



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2026 – 12:09 AM UTC

PDB ID : 4CMG / pdb_00004cmg
Title : Crystal structure of pteridine reductase 1 (PTR1) from Trypanosoma brucei
in ternary complex with cofactor and inhibitor
Authors : Barrack, K.L.; Hunter, W.N.
Deposited on : 2014-01-16
Resolution : 2.00 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

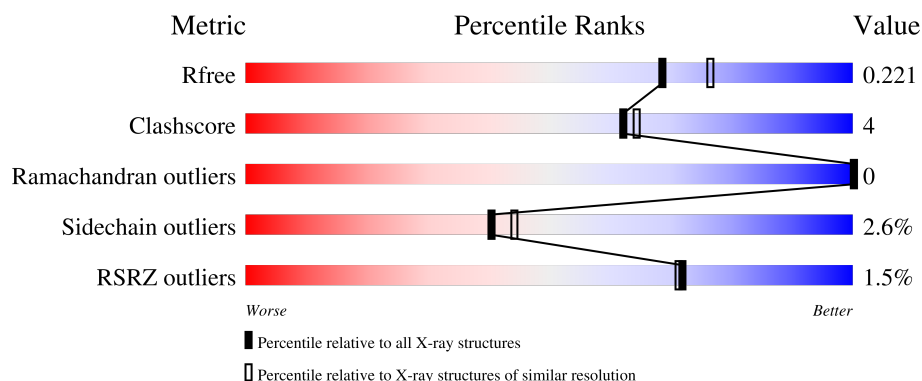
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

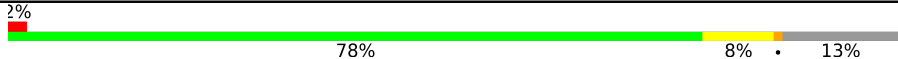
The reported resolution of this entry is 2.00 Å.

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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	288	
1	B	288	
1	C	288	
1	D	288	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8279 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 PTERIDINE REDUCTASE 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	250	Total	C	N	O	S	0	0	0
			1860	1168	328	353	11			
1	B	251	Total	C	N	O	S	0	0	0
			1869	1174	330	354	11			
1	C	250	Total	C	N	O	S	0	1	0
			1869	1173	329	356	11			
1	D	250	Total	C	N	O	S	0	0	0
			1860	1168	328	353	11			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP O76290
A	-18	GLY	-	expression tag	UNP O76290
A	-17	SER	-	expression tag	UNP O76290
A	-16	SER	-	expression tag	UNP O76290
A	-15	HIS	-	expression tag	UNP O76290
A	-14	HIS	-	expression tag	UNP O76290
A	-13	HIS	-	expression tag	UNP O76290
A	-12	HIS	-	expression tag	UNP O76290
A	-11	HIS	-	expression tag	UNP O76290
A	-10	HIS	-	expression tag	UNP O76290
A	-9	SER	-	expression tag	UNP O76290
A	-8	SER	-	expression tag	UNP O76290
A	-7	GLY	-	expression tag	UNP O76290
A	-6	LEU	-	expression tag	UNP O76290
A	-5	VAL	-	expression tag	UNP O76290
A	-4	PRO	-	expression tag	UNP O76290
A	-3	ARG	-	expression tag	UNP O76290
A	-2	GLY	-	expression tag	UNP O76290
A	-1	SER	-	expression tag	UNP O76290
A	0	HIS	-	expression tag	UNP O76290
B	-19	MET	-	expression tag	UNP O76290

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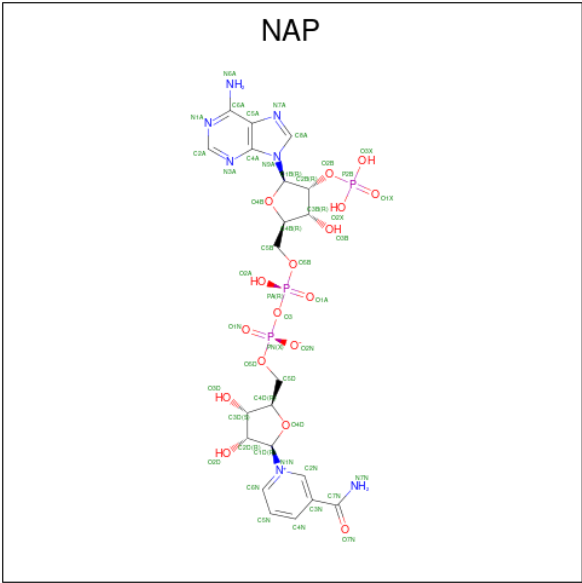
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	expression tag	UNP O76290
B	-17	SER	-	expression tag	UNP O76290
B	-16	SER	-	expression tag	UNP O76290
B	-15	HIS	-	expression tag	UNP O76290
B	-14	HIS	-	expression tag	UNP O76290
B	-13	HIS	-	expression tag	UNP O76290
B	-12	HIS	-	expression tag	UNP O76290
B	-11	HIS	-	expression tag	UNP O76290
B	-10	HIS	-	expression tag	UNP O76290
B	-9	SER	-	expression tag	UNP O76290
B	-8	SER	-	expression tag	UNP O76290
B	-7	GLY	-	expression tag	UNP O76290
B	-6	LEU	-	expression tag	UNP O76290
B	-5	VAL	-	expression tag	UNP O76290
B	-4	PRO	-	expression tag	UNP O76290
B	-3	ARG	-	expression tag	UNP O76290
B	-2	GLY	-	expression tag	UNP O76290
B	-1	SER	-	expression tag	UNP O76290
B	0	HIS	-	expression tag	UNP O76290
C	-19	MET	-	expression tag	UNP O76290
C	-18	GLY	-	expression tag	UNP O76290
C	-17	SER	-	expression tag	UNP O76290
C	-16	SER	-	expression tag	UNP O76290
C	-15	HIS	-	expression tag	UNP O76290
C	-14	HIS	-	expression tag	UNP O76290
C	-13	HIS	-	expression tag	UNP O76290
C	-12	HIS	-	expression tag	UNP O76290
C	-11	HIS	-	expression tag	UNP O76290
C	-10	HIS	-	expression tag	UNP O76290
C	-9	SER	-	expression tag	UNP O76290
C	-8	SER	-	expression tag	UNP O76290
C	-7	GLY	-	expression tag	UNP O76290
C	-6	LEU	-	expression tag	UNP O76290
C	-5	VAL	-	expression tag	UNP O76290
C	-4	PRO	-	expression tag	UNP O76290
C	-3	ARG	-	expression tag	UNP O76290
C	-2	GLY	-	expression tag	UNP O76290
C	-1	SER	-	expression tag	UNP O76290
C	0	HIS	-	expression tag	UNP O76290
D	-19	MET	-	expression tag	UNP O76290
D	-18	GLY	-	expression tag	UNP O76290
D	-17	SER	-	expression tag	UNP O76290

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	expression tag	UNP O76290
D	-15	HIS	-	expression tag	UNP O76290
D	-14	HIS	-	expression tag	UNP O76290
D	-13	HIS	-	expression tag	UNP O76290
D	-12	HIS	-	expression tag	UNP O76290
D	-11	HIS	-	expression tag	UNP O76290
D	-10	HIS	-	expression tag	UNP O76290
D	-9	SER	-	expression tag	UNP O76290
D	-8	SER	-	expression tag	UNP O76290
D	-7	GLY	-	expression tag	UNP O76290
D	-6	LEU	-	expression tag	UNP O76290
D	-5	VAL	-	expression tag	UNP O76290
D	-4	PRO	-	expression tag	UNP O76290
D	-3	ARG	-	expression tag	UNP O76290
D	-2	GLY	-	expression tag	UNP O76290
D	-1	SER	-	expression tag	UNP O76290
D	0	HIS	-	expression tag	UNP O76290

- Molecule 2 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NAP) (formula: C₂₁H₂₈N₇O₁₇P₃).



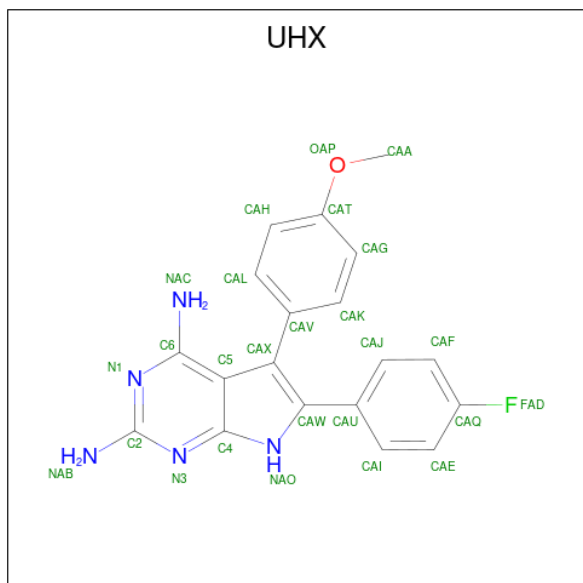
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 48	C 21	N 7	O 17	P 3	0	0
2	B	1	Total 48	C 21	N 7	O 17	P 3	0	0

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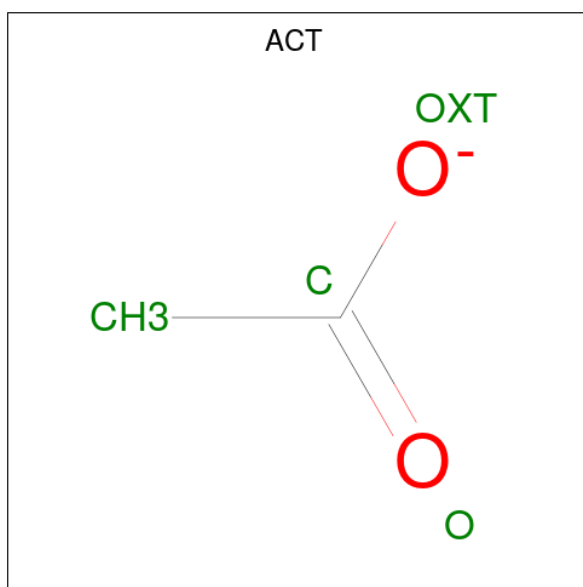
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
2	C	1	Total 48	C 21	N 7	O 17	P 3	0	0
2	D	1	Total 48	C 21	N 7	O 17	P 3	0	0

- Molecule 3 is 6-(4-fluorophenyl)-5-(4-methoxyphenyl)-7H-pyrrolo[2,3-d]pyrimidine-2,4-diamine (CCD ID: UHX) (formula: C₁₉H₁₆FN₅O).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 26	C 19	F 1	N 5	O 1	0	0
3	B	1	Total 26	C 19	F 1	N 5	O 1	0	0
3	C	1	Total 26	C 19	F 1	N 5	O 1	0	0
3	D	1	Total 26	C 19	F 1	N 5	O 1	0	0

- Molecule 4 is ACETATE ION (CCD ID: ACT) (formula: $\text{C}_2\text{H}_3\text{O}_2$).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	150	Total	O	0	0
			150	150		
5	B	133	Total	O	0	0
			133	133		
5	C	114	Total	O	0	0
			114	114		
5	D	120	Total	O	0	0
			120	120		

● Molecule 1: PTERIDINE REDUCTASE 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.92Å 89.66Å 84.08Å 90.00° 115.97° 90.00°	Depositor
Resolution (Å)	44.83 – 2.00 44.83 – 2.00	Depositor EDS
% Data completeness (in resolution range)	95.8 (44.83-2.00) 95.8 (44.83-2.00)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.78 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.161 , 0.213 0.172 , 0.221	Depositor DCC
R_{free} test set	3272 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	15.4	Xtriage
Anisotropy	0.048	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 40.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.016 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8279	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 18.66% 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: NAP, ACT, UHX

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	1.04	0/1887	1.07	1/2560 (0.0%)
1	B	1.04	0/1896	1.07	1/2571 (0.0%)
1	C	1.03	0/1896	1.07	3/2572 (0.1%)
1	D	1.02	1/1887 (0.1%)	1.04	1/2560 (0.0%)
All	All	1.03	1/7566 (0.0%)	1.06	6/10263 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	208	LEU	CA-C	-5.10	1.48	1.53

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	250	GLN	N-CA-C	6.95	119.71	111.71
1	C	30	VAL	N-CA-C	5.93	117.02	108.48
1	C	26	THR	N-CA-C	-5.65	106.39	113.28
1	B	250	GLN	N-CA-C	5.21	118.73	112.38
1	A	78	ASN	N-CA-C	5.20	116.94	111.28
1	D	250	GLN	N-CA-C	5.19	119.10	112.87

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	1860	0	1882	10	0
1	B	1869	0	1895	21	0
1	C	1869	0	1887	11	0
1	D	1860	0	1882	23	0
2	A	48	0	25	0	0
2	B	48	0	25	0	0
2	C	48	0	25	0	0
2	D	48	0	25	0	0
3	A	26	0	16	0	0
3	B	26	0	16	0	0
3	C	26	0	16	0	0
3	D	26	0	16	1	0
4	B	4	0	3	0	0
4	C	4	0	3	0	0
5	A	150	0	0	1	0
5	B	133	0	0	8	0
5	C	114	0	0	4	0
5	D	120	0	0	5	0
All	All	8279	0	7716	64	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 4.

All (64) 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:D:78:ASN:HB3	5:D:2041:HOH:O	1.43	1.19
1:C:215[A]:GLU:HG3	5:C:2084:HOH:O	1.71	0.91
1:D:78:ASN:OD1	1:D:141:ARG:NH1	2.08	0.87
1:B:103:VAL:HG22	5:B:2068:HOH:O	1.83	0.78
1:B:175:ASN:HB2	5:B:2099:HOH:O	1.85	0.77
1:D:222:ARG:HD3	1:D:231:GLU:OE1	1.87	0.74
1:C:78:ASN:OD1	1:C:141:ARG:NH1	2.25	0.70
1:D:164:VAL:HG22	1:D:179:HIS:CD2	2.32	0.65
1:A:75:GLU:CD	5:A:2031:HOH:O	2.41	0.64
1:B:213:MET:HE2	1:B:217:GLU:HB3	1.80	0.63
1:C:65:ASN:HA	1:C:69:LEU:HD22	1.82	0.61
1:C:164:VAL:HG22	1:C:179:HIS:CD2	2.36	0.61
1:D:142:GLN:C	5:D:2065:HOH:O	2.46	0.59
1:B:219:ASP:HB2	5:B:2108:HOH:O	2.03	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:230:ARG:HH22	1:B:236:GLN:HE22	1.50	0.58
1:B:231:GLU:OE2	5:B:2106:HOH:O	2.17	0.57
1:D:60:GLN:OE1	5:D:2030:HOH:O	2.17	0.57
1:B:175:ASN:CB	5:B:2099:HOH:O	2.47	0.56
1:B:220:LYS:HD2	5:B:2110:HOH:O	2.05	0.56
1:A:232:ALA:HB2	1:B:251:TYR:CE2	2.41	0.55
1:C:232:ALA:HB2	1:D:251:TYR:CE2	2.45	0.51
1:B:78:ASN:OD1	1:B:141:ARG:NH1	2.42	0.51
1:A:164:VAL:HG22	1:A:179:HIS:CD2	2.45	0.51
1:B:65:ASN:HA	1:B:69:LEU:HD22	1.92	0.51
1:B:138:PHE:O	1:B:142:GLN:HG2	2.11	0.50
1:D:46:ASP:O	1:D:50:LYS:HG3	2.11	0.50
1:A:247:GLY:O	1:A:250:GLN:HG2	2.12	0.50
1:A:208:LEU:HD11	1:A:234:ALA:HB2	1.96	0.48
1:D:65:ASN:HA	1:D:69:LEU:HD22	1.95	0.47
1:B:26:THR:HG22	1:B:26:THR:O	2.13	0.47
1:A:193:ALA:N	1:A:194:PRO:CD	2.78	0.47
1:B:210:PRO:HG2	1:B:213:MET:HB3	1.96	0.47
1:D:224:LYS:O	1:D:226:PRO:HD3	2.14	0.47
1:D:208:LEU:HD11	1:D:234:ALA:HB2	1.97	0.47
1:C:42:VAL:HG22	5:C:2019:HOH:O	2.17	0.46
1:B:175:ASN:CG	5:B:2099:HOH:O	2.60	0.45
1:C:130:ALA:HB3	1:C:131:PRO:HD3	1.99	0.45
1:D:164:VAL:HG22	1:D:179:HIS:NE2	2.31	0.45
1:D:69:LEU:N	1:D:70:PRO:CD	2.80	0.44
1:D:78:ASN:CB	5:D:2041:HOH:O	2.28	0.44
1:A:250:GLN:HE21	1:A:250:GLN:HA	1.83	0.43
1:B:69:LEU:N	1:B:70:PRO:CD	2.81	0.43
1:D:137:SER:O	1:D:141:ARG:HG2	2.18	0.43
1:A:9:THR:HA	1:A:33:HIS:HB3	2.00	0.43
1:C:141:ARG:HG2	5:C:2058:HOH:O	2.18	0.43
1:D:193:ALA:N	1:D:194:PRO:CD	2.82	0.43
1:B:229:ARG:NH2	5:B:2113:HOH:O	2.51	0.42
1:D:152:SER:HA	5:D:2048:HOH:O	2.19	0.42
1:C:42:VAL:CG2	5:C:2019:HOH:O	2.65	0.42
1:D:222:ARG:HB3	1:D:229:ARG:O	2.19	0.42
1:D:26:THR:O	1:D:26:THR:HG22	2.20	0.42
3:D:1270:UHX:CAL	3:D:1270:UHX:CAJ	2.98	0.42
1:D:130:ALA:HB3	1:D:131:PRO:HD3	2.01	0.41
1:B:193:ALA:HB3	1:B:194:PRO:HD3	2.03	0.41
1:B:214:GLY:O	1:B:218:LYS:HG3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:114:LYS:HG2	1:C:118:THR:HG21	2.03	0.41
1:D:215:GLU:OE1	1:D:222:ARG:NH2	2.54	0.41
1:B:206:VAL:HG22	1:B:209:LEU:HD21	2.02	0.41
1:D:33:HIS:CG	1:D:34:TYR:N	2.89	0.41
1:B:9:THR:HA	1:B:33:HIS:HB3	2.03	0.40
1:A:65:ASN:HA	1:A:69:LEU:HD22	2.02	0.40
1:D:33:HIS:HA	1:D:59:CYS:O	2.21	0.40
1:A:198:ARG:HD2	1:A:252:ILE:O	2.22	0.40
1:C:34:TYR:CE2	1:C:38:ALA:HA	2.57	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	244/288 (85%)	233 (96%)	11 (4%)	0	100	100
1	B	245/288 (85%)	237 (97%)	8 (3%)	0	100	100
1	C	245/288 (85%)	237 (97%)	8 (3%)	0	100	100
1	D	244/288 (85%)	235 (96%)	9 (4%)	0	100	100
All	All	978/1152 (85%)	942 (96%)	36 (4%)	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	198/231 (86%)	189 (96%)	9 (4%)	24	23
1	B	199/231 (86%)	195 (98%)	4 (2%)	48	54
1	C	199/231 (86%)	191 (96%)	8 (4%)	28	27
1	D	198/231 (86%)	197 (100%)	1 (0%)	81	87
All	All	794/924 (86%)	772 (97%)	22 (3%)	40	41

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	LYS
1	A	58	VAL
1	A	78	ASN
1	A	131	PRO
1	A	141	ARG
1	A	159	LEU
1	A	164	VAL
1	A	166	GLN
1	A	245	VAL
1	B	2	GLU
1	B	117	GLU
1	B	213	MET
1	B	229	ARG
1	C	42	VAL
1	C	117	GLU
1	C	166	GLN
1	C	211	VAL
1	C	215[A]	GLU
1	C	215[B]	GLU
1	C	242	ILE
1	C	250	GLN
1	D	2	GLU

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	92	ASN
1	A	119	GLN
1	A	250	GLN
1	B	92	ASN
1	C	92	ASN

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Mol	Chain	Res	Type
1	C	142	GLN
1	D	36	ASN
1	D	92	ASN
1	D	119	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 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$
2	NAP	D	1269	-	50,52,52	1.56	4 (8%)	71,80,80	1.69	11 (15%)
3	UHX	D	1270	-	29,29,29	1.62	7 (24%)	40,42,42	1.92	12 (30%)
2	NAP	B	1269	-	50,52,52	1.24	5 (10%)	71,80,80	1.90	18 (25%)
3	UHX	C	1270	-	29,29,29	1.53	6 (20%)	40,42,42	1.49	7 (17%)
4	ACT	C	1271	-	3,3,3	0.82	0	3,3,3	0.99	0
2	NAP	A	1269	-	50,52,52	1.28	6 (12%)	71,80,80	1.61	14 (19%)
2	NAP	C	1269	-	50,52,52	1.34	7 (14%)	71,80,80	1.58	13 (18%)
3	UHX	B	1270	-	29,29,29	1.51	6 (20%)	40,42,42	1.75	9 (22%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	UHX	A	1270	-	29,29,29	1.43	6 (20%)	40,42,42	1.66	9 (22%)
4	ACT	B	1271	-	3,3,3	0.93	0	3,3,3	0.87	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
2	NAP	D	1269	-	-	0/35/67/67	0/5/5/5
3	UHX	D	1270	-	-	2/10/10/10	0/4/4/4
2	NAP	B	1269	-	-	0/35/67/67	0/5/5/5
3	UHX	C	1270	-	-	2/10/10/10	0/4/4/4
2	NAP	A	1269	-	-	0/35/67/67	0/5/5/5
2	NAP	C	1269	-	-	0/35/67/67	0/5/5/5
3	UHX	B	1270	-	-	2/10/10/10	0/4/4/4
3	UHX	A	1270	-	-	2/10/10/10	0/4/4/4

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	1269	NAP	PA-O3	5.64	1.65	1.59
2	C	1269	NAP	C5A-C4A	4.80	1.47	1.39
2	D	1269	NAP	PN-O3	4.75	1.64	1.59
3	C	1270	UHX	C6-NAC	4.14	1.44	1.34
2	D	1269	NAP	C5A-C4A	4.13	1.46	1.39
2	A	1269	NAP	C5A-C4A	4.08	1.46	1.39
2	A	1269	NAP	C4A-N9A	-3.87	1.29	1.37
3	B	1270	UHX	C5-C6	-3.79	1.38	1.42
3	D	1270	UHX	C2-NAB	3.66	1.41	1.33
3	D	1270	UHX	C6-NAC	3.51	1.43	1.34
2	D	1269	NAP	P2B-O2B	3.50	1.65	1.59
2	C	1269	NAP	PN-O3	3.40	1.63	1.59
3	B	1270	UHX	C2-NAB	3.26	1.40	1.33
3	D	1270	UHX	C5-C4	-3.25	1.36	1.41
3	C	1270	UHX	C2-NAB	3.17	1.40	1.33
2	B	1269	NAP	PA-O3	3.06	1.62	1.59
3	D	1270	UHX	CAU-CAW	3.04	1.52	1.47
2	A	1269	NAP	P2B-O2B	2.97	1.64	1.59
3	B	1270	UHX	C6-NAC	2.86	1.41	1.34
2	B	1269	NAP	C5A-C4A	2.79	1.44	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1269	NAP	P2B-O2B	2.74	1.64	1.59
3	A	1270	UHX	C2-NAB	2.74	1.39	1.33
3	A	1270	UHX	C6-NAC	2.72	1.41	1.34
2	C	1269	NAP	C4A-N9A	-2.68	1.32	1.37
2	A	1269	NAP	C8A-N7A	2.65	1.36	1.31
3	D	1270	UHX	CAW-NAO	-2.60	1.34	1.38
3	C	1270	UHX	C5-CAX	-2.57	1.39	1.46
3	A	1270	UHX	C5-CAX	-2.56	1.39	1.46
2	B	1269	NAP	C5A-N7A	-2.52	1.34	1.39
3	A	1270	UHX	C6-N1	-2.49	1.31	1.35
2	B	1269	NAP	C4A-N9A	-2.47	1.32	1.37
3	B	1270	UHX	C5-C4	-2.45	1.37	1.41
3	D	1270	UHX	C5-CAX	-2.40	1.39	1.46
3	B	1270	UHX	CAW-NAO	-2.37	1.35	1.38
3	A	1270	UHX	C5-C6	-2.32	1.39	1.42
3	C	1270	UHX	C5-C6	-2.30	1.39	1.42
3	B	1270	UHX	C5-CAX	-2.28	1.40	1.46
2	C	1269	NAP	C5A-N7A	-2.25	1.35	1.39
2	C	1269	NAP	PA-O3	2.24	1.61	1.59
3	C	1270	UHX	C4-NAO	-2.24	1.34	1.37
3	A	1270	UHX	CAW-NAO	-2.19	1.35	1.38
3	D	1270	UHX	OAP-CAA	-2.18	1.36	1.42
2	A	1269	NAP	C5A-N7A	-2.17	1.35	1.39
3	C	1270	UHX	C5-C4	-2.17	1.38	1.41
2	C	1269	NAP	C5A-C6A	2.10	1.46	1.41
2	A	1269	NAP	PN-O2N	-2.08	1.45	1.55
2	C	1269	NAP	C8A-N7A	2.02	1.35	1.31

All (93) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1269	NAP	O4B-C1B-N9A	5.56	118.77	108.09
2	D	1269	NAP	N3A-C4A-N9A	5.29	136.17	127.17
2	A	1269	NAP	C2B-C1B-N9A	-5.25	105.12	113.75
2	B	1269	NAP	C2B-C1B-N9A	-4.87	105.74	113.75
3	D	1270	UHX	C5-CAX-CAW	4.77	108.79	106.54
2	D	1269	NAP	C5A-C4A-N3A	-4.70	120.25	126.72
2	C	1269	NAP	C2B-C1B-N9A	-4.67	106.07	113.75
2	D	1269	NAP	O4B-C1B-N9A	4.55	116.82	108.09
2	B	1269	NAP	C4A-N9A-C8A	4.48	110.44	105.74
2	D	1269	NAP	C2B-C1B-N9A	-4.42	106.48	113.75
3	B	1270	UHX	CAI-CAU-CAW	-4.37	115.57	120.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1270	UHX	CAU-CAW-CAX	-4.20	127.29	131.65
3	A	1270	UHX	CAU-CAW-CAX	-4.15	127.33	131.65
2	B	1269	NAP	N3A-C4A-N9A	4.14	134.20	127.17
2	D	1269	NAP	C4A-N9A-C8A	4.09	110.03	105.74
2	A	1269	NAP	C4A-N9A-C8A	4.03	109.97	105.74
2	B	1269	NAP	C5A-C4A-N3A	-3.99	121.22	126.72
2	C	1269	NAP	C5A-C4A-N3A	-3.99	121.23	126.72
2	B	1269	NAP	C3N-C7N-N7N	3.82	122.45	117.74
2	A	1269	NAP	C5A-C4A-N3A	-3.78	121.51	126.72
2	B	1269	NAP	N9A-C8A-N7A	-3.78	108.57	113.94
3	D	1270	UHX	NAC-C6-N1	-3.78	111.93	117.03
3	B	1270	UHX	N3-C2-N1	-3.74	119.75	125.48
3	A	1270	UHX	NAC-C6-N1	-3.64	112.11	117.03
2	C	1269	NAP	O4B-C1B-N9A	3.61	115.03	108.09
3	A	1270	UHX	CAI-CAU-CAW	-3.51	116.59	120.76
3	B	1270	UHX	CAJ-CAU-CAW	3.48	124.91	120.76
2	D	1269	NAP	O3X-P2B-O2X	3.46	120.79	107.80
2	D	1269	NAP	N3A-C2A-N1A	-3.42	123.40	128.58
2	C	1269	NAP	N3A-C4A-N9A	3.41	132.96	127.17
2	A	1269	NAP	O4B-C1B-N9A	3.37	114.56	108.09
2	D	1269	NAP	N6A-C6A-N1A	3.33	125.81	118.38
3	D	1270	UHX	C5-C4-N3	-3.30	121.34	126.54
2	B	1269	NAP	N3A-C2A-N1A	-3.29	123.60	128.58
3	C	1270	UHX	C2-N1-C6	3.23	121.15	117.28
2	A	1269	NAP	N3A-C2A-N1A	-3.21	123.72	128.58
3	A	1270	UHX	C5-CAX-CAW	3.16	108.03	106.54
3	C	1270	UHX	N3-C2-N1	-3.15	120.65	125.48
2	B	1269	NAP	P2B-O2B-C2B	3.12	131.75	123.43
3	D	1270	UHX	CAJ-CAU-CAW	3.10	124.45	120.76
3	A	1270	UHX	C5-C4-N3	-3.08	121.69	126.54
2	A	1269	NAP	N3A-C4A-N9A	3.06	132.38	127.17
3	D	1270	UHX	C4-C5-CAX	-3.04	104.47	107.44
2	C	1269	NAP	N3A-C2A-N1A	-3.03	124.00	128.58
3	C	1270	UHX	CAU-CAW-NAO	2.95	123.46	119.74
2	B	1269	NAP	O7N-C7N-C3N	-2.95	115.99	119.60
2	B	1269	NAP	C2A-N1A-C6A	2.94	123.57	118.73
2	C	1269	NAP	C4A-N9A-C8A	2.86	108.74	105.74
3	D	1270	UHX	CAU-CAW-CAX	-2.86	128.68	131.65
3	A	1270	UHX	CAU-CAW-NAO	2.85	123.33	119.74
2	D	1269	NAP	C2A-N3A-C4A	2.84	118.77	111.83
3	D	1270	UHX	N3-C2-N1	-2.84	121.13	125.48
3	C	1270	UHX	CAI-CAU-CAW	-2.81	117.42	120.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1270	UHX	CAU-CAW-CAX	-2.81	128.72	131.65
2	A	1269	NAP	N9A-C8A-N7A	-2.80	109.96	113.94
2	D	1269	NAP	C5A-C6A-N6A	-2.80	116.35	123.29
2	A	1269	NAP	O2A-PA-O1A	2.76	125.28	112.44
3	D	1270	UHX	CAI-CAU-CAW	-2.74	117.51	120.76
2	C	1269	NAP	C2A-N3A-C4A	2.73	118.50	111.83
3	D	1270	UHX	CAF-CAQ-CAE	-2.72	119.23	122.80
2	B	1269	NAP	C5A-N7A-C8A	2.71	107.71	103.45
2	A	1269	NAP	C2A-N3A-C4A	2.67	118.36	111.83
3	D	1270	UHX	CAJ-CAF-CAQ	2.66	121.11	118.38
3	B	1270	UHX	CAF-CAQ-CAE	-2.62	119.36	122.80
3	A	1270	UHX	CAJ-CAU-CAW	2.61	123.87	120.76
3	D	1270	UHX	CAU-CAW-NAO	2.60	123.02	119.74
3	D	1270	UHX	C2-N3-C4	2.59	120.74	114.59
2	A	1269	NAP	C4A-N9A-C1B	-2.56	120.65	126.63
2	C	1269	NAP	C4A-C5A-N7A	-2.55	107.66	110.58
3	C	1270	UHX	NAB-C2-N1	2.53	121.02	117.22
2	C	1269	NAP	C2A-N1A-C6A	2.53	122.89	118.73
2	A	1269	NAP	C3N-C7N-N7N	2.44	120.74	117.74
2	B	1269	NAP	C2A-N3A-C4A	2.43	117.76	111.83
3	A	1270	UHX	N3-C2-N1	-2.38	121.83	125.48
2	B	1269	NAP	O4D-C4D-C3D	2.37	109.86	105.15
2	A	1269	NAP	C2A-N1A-C6A	2.33	122.56	118.73
3	B	1270	UHX	CAL-CAV-CAX	-2.32	116.92	120.91
2	A	1269	NAP	C4A-C5A-N7A	-2.27	107.98	110.58
2	C	1269	NAP	O2D-C2D-C3D	2.27	119.09	111.82
2	C	1269	NAP	C3N-C7N-N7N	2.26	120.52	117.74
2	B	1269	NAP	C4A-N9A-C1B	-2.24	121.40	126.63
3	B	1270	UHX	NAB-C2-N1	2.23	120.57	117.22
2	B	1269	NAP	N6A-C6A-N1A	2.23	123.35	118.38
3	A	1270	UHX	NAB-C2-N3	2.23	120.56	117.22
2	C	1269	NAP	C6A-C5A-N7A	2.15	136.24	132.09
2	C	1269	NAP	C4A-N9A-C1B	-2.11	121.70	126.63
2	D	1269	NAP	C5A-C4A-N9A	-2.10	103.52	105.81
2	B	1269	NAP	C4D-O4D-C1D	-2.10	108.00	109.92
2	A	1269	NAP	C6A-C5A-N7A	2.09	136.12	132.09
3	B	1270	UHX	CAJ-CAF-CAQ	2.09	120.52	118.38
3	B	1270	UHX	C5-C4-N3	-2.08	123.27	126.54
2	B	1269	NAP	O3B-C3B-C2B	2.07	116.98	111.19
3	C	1270	UHX	CAG-CAK-CAV	-2.02	118.64	120.80

There are no chirality outliers.

All (8) torsion outliers are listed below:

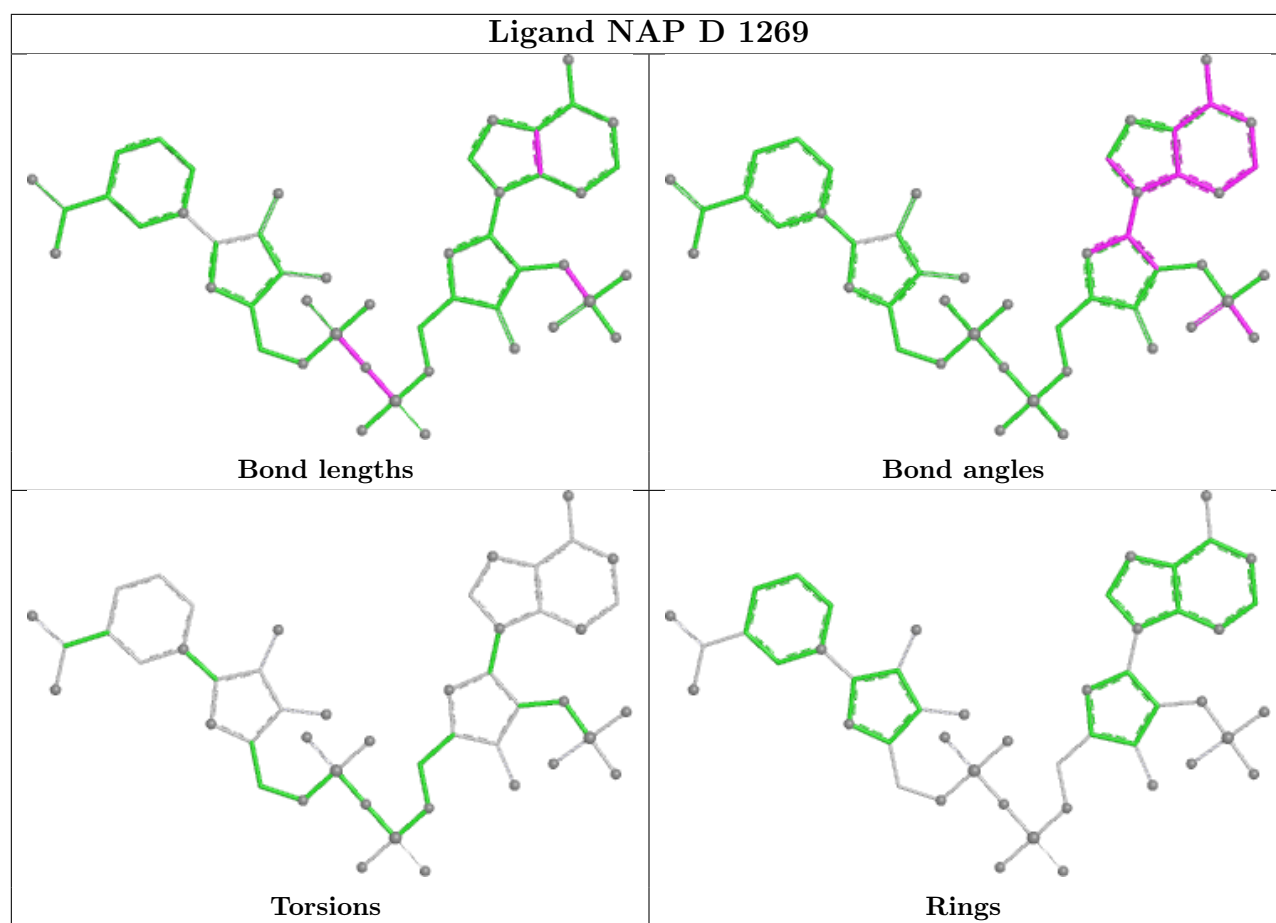
Mol	Chain	Res	Type	Atoms
3	B	1270	UHX	CAG-CAT-OAP-CAA
3	B	1270	UHX	CAH-CAT-OAP-CAA
3	D	1270	UHX	CAG-CAT-OAP-CAA
3	D	1270	UHX	CAH-CAT-OAP-CAA
3	C	1270	UHX	CAG-CAT-OAP-CAA
3	C	1270	UHX	CAH-CAT-OAP-CAA
3	A	1270	UHX	CAG-CAT-OAP-CAA
3	A	1270	UHX	CAH-CAT-OAP-CAA

There are no ring outliers.

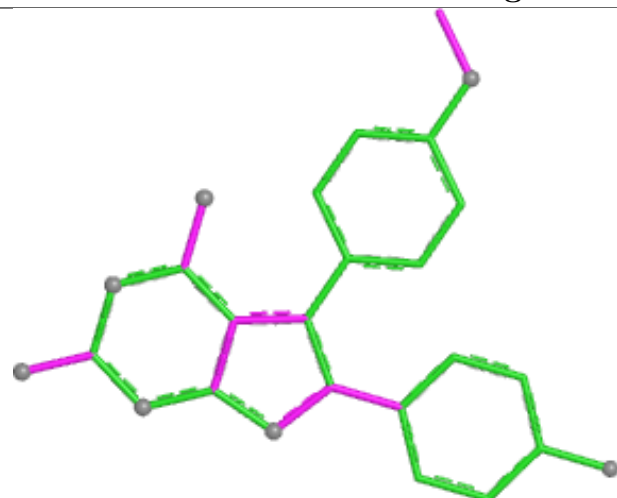
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	1270	UHX	1	0

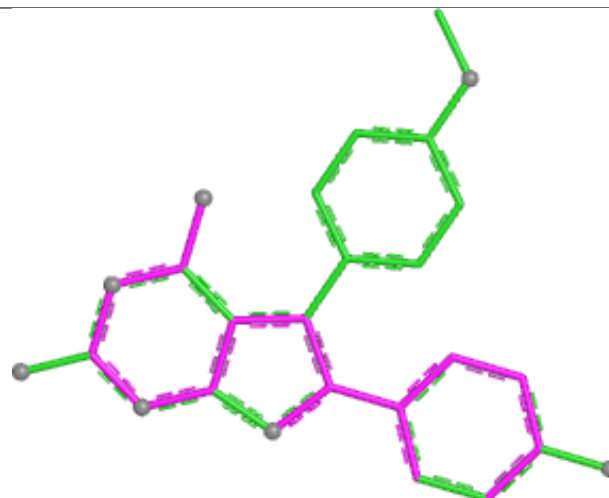
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



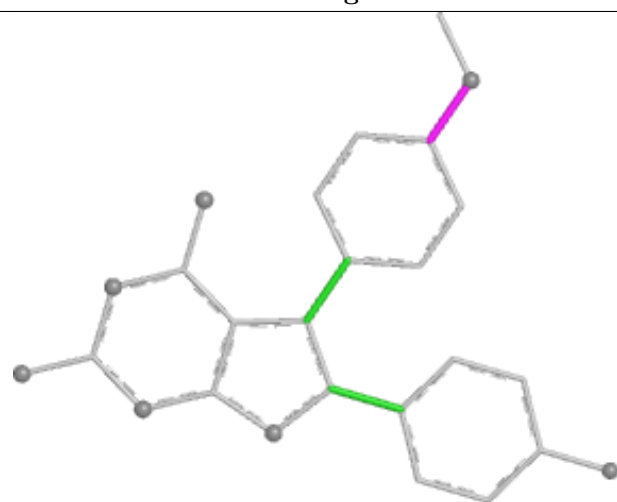
Ligand UHX D 1270



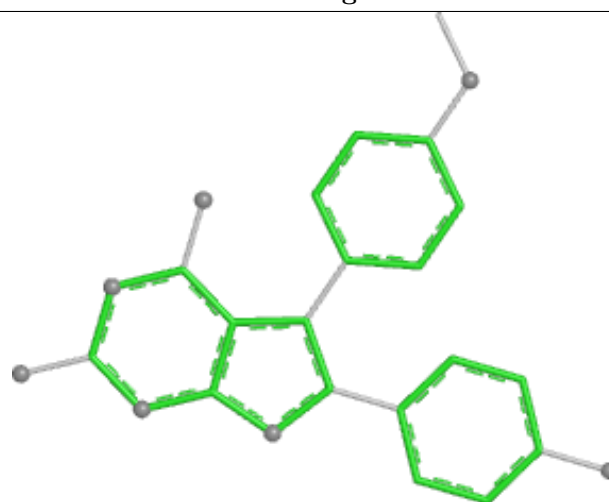
Bond lengths



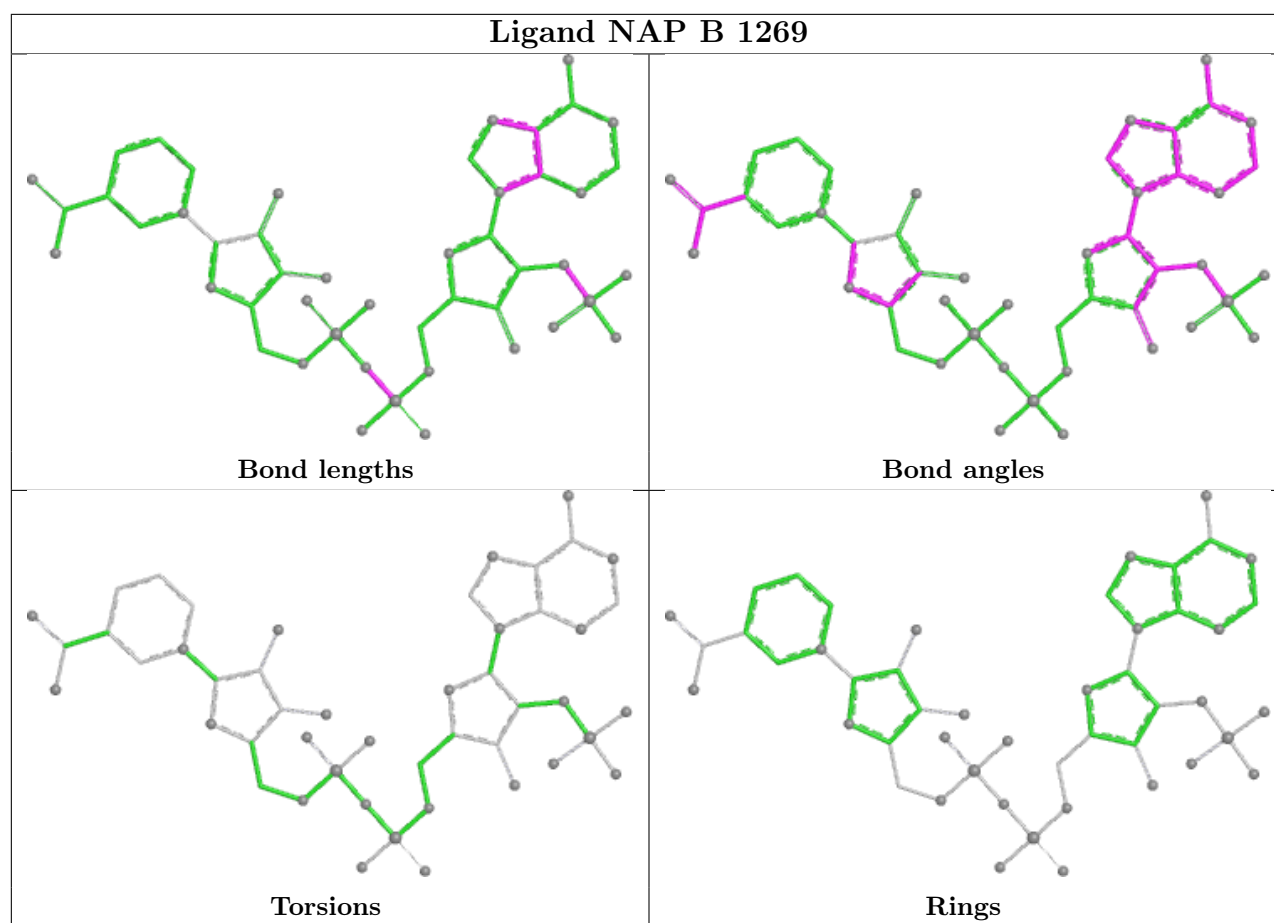
Bond angles



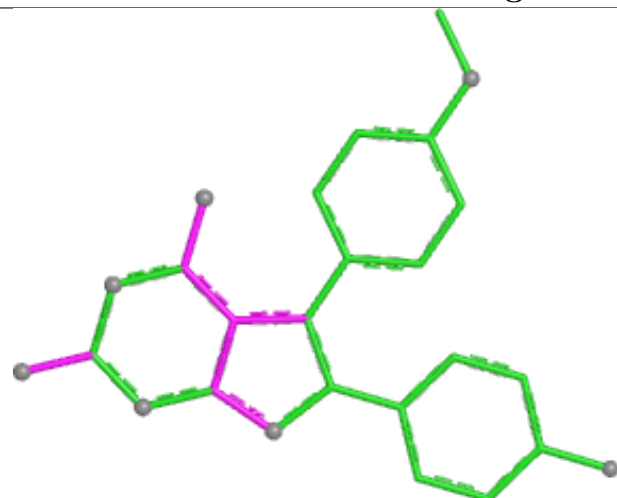
Torsions



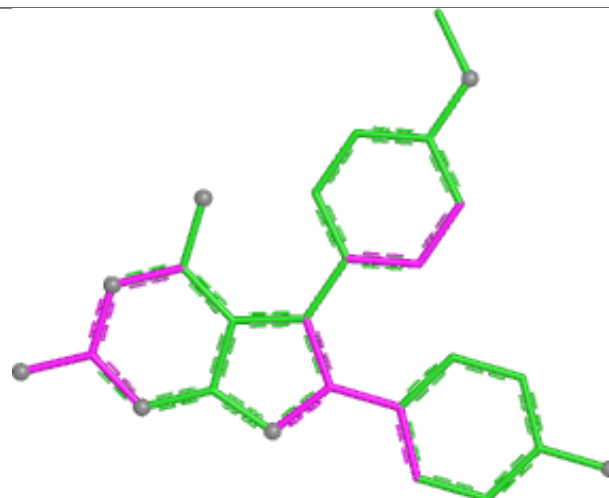
Rings



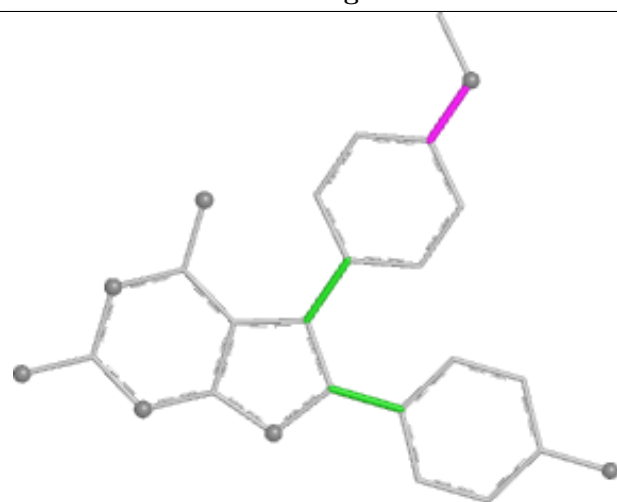
Ligand UHX C 1270



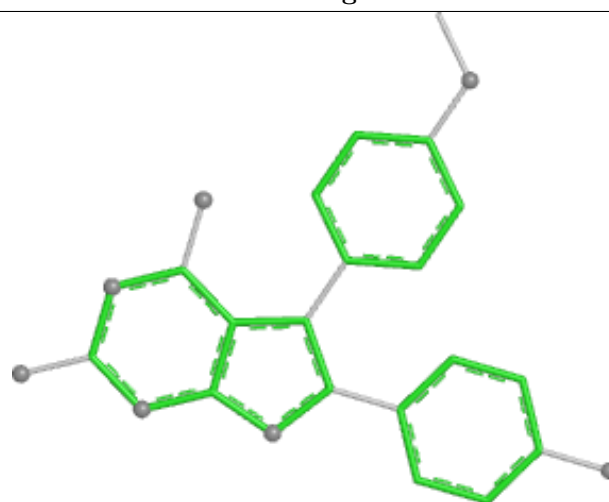
Bond lengths



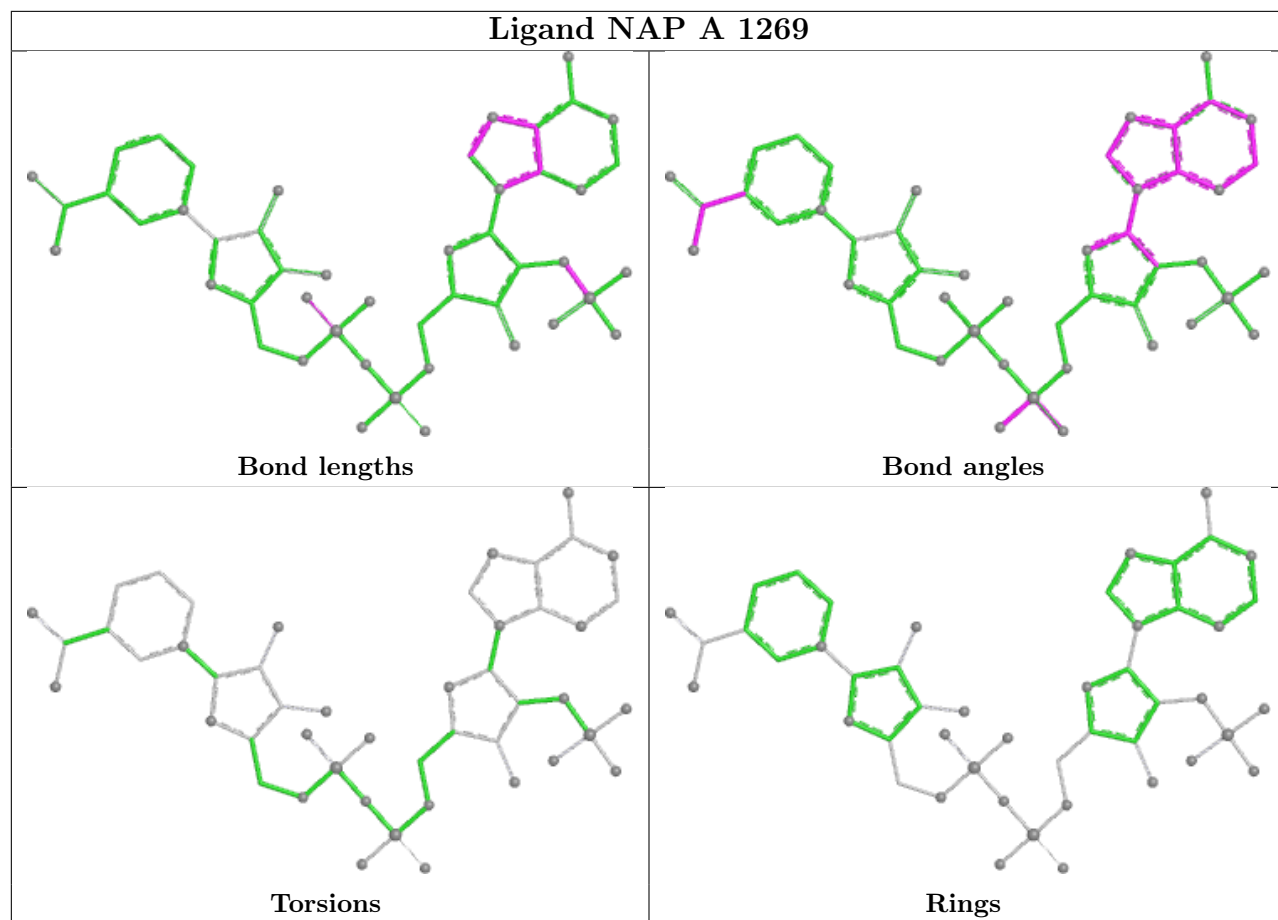
Bond angles

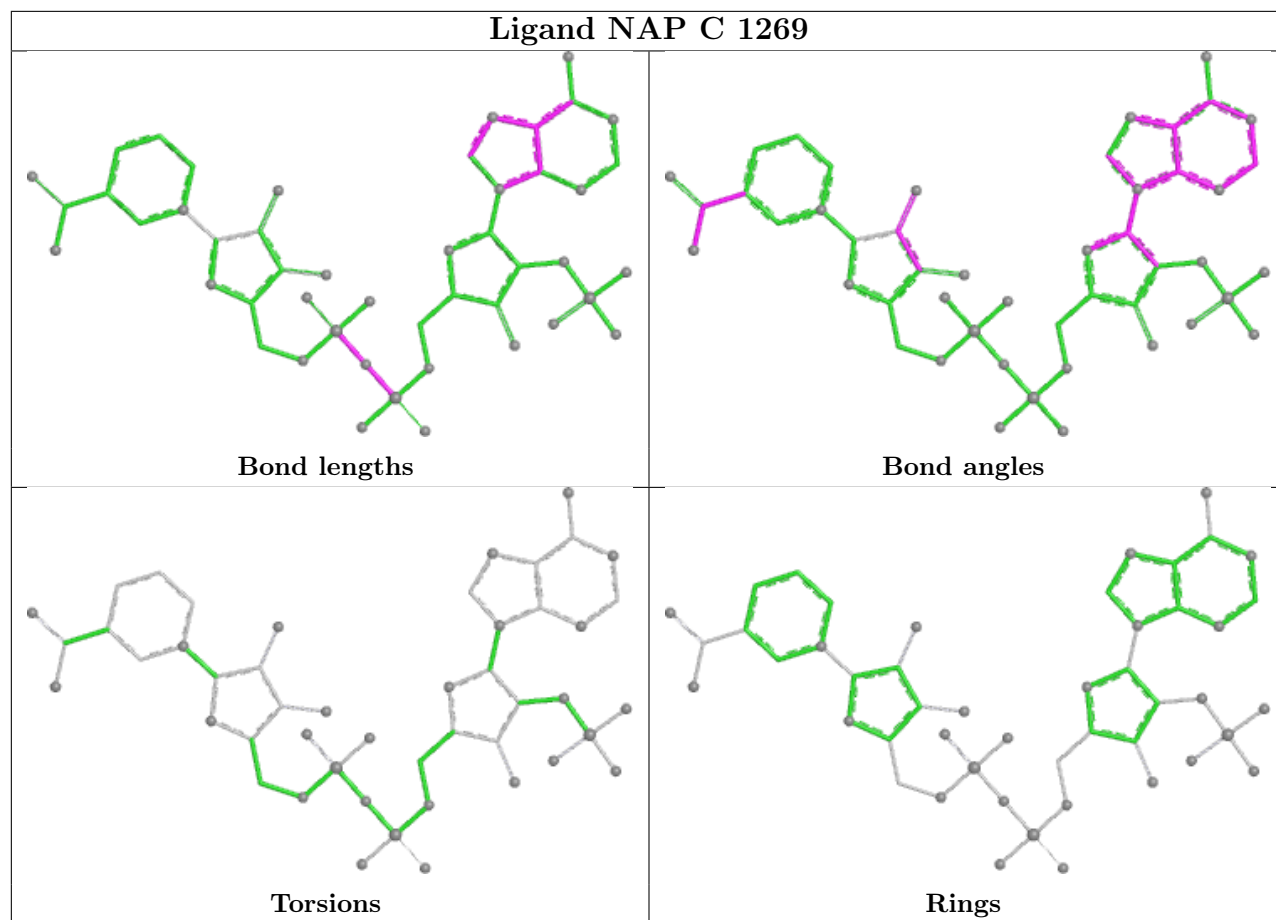


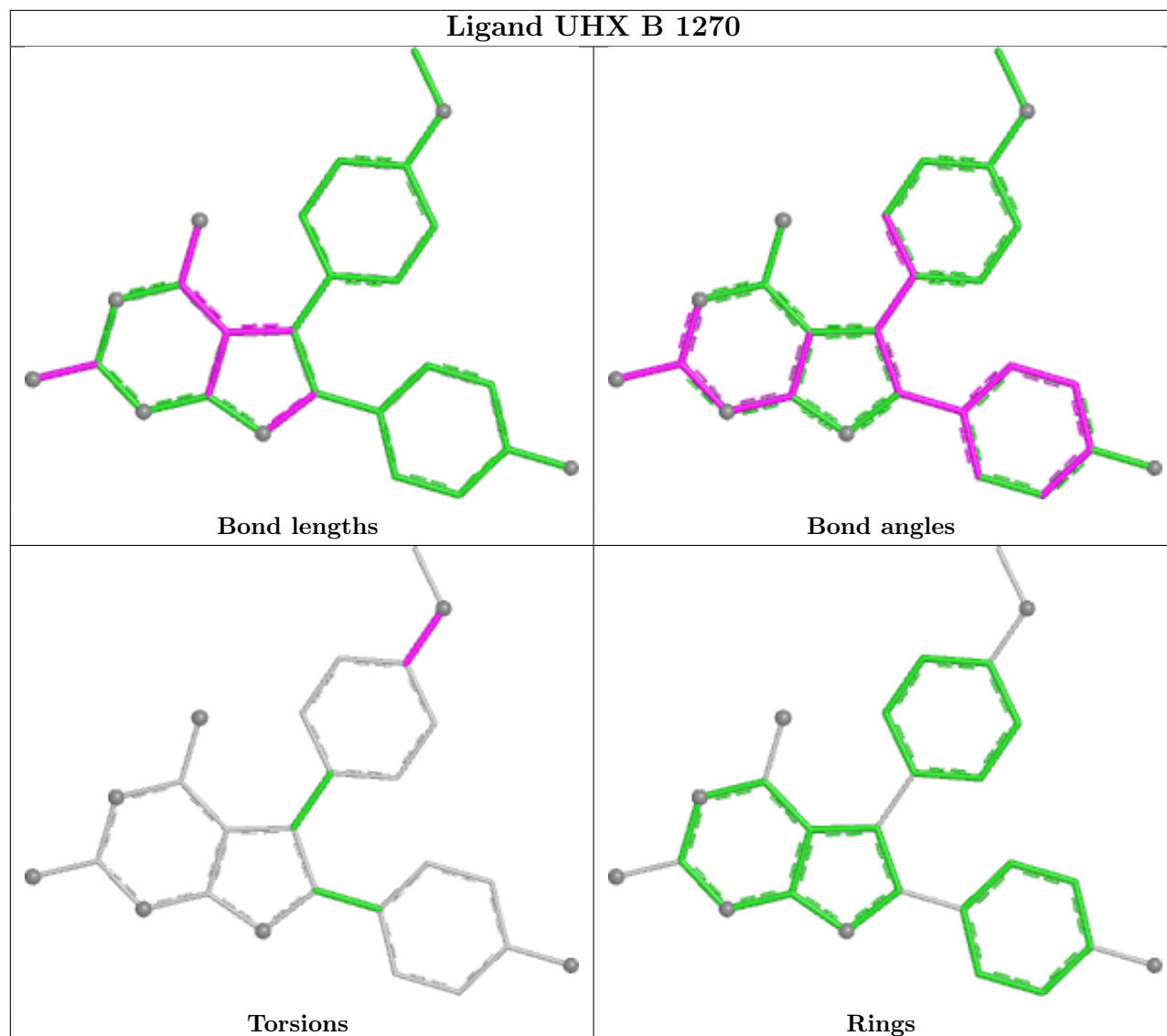
Torsions

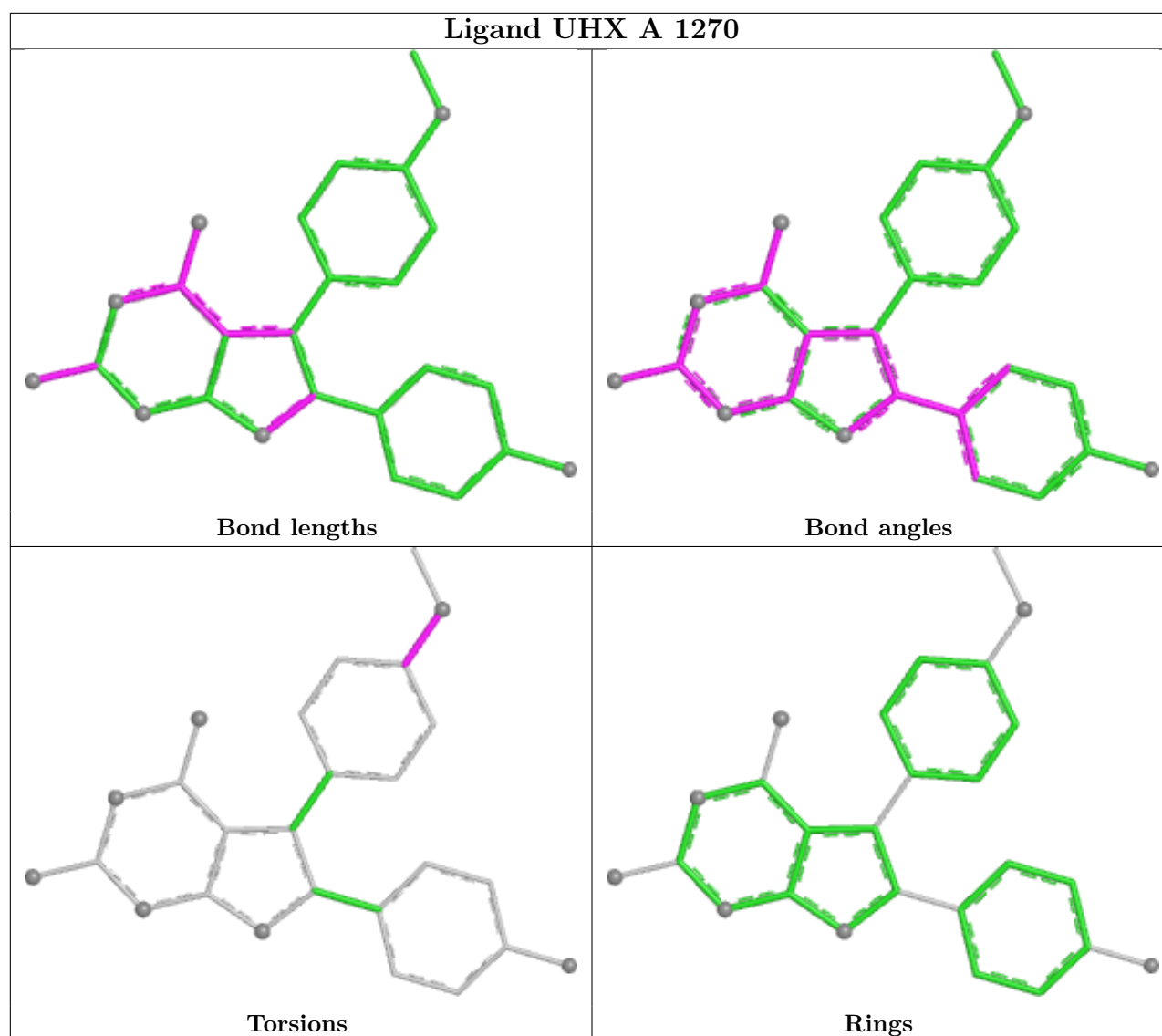


Rings









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	250/288 (86%)	-0.39	5 (2%) 65 64	8, 14, 36, 67	0
1	B	251/288 (87%)	-0.35	4 (1%) 70 70	7, 15, 34, 67	0
1	C	250/288 (86%)	-0.30	4 (1%) 70 70	8, 16, 35, 57	1 (0%)
1	D	250/288 (86%)	-0.39	2 (0%) 82 82	9, 15, 32, 48	0
All	All	1001/1152 (86%)	-0.36	15 (1%) 72 71	7, 15, 34, 67	1 (0%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	211	VAL	5.5
1	C	212	ALA	4.1
1	B	151	SER	4.1
1	A	212	ALA	3.3
1	C	113	GLY	3.0
1	B	211	VAL	3.0
1	A	210	PRO	2.6
1	C	151	SER	2.4
1	B	143	LYS	2.4
1	D	211	VAL	2.4
1	C	2	GLU	2.2
1	D	151	SER	2.2
1	B	210	PRO	2.2
1	A	151	SER	2.1
1	A	213	MET	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](#)

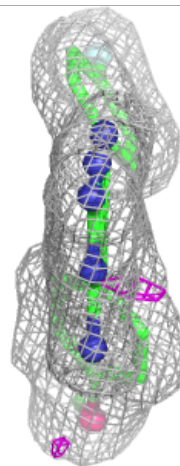
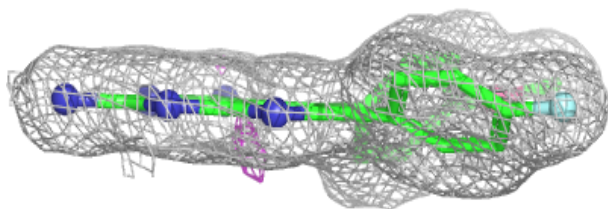
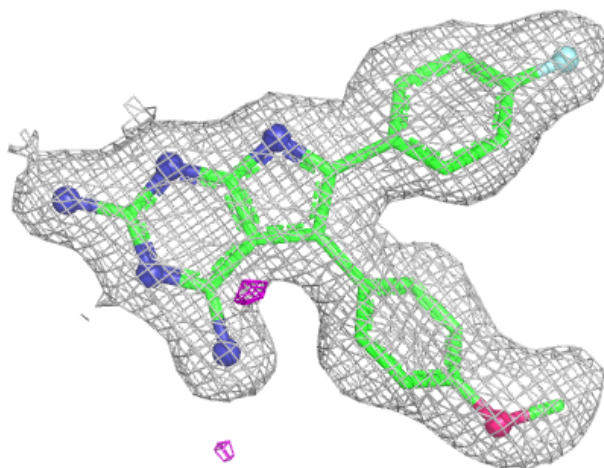
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	UHX	C	1270	26/26	0.94	0.07	14,20,24,25	0
3	UHX	B	1270	26/26	0.96	0.06	14,16,23,30	0
3	UHX	A	1270	26/26	0.96	0.06	13,20,28,35	0
3	UHX	D	1270	26/26	0.96	0.06	12,16,21,21	0
4	ACT	B	1271	4/4	0.96	0.08	18,20,21,22	0
4	ACT	C	1271	4/4	0.97	0.06	17,17,18,18	0
2	NAP	C	1269	48/48	0.98	0.04	9,13,14,15	0
2	NAP	D	1269	48/48	0.98	0.04	9,12,15,15	0
2	NAP	A	1269	48/48	0.98	0.04	9,11,13,14	0
2	NAP	B	1269	48/48	0.98	0.04	9,12,15,17	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.

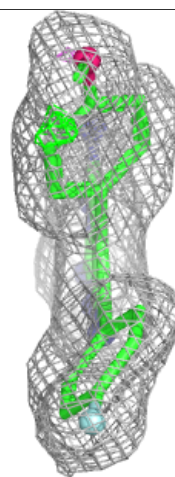
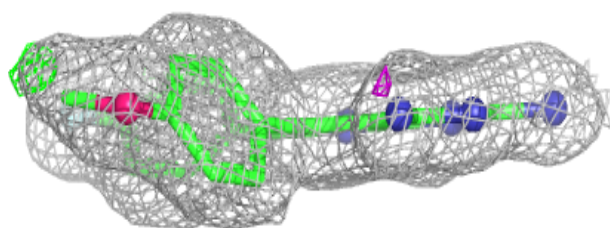
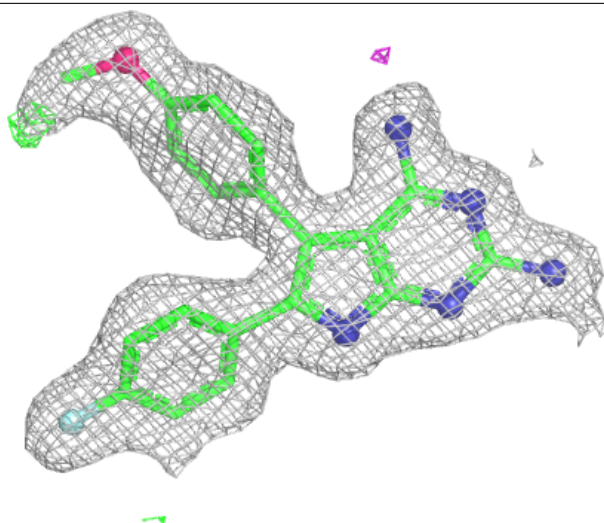
Electron density around UHX C 1270:

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



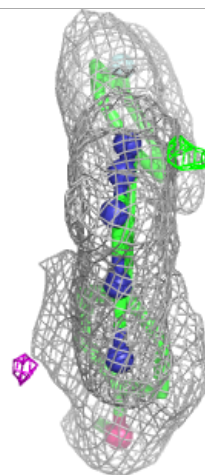
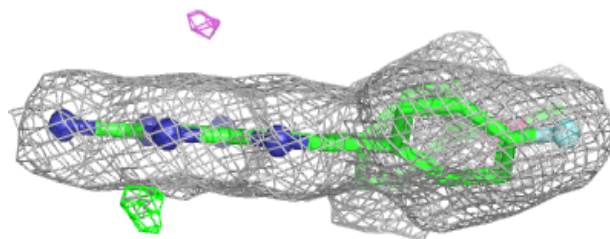
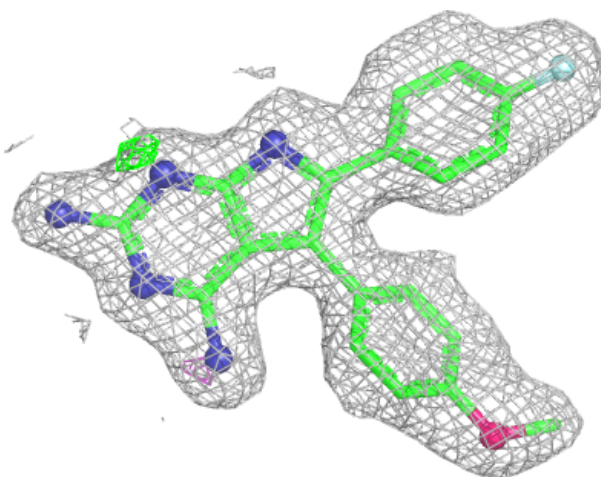
Electron density around UHX B 1270:

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



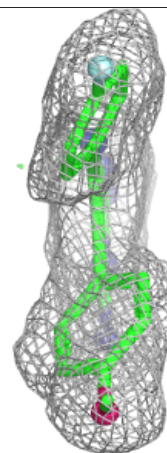
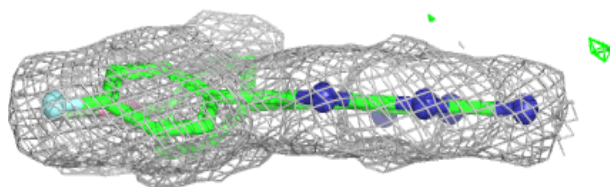
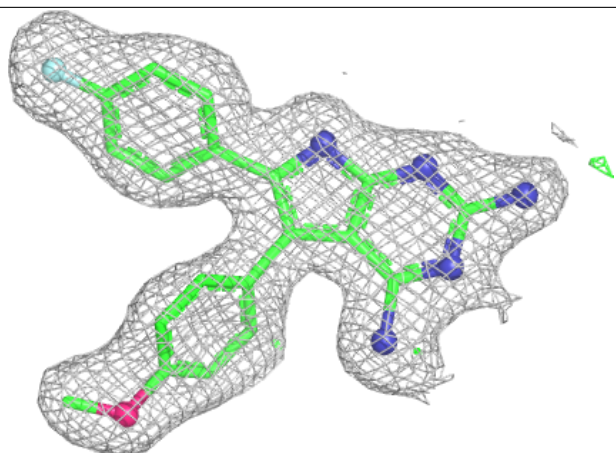
Electron density around UHX A 1270:

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

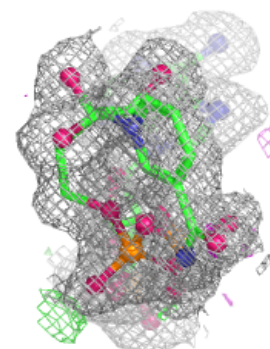
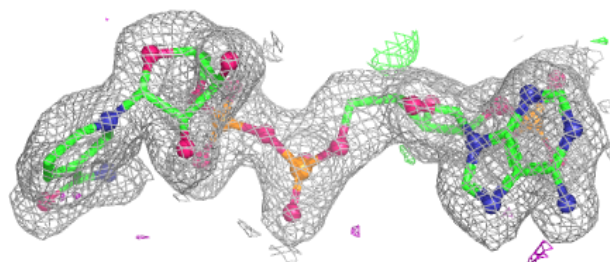
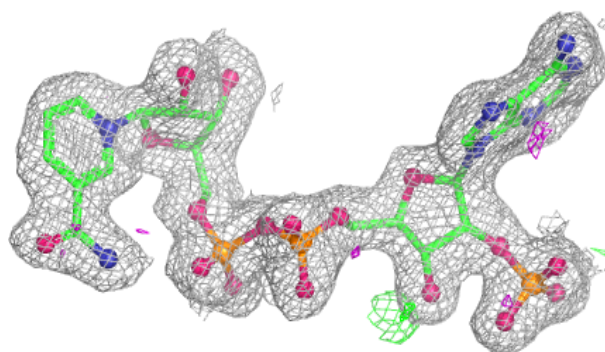


Electron density around UHX D 1270:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

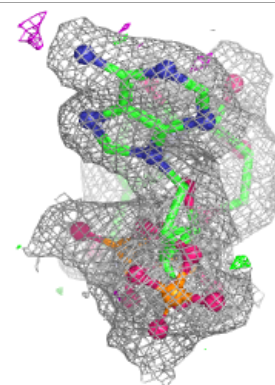
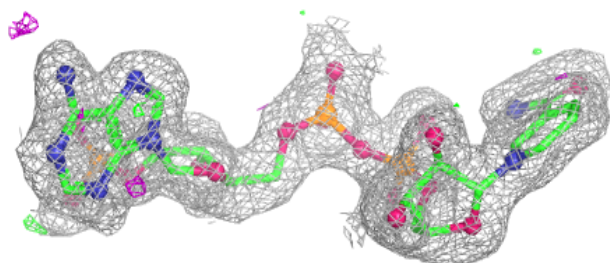
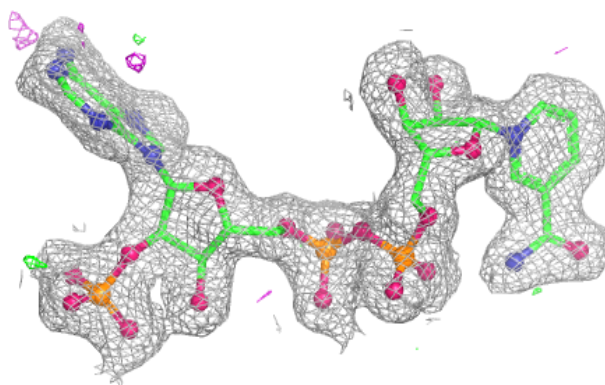
**Electron density around NAP C 1269:**

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

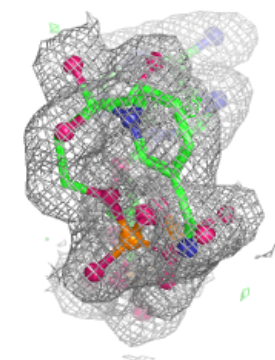
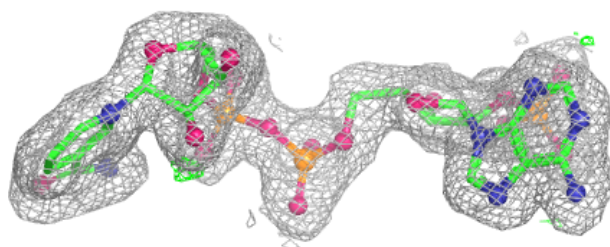
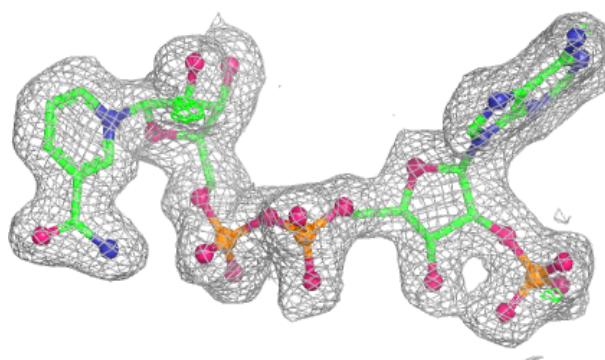


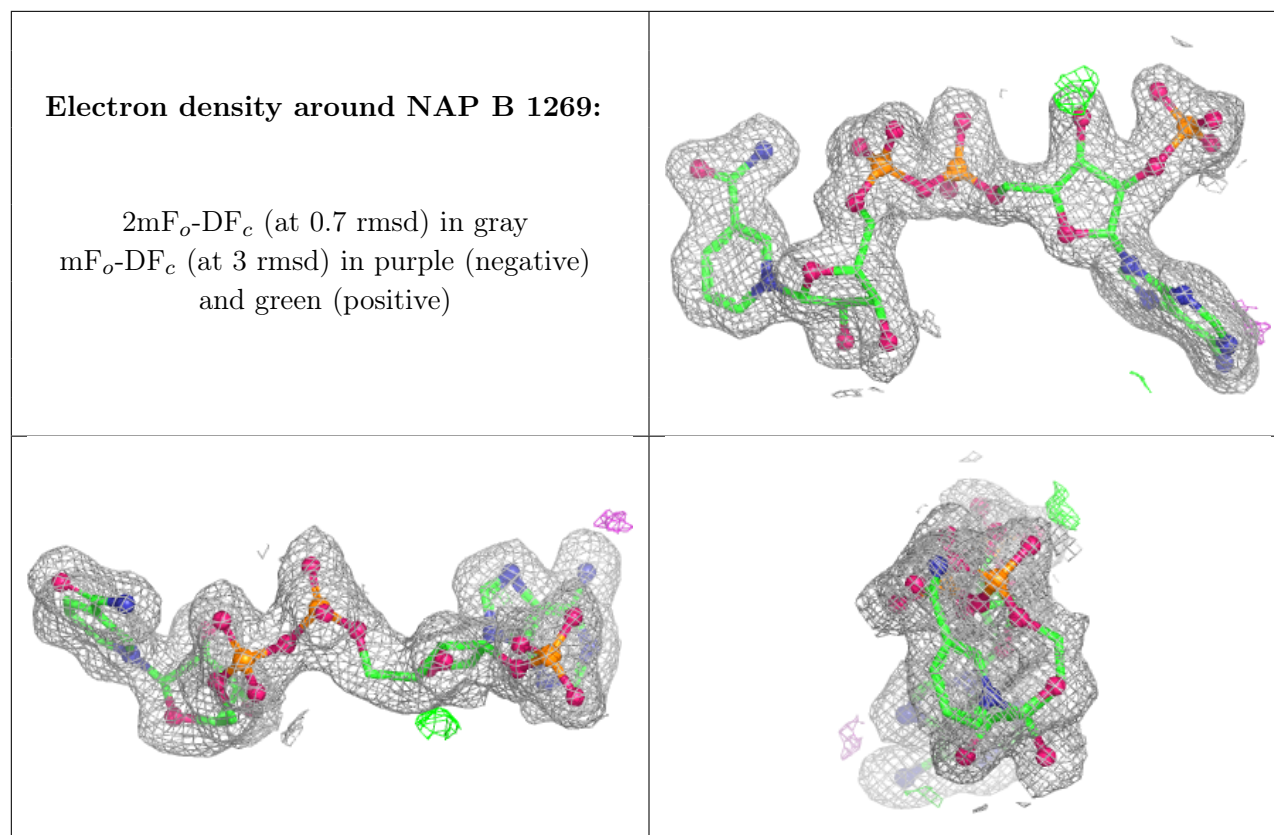
Electron density around NAP D 1269:

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

**Electron density around NAP A 1269:**

$2mF_o-DF_c$ (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.