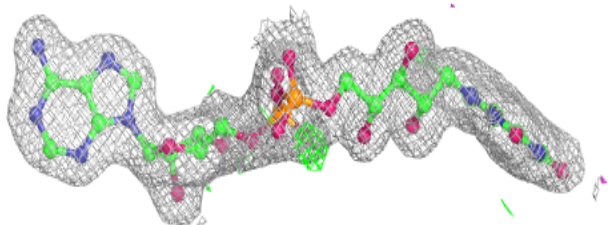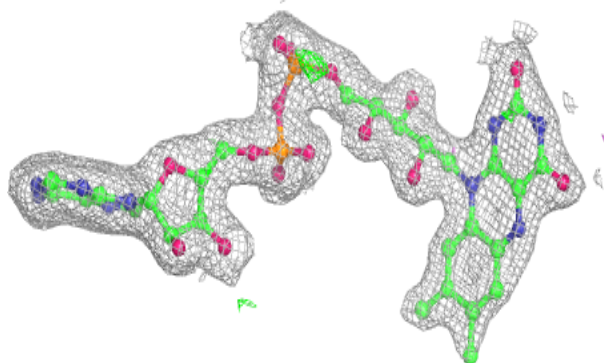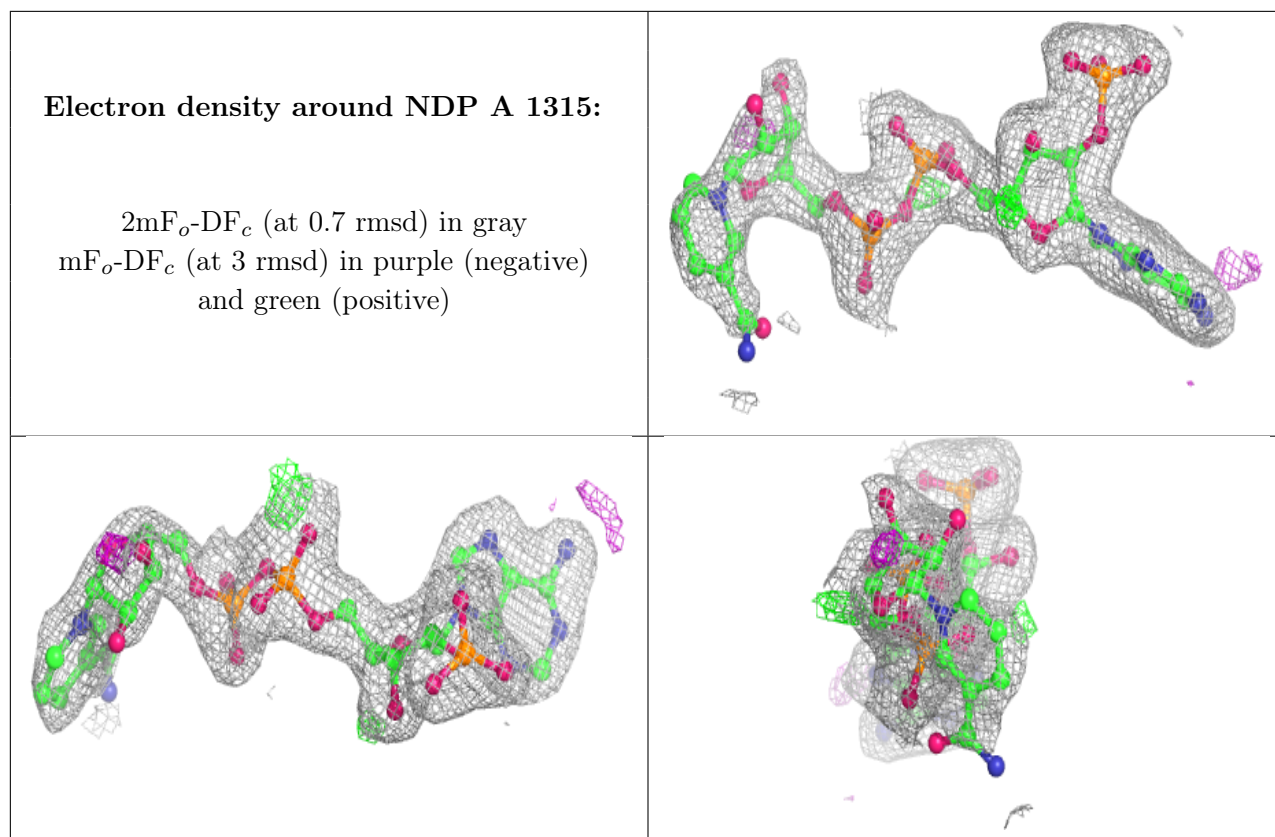
6.5   Other polymers (i)

There are no such residues in this entry.