Full wwPDB X-ray Structure Validation Report ⓘ

Aug 27, 2023 – 08:25 PM EDT

PDB ID	:	3HDQ
Title	:	Crystal structure of UDP-galactopyranose mutase (oxidized form) in complex with substrate
Authors	:	Partha, S.K.; van Straaten, K.E.; Sanders, D.A.
Deposited on	:	2009-05-07
Resolution	:	2.36 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:

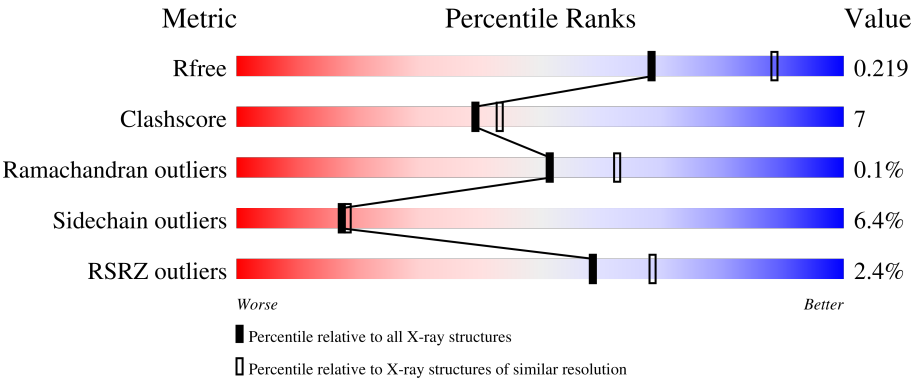
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.36 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	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	397	2% 76% 14% • 8%
1	B	397	3% 76% 14% • 8%
1	C	397	3% 72% 18% • 9%
1	D	397	3% 74% 15% • 9%
1	E	397	3% 77% 13% • 8%

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Mol	Chain	Length	Quality of chain
1	F	397	2% 76% 15% • 9%
1	G	397	2% 77% 13% • 9%
1	H	397	2% 78% 13% • 8%
1	I	397	2% 75% 14% • 9%
1	J	397	2% 72% 18% • 9%

2 Entry composition (i)

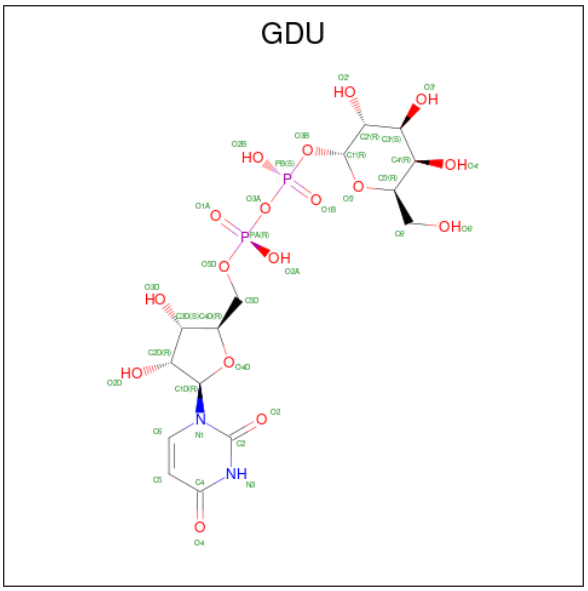
There are 4 unique types of molecules in this entry. The entry contains 31875 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 UDP-galactopyranose mutase.

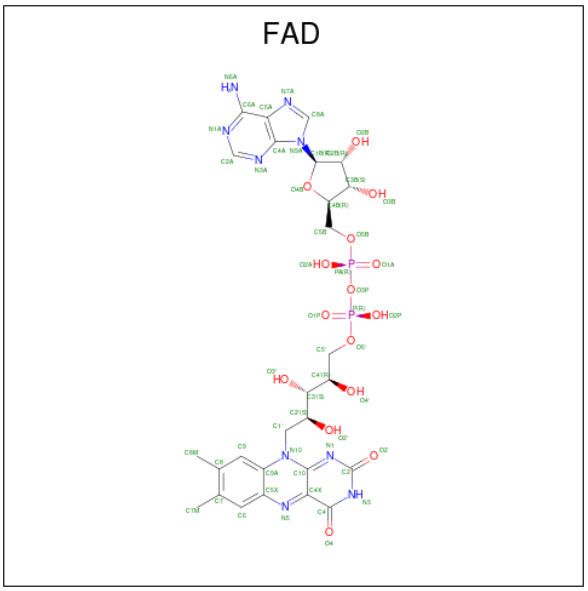
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	365	Total	C	N	O	S	0	1	0
			2992	1909	521	554	8			
1	B	364	Total	C	N	O	S	4	2	0
			2990	1909	522	551	8			
1	C	361	Total	C	N	O	S	23	1	0
			2964	1894	516	546	8			
1	D	360	Total	C	N	O	S	0	1	0
			2955	1888	514	545	8			
1	E	364	Total	C	N	O	S	8	0	0
			2975	1899	516	552	8			
1	F	363	Total	C	N	O	S	4	1	0
			2977	1901	519	549	8			
1	G	363	Total	C	N	O	S	4	1	0
			2974	1899	518	549	8			
1	H	364	Total	C	N	O	S	0	1	0
			2983	1904	520	551	8			
1	I	363	Total	C	N	O	S	4	1	0
			2975	1899	517	551	8			
1	J	361	Total	C	N	O	S	4	1	0
			2959	1890	515	546	8			

- Molecule 2 is GALACTOSE-URIDINE-5'-DIPHOSPHATE (three-letter code: GDU) (formula: $C_{15}H_{24}N_2O_{17}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	B	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	C	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	D	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	E	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	F	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	G	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	H	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	I	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	J	1	Total	C	N	O	P	0	0
			36	15	2	17	2		

- Molecule 3 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	E	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	F	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	G	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	H	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	I	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	J	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	164	Total	O	0	0
			164	164		
4	B	104	Total	O	0	0
			104	104		

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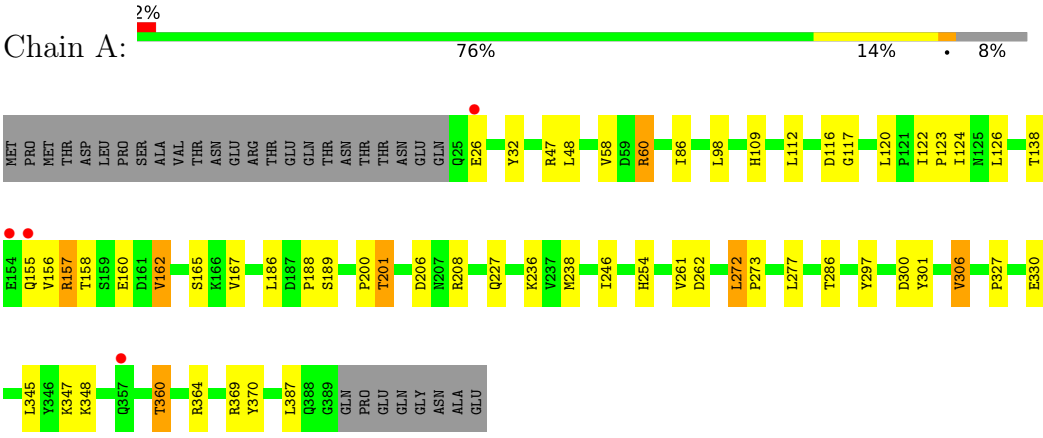
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	88	Total O 88 88	0	0
4	D	86	Total O 86 86	0	0
4	E	110	Total O 110 110	0	0
4	F	143	Total O 143 143	0	0
4	G	116	Total O 116 116	0	0
4	H	143	Total O 143 143	0	0
4	I	160	Total O 160 160	0	0
4	J	127	Total O 127 127	0	0

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.

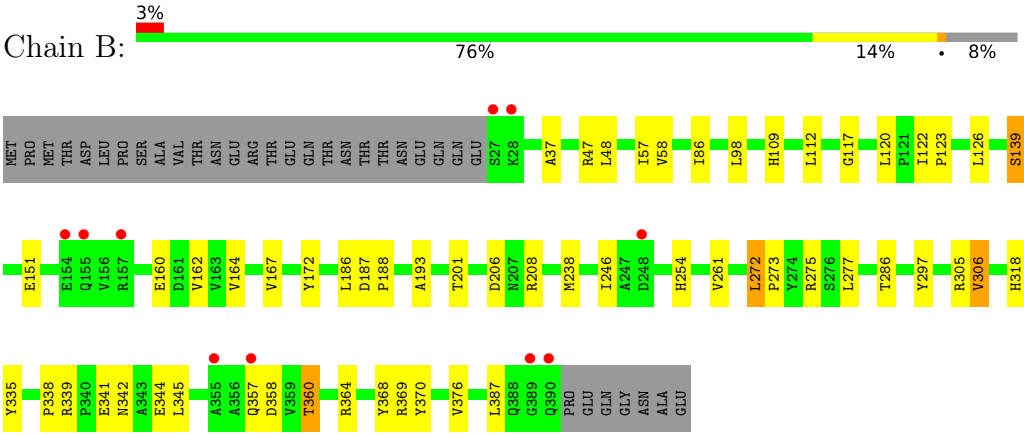
• Molecule 1: UDP-galactopyranose mutase

Chain A:



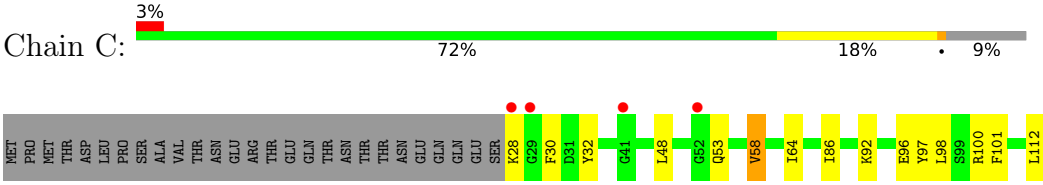
• Molecule 1: UDP-galactopyranose mutase

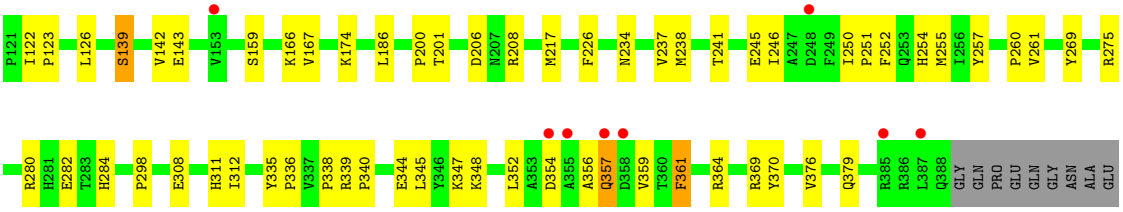
Chain B:



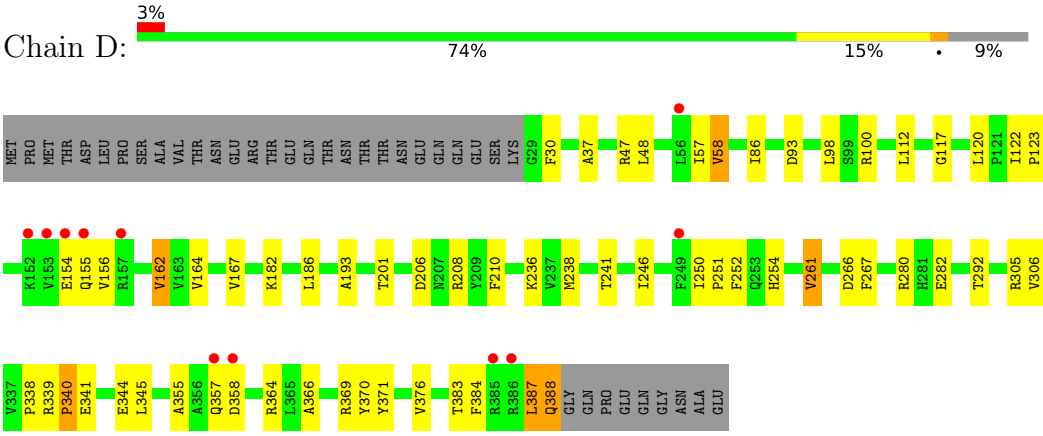
• Molecule 1: UDP-galactopyranose mutase

Chain C:

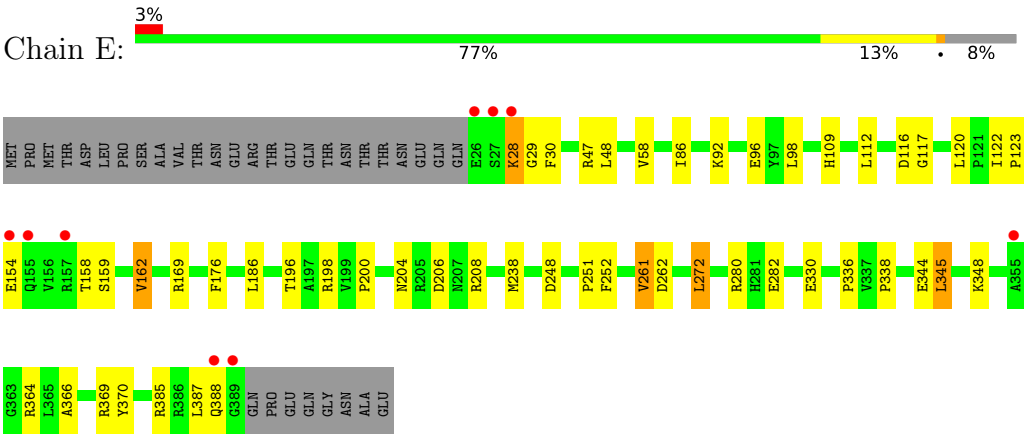




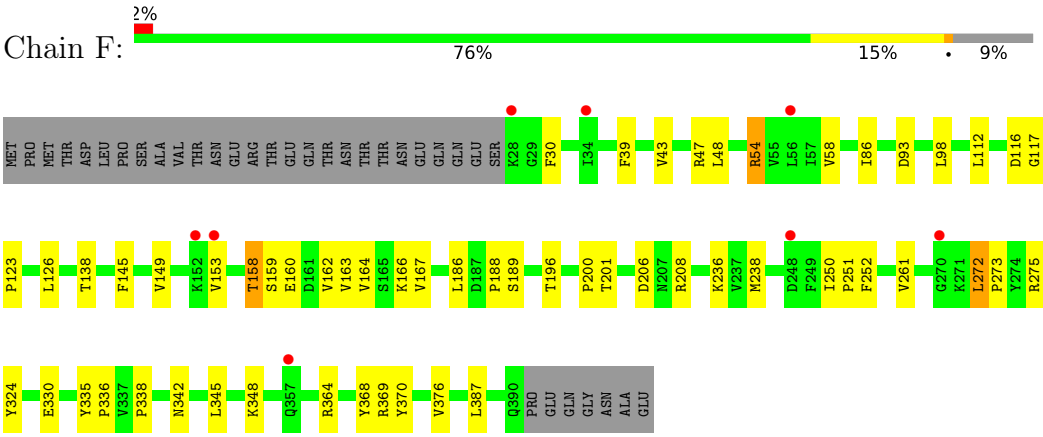
• Molecule 1: UDP-galactopyranose mutase



• Molecule 1: UDP-galactopyranose mutase

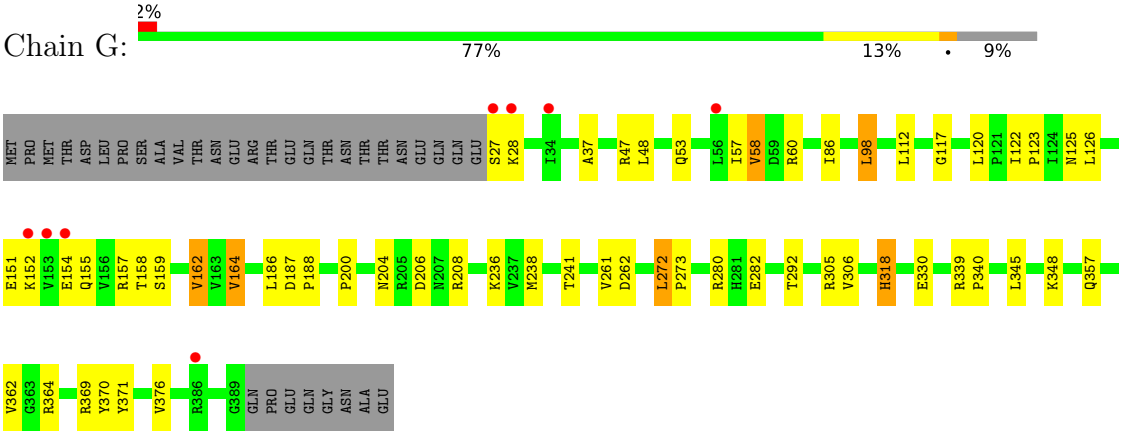


• Molecule 1: UDP-galactopyranose mutase



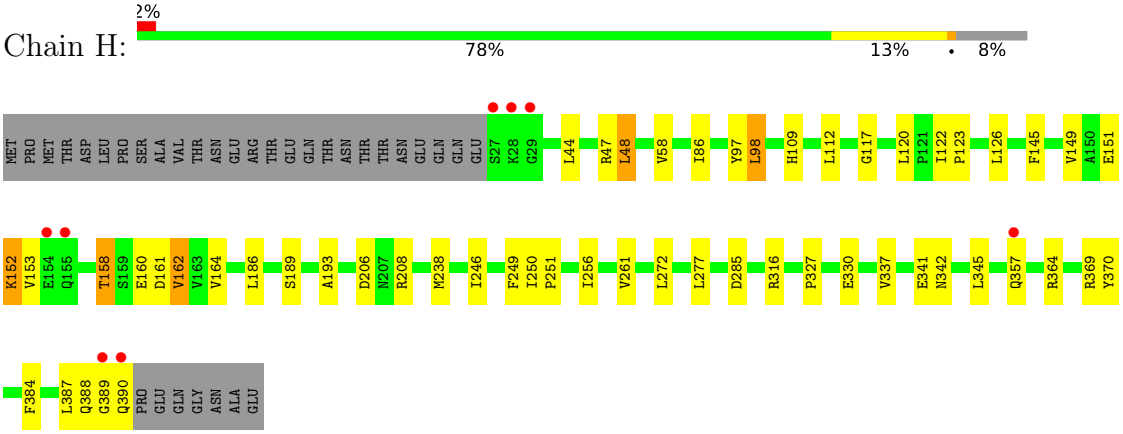
• Molecule 1: UDP-galactopyranose mutase

Chain G:



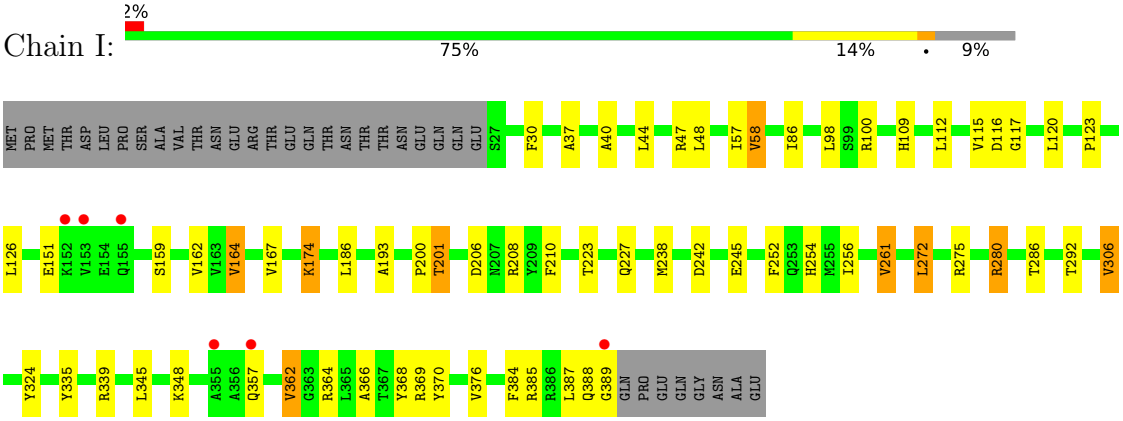
• Molecule 1: UDP-galactopyranose mutase

Chain H:



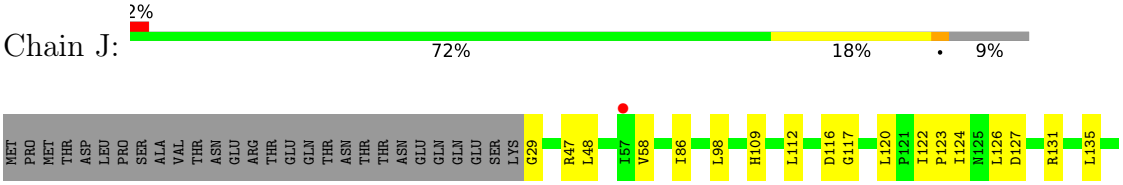
• Molecule 1: UDP-galactopyranose mutase

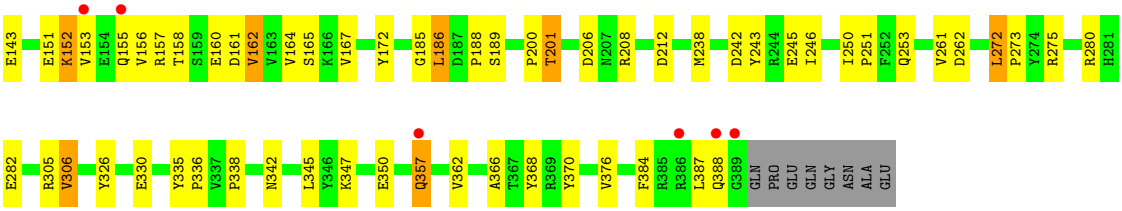
Chain I:



• Molecule 1: UDP-galactopyranose mutase

Chain J:




E143
E151
K152
V153
E154
Q155
V156
R157
T158
S159
E160
D161
V162
V163
V164
S165
K166
V167
Y172
G185
L186
D187
P188
S189
P200
T201
D206
N207
R208
D212
M238
D242
Y243
R244
E245
I246
I250
P251
F252
Q253
V261
D262
L272
P273
Y274
R275
R280
H281
E282
R305
V306
Y326
E330
Y335
P336
V337
P338
N342
L345
Y346
K347
E350
Q357
V362
A366
T367
Y368
H369
Y370
V376
F384
H385
R386
L387
Q388
G389
GLN
PRO
GLU
GLN
GLY
ASN
ALA
GLU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	134.02Å 176.65Å 220.09Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.88 – 2.36 19.88 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.9 (19.88-2.36) 97.8 (19.88-2.30)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.50 (at 2.30Å)	Xtriage
Refinement program	PHENIX (phenix.refine)	Depositor
R, R_{free}	0.177 , 0.226 0.174 , 0.219	Depositor DCC
R_{free} test set	11275 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	35.7	Xtriage
Anisotropy	0.109	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 37.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	31875	wwPDB-VP
Average B, all atoms (Å^2)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.70% 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: GDU, FAD

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	0.43	0/3079	0.58	0/4185
1	B	0.39	0/3081	0.56	0/4188
1	C	0.35	0/3051	0.54	0/4148
1	D	0.40	0/3042	0.54	0/4137
1	E	0.34	0/3059	0.52	0/4159
1	F	0.38	0/3064	0.56	1/4165 (0.0%)
1	G	0.41	0/3061	0.54	0/4161
1	H	0.39	0/3070	0.54	0/4173
1	I	0.41	0/3059	0.57	1/4159 (0.0%)
1	J	0.39	0/3046	0.55	1/4142 (0.0%)
All	All	0.39	0/30612	0.55	3/41617 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	I	306	VAL	CB-CA-C	-5.47	101.01	111.40
1	F	306	VAL	CB-CA-C	-5.33	101.27	111.40
1	J	306	VAL	CB-CA-C	-5.05	101.81	111.40

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	2992	0	2867	50	0
1	B	2990	0	2868	44	0
1	C	2964	0	2845	56	0
1	D	2955	0	2832	45	0
1	E	2975	0	2846	36	0
1	F	2977	0	2856	41	0
1	G	2974	0	2853	36	0
1	H	2983	0	2861	47	0
1	I	2975	0	2847	50	0
1	J	2959	0	2835	67	0
2	A	36	0	22	0	0
2	B	36	0	22	3	0
2	C	36	0	22	1	0
2	D	36	0	22	3	0
2	E	36	0	22	1	0
2	F	36	0	22	2	0
2	G	36	0	22	3	0
2	H	36	0	22	1	0
2	I	36	0	22	4	0
2	J	36	0	22	2	0
3	A	53	0	30	1	0
3	B	53	0	31	2	0
3	C	53	0	30	1	0
3	D	53	0	31	0	0
3	E	53	0	31	0	0
3	F	53	0	29	1	0
3	G	53	0	31	3	0
3	H	53	0	31	0	0
3	I	53	0	31	1	0
3	J	53	0	30	1	0
4	A	164	0	0	2	0
4	B	104	0	0	3	0
4	C	88	0	0	2	0
4	D	86	0	0	1	0
4	E	110	0	0	3	0
4	F	143	0	0	0	0
4	G	116	0	0	1	0
4	H	143	0	0	0	0
4	I	160	0	0	2	0
4	J	127	0	0	0	0
All	All	31875	0	29035	438	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 7.

All (438) 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:152:LYS:CD	1:A:153:VAL:H	1.54	1.18
1:J:357:GLN:HE21	1:J:357:GLN:HA	1.15	1.10
1:A:152:LYS:HD3	1:A:153:VAL:N	1.72	1.04
1:E:58:VAL:HG22	1:E:238:MET:HB3	1.42	1.01
1:H:152:LYS:HE2	1:H:152:LYS:HA	1.38	1.01
1:D:357:GLN:O	1:D:358:ASP:HB2	1.60	0.99
1:A:152:LYS:HD3	1:A:153:VAL:H	1.26	0.95
1:A:152:LYS:HD2	1:A:153:VAL:H	1.32	0.93
1:H:152:LYS:HA	1:H:152:LYS:CE	2.01	0.90
1:J:357:GLN:HA	1:J:357:GLN:NE2	1.88	0.89
1:A:152:LYS:CD	1:A:153:VAL:N	2.30	0.88
1:F:158:THR:HG22	1:F:160:GLU:H	1.42	0.84
1:A:158:THR:HG22	1:A:160:GLU:H	1.44	0.83
1:F:54:ARG:HH21	1:F:54:ARG:HG3	1.41	0.82
1:A:157:ARG:HG2	1:A:157:ARG:HH11	1.43	0.81
1:H:158:THR:HG22	1:H:161:ASP:H	1.44	0.81
1:C:357:GLN:H	1:C:357:GLN:CD	1.83	0.80
1:J:155:GLN:CG	1:J:157:ARG:NH1	2.45	0.80
1:A:152:LYS:HD2	1:A:153:VAL:O	1.82	0.80
1:B:167:VAL:HG11	1:B:201:THR:HG21	1.64	0.80
1:A:157:ARG:HG2	1:A:157:ARG:NH1	1.97	0.79
1:G:376:VAL:HG21	3:G:450:FAD:H5'2	1.64	0.79
1:A:158:THR:HG22	1:A:160:GLU:N	1.96	0.79
1:D:357:GLN:O	1:D:358:ASP:CB	2.30	0.79
1:D:167:VAL:HG11	1:D:201:THR:HG21	1.64	0.78
1:C:364:ARG:HG3	1:C:369:ARG:O	1.85	0.77
1:G:58:VAL:HG23	1:G:238:MET:HB3	1.66	0.77
1:J:152:LYS:HD2	1:J:153:VAL:H	1.50	0.77
1:A:167:VAL:HG11	1:A:201:THR:HG21	1.66	0.76
1:A:60:ARG:HD3	4:A:1219:HOH:O	1.86	0.76
1:J:155:GLN:HG3	1:J:157:ARG:CZ	2.15	0.75
1:G:151:GLU:HB2	1:G:164:VAL:HG13	1.69	0.75
1:J:155:GLN:HG3	1:J:157:ARG:NH1	2.02	0.74
1:A:227:GLN:HG2	4:A:633:HOH:O	1.86	0.74
1:D:364:ARG:HG3	1:D:369:ARG:O	1.88	0.74
1:H:388:GLN:HB2	1:H:389:GLY:HA2	1.69	0.74
1:H:246:ILE:HB	1:H:250:ILE:HD12	1.71	0.72
1:J:155:GLN:CG	1:J:157:ARG:CZ	2.68	0.72
1:J:158:THR:HG22	1:J:160:GLU:N	2.04	0.71
1:J:158:THR:HG22	1:J:160:GLU:H	1.54	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:254:HIS:HB2	4:I:1166:HOH:O	1.89	0.71
1:C:238:MET:HE2	1:C:246:ILE:HG21	1.72	0.71
1:J:58:VAL:HG12	1:J:238:MET:HB3	1.72	0.70
1:G:280[B]:ARG:NH1	1:G:282:GLU:OE2	2.24	0.70
1:G:60:ARG:HD3	4:G:1117:HOH:O	1.91	0.70
1:B:208:ARG:HD2	1:G:117:GLY:CA	2.21	0.70
1:I:385:ARG:O	1:I:389:GLY:HA3	1.92	0.70
1:D:336:PRO:O	1:D:338:PRO:HD3	1.92	0.69
1:E:117:GLY:HA3	1:I:208:ARG:HD2	1.74	0.69
1:F:158:THR:CG2	1:F:160:GLU:H	2.06	0.69
1:A:157:ARG:HH11	1:A:157:ARG:CG	2.06	0.69
1:E:117:GLY:CA	1:I:208:ARG:HD2	2.23	0.69
1:D:58:VAL:HG23	1:D:238:MET:HB3	1.75	0.69
1:F:158:THR:HG21	1:F:189:SER:HA	1.73	0.68
1:B:58:VAL:HG12	1:B:238:MET:HB3	1.74	0.68
1:C:356:ALA:HB1	1:C:359:VAL:CG1	2.22	0.68
1:C:53:GLN:O	1:C:234:ASN:HB3	1.94	0.67
1:J:151:GLU:HB2	1:J:164:VAL:HG13	1.76	0.67
1:A:158:THR:HG21	1:A:189:SER:HA	1.75	0.67
1:C:117:GLY:CA	1:J:208:ARG:HD2	2.25	0.67
1:F:158:THR:HG22	1:F:160:GLU:N	2.09	0.67
1:I:388:GLN:CB	1:I:389:GLY:HA2	2.25	0.66
1:H:58:VAL:HG23	1:H:238:MET:HB3	1.77	0.66
1:H:388:GLN:HA	1:H:388:GLN:NE2	2.11	0.66
1:E:206:ASP:OD1	1:E:208:ARG:HD3	1.95	0.66
1:I:280:ARG:HH11	1:I:280:ARG:CG	2.09	0.65
1:B:357:GLN:O	1:B:358:ASP:HB2	1.96	0.65
1:F:158:THR:CG2	1:F:189:SER:HA	2.26	0.65
1:J:158:THR:CG2	1:J:189:SER:HA	2.25	0.65
1:A:117:GLY:CA	1:G:208:ARG:HD2	2.26	0.64
1:E:280:ARG:NH1	1:E:282:GLU:OE2	2.29	0.64
1:I:162:VAL:CG1	1:I:193:ALA:HB1	2.27	0.64
1:D:280[B]:ARG:NH2	1:D:282:GLU:OE2	2.29	0.64
1:E:208:ARG:HD2	1:H:117:GLY:CA	2.28	0.64
1:B:117:GLY:CA	1:C:208:ARG:HD2	2.28	0.63
1:A:117:GLY:HA3	1:G:208:ARG:HD2	1.80	0.63
1:A:254:HIS:NE2	1:A:360:THR:HG22	2.14	0.62
1:C:255:MET:O	1:C:359:VAL:HA	1.99	0.62
1:D:254:HIS:ND1	1:D:358:ASP:HA	2.15	0.62
1:I:388:GLN:CB	1:I:389:GLY:CA	2.78	0.62
1:A:158:THR:CG2	1:A:189:SER:HA	2.30	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:97:TYR:CD2	1:C:98:LEU:HD12	2.35	0.61
1:J:206:ASP:OD1	1:J:208:ARG:HD3	1.99	0.61
1:C:357:GLN:H	1:C:357:GLN:NE2	1.98	0.61
1:F:206:ASP:OD1	1:F:208:ARG:HD3	2.01	0.61
1:A:167:VAL:CG1	1:A:201:THR:HG21	2.31	0.60
1:J:29:GLY:HA3	1:J:251:PRO:HG2	1.82	0.60
1:F:117:GLY:CA	1:H:208:ARG:HD2	2.32	0.60
1:H:388:GLN:HA	1:H:388:GLN:HE21	1.67	0.60
1:H:388:GLN:CB	1:H:389:GLY:HA2	2.31	0.60
1:D:206:ASP:OD1	1:D:208:ARG:HD3	2.01	0.60
1:B:305:ARG:HH12	2:B:500:GDU:H5'	1.66	0.60
1:B:364:ARG:HG3	1:B:369:ARG:O	2.01	0.60
1:C:336:PRO:O	1:C:338:PRO:HD3	2.02	0.60
1:G:305:ARG:NH1	2:G:500:GDU:H5'	2.17	0.60
1:D:388:GLN:HA	1:D:388:GLN:NE2	2.17	0.60
1:G:206:ASP:OD1	1:G:208:ARG:HD3	2.02	0.60
1:C:269:TYR:CE2	1:C:352:LEU:HD11	2.37	0.59
1:C:30:PHE:O	1:C:252:PHE:HA	2.02	0.59
1:D:388:GLN:HA	1:D:388:GLN:HE21	1.67	0.59
1:C:238:MET:HE2	1:C:241:THR:HG21	1.85	0.59
1:I:242:ASP:HB3	1:I:245:GLU:HG3	1.84	0.59
1:C:344:GLU:O	1:C:347:LYS:HB3	2.03	0.59
1:I:280:ARG:HH11	1:I:280:ARG:HG2	1.67	0.59
1:I:388:GLN:HB2	1:I:389:GLY:CA	2.33	0.59
1:J:376:VAL:HG21	3:J:450:FAD:H5'2	1.84	0.59
1:B:318:HIS:CE1	1:H:316:ARG:HD3	2.38	0.58
1:J:158:THR:CG2	1:J:160:GLU:H	2.15	0.58
1:C:97:TYR:O	1:C:100:ARG:HG3	2.03	0.58
1:D:208:ARG:HD2	1:I:117:GLY:CA	2.33	0.58
1:J:155:GLN:HG2	1:J:157:ARG:NH1	2.17	0.58
1:J:158:THR:HG21	1:J:189:SER:HA	1.85	0.58
1:D:117:GLY:HA2	1:F:208:ARG:HD2	1.84	0.58
1:E:29:GLY:HA3	1:E:251:PRO:HG2	1.86	0.58
1:I:388:GLN:HB2	1:I:389:GLY:HA2	1.86	0.58
1:C:143:GLU:HB2	4:C:1001:HOH:O	2.03	0.58
1:C:117:GLY:HA2	1:J:208:ARG:HD2	1.85	0.58
1:C:206:ASP:OD1	1:C:208:ARG:HD3	2.04	0.58
1:C:123:PRO:HB3	1:C:200:PRO:O	2.04	0.57
1:I:58:VAL:HG23	1:I:238:MET:HB3	1.85	0.57
1:A:158:THR:CG2	1:A:160:GLU:H	2.13	0.57
1:H:206:ASP:OD1	1:H:208:ARG:HD3	2.03	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:208:ARG:HD2	1:H:117:GLY:HA2	1.86	0.57
1:J:155:GLN:HG2	1:J:157:ARG:CZ	2.34	0.57
1:J:158:THR:HB	1:J:161:ASP:OD2	2.04	0.57
1:B:208:ARG:HD2	1:G:117:GLY:HA3	1.86	0.57
1:I:223:THR:O	1:I:227[B]:GLN:HG3	2.04	0.57
1:B:201:THR:HG23	4:B:982:HOH:O	2.05	0.57
1:F:54:ARG:HG3	1:F:54:ARG:NH2	2.14	0.57
1:I:348:LYS:HE2	4:I:936:HOH:O	2.04	0.56
1:C:269:TYR:HE2	1:C:352:LEU:CD1	2.18	0.56
1:I:210:PHE:HZ	2:I:500:GDU:O4'	1.88	0.56
1:I:280:ARG:HG2	1:I:280:ARG:NH1	2.20	0.56
1:D:384:PHE:O	1:D:388:GLN:HG2	2.05	0.56
1:F:167:VAL:CG1	1:F:201:THR:HG21	2.35	0.56
1:H:151:GLU:HB2	1:H:164:VAL:CG1	2.36	0.56
1:H:158:THR:CG2	1:H:189:SER:HA	2.35	0.56
1:J:29:GLY:CA	1:J:251:PRO:HG2	2.36	0.56
1:C:356:ALA:HB1	1:C:359:VAL:HG13	1.87	0.56
1:A:208:ARG:HD2	1:J:117:GLY:CA	2.35	0.55
1:B:117:GLY:HA2	1:C:208:ARG:HD2	1.87	0.55
1:E:198:ARG:O	1:E:200:PRO:HD3	2.06	0.55
1:F:117:GLY:HA3	1:H:208:ARG:HD2	1.87	0.55
1:J:158:THR:HG22	1:J:161:ASP:H	1.70	0.55
1:H:151:GLU:HB2	1:H:164:VAL:HG13	1.89	0.55
1:D:210:PHE:HZ	2:D:500:GDU:HO4'	1.55	0.55
1:J:123:PRO:HB3	1:J:200:PRO:O	2.06	0.55
1:J:151:GLU:O	1:J:165:SER:HA	2.06	0.55
1:J:347:LYS:HE2	1:J:350:GLU:OE2	2.06	0.55
1:E:364:ARG:HG3	1:E:369:ARG:O	2.06	0.55
1:H:158:THR:CG2	1:H:160:GLU:H	2.19	0.55
1:C:359:VAL:HG22	1:C:361:PHE:CE1	2.42	0.54
1:H:44:LEU:HD13	1:H:256:ILE:HD13	1.89	0.54
1:A:152:LYS:HE2	1:A:165:SER:HB2	1.88	0.54
1:G:151:GLU:HB2	1:G:164:VAL:CG1	2.37	0.54
1:B:305:ARG:NH1	2:B:500:GDU:H5'	2.23	0.54
1:I:261:VAL:HG13	1:I:366:ALA:O	2.08	0.54
1:J:152:LYS:CD	1:J:153:VAL:H	2.20	0.54
1:B:272:LEU:HD22	1:B:368:TYR:CE1	2.42	0.54
1:D:135:LEU:HD23	1:F:138:THR:HG21	1.90	0.54
1:A:158:THR:HG23	1:A:188:PRO:O	2.07	0.54
1:H:86:ILE:HD13	2:H:500:GDU:H6'2	1.90	0.54
1:E:336:PRO:O	1:E:338:PRO:HD3	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:97:TYR:HD2	1:C:98:LEU:CD1	2.21	0.53
1:C:238:MET:CE	1:C:246:ILE:HG21	2.37	0.53
1:A:206:ASP:OD1	1:A:208:ARG:HD3	2.09	0.53
1:G:357:GLN:HA	1:G:357:GLN:HE21	1.73	0.53
1:D:167:VAL:CG1	1:D:201:THR:HG21	2.36	0.53
1:G:364:ARG:HG3	1:G:369:ARG:O	2.09	0.53
1:B:254[A]:HIS:NE2	1:B:360:THR:CG2	2.71	0.53
1:F:162:VAL:O	1:F:166:LYS:HD2	2.09	0.52
1:I:206:ASP:OD1	1:I:208:ARG:HD3	2.09	0.52
1:B:272:LEU:HD22	1:B:368:TYR:CZ	2.45	0.52
1:C:298:PRO:HG3	4:C:1238:HOH:O	2.09	0.52
1:J:158:THR:HG23	1:J:189:SER:HA	1.90	0.52
1:J:262:ASP:HB3	1:J:272:LEU:HB2	1.91	0.52
1:D:117:GLY:CA	1:F:208:ARG:HD2	2.38	0.52
1:J:243:TYR:O	1:J:246:ILE:HG22	2.10	0.52
1:D:208:ARG:HD2	1:I:117:GLY:HA2	1.91	0.52
1:I:115:VAL:HG11	1:I:174:LYS:HG2	1.91	0.52
1:B:117:GLY:HA3	1:C:208:ARG:HD2	1.92	0.51
1:F:376:VAL:HG21	3:F:450:FAD:H5'2	1.92	0.51
1:I:357:GLN:OE1	1:I:357:GLN:HA	2.10	0.51
1:J:167:VAL:HG11	1:J:201:THR:HG21	1.91	0.51
1:J:280[B]:ARG:HD2	1:J:282:GLU:OE2	2.11	0.51
1:J:242:ASP:HB3	1:J:245:GLU:HG3	1.90	0.51
1:C:58:VAL:HG23	1:C:238:MET:HB3	1.92	0.51
1:I:364:ARG:HG3	1:I:369:ARG:O	2.10	0.51
1:J:185:GLY:O	1:J:186:LEU:HD13	2.10	0.51
1:B:162:VAL:HG13	1:B:193:ALA:HB1	1.91	0.51
1:I:167:VAL:HG11	1:I:201:THR:HG21	1.93	0.51
1:H:357:GLN:H	1:H:357:GLN:CD	2.14	0.51
1:G:158:THR:O	1:G:162:VAL:HG22	2.11	0.51
1:C:308:GLU:HB3	1:C:311:HIS:HD2	1.76	0.51
1:E:262:ASP:HB3	1:E:272:LEU:HB2	1.92	0.51
1:B:208:ARG:HD2	1:G:117:GLY:HA2	1.92	0.50
1:B:376:VAL:HG21	3:B:450:FAD:H5'2	1.91	0.50
1:D:344:GLU:HG3	4:D:1032:HOH:O	2.11	0.50
1:G:123:PRO:HB3	1:G:200:PRO:O	2.12	0.50
1:G:262:ASP:HB3	1:G:272:LEU:HB2	1.93	0.50
1:H:249:PHE:O	1:H:251:PRO:HD3	2.12	0.50
1:J:280[B]:ARG:NH2	1:J:326:TYR:OH	2.44	0.50
1:B:201:THR:HG22	4:B:715:HOH:O	2.11	0.50
1:D:30:PHE:O	1:D:252:PHE:HA	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:162:VAL:CG1	1:H:193:ALA:HB1	2.41	0.50
1:A:254:HIS:NE2	1:A:360:THR:CG2	2.74	0.50
1:F:336:PRO:O	1:F:338:PRO:HD3	2.11	0.50
1:I:280:ARG:NH1	1:I:324:TYR:CD2	2.74	0.50
1:C:139:SER:O	1:C:142:VAL:HG12	2.11	0.50
1:D:86:ILE:N	1:D:86:ILE:HD12	2.25	0.50
1:A:123:PRO:HB3	1:A:200:PRO:O	2.11	0.50
1:A:122:ILE:HA	1:A:123:PRO:C	2.32	0.50
1:I:30:PHE:O	1:I:252:PHE:HA	2.12	0.50
1:H:162:VAL:HG13	1:H:193:ALA:HB1	1.93	0.50
1:G:86:ILE:N	1:G:86:ILE:HD12	2.27	0.49
1:J:86:ILE:HG21	1:J:109:HIS:HB2	1.94	0.49
1:J:280[B]:ARG:NH1	1:J:282:GLU:OE2	2.41	0.49
1:B:139:SER:O	1:B:142:VAL:HG12	2.12	0.49
1:C:376:VAL:HG21	3:C:450:FAD:H5'2	1.94	0.49
1:E:357:GLN:HE21	1:E:357:GLN:HA	1.77	0.49
1:G:272:LEU:HD23	1:G:273:PRO:HD2	1.94	0.49
1:I:115:VAL:CG1	1:I:174:LYS:HG2	2.41	0.49
1:B:254[A]:HIS:NE2	1:B:360:THR:HG22	2.26	0.49
1:F:122:ILE:HA	1:F:123:PRO:C	2.33	0.49
1:A:156:VAL:HG11	1:A:162:VAL:HG13	1.94	0.49
1:J:272:LEU:HD13	1:J:368:TYR:CD1	2.47	0.49
1:C:361:PHE:N	1:C:361:PHE:CD1	2.80	0.49
1:H:277:LEU:HD23	1:H:327:PRO:HA	1.95	0.49
1:J:246:ILE:HG13	1:J:250:ILE:HD12	1.94	0.49
1:H:122:ILE:HA	1:H:123:PRO:C	2.33	0.49
1:G:305:ARG:HH12	2:G:500:GDU:H5'	1.76	0.49
1:I:40:ALA:HB1	1:I:362:VAL:HG22	1.94	0.49
1:I:123:PRO:HB3	1:I:200:PRO:O	2.12	0.49
1:I:280:ARG:HH11	1:I:280:ARG:HB3	1.76	0.49
1:E:86:ILE:HG21	1:E:109:HIS:HB2	1.94	0.49
1:F:162:VAL:HG21	1:F:196:THR:OG1	2.13	0.49
2:I:500:GDU:O4'	2:I:500:GDU:O6'	2.26	0.49
1:J:261:VAL:CG1	1:J:366:ALA:O	2.61	0.49
1:G:37:ALA:HA	1:G:57:ILE:HD11	1.94	0.49
1:H:145:PHE:O	1:H:149:VAL:HG22	2.12	0.49
1:H:158:THR:HG21	1:H:189:SER:HA	1.95	0.48
1:E:159:SER:HB3	1:E:196:THR:HG23	1.95	0.48
1:J:29:GLY:HA3	1:J:251:PRO:O	2.14	0.48
1:A:86:ILE:HG21	1:A:109:HIS:HB2	1.94	0.48
1:E:357:GLN:HA	1:E:357:GLN:NE2	2.27	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:97:TYR:HD2	1:C:98:LEU:HD12	1.76	0.48
1:J:47:ARG:NE	1:J:47:ARG:HA	2.27	0.48
1:B:273:PRO:HG2	1:B:342:ASN:OD1	2.14	0.48
1:C:64:ILE:HD12	1:C:226:PHE:HB3	1.95	0.48
1:A:208:ARG:HD2	1:J:117:GLY:HA3	1.95	0.48
1:I:162:VAL:HG11	1:I:193:ALA:HB1	1.95	0.48
1:I:388:GLN:HB3	1:I:389:GLY:HA2	1.95	0.48
1:C:269:TYR:CE2	1:C:352:LEU:CD1	2.96	0.48
1:D:47:ARG:NH1	1:D:100:ARG:HH12	2.10	0.48
1:B:206:ASP:OD1	1:B:208:ARG:HD3	2.14	0.47
1:C:246:ILE:HD12	1:C:250:ILE:HD12	1.96	0.47
1:I:86:ILE:HG21	1:I:109:HIS:HB2	1.96	0.47
1:I:151:GLU:HB2	1:I:164:VAL:HG13	1.95	0.47
1:J:158:THR:HB	1:J:161:ASP:CG	2.34	0.47
1:A:236:LYS:HB3	1:I:238:MET:HE3	1.96	0.47
1:C:86:ILE:HD13	2:C:500:GDU:H6'2	1.97	0.47
1:F:305:ARG:NH1	2:F:500:GDU:H5'	2.30	0.47
1:E:47:ARG:NE	1:E:47:ARG:HA	2.30	0.46
1:G:318:HIS:NE2	1:H:285:ASP:OD2	2.44	0.46
1:B:122:ILE:HA	1:B:123:PRO:C	2.36	0.46
1:H:158:THR:HG22	1:H:160:GLU:N	2.30	0.46
1:C:282:GLU:OE1	1:C:284:HIS:CE1	2.69	0.46
1:F:305:ARG:HH12	2:F:500:GDU:H5'	1.80	0.46
1:C:32:TYR:CD1	1:C:254:HIS:HB3	2.51	0.46
1:D:37:ALA:HA	1:D:57:ILE:HD11	1.97	0.46
1:D:246:ILE:HD13	1:D:250:ILE:HD12	1.97	0.46
1:B:162:VAL:CG1	1:B:193:ALA:HB1	2.45	0.46
1:A:158:THR:CG2	1:A:160:GLU:HB3	2.46	0.46
1:C:122:ILE:HA	1:C:123:PRO:C	2.36	0.46
1:D:383:THR:HG22	1:D:387:LEU:HD22	1.97	0.46
1:I:47:ARG:NH1	1:I:100:ARG:HH12	2.14	0.46
1:C:257:TYR:HE2	1:C:260:PRO:O	1.97	0.46
1:D:122:ILE:HA	1:D:123:PRO:C	2.35	0.46
1:J:172:TYR:OH	1:J:188:PRO:HG2	2.16	0.46
1:G:357:GLN:HA	1:G:357:GLN:NE2	2.31	0.46
3:A:450:FAD:O2'	3:A:450:FAD:O4'	2.30	0.46
1:D:206:ASP:HA	1:I:116:ASP:O	2.16	0.46
1:H:158:THR:HG23	1:H:189:SER:HA	1.97	0.46
1:I:280:ARG:HH11	1:I:280:ARG:CB	2.29	0.46
1:H:86:ILE:HG21	1:H:109:HIS:HB2	1.99	0.45
1:B:167:VAL:CG1	1:B:201:THR:HG21	2.41	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:208:ARG:HD2	1:H:117:GLY:HA3	1.98	0.45
1:F:273:PRO:HG2	1:F:342:ASN:OD1	2.15	0.45
1:J:152:LYS:HD2	1:J:153:VAL:O	2.16	0.45
1:J:158:THR:O	1:J:162:VAL:HG22	2.17	0.45
1:I:376:VAL:HG21	3:I:450:FAD:H5'2	1.98	0.45
1:B:272:LEU:HD13	1:B:368:TYR:CD1	2.51	0.45
1:C:237:VAL:O	1:F:238:MET:HA	2.16	0.45
1:D:162:VAL:HG13	1:D:193:ALA:HB1	1.98	0.45
1:A:124:ILE:HB	1:A:201:THR:HG22	1.98	0.45
1:A:273:PRO:HG2	1:A:342:ASN:OD1	2.17	0.45
1:F:272:LEU:HD13	1:F:368:TYR:CD1	2.51	0.45
1:J:155:GLN:HG2	1:J:157:ARG:NH2	2.32	0.45
1:A:206:ASP:HA	1:J:116:ASP:O	2.17	0.45
1:C:245:GLU:OE2	1:F:236:LYS:HE3	2.16	0.45
1:B:318:HIS:NE2	1:H:316:ARG:HD3	2.30	0.45
1:B:37:ALA:HA	1:B:57:ILE:HD11	1.98	0.45
1:H:97:TYR:HD2	1:H:98:LEU:HD13	1.82	0.45
1:A:152:LYS:HD3	1:A:152:LYS:HA	1.26	0.45
1:A:158:THR:HG21	1:A:160:GLU:HB3	1.99	0.45
1:D:135:LEU:HD23	1:F:138:THR:CG2	2.46	0.45
1:A:158:THR:O	1:A:162:VAL:HG22	2.17	0.45
1:D:305:ARG:NH1	2:D:500:GDU:H5'	2.32	0.45
1:E:261:VAL:HG13	1:E:366:ALA:O	2.17	0.45
1:J:336:PRO:O	1:J:338:PRO:HD3	2.17	0.45
1:C:117:GLY:HA3	1:J:208:ARG:HD2	1.98	0.44
1:C:167:VAL:CG1	1:C:201:THR:HG21	2.46	0.44
1:F:145:PHE:O	1:F:149:VAL:HG22	2.16	0.44
1:F:158:THR:HG23	1:F:188:PRO:O	2.17	0.44
1:G:58:VAL:HG22	1:G:241:THR:HB	1.99	0.44
1:I:44:LEU:HD13	1:I:256:ILE:HD13	1.99	0.44
1:B:357:GLN:O	1:B:358:ASP:CB	2.65	0.44
1:C:97:TYR:CZ	1:C:101:PHE:HE1	2.35	0.44
1:D:208:ARG:HD2	1:I:117:GLY:HA3	1.98	0.44
1:D:371:TYR:HB3	1:D:376:VAL:HG23	1.98	0.44
1:G:339:ARG:HB2	1:G:340:PRO:HD2	1.99	0.44
1:F:86:ILE:N	1:F:86:ILE:HD12	2.32	0.44
1:H:246:ILE:HD12	1:H:250:ILE:HD12	1.98	0.44
1:J:246:ILE:HD12	1:J:246:ILE:HA	1.82	0.44
1:D:388:GLN:HE21	1:D:388:GLN:CA	2.30	0.44
1:H:158:THR:HG23	1:H:160:GLU:H	1.81	0.44
1:H:337:VAL:HB	1:H:342:ASN:ND2	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:384:PHE:CE1	1:I:388:GLN:HG3	2.52	0.44
2:I:500:GDU:HO4'	2:I:500:GDU:HO6'	1.61	0.44
1:D:238:MET:HG2	1:D:241:THR:OG1	2.17	0.44
1:D:250:ILE:HA	1:D:251:PRO:HD3	1.78	0.44
1:E:29:GLY:CA	1:E:251:PRO:HG2	2.48	0.44
1:E:116:ASP:O	1:I:206:ASP:HA	2.18	0.44
1:F:39:PHE:O	1:F:43:VAL:HG23	2.17	0.44
1:G:187:ASP:CG	1:G:188:PRO:HD2	2.38	0.44
1:C:92:LYS:O	1:C:96:GLU:HG3	2.18	0.44
1:D:156:VAL:CG1	1:D:162:VAL:HG13	2.47	0.44
1:A:151:GLU:O	1:A:165:SER:HA	2.17	0.43
1:E:169:ARG:HD2	4:E:520:HOH:O	2.18	0.43
1:H:152:LYS:NZ	1:H:153:VAL:H	2.16	0.43
1:A:277:LEU:HD23	1:A:327:PRO:HA	2.01	0.43
1:C:275:ARG:HB3	1:C:335:TYR:HB2	2.00	0.43
1:D:236:LYS:HA	1:D:236:LYS:HD3	1.89	0.43
1:H:47:ARG:HA	1:H:47:ARG:NE	2.34	0.43
1:A:116:ASP:O	1:G:206:ASP:HA	2.18	0.43
1:E:248:ASP:HB2	4:E:1050:HOH:O	2.18	0.43
1:F:30:PHE:O	1:F:252:PHE:HA	2.18	0.43
1:J:272:LEU:HD13	1:J:368:TYR:CE1	2.54	0.43
2:G:500:GDU:H2'	3:G:450:FAD:C4	2.49	0.43
1:I:272:LEU:HD13	1:I:368:TYR:CD1	2.54	0.43
1:J:122:ILE:HA	1:J:123:PRO:C	2.38	0.43
1:D:355:ALA:O	1:D:357:GLN:NE2	2.51	0.43
1:A:364:ARG:HG3	1:A:369:ARG:O	2.18	0.43
1:E:28:LYS:HA	1:E:28:LYS:HD2	1.84	0.43
1:E:125:ASN:HB2	1:E:204:ASN:O	2.19	0.43
1:G:47:ARG:HA	1:G:47:ARG:NE	2.33	0.43
1:I:272:LEU:HD13	1:I:368:TYR:CE1	2.54	0.43
1:E:122:ILE:HA	1:E:123:PRO:C	2.38	0.43
1:J:127:ASP:O	1:J:131:ARG:HG3	2.19	0.43
1:A:300:ASP:O	1:A:301:TYR:HB2	2.19	0.43
1:J:167:VAL:CG1	1:J:201:THR:HG21	2.49	0.43
1:A:138:THR:HG21	1:J:135:LEU:HD23	2.01	0.43
1:C:257:TYR:CE2	1:C:260:PRO:O	2.72	0.43
1:J:253:GLN:HE21	1:J:253:GLN:N	2.16	0.43
1:C:339:ARG:HB2	1:C:340:PRO:HD2	2.01	0.42
1:B:86:ILE:HG21	1:B:109:HIS:HB2	2.00	0.42
1:B:151:GLU:HB2	1:B:164:VAL:HG13	2.01	0.42
1:D:305:ARG:HH12	2:D:500:GDU:H5'	1.84	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:384:PHE:O	1:J:388:GLN:HG2	2.18	0.42
1:D:266:ASP:O	1:D:267:PHE:HB2	2.19	0.42
1:J:156:VAL:HG13	1:J:161:ASP:HB3	2.01	0.42
1:B:277:LEU:HD23	1:B:327:PRO:HA	2.01	0.42
1:D:261:VAL:HG13	1:D:366:ALA:O	2.19	0.42
1:E:117:GLY:HA2	1:I:208:ARG:HD2	1.99	0.42
1:J:124:ILE:HB	1:J:201:THR:HG22	2.00	0.42
1:B:141:GLN:HA	1:B:144:GLU:HG3	2.01	0.42
1:E:388:GLN:NE2	1:E:388:GLN:HA	2.34	0.42
1:H:48:LEU:HD13	1:H:384:PHE:CD1	2.54	0.42
1:F:162:VAL:CG2	1:F:196:THR:OG1	2.67	0.42
1:I:37:ALA:HA	1:I:57:ILE:HD11	2.00	0.42
1:C:250:ILE:HA	1:C:251:PRO:HD3	1.71	0.42
1:D:162:VAL:CG1	1:D:193:ALA:HB1	2.49	0.42
1:E:58:VAL:CG2	1:E:238:MET:HB3	2.31	0.42
1:G:125:ASN:HB2	1:G:204:ASN:O	2.19	0.42
1:E:345:LEU:HD22	1:E:345:LEU:O	2.20	0.42
1:F:47:ARG:HA	1:F:47:ARG:NE	2.35	0.42
1:F:123:PRO:HB3	1:F:200:PRO:O	2.20	0.42
1:B:187:ASP:CG	1:B:188:PRO:HD2	2.40	0.42
1:E:357:GLN:O	1:E:358:ASP:HB2	2.20	0.42
1:H:341:GLU:HG2	1:H:342:ASN:N	2.34	0.42
1:A:32:TYR:HA	1:A:254:HIS:O	2.20	0.41
1:A:47:ARG:HA	1:A:47:ARG:NE	2.35	0.41
1:B:344:GLU:HG3	4:B:764:HOH:O	2.21	0.41
1:D:306:VAL:HG22	1:D:324:TYR:CD1	2.55	0.41
1:E:176:PHE:HA	2:E:500:GDU:O2	2.20	0.41
1:A:58:VAL:HG23	1:A:238:MET:HB3	2.01	0.41
1:A:262:ASP:HB3	1:A:272:LEU:HB2	2.02	0.41
1:G:155:GLN:HB3	1:G:157:ARG:HH11	1.85	0.41
3:G:450:FAD:O2'	3:G:450:FAD:O4'	2.30	0.41
1:H:48:LEU:HD13	1:H:384:PHE:CE1	2.56	0.41
1:C:269:TYR:HE2	1:C:352:LEU:HD11	1.79	0.41
1:F:250:ILE:HA	1:F:251:PRO:HD3	1.87	0.41
1:G:159:SER:HA	1:G:162:VAL:CG2	2.50	0.41
1:F:116:ASP:O	1:H:206:ASP:HA	2.21	0.41
1:F:153:VAL:HG23	1:F:153:VAL:O	2.20	0.41
1:G:48:LEU:HD12	1:G:53:GLN:HG3	2.03	0.41
1:A:297:TYR:HE1	1:A:306:VAL:HG23	1.86	0.41
1:H:364:ARG:HG3	1:H:369:ARG:O	2.20	0.41
1:J:305:ARG:HH12	2:J:500:GDU:H5'	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:500:GDU:H2'	3:B:450:FAD:C4	2.51	0.41
1:G:98:LEU:HD12	1:G:98:LEU:HA	1.91	0.41
1:C:269:TYR:HE2	1:C:352:LEU:HD12	1.85	0.41
1:E:30:PHE:O	1:E:252:PHE:HA	2.21	0.41
1:G:122:ILE:HA	1:G:123:PRO:C	2.40	0.41
1:G:236:LYS:HA	1:G:236:LYS:HD3	1.96	0.41
1:J:275:ARG:HB3	1:J:335:TYR:HB2	2.03	0.41
1:J:305:ARG:NH1	2:J:500:GDU:H5'	2.35	0.41
1:C:356:ALA:CB	1:C:359:VAL:HG13	2.50	0.41
1:F:306:VAL:HG13	1:F:324:TYR:CE1	2.56	0.41
1:B:160:GLU:HG3	1:B:172:TYR:CZ	2.56	0.40
1:B:277:LEU:HD11	1:B:335:TYR:HE1	1.86	0.40
1:E:385:ARG:NH2	4:E:415:HOH:O	2.54	0.40
1:F:364:ARG:HG3	1:F:369:ARG:O	2.21	0.40
1:I:86:ILE:HD13	2:I:500:GDU:O6'	2.21	0.40
1:I:275:ARG:HB3	1:I:335:TYR:HB2	2.03	0.40
1:J:273:PRO:HG2	1:J:342:ASN:OD1	2.21	0.40
1:B:47:ARG:HA	1:B:47:ARG:NE	2.35	0.40
1:B:275:ARG:HB3	1:B:335:TYR:HB2	2.03	0.40
1:B:297:TYR:HE1	1:B:306:VAL:HG23	1.85	0.40
1:D:339:ARG:O	1:D:340:PRO:C	2.60	0.40
1:E:92:LYS:HE2	1:E:96:GLU:OE2	2.21	0.40
1:F:275:ARG:HB3	1:F:335:TYR:HB2	2.02	0.40
1:H:158:THR:HG22	1:H:161:ASP:N	2.24	0.40
1:B:272:LEU:HD23	1:B:273:PRO:HD2	2.02	0.40
1:B:338:PRO:O	1:B:339:ARG:HB3	2.22	0.40
1:E:158:THR:O	1:E:162:VAL:HG22	2.21	0.40
1:C:217:MET:HG3	1:C:312:ILE:O	2.21	0.40
1:F:162:VAL:HG23	1:F:163:VAL:N	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	364/397 (92%)	355 (98%)	9 (2%)	0	100	100
1	B	364/397 (92%)	352 (97%)	12 (3%)	0	100	100
1	C	360/397 (91%)	347 (96%)	13 (4%)	0	100	100
1	D	359/397 (90%)	345 (96%)	13 (4%)	1 (0%)	41	47
1	E	362/397 (91%)	353 (98%)	9 (2%)	0	100	100
1	F	362/397 (91%)	356 (98%)	6 (2%)	0	100	100
1	G	362/397 (91%)	355 (98%)	6 (2%)	1 (0%)	41	47
1	H	363/397 (91%)	353 (97%)	10 (3%)	0	100	100
1	I	362/397 (91%)	353 (98%)	9 (2%)	0	100	100
1	J	360/397 (91%)	353 (98%)	7 (2%)	0	100	100
All	All	3618/3970 (91%)	3522 (97%)	94 (3%)	2 (0%)	51	63

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	340	PRO
1	G	154	GLU

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	318/346 (92%)	292 (92%)	26 (8%)	11	11
1	B	318/346 (92%)	299 (94%)	19 (6%)	19	21
1	C	315/346 (91%)	294 (93%)	21 (7%)	16	17
1	D	314/346 (91%)	294 (94%)	20 (6%)	17	18
1	E	316/346 (91%)	298 (94%)	18 (6%)	20	22
1	F	316/346 (91%)	296 (94%)	20 (6%)	18	19
1	G	316/346 (91%)	294 (93%)	22 (7%)	15	15
1	H	317/346 (92%)	301 (95%)	16 (5%)	24	28

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	I	316/346 (91%)	294 (93%)	22 (7%)	15 15
1	J	314/346 (91%)	295 (94%)	19 (6%)	18 20
All	All	3160/3460 (91%)	2957 (94%)	203 (6%)	17 18

All (203) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	GLU
1	A	48	LEU
1	A	60	ARG
1	A	98	LEU
1	A	112	LEU
1	A	120	LEU
1	A	126	LEU
1	A	152	LYS
1	A	155	GLN
1	A	157	ARG
1	A	162	VAL
1	A	186	LEU
1	A	201	THR
1	A	246	ILE
1	A	261	VAL
1	A	272	LEU
1	A	286	THR
1	A	306	VAL
1	A	330	GLU
1	A	339	ARG
1	A	345	LEU
1	A	347	LYS
1	A	348	LYS
1	A	360	THR
1	A	370	TYR
1	A	387	LEU
1	B	48	LEU
1	B	98	LEU
1	B	112	LEU
1	B	120	LEU
1	B	126	LEU
1	B	139	SER
1	B	144	GLU
1	B	186	LEU

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Mol	Chain	Res	Type
1	B	246	ILE
1	B	261	VAL
1	B	272	LEU
1	B	286	THR
1	B	306	VAL
1	B	330	GLU
1	B	341	GLU
1	B	345	LEU
1	B	360	THR
1	B	370	TYR
1	B	387	LEU
1	C	28	LYS
1	C	48	LEU
1	C	58	VAL
1	C	112	LEU
1	C	120	LEU
1	C	126	LEU
1	C	139	SER
1	C	159	SER
1	C	166	LYS
1	C	174	LYS
1	C	186	LEU
1	C	261	VAL
1	C	280[A]	ARG
1	C	280[B]	ARG
1	C	345	LEU
1	C	348	LYS
1	C	354	ASP
1	C	357	GLN
1	C	361	PHE
1	C	370	TYR
1	C	379	GLN
1	D	48	LEU
1	D	58	VAL
1	D	93	ASP
1	D	98	LEU
1	D	112	LEU
1	D	120	LEU
1	D	126	LEU
1	D	154	GLU
1	D	155	GLN
1	D	162	VAL

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Mol	Chain	Res	Type
1	D	164	VAL
1	D	182	LYS
1	D	186	LEU
1	D	261	VAL
1	D	292	THR
1	D	341	GLU
1	D	345	LEU
1	D	370	TYR
1	D	387	LEU
1	D	388	GLN
1	E	28	LYS
1	E	48	LEU
1	E	98	LEU
1	E	112	LEU
1	E	120	LEU
1	E	126	LEU
1	E	154	GLU
1	E	162	VAL
1	E	186	LEU
1	E	261	VAL
1	E	272	LEU
1	E	330	GLU
1	E	344	GLU
1	E	345	LEU
1	E	348	LYS
1	E	362	VAL
1	E	370	TYR
1	E	387	LEU
1	F	48	LEU
1	F	54	ARG
1	F	58	VAL
1	F	93	ASP
1	F	98	LEU
1	F	112	LEU
1	F	120	LEU
1	F	126	LEU
1	F	158	THR
1	F	159	SER
1	F	164	VAL
1	F	186	LEU
1	F	261	VAL
1	F	272	LEU

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Mol	Chain	Res	Type
1	F	306	VAL
1	F	330	GLU
1	F	345	LEU
1	F	348	LYS
1	F	370	TYR
1	F	387	LEU
1	G	27	SER
1	G	28	LYS
1	G	58	VAL
1	G	98	LEU
1	G	112	LEU
1	G	120	LEU
1	G	126	LEU
1	G	152	LYS
1	G	162	VAL
1	G	164	VAL
1	G	186	LEU
1	G	261	VAL
1	G	272	LEU
1	G	292	THR
1	G	306	VAL
1	G	318	HIS
1	G	330	GLU
1	G	345	LEU
1	G	348	LYS
1	G	362	VAL
1	G	370	TYR
1	G	371	TYR
1	H	48	LEU
1	H	98	LEU
1	H	112	LEU
1	H	120	LEU
1	H	126	LEU
1	H	152	LYS
1	H	158	THR
1	H	162	VAL
1	H	186	LEU
1	H	261	VAL
1	H	272	LEU
1	H	330	GLU
1	H	345	LEU
1	H	370	TYR

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Mol	Chain	Res	Type
1	H	387	LEU
1	H	390	GLN
1	I	48	LEU
1	I	58	VAL
1	I	98	LEU
1	I	112	LEU
1	I	120	LEU
1	I	126	LEU
1	I	159	SER
1	I	164	VAL
1	I	174	LYS
1	I	186	LEU
1	I	201	THR
1	I	261	VAL
1	I	272	LEU
1	I	280	ARG
1	I	286	THR
1	I	292	THR
1	I	306	VAL
1	I	339	ARG
1	I	345	LEU
1	I	362	VAL
1	I	370	TYR
1	I	387	LEU
1	J	48	LEU
1	J	98	LEU
1	J	112	LEU
1	J	120	LEU
1	J	126	LEU
1	J	143	GLU
1	J	152	LYS
1	J	162	VAL
1	J	186	LEU
1	J	201	THR
1	J	212	ASP
1	J	272	LEU
1	J	306	VAL
1	J	330	GLU
1	J	345	LEU
1	J	357	GLN
1	J	362	VAL
1	J	370	TYR

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Mol	Chain	Res	Type
1	J	387	LEU

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

Mol	Chain	Res	Type
1	C	284	HIS
1	C	311	HIS
1	C	357	GLN
1	D	388	GLN
1	E	357	GLN
1	E	388	GLN
1	F	390	GLN
1	G	357	GLN
1	H	284	HIS
1	H	388	GLN
1	J	253	GLN
1	J	357	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

20 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	GDU	E	500	-	35,38,38	2.70	4 (11%)	53,58,58	3.53	16 (30%)
2	GDU	B	500	-	35,38,38	2.66	4 (11%)	53,58,58	3.60	18 (33%)
2	GDU	A	500	-	35,38,38	2.66	5 (14%)	53,58,58	3.56	15 (28%)
2	GDU	I	500	-	35,38,38	2.65	4 (11%)	53,58,58	3.73	18 (33%)
3	FAD	J	450	-	53,58,58	1.86	18 (33%)	68,89,89	1.37	8 (11%)
3	FAD	F	450	-	53,58,58	1.82	18 (33%)	68,89,89	1.37	8 (11%)
3	FAD	B	450	-	53,58,58	1.75	19 (35%)	68,89,89	1.48	8 (11%)
2	GDU	J	500	-	35,38,38	2.66	3 (8%)	53,58,58	3.64	17 (32%)
2	GDU	H	500	-	35,38,38	2.76	5 (14%)	53,58,58	3.43	14 (26%)
2	GDU	D	500	-	35,38,38	2.72	6 (17%)	53,58,58	3.62	17 (32%)
2	GDU	F	500	-	35,38,38	2.70	4 (11%)	53,58,58	3.70	21 (39%)
2	GDU	G	500	-	35,38,38	2.66	4 (11%)	53,58,58	3.64	18 (33%)
3	FAD	A	450	-	53,58,58	1.84	20 (37%)	68,89,89	1.61	14 (20%)
3	FAD	C	450	-	53,58,58	1.88	17 (32%)	68,89,89	1.62	12 (17%)
3	FAD	I	450	-	53,58,58	1.82	19 (35%)	68,89,89	1.41	11 (16%)
3	FAD	D	450	-	53,58,58	1.75	19 (35%)	68,89,89	1.53	12 (17%)
3	FAD	H	450	-	53,58,58	1.82	18 (33%)	68,89,89	1.25	8 (11%)
3	FAD	G	450	-	53,58,58	1.73	14 (26%)	68,89,89	1.37	8 (11%)
2	GDU	C	500	-	35,38,38	2.72	4 (11%)	53,58,58	3.55	17 (32%)
3	FAD	E	450	-	53,58,58	1.77	16 (30%)	68,89,89	1.45	10 (14%)

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	GDU	E	500	-	-	4/23/59/59	0/3/3/3
2	GDU	B	500	-	-	2/23/59/59	0/3/3/3
2	GDU	A	500	-	-	3/23/59/59	0/3/3/3
2	GDU	I	500	-	-	6/23/59/59	0/3/3/3
3	FAD	J	450	-	-	3/30/50/50	0/6/6/6
3	FAD	F	450	-	-	2/30/50/50	0/6/6/6
3	FAD	B	450	-	-	1/30/50/50	0/6/6/6

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GDU	J	500	-	-	6/23/59/59	0/3/3/3
2	GDU	H	500	-	-	4/23/59/59	0/3/3/3
2	GDU	D	500	-	-	6/23/59/59	0/3/3/3
2	GDU	F	500	-	-	6/23/59/59	0/3/3/3
2	GDU	G	500	-	-	4/23/59/59	0/3/3/3
3	FAD	A	450	-	-	5/30/50/50	0/6/6/6
3	FAD	C	450	-	-	1/30/50/50	0/6/6/6
3	FAD	I	450	-	-	4/30/50/50	0/6/6/6
3	FAD	D	450	-	-	3/30/50/50	0/6/6/6
3	FAD	H	450	-	-	5/30/50/50	0/6/6/6
3	FAD	G	450	-	-	3/30/50/50	0/6/6/6
2	GDU	C	500	-	-	6/23/59/59	0/3/3/3
3	FAD	E	450	-	-	6/30/50/50	0/6/6/6

All (221) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	500	GDU	O2-C2	11.27	1.43	1.23
2	G	500	GDU	O2-C2	11.25	1.43	1.23
2	E	500	GDU	O2-C2	11.23	1.43	1.23
2	C	500	GDU	O2-C2	11.14	1.43	1.23
2	F	500	GDU	O2-C2	11.01	1.43	1.23
2	H	500	GDU	O2-C2	11.01	1.43	1.23
2	B	500	GDU	O2-C2	10.84	1.42	1.23
2	I	500	GDU	O2-C2	10.81	1.42	1.23
2	A	500	GDU	O2-C2	10.64	1.42	1.23
2	J	500	GDU	O2-C2	10.45	1.42	1.23
2	A	500	GDU	C2-N1	-8.05	1.25	1.38
2	J	500	GDU	C2-N1	-7.94	1.25	1.38
2	H	500	GDU	C2-N1	-7.88	1.25	1.38
2	F	500	GDU	C2-N1	-7.75	1.26	1.38
2	I	500	GDU	C2-N1	-7.75	1.26	1.38
2	G	500	GDU	C2-N1	-7.54	1.26	1.38
2	E	500	GDU	C2-N1	-7.53	1.26	1.38
2	B	500	GDU	C2-N1	-7.49	1.26	1.38
2	C	500	GDU	C2-N1	-7.34	1.26	1.38
2	D	500	GDU	C2-N1	-7.27	1.26	1.38
2	H	500	GDU	C2-N3	-6.68	1.26	1.38
2	C	500	GDU	C2-N3	-6.48	1.26	1.38
2	E	500	GDU	C2-N3	-6.35	1.26	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	I	500	GDU	C2-N3	-6.33	1.26	1.38
2	A	500	GDU	C2-N3	-6.23	1.26	1.38
2	J	500	GDU	C2-N3	-6.20	1.26	1.38
2	F	500	GDU	C2-N3	-6.15	1.27	1.38
2	B	500	GDU	C2-N3	-6.14	1.27	1.38
2	D	500	GDU	C2-N3	-6.13	1.27	1.38
2	G	500	GDU	C2-N3	-5.89	1.27	1.38
3	C	450	FAD	C5X-N5	-4.20	1.31	1.39
3	B	450	FAD	C5X-N5	-3.45	1.32	1.39
3	J	450	FAD	O4-C4	-3.40	1.17	1.23
3	I	450	FAD	C5X-N5	-3.33	1.33	1.39
3	H	450	FAD	P-O2P	-3.16	1.40	1.55
3	B	450	FAD	C9A-C5X	-3.13	1.36	1.41
3	F	450	FAD	O4'-C4'	-3.13	1.36	1.43
3	J	450	FAD	P-O2P	-3.11	1.40	1.55
3	G	450	FAD	O2-C2	-3.11	1.18	1.24
3	C	450	FAD	C2A-N3A	3.08	1.37	1.32
3	A	450	FAD	PA-O2A	-3.08	1.40	1.55
3	I	450	FAD	P-O2P	-3.08	1.40	1.55
3	I	450	FAD	O4-C4	-3.07	1.17	1.23
3	C	450	FAD	O2-C2	-3.06	1.18	1.24
3	E	450	FAD	O2-C2	-3.06	1.18	1.24
3	C	450	FAD	C9A-N10	-3.05	1.35	1.41
3	F	450	FAD	P-O2P	-3.02	1.41	1.55
3	A	450	FAD	C4X-C10	-3.02	1.35	1.44
3	D	450	FAD	C9A-C5X	-2.99	1.36	1.41
3	J	450	FAD	C9A-N10	-2.98	1.35	1.41
3	C	450	FAD	C4X-C10	-2.91	1.35	1.44
3	F	450	FAD	PA-O2A	-2.90	1.41	1.55
3	G	450	FAD	P-O2P	-2.90	1.41	1.55
3	F	450	FAD	O4-C4	-2.89	1.18	1.23
3	A	450	FAD	P-O2P	-2.88	1.41	1.55
3	E	450	FAD	C4X-C10	-2.88	1.35	1.44
3	J	450	FAD	O2-C2	-2.86	1.19	1.24
3	B	450	FAD	P-O2P	-2.86	1.41	1.55
3	J	450	FAD	C4X-C4	-2.86	1.34	1.44
3	D	450	FAD	C4X-C4	-2.85	1.34	1.44
3	I	450	FAD	PA-O2A	-2.85	1.42	1.55
3	G	450	FAD	O4B-C4B	-2.84	1.38	1.45
3	A	450	FAD	O3'-C3'	-2.84	1.36	1.43
3	A	450	FAD	O4B-C4B	-2.84	1.38	1.45
3	C	450	FAD	O2'-C2'	-2.83	1.37	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	450	FAD	C5X-N5	-2.83	1.34	1.39
3	G	450	FAD	PA-O2A	-2.81	1.42	1.55
3	H	450	FAD	PA-O2A	-2.79	1.42	1.55
3	I	450	FAD	C9A-N10	-2.78	1.36	1.41
3	G	450	FAD	C9A-C5X	-2.78	1.36	1.41
3	C	450	FAD	O3B-C3B	-2.76	1.36	1.43
3	H	450	FAD	O4-C4	-2.76	1.18	1.23
3	E	450	FAD	O4-C4	-2.76	1.18	1.23
3	C	450	FAD	C4X-C4	-2.75	1.34	1.44
3	F	450	FAD	PA-O1A	-2.75	1.41	1.50
3	C	450	FAD	PA-O2A	-2.75	1.42	1.55
3	D	450	FAD	PA-O2A	-2.75	1.42	1.55
3	J	450	FAD	C2A-N3A	2.71	1.36	1.32
3	H	450	FAD	C5X-N5	-2.70	1.34	1.39
3	B	450	FAD	O2-C2	-2.70	1.19	1.24
3	F	450	FAD	O3'-C3'	-2.70	1.36	1.43
3	H	450	FAD	O4'-C4'	-2.70	1.37	1.43
3	E	450	FAD	P-O2P	-2.68	1.42	1.55
3	G	450	FAD	P-O1P	-2.67	1.41	1.50
3	A	450	FAD	P-O1P	-2.67	1.41	1.50
3	B	450	FAD	PA-O2A	-2.66	1.42	1.55
3	J	450	FAD	PA-O2A	-2.65	1.42	1.55
3	H	450	FAD	C4X-C4	-2.63	1.34	1.44
3	J	450	FAD	O3'-C3'	-2.63	1.36	1.43
3	E	450	FAD	PA-O2A	-2.63	1.43	1.55
3	D	450	FAD	O2-C2	-2.62	1.19	1.24
3	H	450	FAD	C4X-C10	-2.62	1.36	1.44
3	F	450	FAD	O2-C2	-2.61	1.19	1.24
3	F	450	FAD	O4B-C4B	-2.61	1.39	1.45
3	D	450	FAD	C5X-N5	-2.60	1.34	1.39
3	E	450	FAD	O4B-C4B	-2.60	1.39	1.45
3	E	450	FAD	C9A-N10	-2.60	1.36	1.41
3	J	450	FAD	C5X-N5	-2.59	1.34	1.39
3	E	450	FAD	C4X-N5	2.58	1.35	1.30
3	A	450	FAD	C4X-C4	-2.57	1.35	1.44
3	I	450	FAD	C4X-C4	-2.57	1.35	1.44
3	C	450	FAD	C9A-C5X	-2.57	1.36	1.41
3	A	450	FAD	PA-O1A	-2.56	1.41	1.50
3	E	450	FAD	C9A-C5X	-2.56	1.36	1.41
3	I	450	FAD	O3'-C3'	-2.56	1.37	1.43
3	J	450	FAD	O4B-C1B	-2.55	1.37	1.41
3	D	450	FAD	C2A-N3A	2.55	1.36	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	450	FAD	O3'-C3'	-2.55	1.37	1.43
3	B	450	FAD	C4X-C4	-2.54	1.35	1.44
3	G	450	FAD	C2A-N3A	2.53	1.36	1.32
3	J	450	FAD	C6-C5X	-2.51	1.36	1.40
3	C	450	FAD	C6-C5X	-2.50	1.36	1.40
3	J	450	FAD	C4X-C10	-2.50	1.36	1.44
3	E	450	FAD	C5X-N5	-2.49	1.34	1.39
3	F	450	FAD	P-O1P	-2.49	1.42	1.50
3	H	450	FAD	C2A-N3A	2.48	1.36	1.32
3	F	450	FAD	C4X-C4	-2.47	1.35	1.44
3	A	450	FAD	O4-C4	-2.46	1.18	1.23
3	I	450	FAD	PA-O1A	-2.46	1.42	1.50
3	B	450	FAD	PA-O1A	-2.45	1.42	1.50
3	F	450	FAD	C4X-C10	-2.43	1.37	1.44
3	E	450	FAD	O2'-C2'	-2.43	1.38	1.43
3	J	450	FAD	C9A-C5X	-2.43	1.37	1.41
3	D	450	FAD	O4B-C4B	-2.43	1.39	1.45
3	C	450	FAD	P-O2P	-2.42	1.44	1.55
3	A	450	FAD	C4'-C3'	-2.41	1.48	1.53
3	I	450	FAD	O4B-C4B	-2.41	1.39	1.45
3	G	450	FAD	O3'-C3'	-2.41	1.37	1.43
3	D	450	FAD	P-O2P	-2.41	1.44	1.55
3	D	450	FAD	C4X-C10	-2.40	1.37	1.44
3	I	450	FAD	C2A-N3A	2.40	1.36	1.32
3	A	450	FAD	C9A-N10	-2.40	1.36	1.41
3	I	450	FAD	C4A-N3A	-2.39	1.32	1.35
3	A	450	FAD	O2-C2	-2.39	1.19	1.24
3	F	450	FAD	C5X-N5	-2.38	1.34	1.39
3	H	450	FAD	O4B-C1B	-2.38	1.37	1.41
3	I	450	FAD	P-O1P	-2.38	1.42	1.50
3	I	450	FAD	C9A-C5X	-2.37	1.37	1.41
3	I	450	FAD	O2-C2	-2.37	1.19	1.24
3	B	450	FAD	C6-C5X	-2.36	1.36	1.40
3	H	450	FAD	C4-N3	-2.36	1.34	1.38
3	H	450	FAD	O3'-C3'	-2.34	1.37	1.43
3	B	450	FAD	C4-N3	-2.34	1.34	1.38
3	A	450	FAD	C4X-N5	2.34	1.35	1.30
2	H	500	GDU	C4-N3	-2.33	1.34	1.38
3	D	450	FAD	C4'-C3'	-2.33	1.49	1.53
3	H	450	FAD	O4B-C4B	-2.32	1.39	1.45
3	J	450	FAD	C4-N3	-2.31	1.34	1.38
3	G	450	FAD	C4X-N5	2.31	1.35	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	450	FAD	C9A-N10	-2.31	1.37	1.41
3	D	450	FAD	O4'-C4'	-2.31	1.38	1.43
3	F	450	FAD	O2'-C2'	-2.30	1.38	1.43
3	D	450	FAD	C6-C7	-2.30	1.36	1.39
3	B	450	FAD	O4'-C4'	-2.29	1.38	1.43
3	F	450	FAD	C2A-N3A	2.29	1.35	1.32
3	B	450	FAD	C4X-C10	-2.28	1.37	1.44
2	A	500	GDU	C5-C4	2.28	1.48	1.43
3	H	450	FAD	C9A-C5X	-2.27	1.37	1.41
3	H	450	FAD	P-O1P	-2.26	1.42	1.50
3	C	450	FAD	C4-N3	-2.26	1.34	1.38
3	E	450	FAD	C4X-C4	-2.26	1.36	1.44
3	J	450	FAD	O4'-C4'	-2.25	1.38	1.43
3	C	450	FAD	C2B-C1B	-2.25	1.50	1.53
3	I	450	FAD	C4X-C10	-2.24	1.37	1.44
3	B	450	FAD	O4B-C4B	-2.21	1.40	1.45
3	C	450	FAD	O4-C4	-2.21	1.19	1.23
3	A	450	FAD	O2'-C2'	-2.21	1.38	1.43
3	I	450	FAD	O2'-C2'	-2.20	1.38	1.43
3	D	450	FAD	C8-C7	-2.19	1.35	1.40
3	F	450	FAD	C9A-N10	-2.19	1.37	1.41
3	A	450	FAD	C5X-N5	-2.19	1.35	1.39
3	A	450	FAD	C2B-C1B	-2.18	1.50	1.53
3	D	450	FAD	P-O1P	-2.17	1.43	1.50
3	C	450	FAD	O3'-C3'	-2.17	1.37	1.43
2	I	500	GDU	C4-N3	-2.16	1.34	1.38
3	H	450	FAD	C4X-N5	2.16	1.35	1.30
3	F	450	FAD	O3B-C3B	-2.16	1.37	1.43
3	D	450	FAD	O3'-C3'	-2.15	1.37	1.43
2	C	500	GDU	C4-N3	-2.15	1.34	1.38
3	I	450	FAD	C2B-C1B	-2.15	1.50	1.53
2	B	500	GDU	C5-C4	2.14	1.48	1.43
3	D	450	FAD	O4-C4	-2.13	1.19	1.23
2	E	500	GDU	C4-N3	-2.13	1.34	1.38
2	D	500	GDU	C4-N3	-2.12	1.34	1.38
3	B	450	FAD	O4B-C1B	-2.11	1.38	1.41
3	H	450	FAD	O2'-C2'	-2.11	1.38	1.43
3	B	450	FAD	C5'-C4'	-2.11	1.48	1.51
3	C	450	FAD	PA-O1A	-2.11	1.43	1.50
2	H	500	GDU	C4'-C5'	2.11	1.57	1.53
3	B	450	FAD	O3'-C3'	-2.11	1.38	1.43
3	A	450	FAD	C2-N3	-2.10	1.34	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	450	FAD	O2B-C2B	-2.10	1.38	1.43
3	J	450	FAD	O4B-C4B	-2.10	1.40	1.45
3	A	450	FAD	O4B-C1B	-2.10	1.38	1.41
2	G	500	GDU	C4-N3	-2.09	1.34	1.38
3	E	450	FAD	C4-N3	-2.08	1.35	1.38
3	F	450	FAD	C4A-N3A	-2.07	1.32	1.35
3	I	450	FAD	O3B-C3B	-2.06	1.38	1.43
3	B	450	FAD	C2A-N3A	2.06	1.35	1.32
3	G	450	FAD	C4X-C10	-2.05	1.38	1.44
3	I	450	FAD	O4'-C4'	-2.05	1.39	1.43
3	J	450	FAD	C6-C7	-2.05	1.36	1.39
3	B	450	FAD	O4-C4	-2.05	1.19	1.23
2	A	500	GDU	C4-N3	-2.04	1.34	1.38
2	D	500	GDU	C4'-C3'	2.04	1.57	1.52
2	D	500	GDU	C4'-C5'	2.04	1.57	1.53
3	D	450	FAD	C2B-C1B	-2.03	1.50	1.53
3	D	450	FAD	O3B-C3B	-2.03	1.38	1.43
3	A	450	FAD	C2A-N3A	2.03	1.35	1.32
3	H	450	FAD	PA-O1A	-2.03	1.43	1.50
3	G	450	FAD	O4'-C4'	-2.03	1.39	1.43
3	F	450	FAD	C4X-N5	2.03	1.34	1.30
3	J	450	FAD	C4X-N5	2.03	1.34	1.30
3	E	450	FAD	C6-C5X	-2.02	1.36	1.40
3	B	450	FAD	P-O1P	-2.02	1.43	1.50
3	G	450	FAD	C9A-N10	-2.02	1.37	1.41
3	G	450	FAD	O4B-C1B	-2.01	1.38	1.41
3	E	450	FAD	C9-C8	-2.01	1.36	1.39
3	D	450	FAD	O2'-C2'	-2.00	1.39	1.43
3	B	450	FAD	C6-C7	-2.00	1.36	1.39
2	F	500	GDU	C5-C4	2.00	1.48	1.43

All (270) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	I	500	GDU	N3-C2-N1	16.64	136.98	114.89
2	A	500	GDU	N3-C2-N1	16.60	136.93	114.89
2	J	500	GDU	N3-C2-N1	16.59	136.91	114.89
2	F	500	GDU	N3-C2-N1	16.40	136.66	114.89
2	B	500	GDU	N3-C2-N1	16.38	136.64	114.89
2	G	500	GDU	N3-C2-N1	16.34	136.58	114.89
2	E	500	GDU	N3-C2-N1	16.26	136.47	114.89
2	H	500	GDU	N3-C2-N1	16.02	136.16	114.89

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	500	GDU	N3-C2-N1	15.97	136.09	114.89
2	C	500	GDU	N3-C2-N1	15.81	135.88	114.89
2	J	500	GDU	C4-N3-C2	-10.57	112.64	126.58
2	I	500	GDU	C4-N3-C2	-10.45	112.80	126.58
2	F	500	GDU	C4-N3-C2	-10.44	112.80	126.58
2	B	500	GDU	C4-N3-C2	-10.38	112.89	126.58
2	A	500	GDU	C4-N3-C2	-10.25	113.05	126.58
2	C	500	GDU	C4-N3-C2	-10.24	113.07	126.58
2	D	500	GDU	C4-N3-C2	-10.22	113.10	126.58
2	E	500	GDU	C4-N3-C2	-9.89	113.53	126.58
2	G	500	GDU	C4-N3-C2	-9.85	113.58	126.58
2	H	500	GDU	C4-N3-C2	-9.65	113.84	126.58
2	A	500	GDU	O2-C2-N1	-8.34	111.70	122.79
2	G	500	GDU	O2-C2-N1	-8.31	111.74	122.79
2	J	500	GDU	O2-C2-N1	-8.29	111.77	122.79
2	F	500	GDU	O2-C2-N1	-8.27	111.79	122.79
2	B	500	GDU	O2-C2-N1	-8.10	112.02	122.79
2	I	500	GDU	O2-C2-N1	-7.66	112.60	122.79
2	E	500	GDU	O2-C2-N1	-7.44	112.89	122.79
2	D	500	GDU	O2-C2-N1	-7.21	113.20	122.79
2	H	500	GDU	O2-C2-N1	-7.20	113.21	122.79
2	C	500	GDU	O2-C2-N1	-7.01	113.47	122.79
2	G	500	GDU	O3A-PB-O3B	6.61	115.81	102.48
2	E	500	GDU	O3A-PB-O3B	6.58	115.75	102.48
2	I	500	GDU	O3A-PB-O3B	6.41	115.42	102.48
2	I	500	GDU	O5'-C1'-O3B	-6.38	103.03	111.36
2	D	500	GDU	O3A-PB-O3B	6.30	115.19	102.48
2	G	500	GDU	C6-N1-C2	-6.18	113.09	120.99
3	B	450	FAD	N3A-C2A-N1A	-6.16	119.06	128.68
2	I	500	GDU	O2-C2-N3	-5.95	110.41	121.50
2	I	500	GDU	C6-N1-C2	-5.94	113.39	120.99
3	D	450	FAD	N3A-C2A-N1A	-5.91	119.44	128.68
3	C	450	FAD	N3A-C2A-N1A	-5.90	119.46	128.68
3	J	450	FAD	N3A-C2A-N1A	-5.88	119.49	128.68
2	H	500	GDU	O2-C2-N3	-5.85	110.61	121.50
2	E	500	GDU	O2-C2-N3	-5.84	110.62	121.50
2	C	500	GDU	O2-C2-N3	-5.83	110.64	121.50
3	A	450	FAD	N3A-C2A-N1A	-5.80	119.61	128.68
2	D	500	GDU	O2-C2-N3	-5.79	110.71	121.50
3	G	450	FAD	N3A-C2A-N1A	-5.76	119.67	128.68
2	F	500	GDU	O3A-PB-O3B	5.74	114.06	102.48
2	J	500	GDU	C6-N1-C2	-5.63	113.78	120.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	500	GDU	C6-N1-C2	-5.63	113.79	120.99
2	E	500	GDU	C6-N1-C2	-5.63	113.80	120.99
2	D	500	GDU	C6-N1-C2	-5.61	113.82	120.99
2	C	500	GDU	O3A-PB-O3B	5.61	113.79	102.48
2	A	500	GDU	O3A-PB-O3B	5.56	113.69	102.48
2	D	500	GDU	O5'-C5'-C4'	5.55	119.77	109.69
2	B	500	GDU	O3A-PB-O3B	5.53	113.64	102.48
2	J	500	GDU	O2-C2-N3	-5.50	111.26	121.50
2	B	500	GDU	O2-C2-N3	-5.45	111.34	121.50
2	A	500	GDU	O2-C2-N3	-5.44	111.36	121.50
2	J	500	GDU	O3A-PB-O3B	5.41	113.40	102.48
2	B	500	GDU	C6-N1-C2	-5.41	114.07	120.99
2	A	500	GDU	C6-N1-C2	-5.41	114.08	120.99
2	H	500	GDU	O5'-C5'-C4'	5.36	119.43	109.69
2	F	500	GDU	O2-C2-N3	-5.36	111.52	121.50
2	C	500	GDU	C6-N1-C2	-5.32	114.19	120.99
2	F	500	GDU	C6-N1-C2	-5.29	114.23	120.99
2	G	500	GDU	O2-C2-N3	-5.28	111.66	121.50
2	E	500	GDU	O5'-C5'-C4'	5.26	119.25	109.69
2	A	500	GDU	O5'-C5'-C4'	5.22	119.17	109.69
2	F	500	GDU	O5'-C5'-C4'	5.21	119.15	109.69
2	H	500	GDU	O3A-PB-O3B	5.16	112.88	102.48
3	F	450	FAD	N3A-C2A-N1A	-5.08	120.73	128.68
3	E	450	FAD	N3A-C2A-N1A	-5.08	120.74	128.68
2	C	500	GDU	O5'-C5'-C4'	5.00	118.78	109.69
2	B	500	GDU	O5'-C5'-C4'	4.99	118.76	109.69
2	D	500	GDU	C1D-N1-C2	4.98	126.58	117.57
2	J	500	GDU	O5'-C5'-C4'	4.95	118.69	109.69
2	F	500	GDU	O5'-C1'-O3B	-4.90	104.96	111.36
2	I	500	GDU	O5'-C5'-C4'	4.85	118.50	109.69
3	H	450	FAD	N3A-C2A-N1A	-4.82	121.14	128.68
2	C	500	GDU	C1D-N1-C2	4.80	126.26	117.57
2	G	500	GDU	O5'-C5'-C4'	4.70	118.23	109.69
2	E	500	GDU	C1D-N1-C2	4.67	126.03	117.57
3	I	450	FAD	N3A-C2A-N1A	-4.66	121.39	128.68
2	C	500	GDU	PB-O3B-C1'	4.66	137.73	119.74
2	J	500	GDU	C1D-N1-C2	4.60	125.90	117.57
2	I	500	GDU	C1D-N1-C2	4.58	125.87	117.57
2	G	500	GDU	C1D-N1-C2	4.49	125.69	117.57
3	A	450	FAD	O3'-C3'-C4'	-4.46	98.04	108.81
2	F	500	GDU	PB-O3B-C1'	4.35	136.56	119.74
2	H	500	GDU	C1D-N1-C2	4.35	125.44	117.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	500	GDU	C1D-N1-C2	4.27	125.30	117.57
2	D	500	GDU	PB-O3B-C1'	4.24	136.13	119.74
2	G	500	GDU	PB-O3B-C1'	4.16	135.82	119.74
2	J	500	GDU	PB-O3B-C1'	4.12	135.68	119.74
2	D	500	GDU	O5'-C1'-O3B	-4.01	106.12	111.36
2	C	500	GDU	O3B-C1'-C2'	3.99	115.70	108.38
2	F	500	GDU	C1D-N1-C2	3.91	124.65	117.57
3	B	450	FAD	C4-C4X-C10	3.89	123.33	116.79
2	B	500	GDU	PB-O3B-C1'	3.84	134.59	119.74
3	E	450	FAD	C4-N3-C2	-3.80	118.62	125.64
2	A	500	GDU	C1D-N1-C2	3.78	124.41	117.57
3	J	450	FAD	C4-N3-C2	-3.71	118.79	125.64
3	J	450	FAD	O4-C4-C4X	-3.59	117.07	126.60
3	C	450	FAD	C4-N3-C2	-3.56	119.06	125.64
2	H	500	GDU	PB-O3B-C1'	3.55	133.47	119.74
2	A	500	GDU	PB-O3B-C1'	3.53	133.40	119.74
2	C	500	GDU	O5'-C1'-O3B	-3.45	106.85	111.36
2	G	500	GDU	O5'-C1'-O3B	-3.44	106.87	111.36
2	D	500	GDU	O3B-C1'-C2'	3.44	114.68	108.38
2	B	500	GDU	O5'-C1'-O3B	-3.43	106.88	111.36
3	D	450	FAD	O4-C4-C4X	-3.41	117.56	126.60
2	I	500	GDU	PB-O3B-C1'	3.39	132.85	119.74
2	A	500	GDU	O5'-C1'-O3B	-3.33	107.01	111.36
2	J	500	GDU	O4-C4-C5	-3.31	119.34	125.16
2	F	500	GDU	O2'-C2'-C3'	3.26	117.88	110.35
3	G	450	FAD	C4-N3-C2	-3.26	119.63	125.64
2	C	500	GDU	O4-C4-C5	-3.21	119.52	125.16
3	C	450	FAD	O2'-C2'-C3'	-3.20	101.31	109.10
3	I	450	FAD	C4-N3-C2	-3.19	119.74	125.64
3	C	450	FAD	C4-C4X-C10	3.19	122.15	116.79
3	I	450	FAD	C5X-C9A-N10	3.17	121.22	117.95
2	G	500	GDU	C1'-C2'-C3'	-3.15	103.43	110.00
3	C	450	FAD	O4-C4-C4X	-3.15	118.25	126.60
2	F	500	GDU	O4-C4-C5	-3.15	119.63	125.16
2	J	500	GDU	O5'-C1'-O3B	-3.14	107.26	111.36
2	B	500	GDU	C1'-C2'-C3'	-3.13	103.48	110.00
2	D	500	GDU	O4-C4-C5	-3.12	119.67	125.16
2	G	500	GDU	O4D-C4D-C5D	3.11	119.60	109.37
3	D	450	FAD	C4-C4X-C10	3.08	121.96	116.79
3	E	450	FAD	C4X-C4-N3	3.07	120.99	113.19
2	E	500	GDU	PB-O3B-C1'	3.06	131.56	119.74
2	F	500	GDU	O3B-C1'-C2'	3.05	113.96	108.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	450	FAD	C6-C5X-C9A	3.02	123.21	118.94
2	H	500	GDU	O4D-C4D-C5D	3.01	119.29	109.37
3	A	450	FAD	C4X-C10-N10	3.00	120.87	116.48
3	A	450	FAD	O4-C4-C4X	-3.00	118.65	126.60
2	I	500	GDU	O4D-C4D-C5D	2.99	119.21	109.37
3	B	450	FAD	C4X-C10-N1	-2.99	117.80	124.73
3	D	450	FAD	C4-N3-C2	-2.98	120.14	125.64
3	J	450	FAD	C4X-C4-N3	2.97	120.74	113.19
3	I	450	FAD	O4-C4-C4X	-2.97	118.72	126.60
3	F	450	FAD	C4-N3-C2	-2.97	120.16	125.64
2	F	500	GDU	C4'-C3'-C2'	-2.96	105.66	110.82
2	A	500	GDU	PB-O3A-PA	-2.95	122.70	132.83
3	E	450	FAD	C9A-C5X-N5	-2.91	119.27	122.43
3	F	450	FAD	C4X-C10-N10	2.89	120.71	116.48
2	E	500	GDU	O4D-C4D-C5D	2.89	118.88	109.37
3	C	450	FAD	C5'-C4'-C3'	-2.86	106.69	112.20
2	F	500	GDU	C2D-C1D-N1	2.85	121.29	113.22
2	G	500	GDU	C4'-C3'-C2'	-2.85	105.85	110.82
2	J	500	GDU	O4D-C1D-N1	2.84	114.85	108.36
2	F	500	GDU	O4D-C4D-C5D	2.84	118.71	109.37
3	A	450	FAD	C10-N1-C2	2.84	122.57	116.90
2	J	500	GDU	O4D-C4D-C5D	2.83	118.70	109.37
2	I	500	GDU	O4D-C1D-N1	2.83	114.83	108.36
2	G	500	GDU	O4-C4-C5	-2.83	120.19	125.16
2	B	500	GDU	O2'-C2'-C3'	2.81	116.85	110.35
3	G	450	FAD	C4-C4X-C10	2.81	121.50	116.79
3	B	450	FAD	O4-C4-C4X	-2.77	119.24	126.60
2	I	500	GDU	O4-C4-C5	-2.77	120.30	125.16
2	B	500	GDU	O4-C4-C5	-2.75	120.32	125.16
3	E	450	FAD	C1B-N9A-C4A	-2.74	121.82	126.64
2	B	500	GDU	O4D-C4D-C5D	2.73	118.34	109.37
3	A	450	FAD	C4-N3-C2	-2.72	120.62	125.64
2	G	500	GDU	O4D-C1D-N1	2.71	114.56	108.36
3	B	450	FAD	C6-C5X-C9A	2.71	122.77	118.94
3	I	450	FAD	C4X-C4-N3	2.70	120.04	113.19
2	F	500	GDU	O4D-C1D-C2D	-2.70	100.76	106.64
3	H	450	FAD	C5X-C9A-N10	2.69	120.73	117.95
3	A	450	FAD	C4X-C4-N3	2.68	120.00	113.19
3	F	450	FAD	C4X-C4-N3	2.68	120.00	113.19
2	H	500	GDU	O4D-C1D-N1	2.68	114.49	108.36
3	D	450	FAD	C4X-C10-N1	-2.68	118.52	124.73
3	E	450	FAD	O4-C4-C4X	-2.67	119.53	126.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	500	GDU	O4-C4-C5	-2.65	120.51	125.16
3	B	450	FAD	C4-N3-C2	-2.63	120.78	125.64
2	E	500	GDU	C4'-C3'-C2'	-2.63	106.22	110.82
2	C	500	GDU	C5-C4-N3	2.63	118.78	114.84
3	H	450	FAD	C4X-C10-N10	2.63	120.33	116.48
3	C	450	FAD	O3B-C3B-C4B	-2.62	103.47	111.05
3	E	450	FAD	C5X-C9A-N10	2.62	120.66	117.95
2	D	500	GDU	O4D-C4D-C5D	2.61	117.96	109.37
2	E	500	GDU	O4-C4-C5	-2.58	120.63	125.16
3	G	450	FAD	C4A-C5A-N7A	-2.57	106.72	109.40
3	H	450	FAD	C4-N3-C2	-2.57	120.89	125.64
3	E	450	FAD	C4A-C5A-N7A	-2.57	106.72	109.40
3	I	450	FAD	C4X-C10-N1	-2.56	118.78	124.73
3	G	450	FAD	C4X-C10-N1	-2.54	118.83	124.73
3	B	450	FAD	C4-C4X-N5	-2.53	114.63	118.23
3	A	450	FAD	O3'-C3'-C2'	2.53	114.92	108.81
2	C	500	GDU	C2D-C1D-N1	2.51	120.34	113.22
3	I	450	FAD	C6-C5X-C9A	2.51	122.49	118.94
3	A	450	FAD	C4X-C10-N1	-2.50	118.94	124.73
2	B	500	GDU	C4'-C3'-C2'	-2.47	106.51	110.82
3	H	450	FAD	C4X-C4-N3	2.47	119.45	113.19
2	C	500	GDU	O4D-C4D-C5D	2.46	117.48	109.37
2	A	500	GDU	O4D-C4D-C5D	2.46	117.47	109.37
3	J	450	FAD	O4B-C1B-C2B	-2.46	103.33	106.93
3	F	450	FAD	O4-C4-C4X	-2.44	120.12	126.60
3	I	450	FAD	C4-C4X-C10	2.44	120.89	116.79
3	C	450	FAD	C4X-C10-N1	-2.42	119.11	124.73
3	F	450	FAD	C5X-C9A-N10	2.42	120.45	117.95
3	F	450	FAD	C4X-C10-N1	-2.40	119.15	124.73
2	D	500	GDU	C5-C4-N3	2.40	118.42	114.84
3	D	450	FAD	O3'-C3'-C4'	-2.39	103.03	108.81
3	G	450	FAD	C10-C4X-N5	-2.38	119.80	124.86
2	A	500	GDU	O4-C4-C5	-2.37	120.99	125.16
3	B	450	FAD	C5X-C9A-N10	2.37	120.40	117.95
2	I	500	GDU	C5-C4-N3	2.36	118.37	114.84
3	H	450	FAD	O4-C4-C4X	-2.36	120.35	126.60
2	F	500	GDU	O4D-C1D-N1	2.35	113.73	108.36
2	A	500	GDU	O4D-C1D-N1	2.33	113.69	108.36
3	D	450	FAD	C4X-C4-N3	2.32	119.09	113.19
2	D	500	GDU	O4D-C1D-N1	2.32	113.67	108.36
3	A	450	FAD	C9A-C5X-N5	-2.31	119.92	122.43
3	I	450	FAD	C9A-C5X-N5	-2.29	119.94	122.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	E	450	FAD	C4X-C10-N10	2.29	119.83	116.48
3	H	450	FAD	C9A-C5X-N5	-2.29	119.94	122.43
2	H	500	GDU	C1'-C2'-C3'	-2.29	105.23	110.00
3	G	450	FAD	O4-C4-C4X	-2.29	120.53	126.60
3	J	450	FAD	C4X-C10-N10	2.28	119.82	116.48
3	A	450	FAD	O5'-C5'-C4'	2.26	115.39	109.36
3	C	450	FAD	C4X-C4-N3	2.26	118.92	113.19
3	D	450	FAD	C4A-C5A-N7A	-2.23	107.07	109.40
2	E	500	GDU	C1'-C2'-C3'	-2.23	105.35	110.00
3	C	450	FAD	O4B-C1B-C2B	-2.22	103.68	106.93
2	J	500	GDU	C5-C4-N3	2.22	118.16	114.84
3	G	450	FAD	C4X-C10-N10	2.22	119.72	116.48
2	E	500	GDU	O5'-C1'-O3B	-2.21	108.47	111.36
2	B	500	GDU	C5-C4-N3	2.21	118.15	114.84
2	J	500	GDU	C1'-C2'-C3'	-2.21	105.40	110.00
3	A	450	FAD	C5'-C4'-C3'	-2.21	107.94	112.20
2	I	500	GDU	C4'-C3'-C2'	-2.20	106.97	110.82
2	B	500	GDU	C2D-C1D-N1	2.20	119.45	113.22
3	H	450	FAD	O3'-C3'-C4'	-2.19	103.52	108.81
2	I	500	GDU	C2D-C1D-N1	2.19	119.42	113.22
3	F	450	FAD	C9A-C5X-N5	-2.18	120.06	122.43
3	E	450	FAD	C5'-C4'-C3'	2.18	116.42	112.20
2	G	500	GDU	O2'-C2'-C3'	2.18	115.38	110.35
2	J	500	GDU	O4-C4-N3	2.17	122.50	119.31
3	D	450	FAD	C8M-C8-C7	-2.17	116.29	120.74
2	F	500	GDU	C5-C4-N3	2.16	118.07	114.84
3	J	450	FAD	C4X-C10-N1	-2.14	119.76	124.73
2	B	500	GDU	PB-O3A-PA	-2.14	125.49	132.83
3	I	450	FAD	C4A-C5A-N7A	-2.14	107.17	109.40
2	C	500	GDU	O2'-C2'-C3'	2.14	115.29	110.35
2	J	500	GDU	C2D-C1D-N1	2.14	119.27	113.22
2	I	500	GDU	O4D-C1D-C2D	-2.14	101.98	106.64
2	E	500	GDU	O2'-C2'-C3'	2.14	115.28	110.35
2	D	500	GDU	O2'-C2'-C3'	2.13	115.28	110.35
3	C	450	FAD	C4X-C10-N10	2.13	119.59	116.48
3	D	450	FAD	C6-C5X-C9A	2.12	121.94	118.94
2	G	500	GDU	PB-O3A-PA	-2.11	125.60	132.83
2	C	500	GDU	O4D-C1D-N1	2.11	113.18	108.36
3	D	450	FAD	C5'-C4'-C3'	-2.10	108.15	112.20
2	I	500	GDU	O3B-C1'-C2'	2.09	112.21	108.38
2	H	500	GDU	PB-O3A-PA	-2.08	125.70	132.83
2	D	500	GDU	C2D-C1D-N1	2.07	119.08	113.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	G	500	GDU	C2D-C1D-N1	2.05	119.04	113.22
3	A	450	FAD	O4B-C1B-C2B	-2.05	103.93	106.93
3	I	450	FAD	O3'-C3'-C2'	2.05	113.77	108.81
2	F	500	GDU	O4-C4-N3	2.04	122.31	119.31
3	A	450	FAD	C5X-C9A-N10	2.03	120.05	117.95
3	D	450	FAD	C8M-C8-C9	2.02	123.23	119.49
2	E	500	GDU	C2D-C1D-N1	2.02	118.93	113.22
3	J	450	FAD	C4-C4X-C10	2.02	120.18	116.79
2	F	500	GDU	C1'-C2'-C3'	-2.01	105.80	110.00
2	A	500	GDU	C5-C4-N3	2.01	117.84	114.84

There are no chirality outliers.

All (80) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	500	GDU	O5'-C1'-O3B-PB
2	B	500	GDU	O5'-C1'-O3B-PB
2	C	500	GDU	C1'-O3B-PB-O2B
2	C	500	GDU	C2'-C1'-O3B-PB
2	C	500	GDU	O5'-C1'-O3B-PB
2	D	500	GDU	C1'-O3B-PB-O2B
2	D	500	GDU	C2'-C1'-O3B-PB
2	D	500	GDU	O5'-C1'-O3B-PB
2	E	500	GDU	PA-O3A-PB-O3B
2	E	500	GDU	O5'-C1'-O3B-PB
2	F	500	GDU	C1'-O3B-PB-O2B
2	F	500	GDU	C2'-C1'-O3B-PB
2	F	500	GDU	O5'-C1'-O3B-PB
2	G	500	GDU	O5'-C1'-O3B-PB
2	H	500	GDU	O5'-C1'-O3B-PB
2	I	500	GDU	C1'-O3B-PB-O2B
2	I	500	GDU	C2'-C1'-O3B-PB
2	I	500	GDU	O5'-C1'-O3B-PB
2	J	500	GDU	C1'-O3B-PB-O2B
2	J	500	GDU	O5'-C1'-O3B-PB
3	E	450	FAD	C1'-C2'-C3'-O3'
3	E	450	FAD	C5'-O5'-P-O2P
2	D	500	GDU	O5'-C5'-C6'-O6'
2	H	500	GDU	O5'-C5'-C6'-O6'
2	A	500	GDU	O5'-C5'-C6'-O6'
2	J	500	GDU	O5'-C5'-C6'-O6'
3	D	450	FAD	O4B-C4B-C5B-O5B

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Mol	Chain	Res	Type	Atoms
2	C	500	GDU	O5'-C5'-C6'-O6'
2	G	500	GDU	O5'-C5'-C6'-O6'
2	A	500	GDU	C4'-C5'-C6'-O6'
2	E	500	GDU	O5'-C5'-C6'-O6'
2	D	500	GDU	C1'-O3B-PB-O3A
2	F	500	GDU	C1'-O3B-PB-O3A
2	I	500	GDU	C1'-O3B-PB-O3A
2	F	500	GDU	O5'-C5'-C6'-O6'
2	B	500	GDU	O5'-C5'-C6'-O6'
3	A	450	FAD	O3'-C3'-C4'-O4'
3	D	450	FAD	C3B-C4B-C5B-O5B
3	A	450	FAD	O3'-C3'-C4'-C5'
3	A	450	FAD	C2'-C3'-C4'-C5'
2	C	500	GDU	C1'-O3B-PB-O3A
3	A	450	FAD	C2'-C3'-C4'-O4'
3	H	450	FAD	O3'-C3'-C4'-C5'
2	J	500	GDU	C2'-C1'-O3B-PB
3	E	450	FAD	PA-O3P-P-O5'
3	G	450	FAD	PA-O3P-P-O5'
3	E	450	FAD	C5'-O5'-P-O3P
2	C	500	GDU	C1'-O3B-PB-O1B
2	D	500	GDU	C1'-O3B-PB-O1B
2	F	500	GDU	C1'-O3B-PB-O1B
2	I	500	GDU	C1'-O3B-PB-O1B
2	J	500	GDU	C1'-O3B-PB-O1B
3	E	450	FAD	C5'-O5'-P-O1P
3	I	450	FAD	C5'-O5'-P-O1P
3	I	450	FAD	C1'-C2'-C3'-O3'
3	J	450	FAD	C1'-C2'-C3'-O3'
2	H	500	GDU	C4'-C5'-C6'-O6'
3	H	450	FAD	C2'-C3'-C4'-O4'
2	J	500	GDU	C1'-O3B-PB-O3A
2	I	500	GDU	O5'-C5'-C6'-O6'
3	H	450	FAD	O3'-C3'-C4'-O4'
3	H	450	FAD	C2'-C3'-C4'-C5'
2	E	500	GDU	C1'-O3B-PB-O2B
2	G	500	GDU	C1'-O3B-PB-O2B
2	H	500	GDU	C1'-O3B-PB-O2B
3	A	450	FAD	O4B-C4B-C5B-O5B
3	F	450	FAD	P-O3P-PA-O5B
3	I	450	FAD	PA-O3P-P-O5'
2	G	500	GDU	C2'-C1'-O3B-PB

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Mol	Chain	Res	Type	Atoms
3	B	450	FAD	O4B-C4B-C5B-O5B
3	H	450	FAD	O4B-C4B-C5B-O5B
3	G	450	FAD	O4B-C4B-C5B-O5B
3	I	450	FAD	O4B-C4B-C5B-O5B
3	D	450	FAD	C5B-O5B-PA-O1A
3	G	450	FAD	C5'-O5'-P-O1P
3	C	450	FAD	O4B-C4B-C5B-O5B
3	E	450	FAD	O4B-C4B-C5B-O5B
3	F	450	FAD	O4B-C4B-C5B-O5B
3	J	450	FAD	O4B-C4B-C5B-O5B
3	J	450	FAD	O2'-C2'-C3'-O3'

There are no ring outliers.

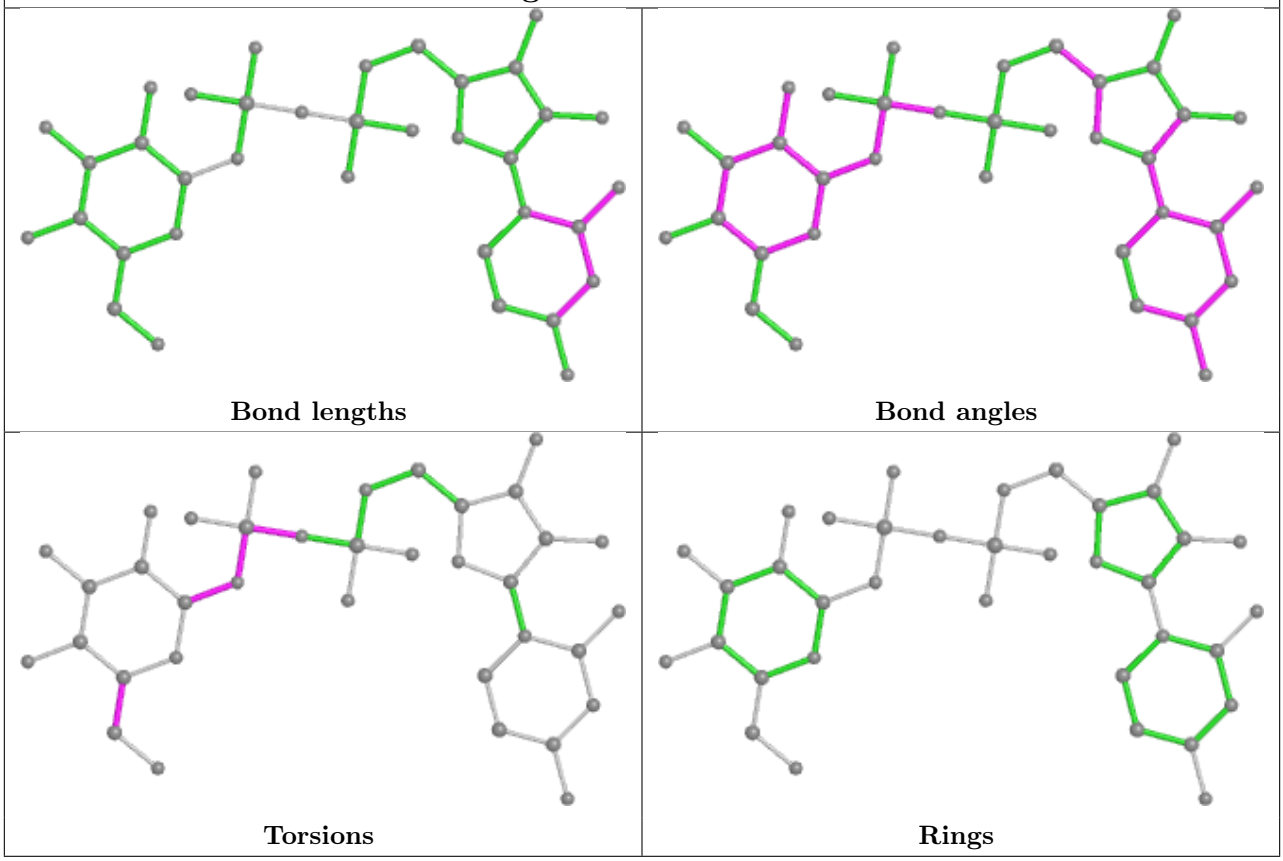
16 monomers are involved in 28 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	500	GDU	1	0
2	B	500	GDU	3	0
2	I	500	GDU	4	0
3	J	450	FAD	1	0
3	F	450	FAD	1	0
3	B	450	FAD	2	0
2	J	500	GDU	2	0
2	H	500	GDU	1	0
2	D	500	GDU	3	0
2	F	500	GDU	2	0
2	G	500	GDU	3	0
3	A	450	FAD	1	0
3	C	450	FAD	1	0
3	I	450	FAD	1	0
3	G	450	FAD	3	0
2	C	500	GDU	1	0

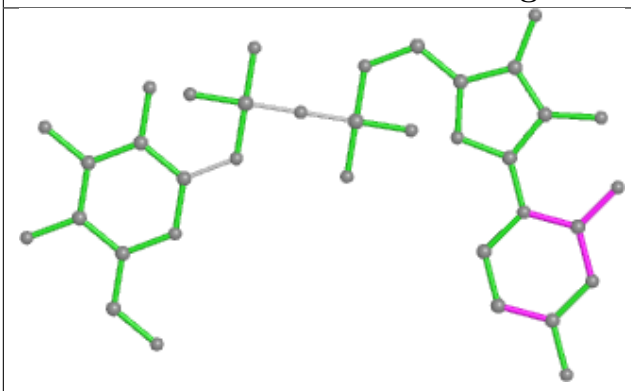
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

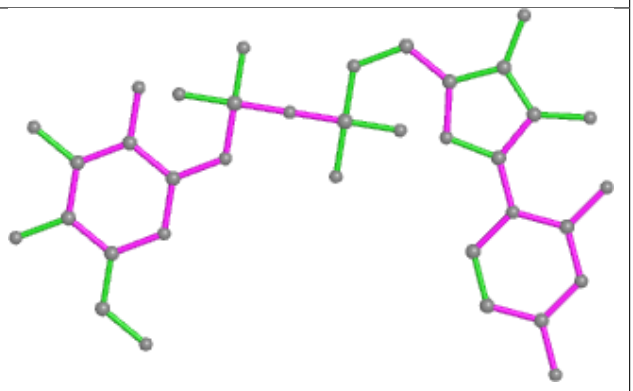
Ligand GDU E 500



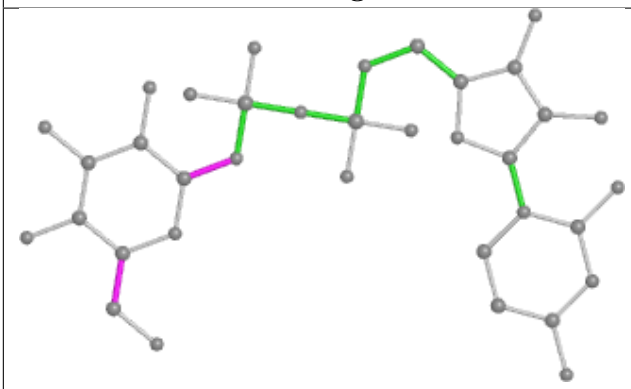
Ligand GDU B 500



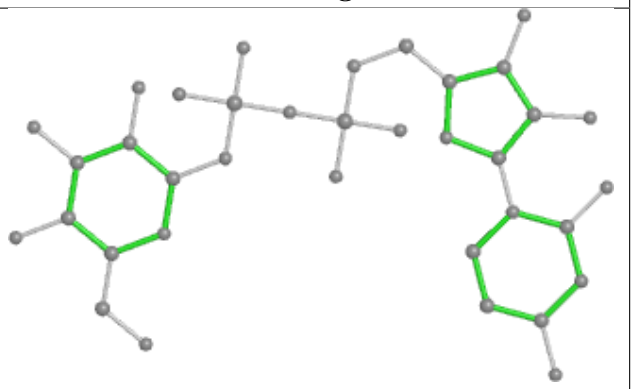
Bond lengths



Bond angles



Torsions



Rings

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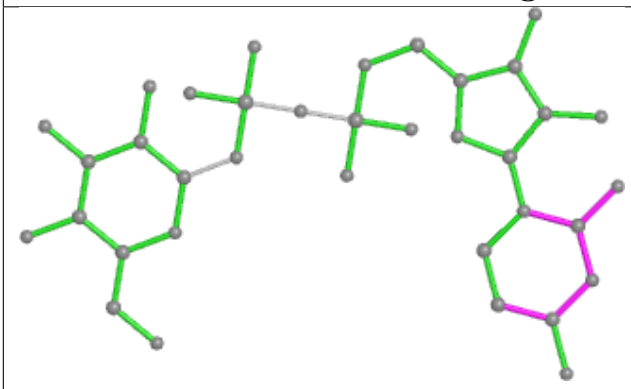
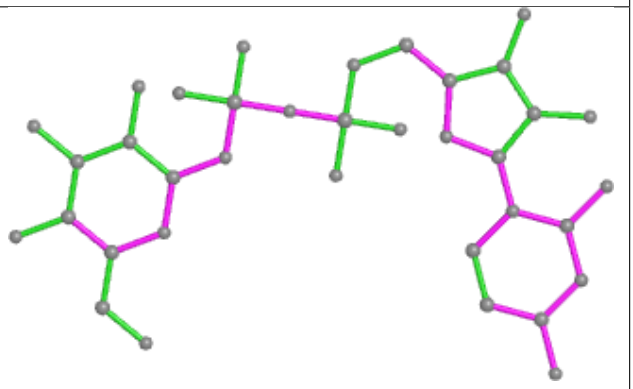
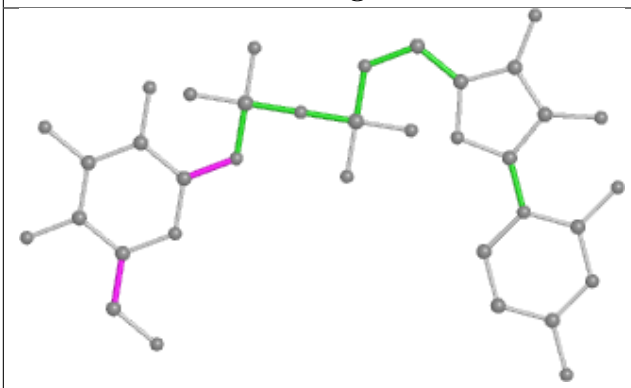


Bond lengths



Bond angles



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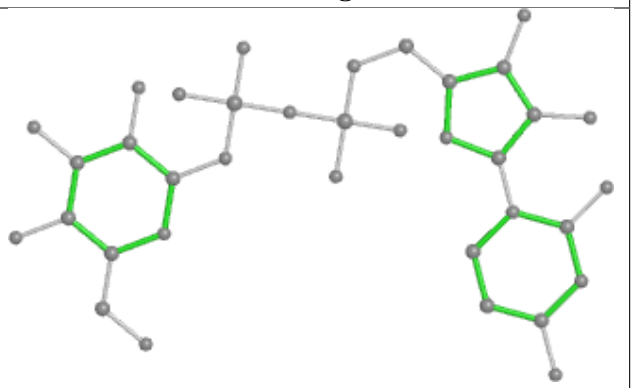

Rings

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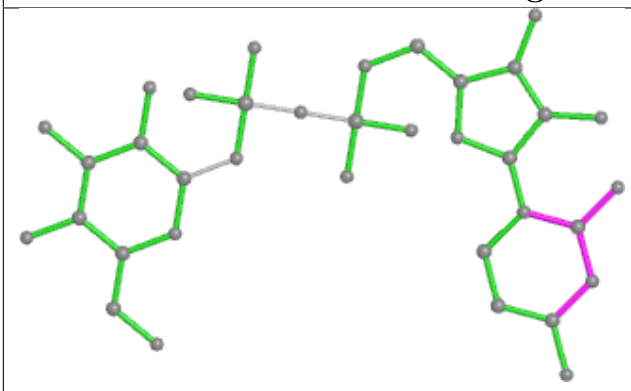

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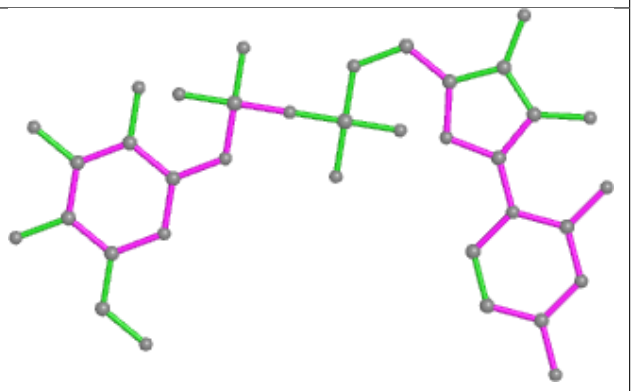
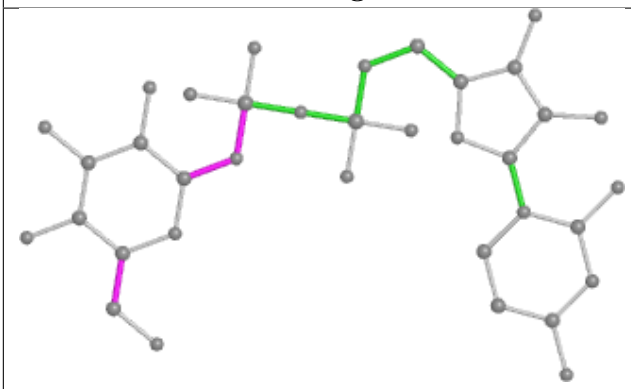


Bond angles



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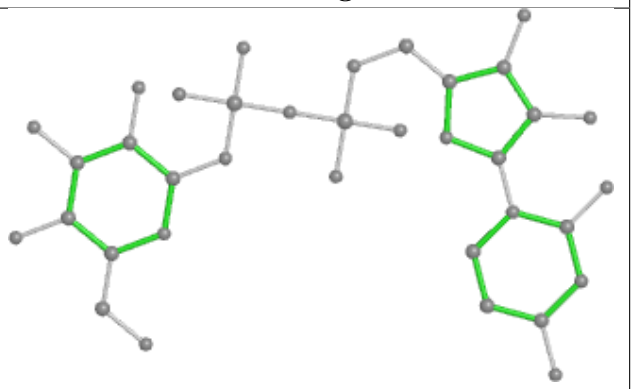
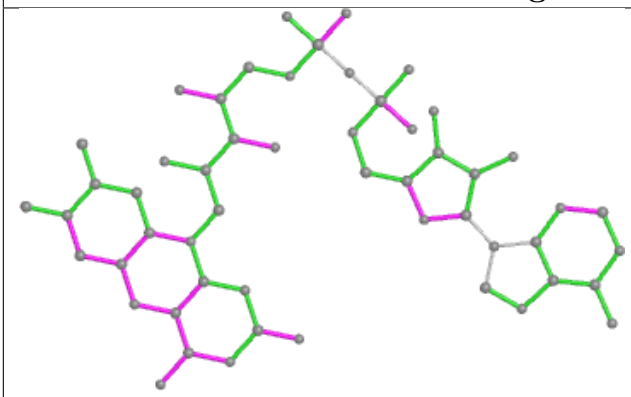
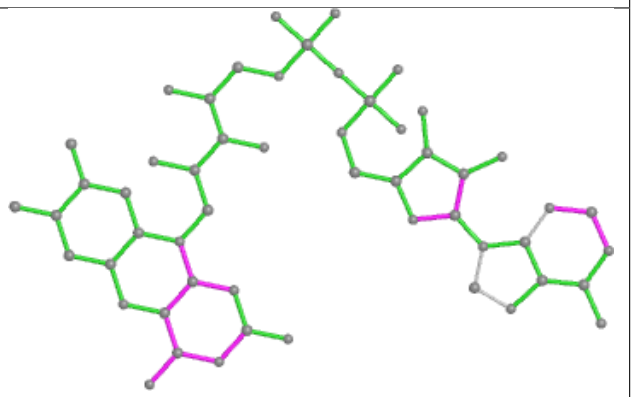


Rings

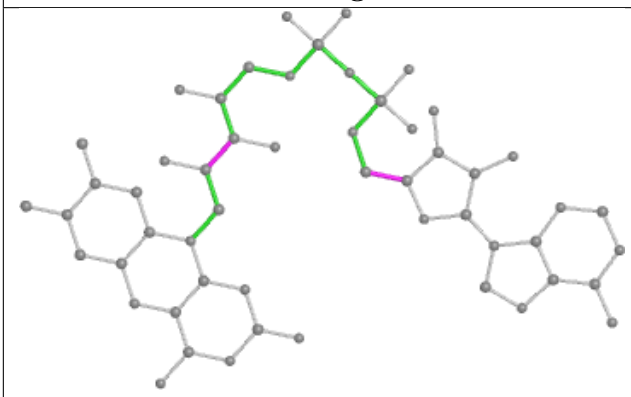
Ligand FAD J 450



Bond lengths



Bond angles



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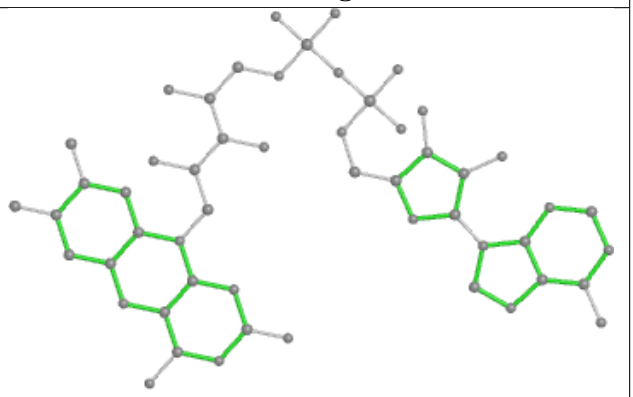
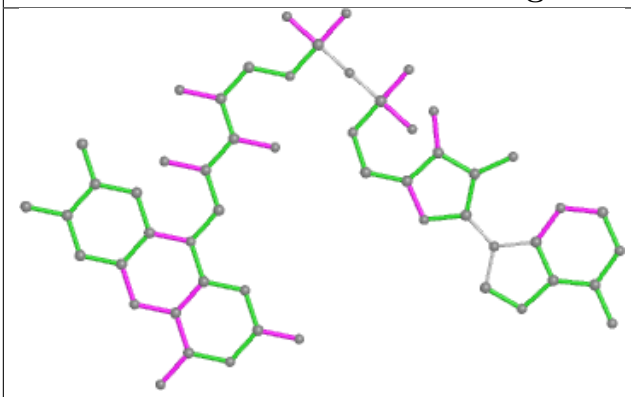
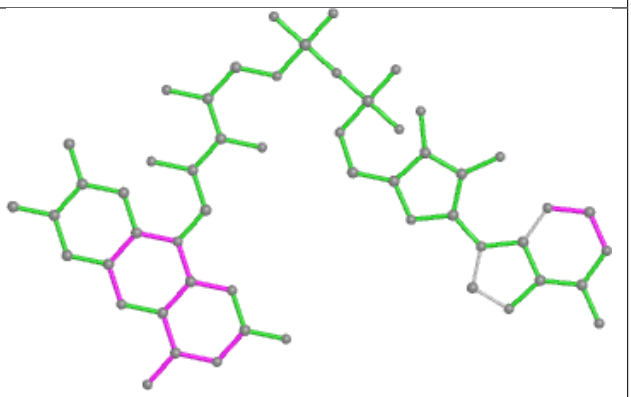


Rings

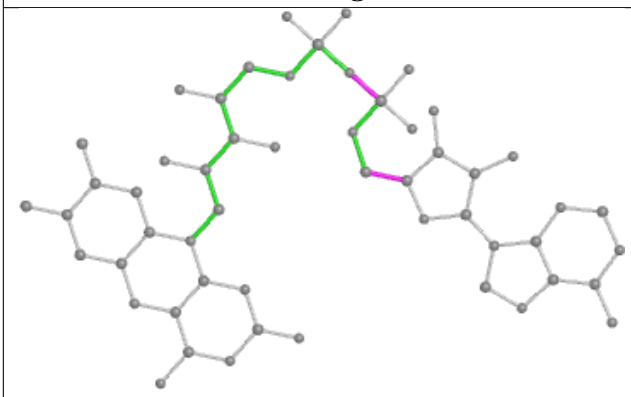
Ligand FAD F 450



Bond lengths



Bond angles



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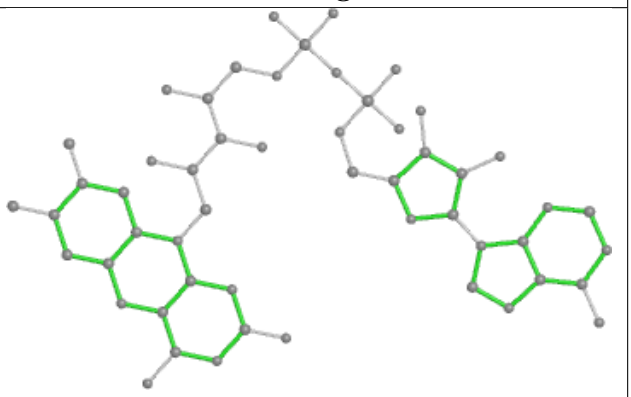

Rings

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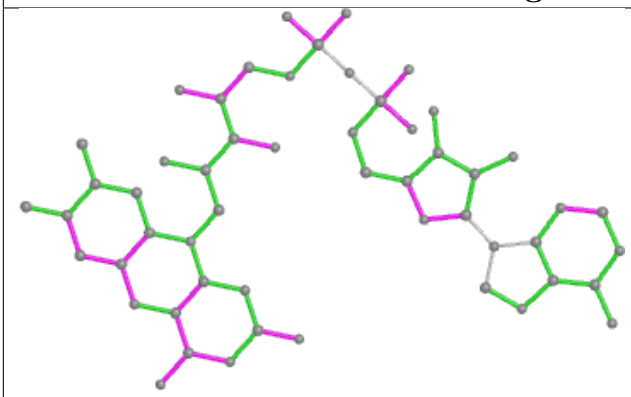
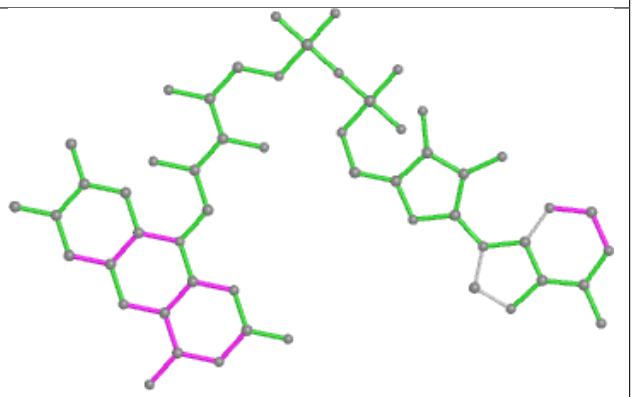
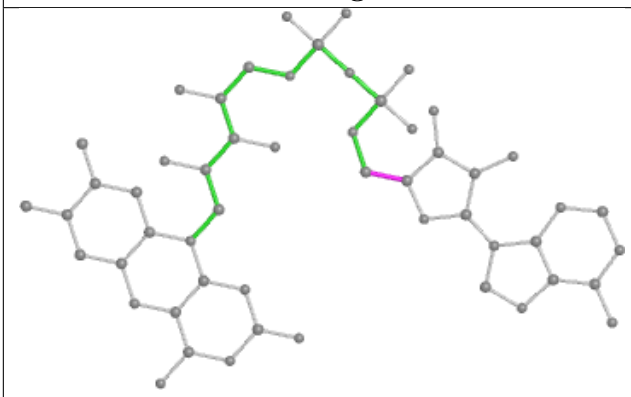


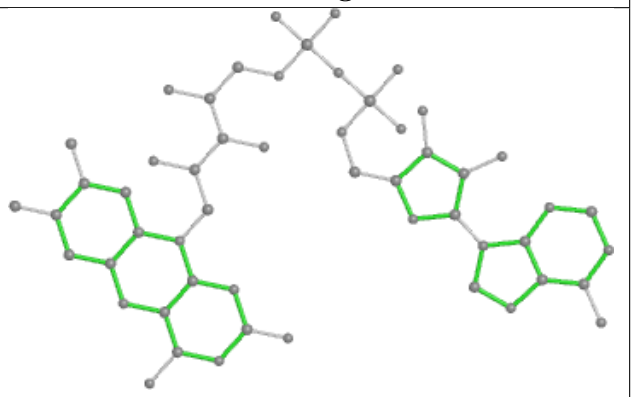
Bond lengths



Bond angles

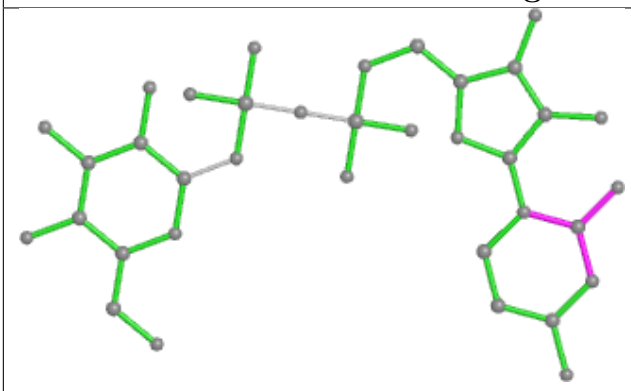


Torsions



Rings

Ligand GDU J 500



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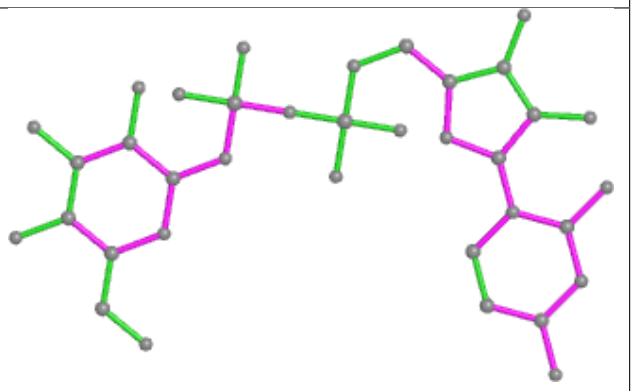
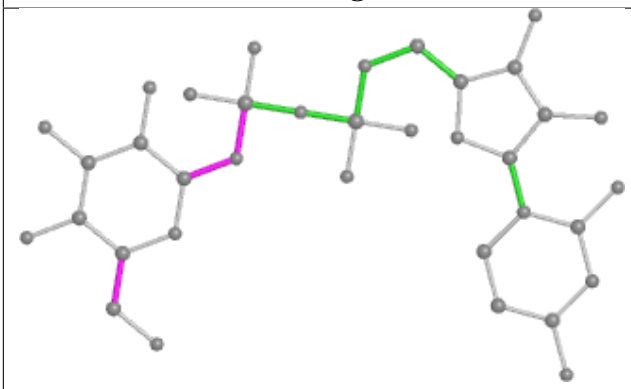


Bond angles



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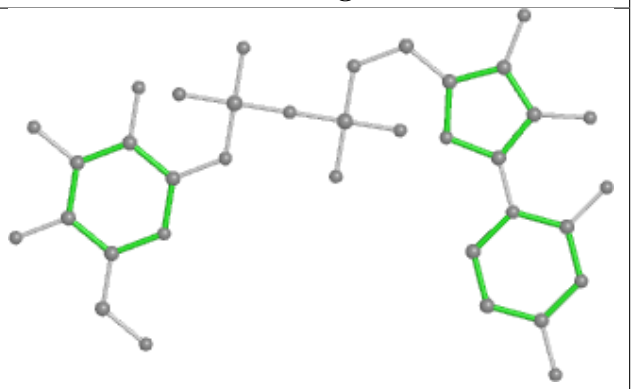

Rings

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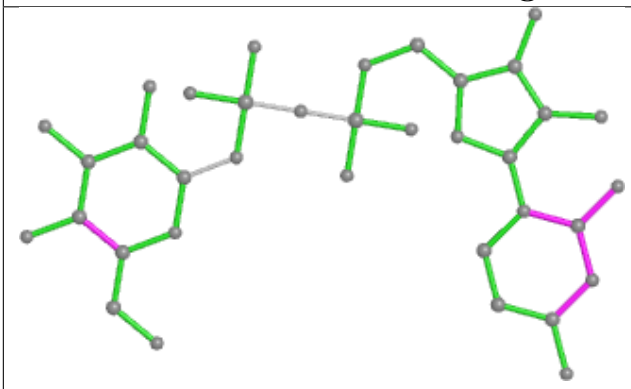

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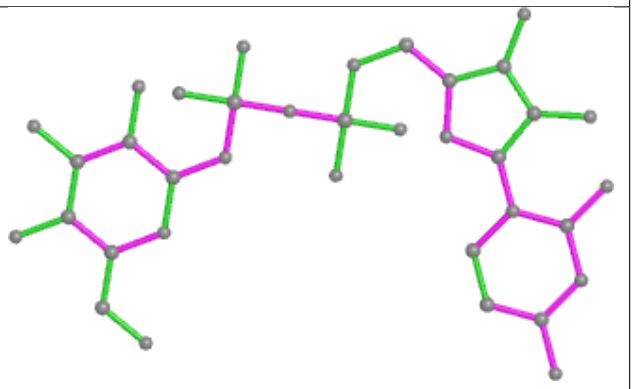

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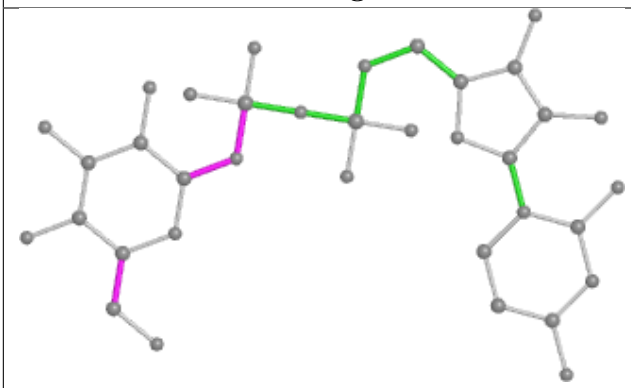

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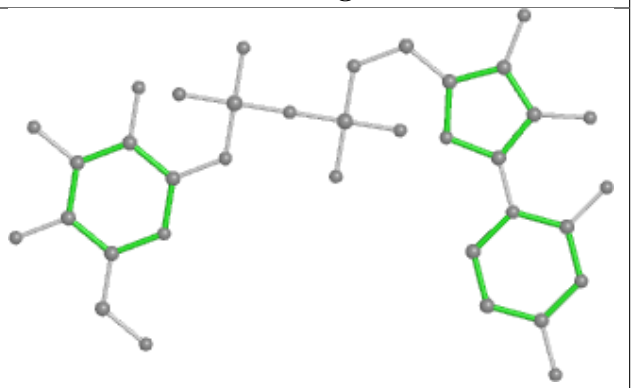

Rings

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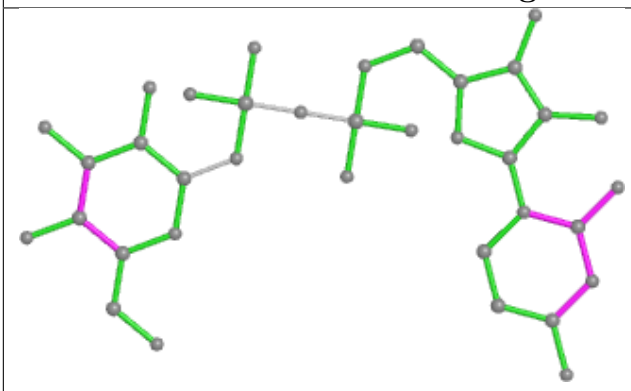

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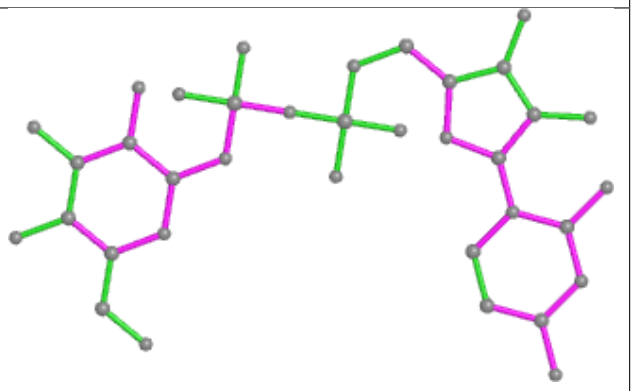
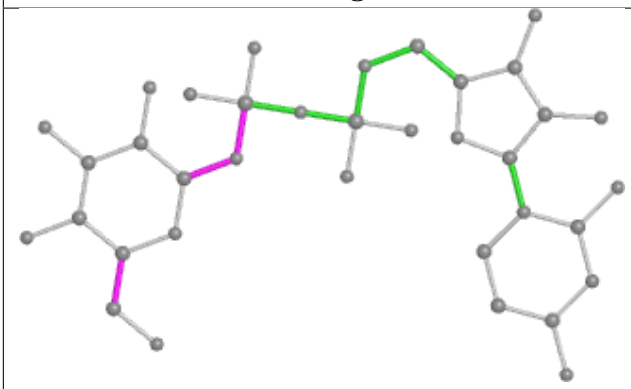


Bond angles



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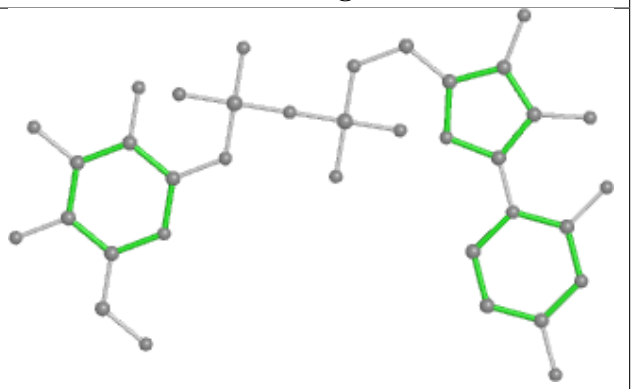
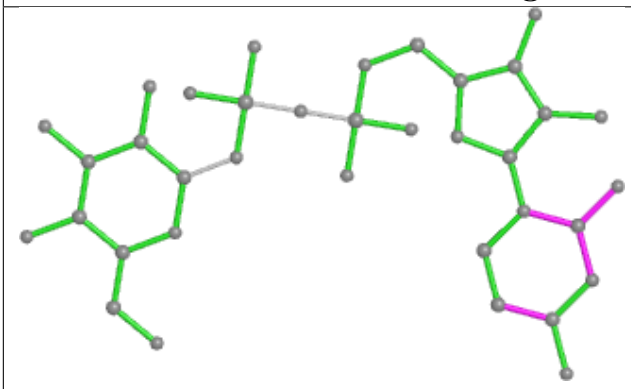


Rings

Ligand GDU F 500



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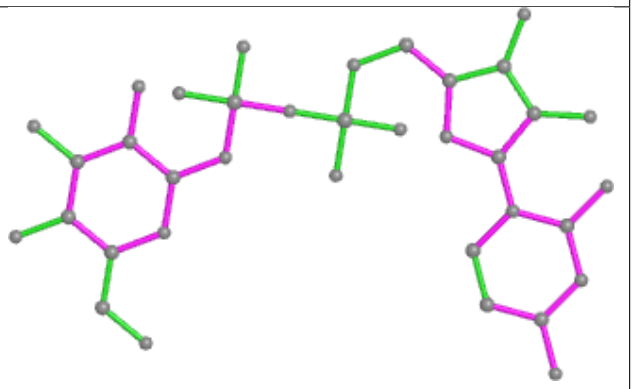
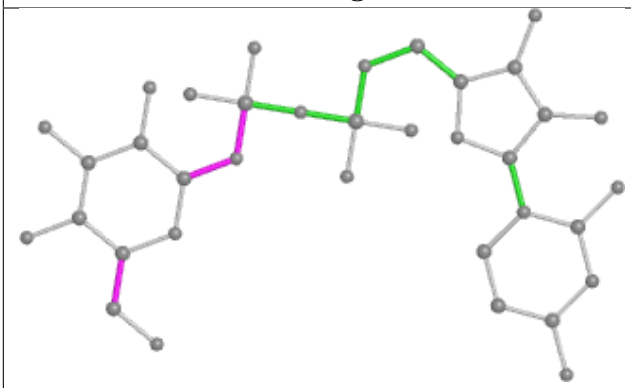


Bond angles



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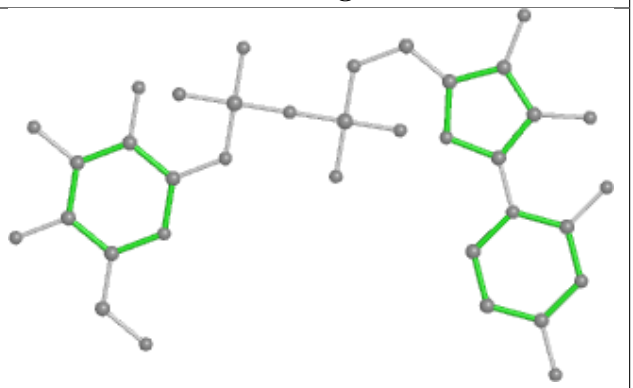
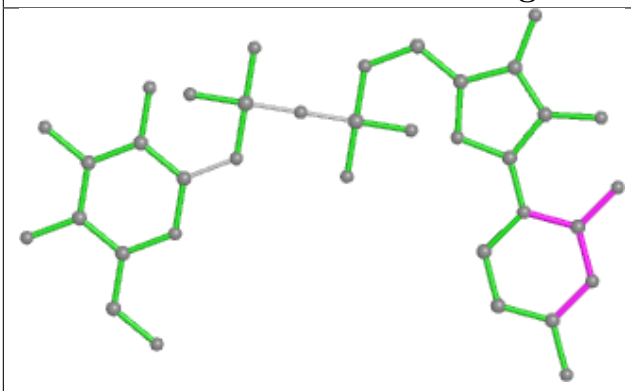


Rings

Ligand GDU G 500



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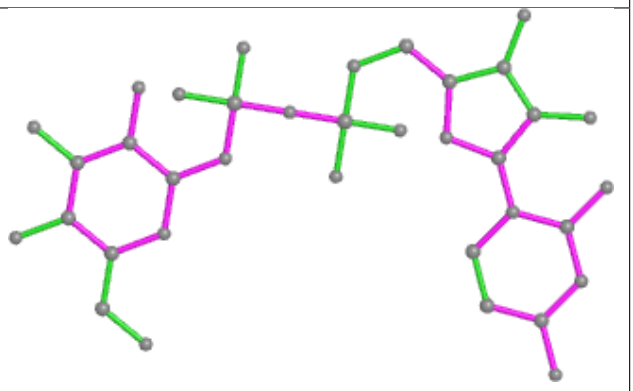

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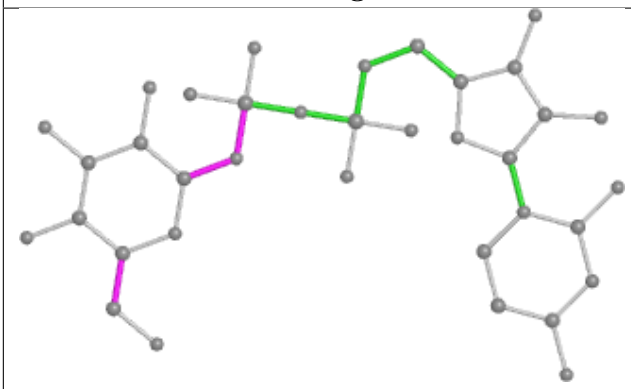
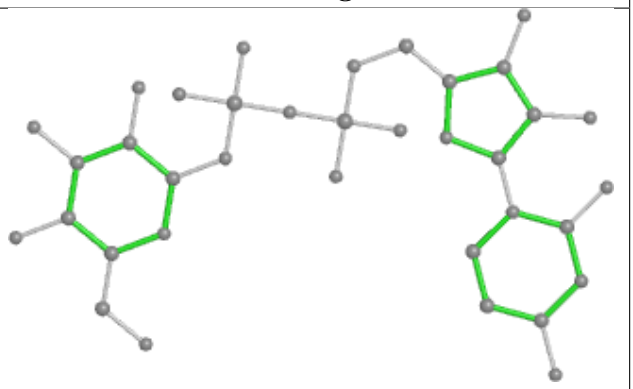
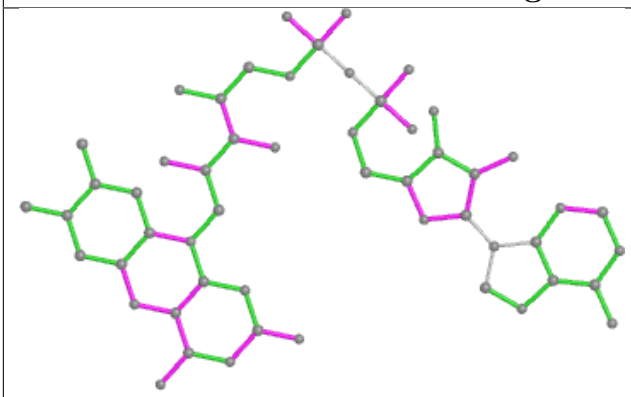


Torsions

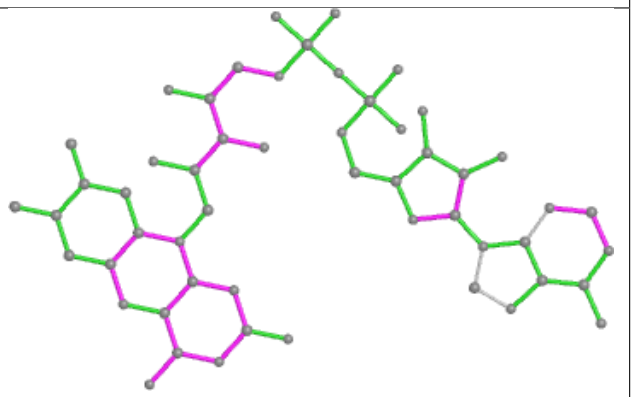


Rings

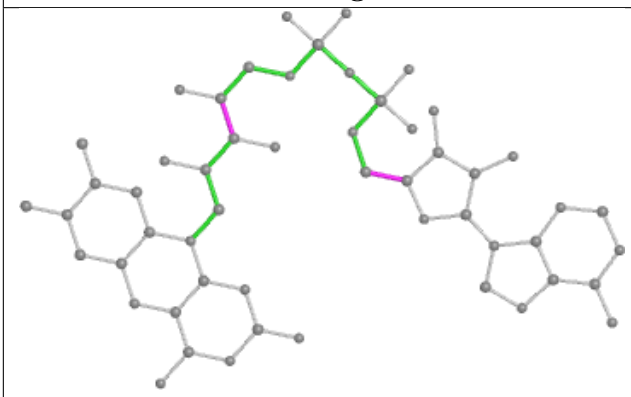
Ligand FAD A 450



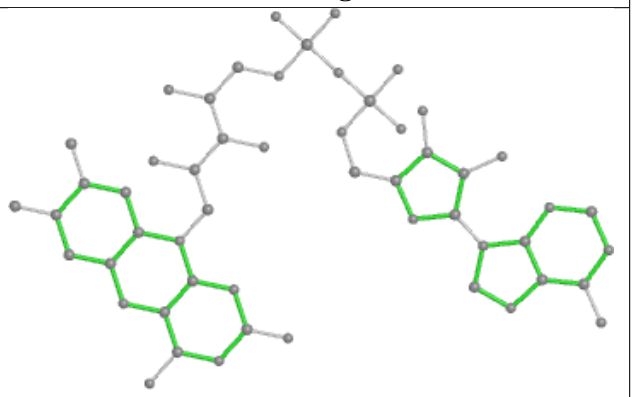
Bond lengths



Bond angles

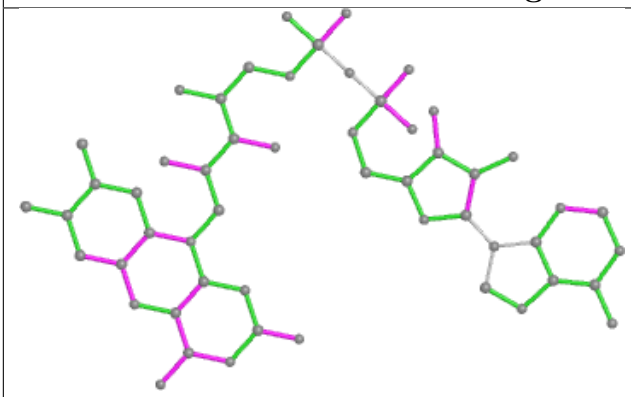


Torsions



Rings

Ligand FAD C 450



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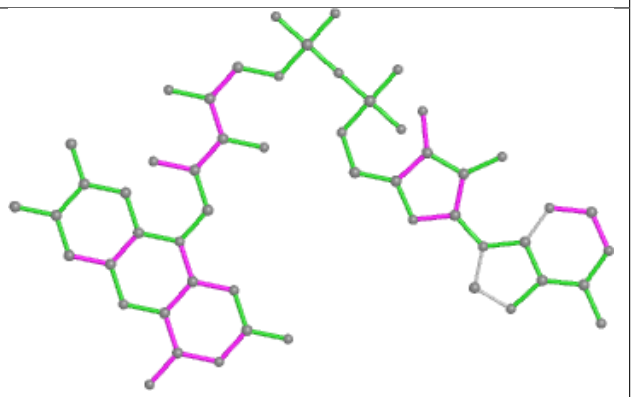
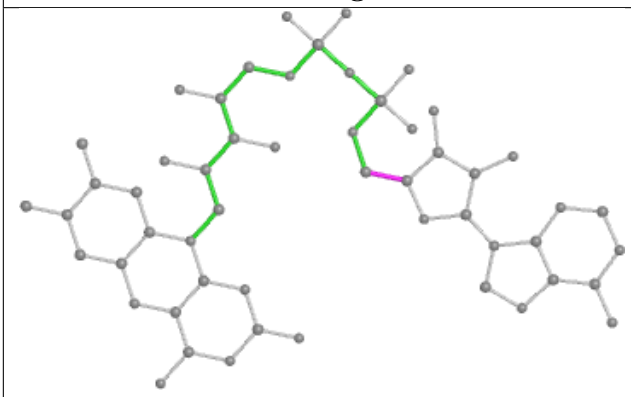


Bond angles



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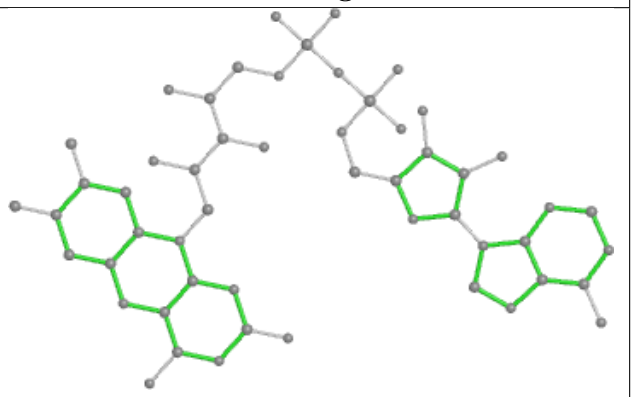
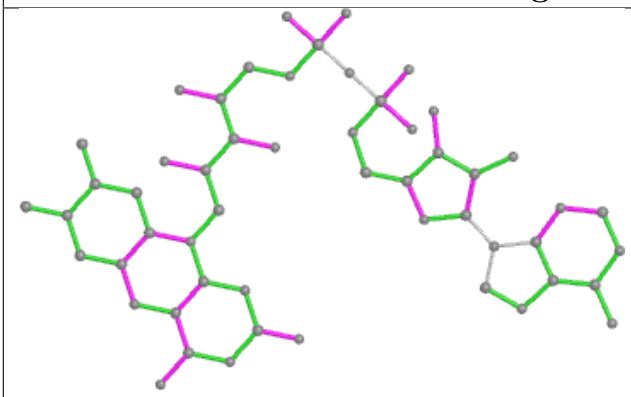


Rings

Ligand FAD I 450



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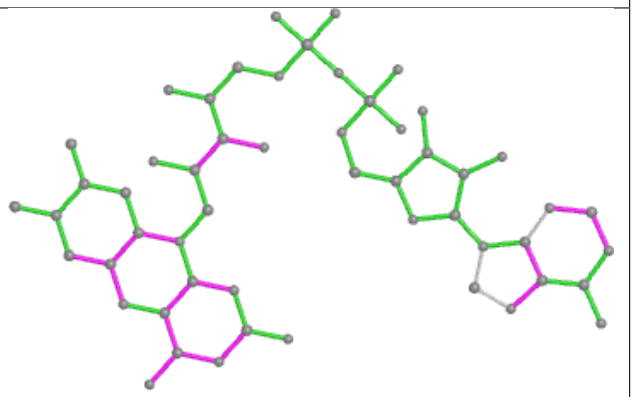
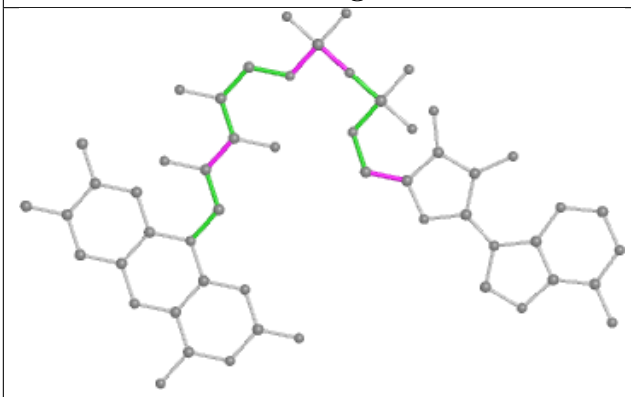
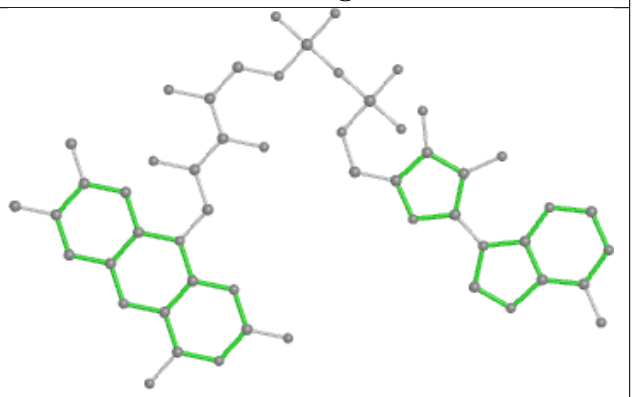


Bond angles

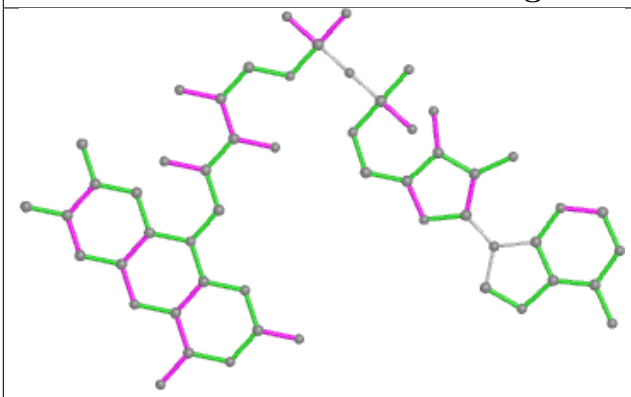


Torsions



Rings

Ligand FAD D 450



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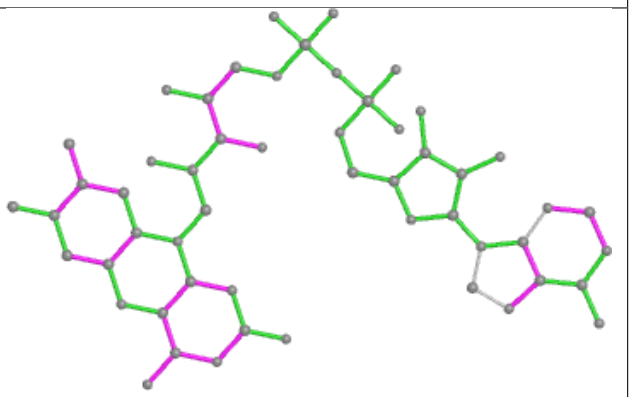
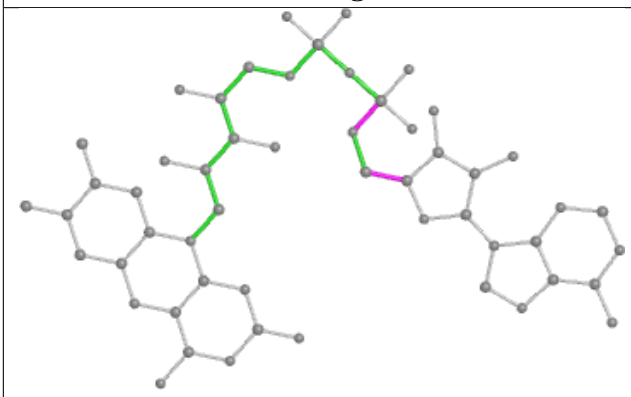
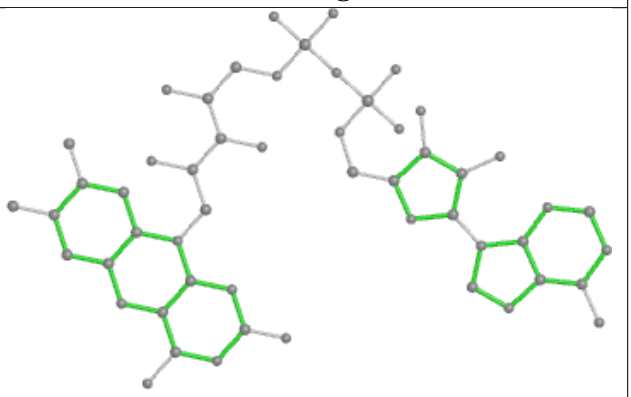


Bond angles

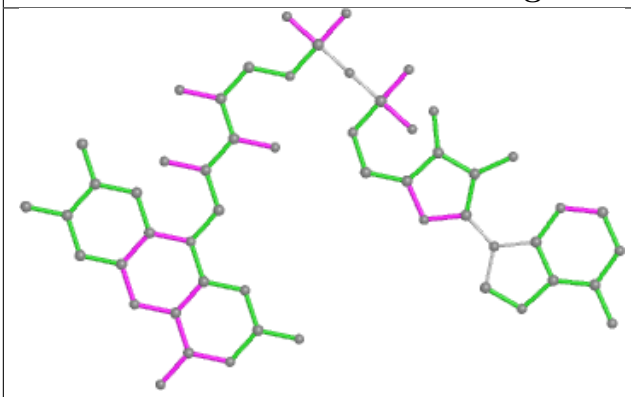


Torsions



Rings

Ligand FAD H 450



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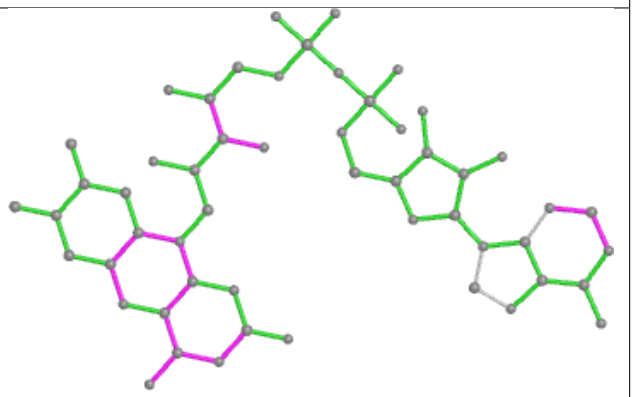
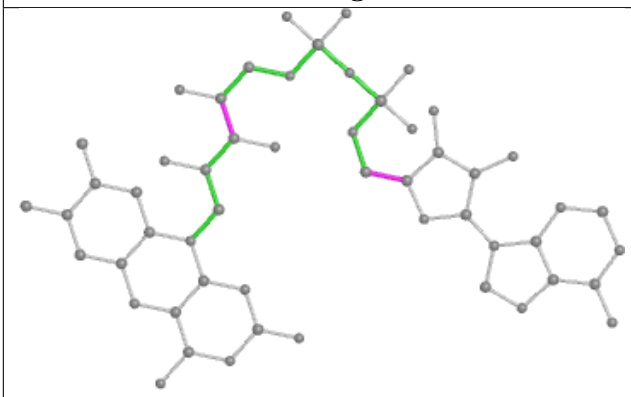


Bond angles



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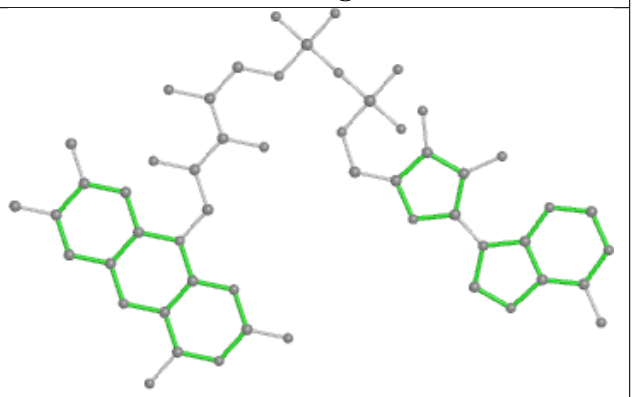
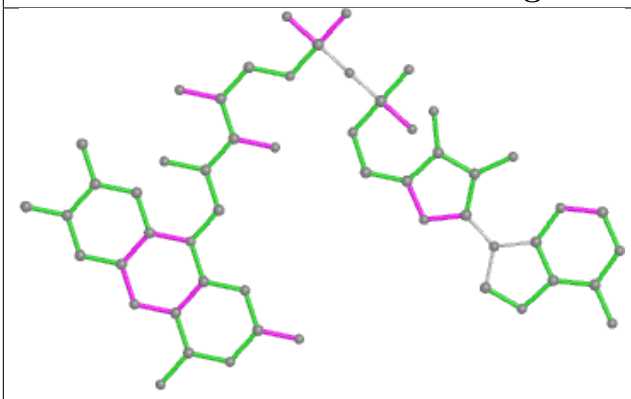


Rings

Ligand FAD G 450



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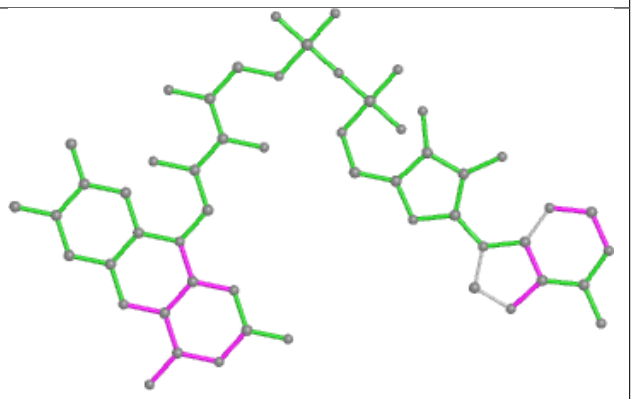
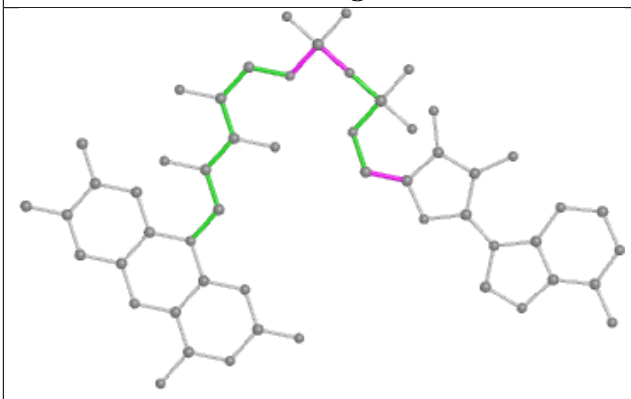
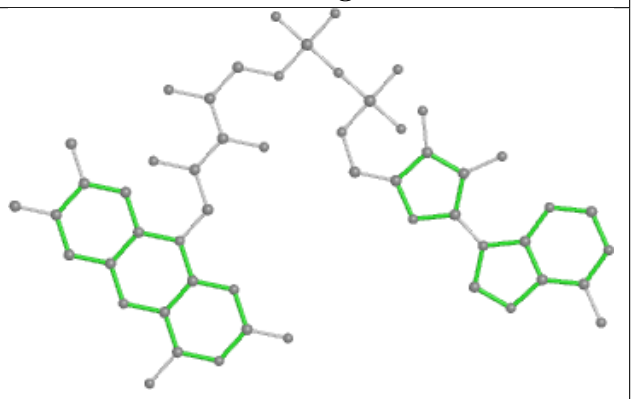


Bond angles

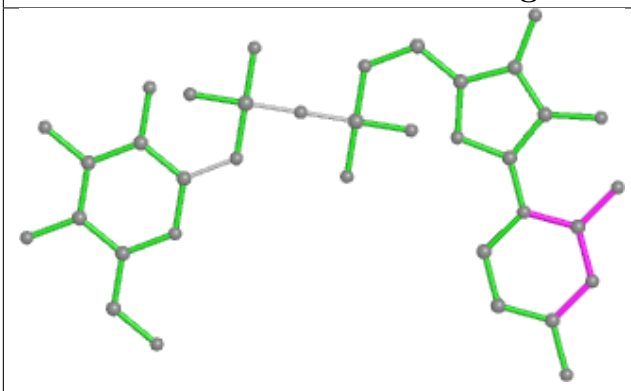


Torsions

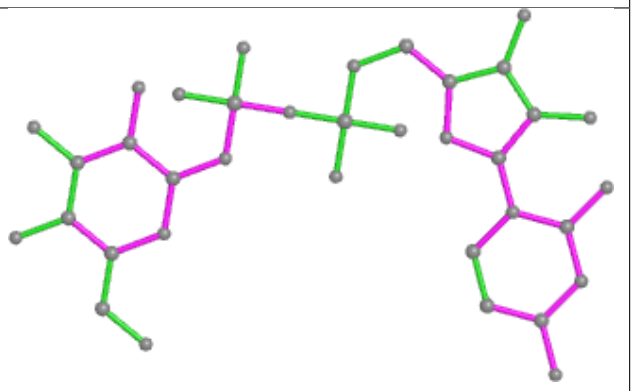


Rings

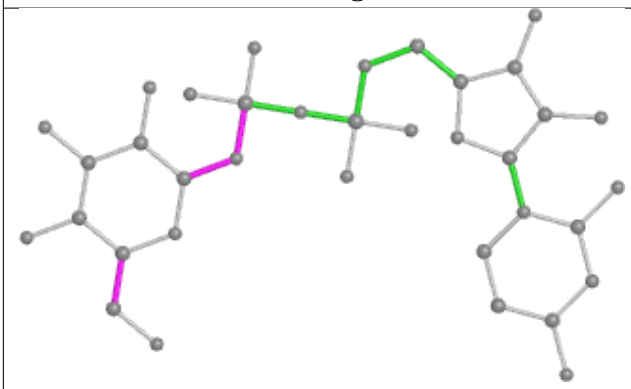
Ligand GDU C 500



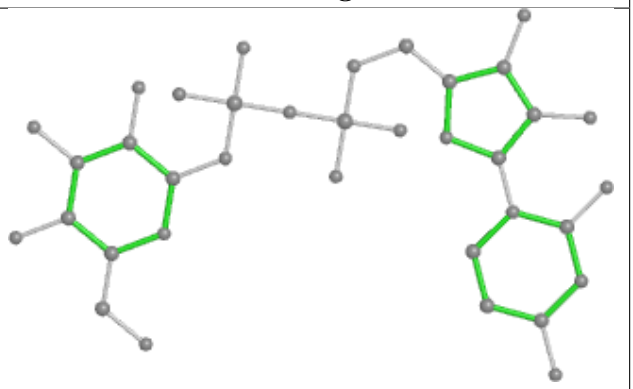
Bond lengths



Bond angles

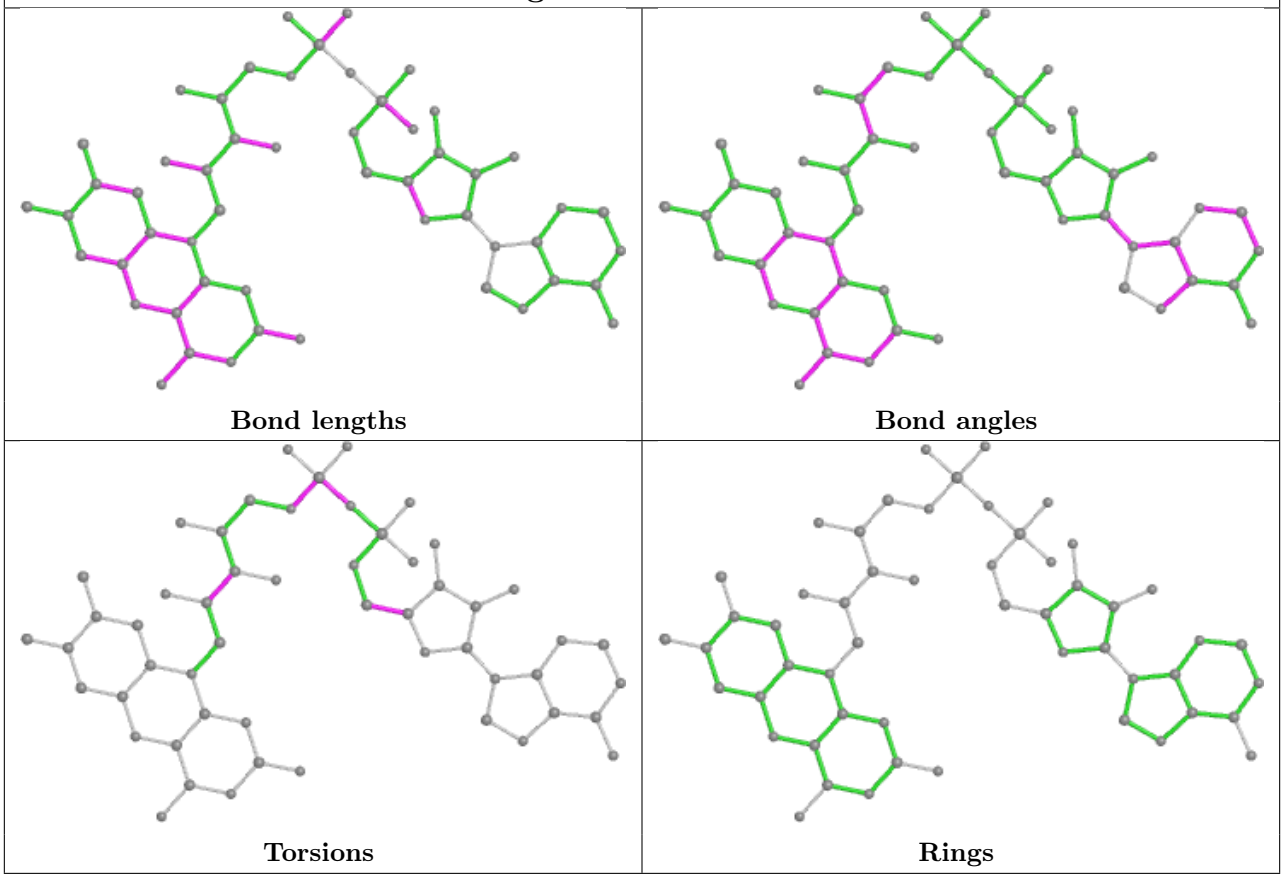


Torsions



Rings

Ligand FAD E 450



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, 95^{th} 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	365/397 (91%)	-0.43	6 (1%)	72	80	20, 30, 46, 75	0
1	B	364/397 (91%)	-0.31	10 (2%)	54	64	23, 34, 54, 80	1 (0%)
1	C	361/397 (90%)	-0.05	12 (3%)	46	59	25, 39, 64, 82	6 (1%)
1	D	360/397 (90%)	-0.15	11 (3%)	49	61	20, 41, 65, 81	0
1	E	364/397 (91%)	-0.31	11 (3%)	50	61	24, 37, 57, 98	2 (0%)
1	F	363/397 (91%)	-0.38	8 (2%)	62	72	20, 32, 51, 75	1 (0%)
1	G	363/397 (91%)	-0.29	8 (2%)	62	72	20, 35, 55, 78	1 (0%)
1	H	364/397 (91%)	-0.34	8 (2%)	62	72	20, 32, 52, 76	0
1	I	363/397 (91%)	-0.39	6 (1%)	70	78	20, 32, 47, 70	1 (0%)
1	J	361/397 (90%)	-0.24	7 (1%)	66	76	20, 35, 59, 81	1 (0%)
All	All	3628/3970 (91%)	-0.29	87 (2%)	59	68	20, 34, 58, 98	13 (0%)

All (87) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	26	GLU	7.7
1	D	357	GLN	5.6
1	D	153	VAL	5.3
1	G	27	SER	5.3
1	H	27	SER	5.2
1	F	153	VAL	5.2
1	H	28	LYS	5.0
1	B	27	SER	4.6
1	C	357	GLN	4.5
1	B	390	GLN	4.3
1	A	154	GLU	4.3
1	B	28	LYS	4.2
1	H	357	GLN	4.1

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Mol	Chain	Res	Type	RSRZ
1	C	385	ARG	4.1
1	H	389	GLY	4.1
1	E	155	GLN	3.9
1	G	153	VAL	3.9
1	B	357	GLN	3.9
1	A	26	GLU	3.8
1	H	390	GLN	3.8
1	E	27	SER	3.8
1	G	28	LYS	3.7
1	B	389	GLY	3.7
1	D	157	ARG	3.7
1	I	357	GLN	3.7
1	D	385	ARG	3.6
1	B	154	GLU	3.4
1	J	357	GLN	3.4
1	E	28	LYS	3.4
1	H	154	GLU	3.3
1	C	355	ALA	3.3
1	J	389	GLY	3.3
1	A	153	VAL	3.3
1	A	357	GLN	3.2
1	H	29	GLY	3.2
1	B	155	GLN	3.2
1	C	28	LYS	3.2
1	E	357	GLN	3.2
1	F	248	ASP	3.2
1	D	154	GLU	3.0
1	F	357	GLN	3.0
1	J	386	ARG	2.9
1	G	154	GLU	2.9
1	C	153	VAL	2.9
1	F	152	LYS	2.8
1	I	152	LYS	2.8
1	J	155	GLN	2.7
1	D	155	GLN	2.7
1	D	358	ASP	2.6
1	G	152	LYS	2.5
1	E	388	GLN	2.5
1	C	354	ASP	2.5
1	D	152	LYS	2.5
1	B	157	ARG	2.5
1	F	270	GLY	2.5

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Mol	Chain	Res	Type	RSRZ
1	C	52	GLY	2.4
1	E	154	GLU	2.4
1	I	153	VAL	2.4
1	I	355	ALA	2.4
1	A	155	GLN	2.4
1	G	34	ILE	2.3
1	D	386	ARG	2.3
1	C	248	ASP	2.3
1	A	152	LYS	2.3
1	J	153	VAL	2.3
1	C	387	LEU	2.3
1	H	155	GLN	2.2
1	F	56	LEU	2.2
1	F	28	LYS	2.2
1	E	389	GLY	2.2
1	D	56	LEU	2.2
1	B	248	ASP	2.2
1	C	29	GLY	2.2
1	C	358	ASP	2.2
1	J	57	ILE	2.2
1	E	355	ALA	2.1
1	B	355	ALA	2.1
1	I	389	GLY	2.1
1	I	155	GLN	2.1
1	E	153	VAL	2.1
1	E	157	ARG	2.1
1	D	249	PHE	2.0
1	G	386	ARG	2.0
1	G	56	LEU	2.0
1	J	388	GLN	2.0
1	F	34	ILE	2.0
1	C	41	GLY	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 monosaccharides in this entry.

6.4 Ligands (i)

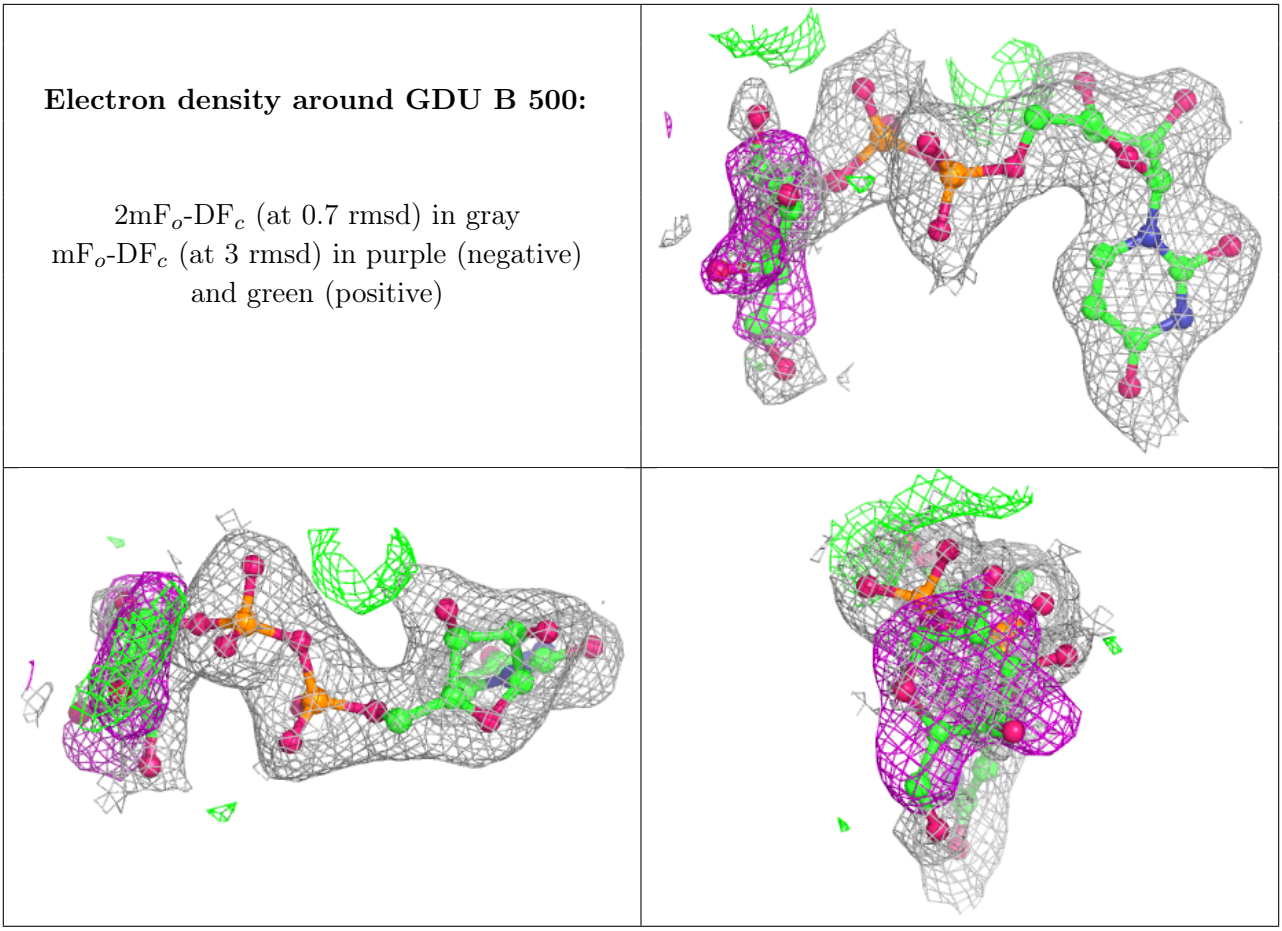
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	GDU	B	500	36/36	0.93	0.16	31,39,57,61	0
2	GDU	D	500	36/36	0.93	0.16	35,44,65,69	0
2	GDU	C	500	36/36	0.94	0.14	29,39,63,64	0
2	GDU	I	500	36/36	0.94	0.16	29,34,54,58	0
2	GDU	H	500	36/36	0.95	0.14	25,31,48,52	0
2	GDU	E	500	36/36	0.95	0.14	28,36,55,58	0
2	GDU	J	500	36/36	0.95	0.15	25,32,54,57	0
3	FAD	C	450	53/53	0.95	0.14	23,29,36,51	0
3	FAD	B	450	53/53	0.96	0.09	23,29,36,51	0
2	GDU	F	500	36/36	0.96	0.14	26,35,50,53	0
3	FAD	F	450	53/53	0.96	0.09	23,29,36,51	0
3	FAD	G	450	53/53	0.96	0.11	23,29,36,51	0
3	FAD	H	450	53/53	0.96	0.09	23,29,36,51	0
3	FAD	J	450	53/53	0.96	0.11	23,29,36,51	0
3	FAD	D	450	53/53	0.97	0.11	23,29,36,51	0
3	FAD	E	450	53/53	0.97	0.10	23,29,36,51	0
3	FAD	I	450	53/53	0.97	0.08	23,29,36,51	0
3	FAD	A	450	53/53	0.97	0.09	23,29,36,51	0
2	GDU	G	500	36/36	0.98	0.13	31,36,40,43	11
2	GDU	A	500	36/36	0.98	0.12	25,29,32,34	12

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.

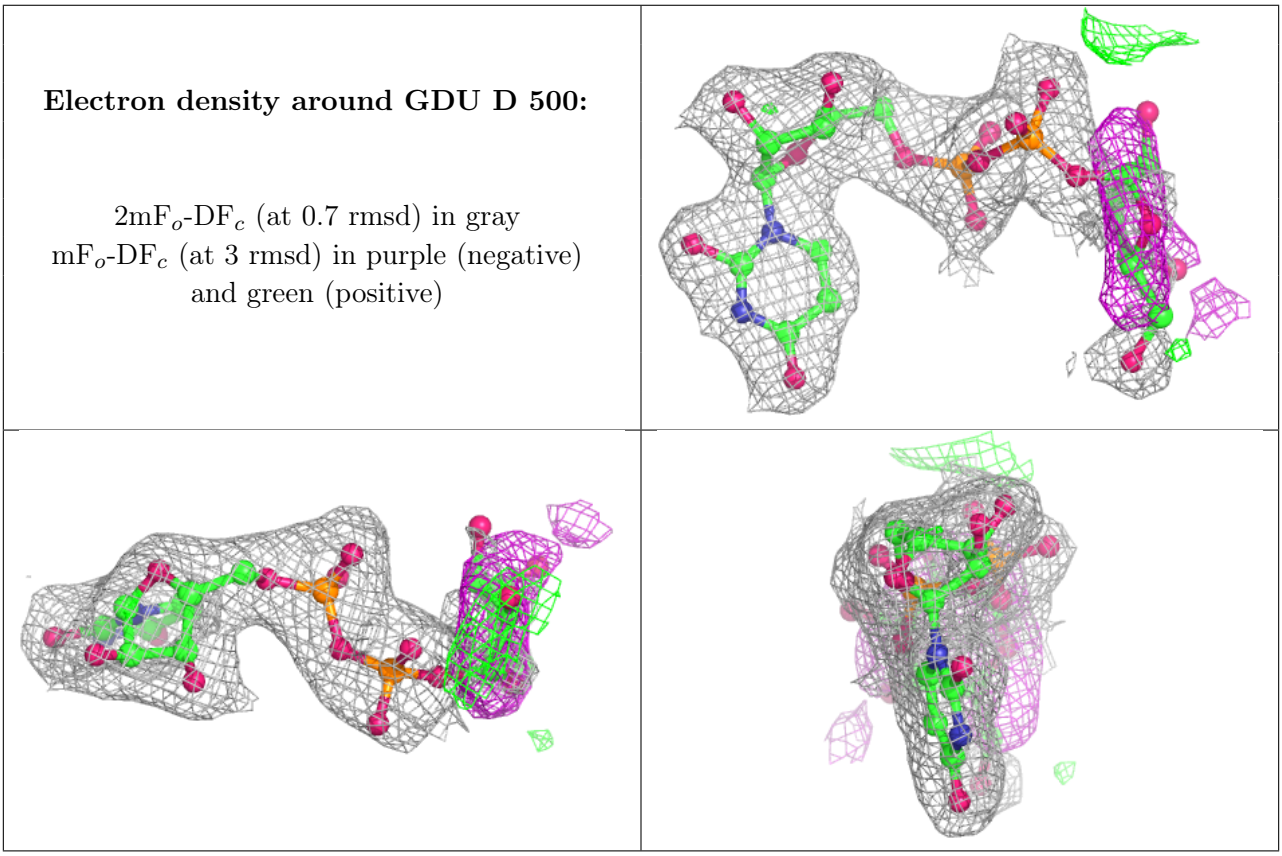
Electron density around GDU B 500:

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



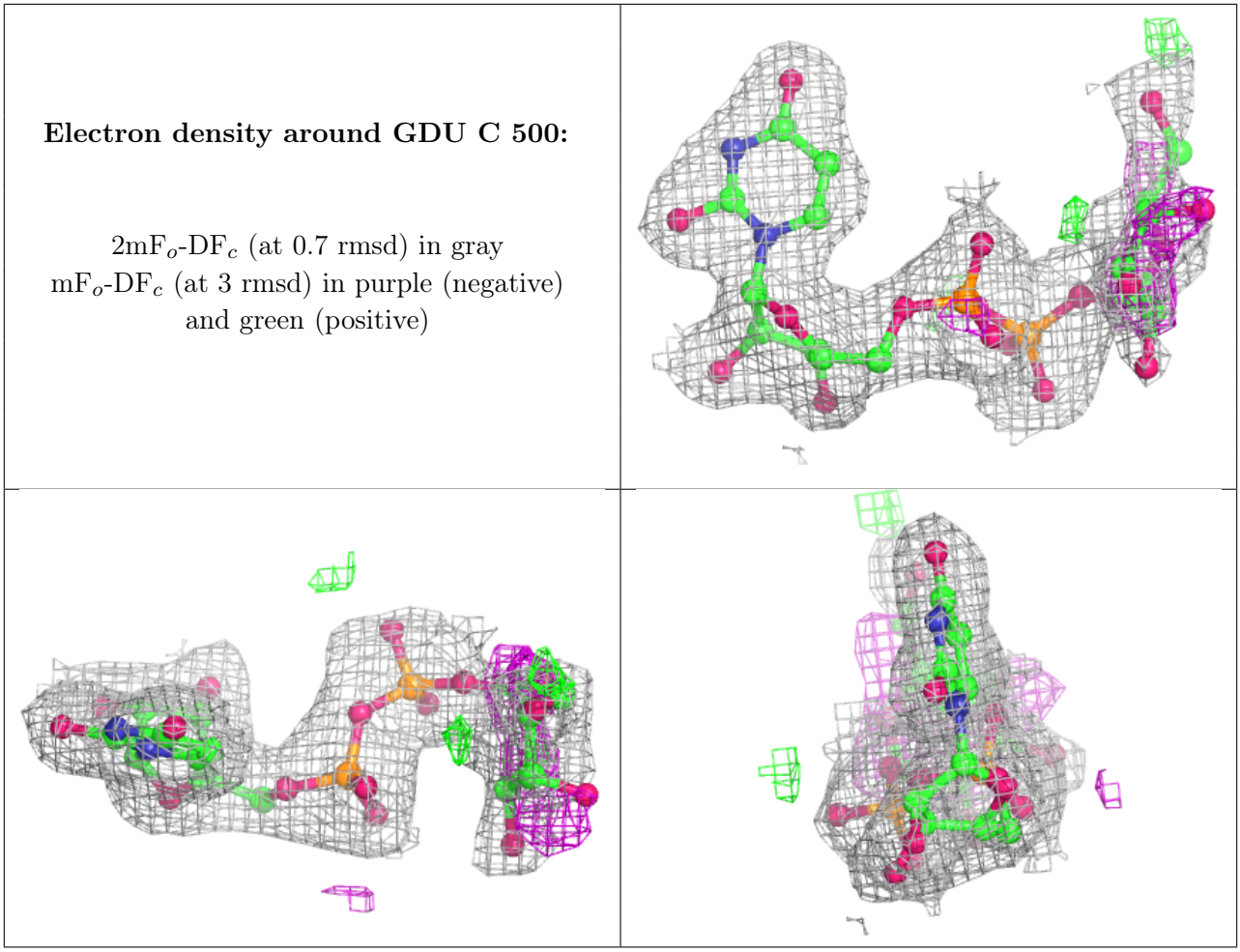
Electron density around GDU D 500:

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



Electron density around GDU C 500:

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



Electron density around GDU I 500:

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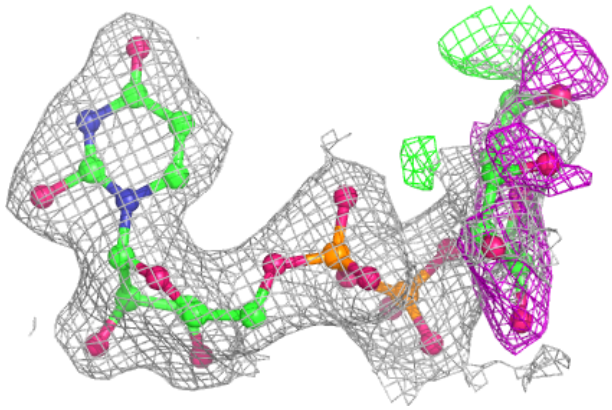
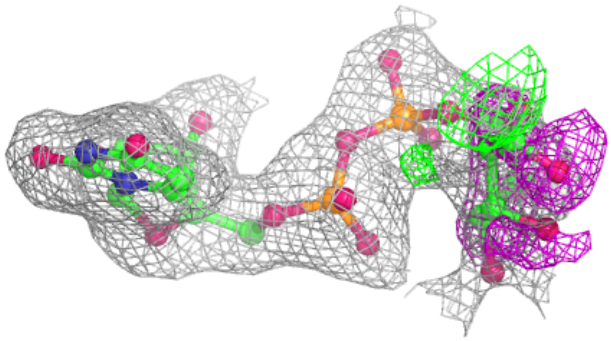
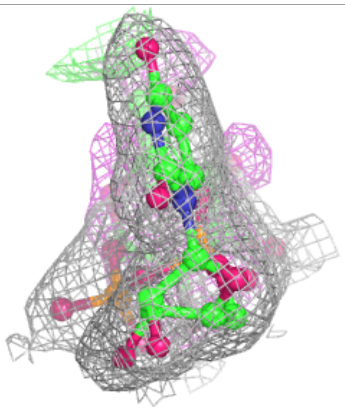
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

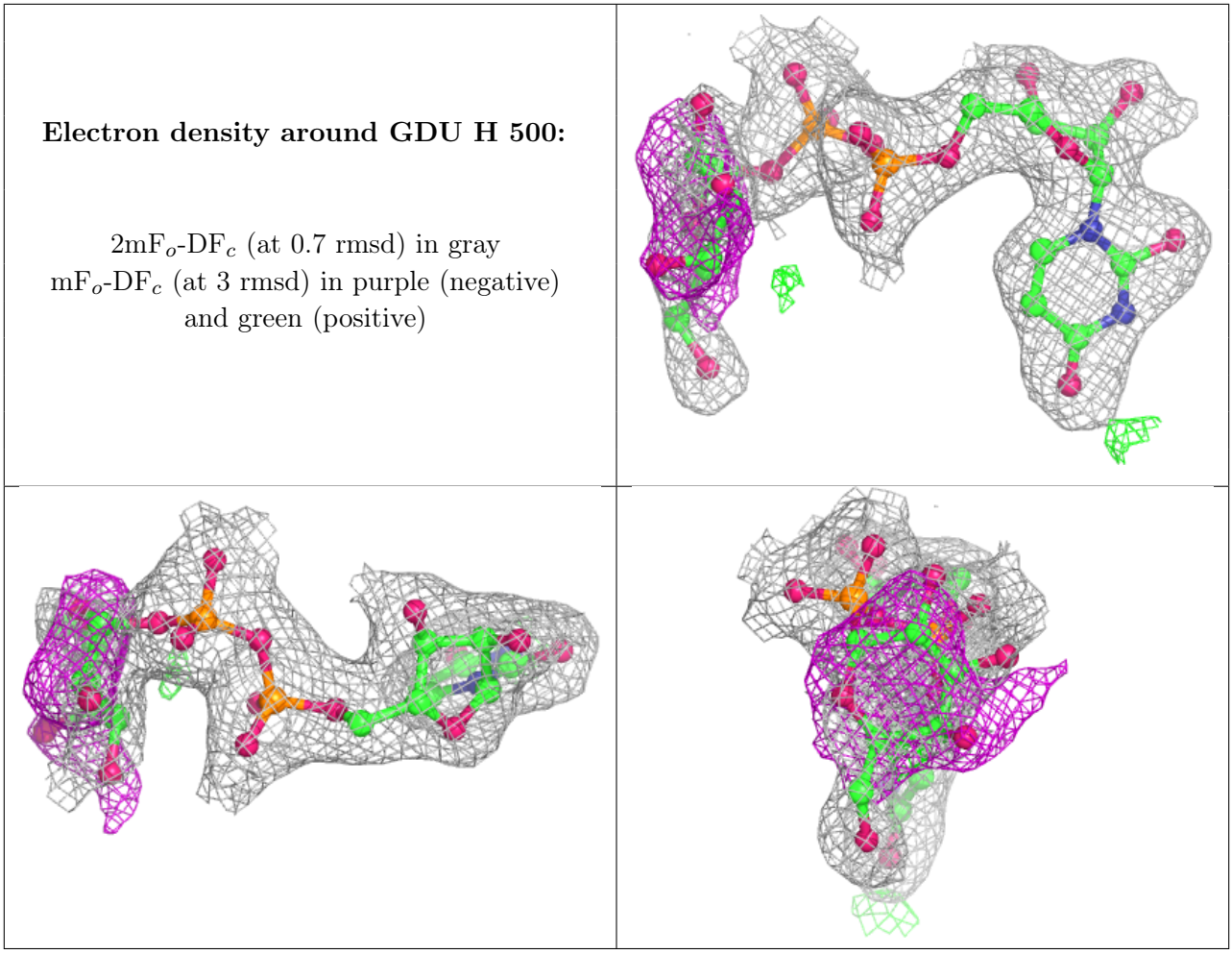






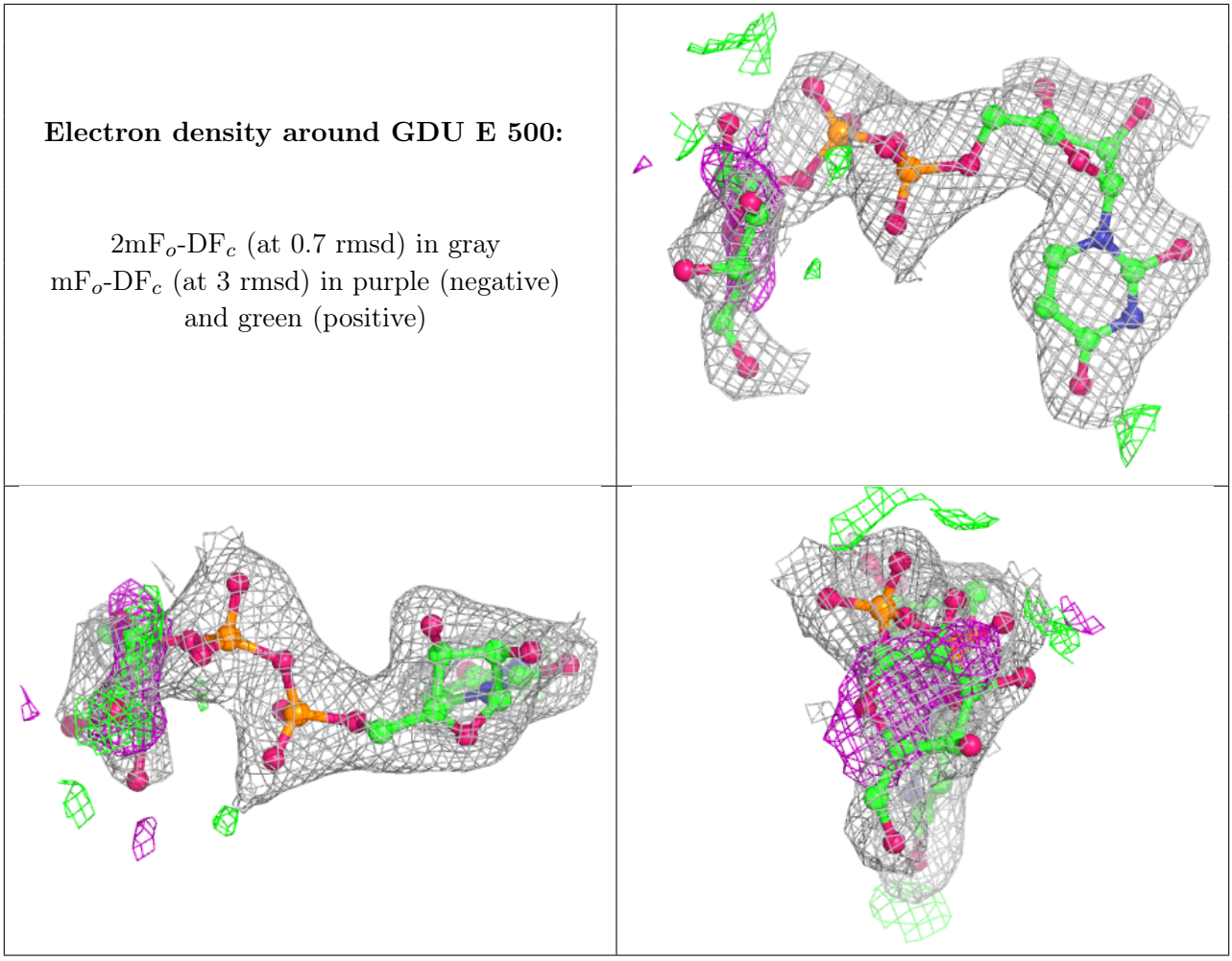
Electron density around GDU H 500:

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



Electron density around GDU E 500:

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



Electron density around GDU J 500:

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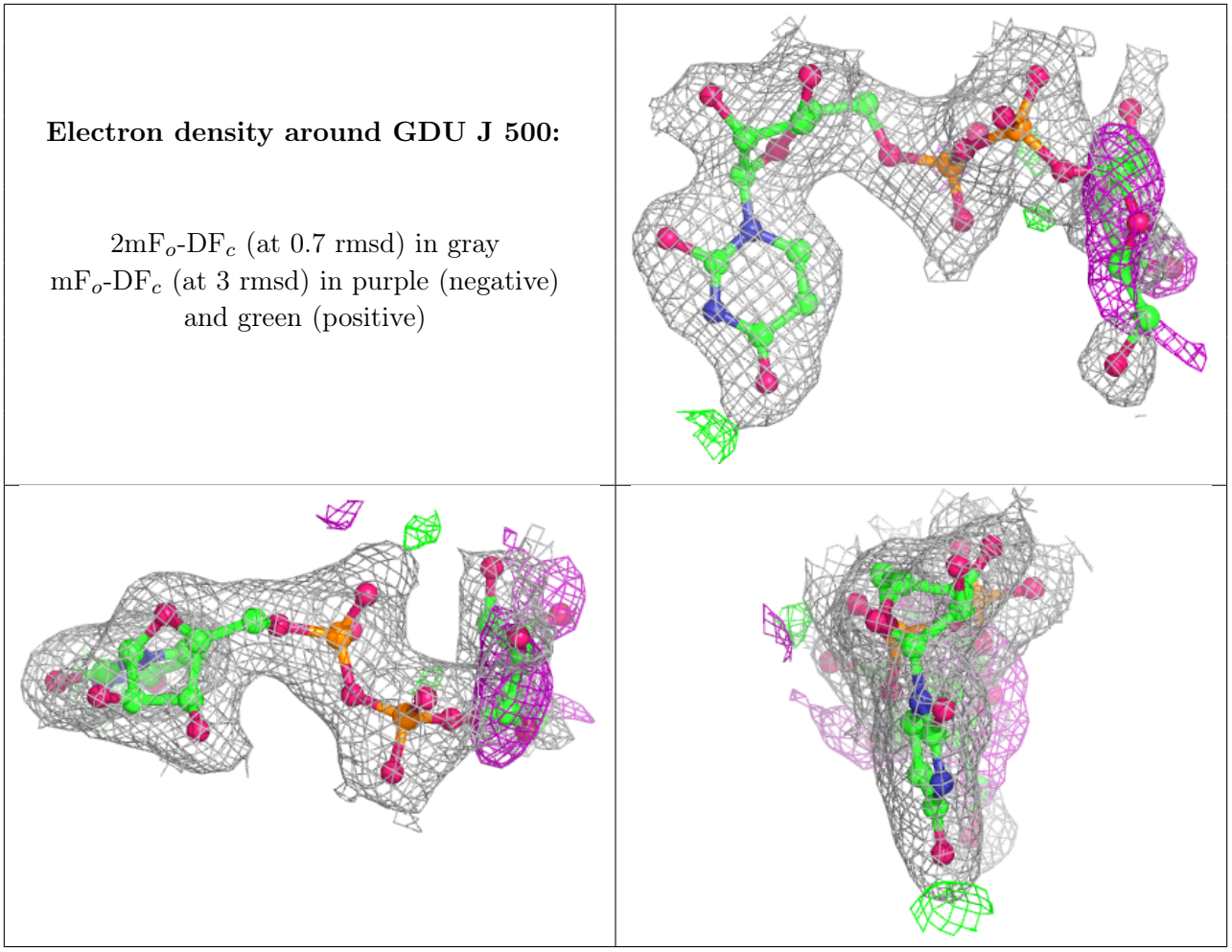
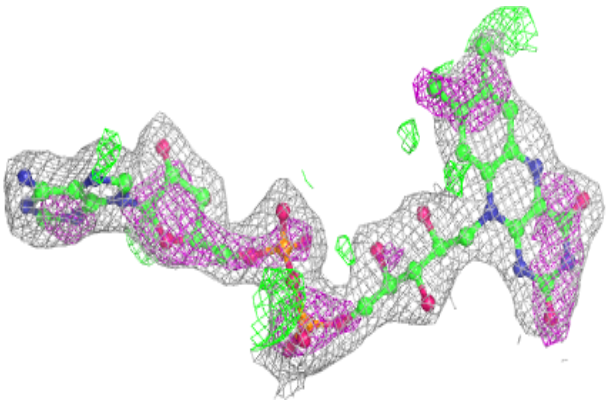
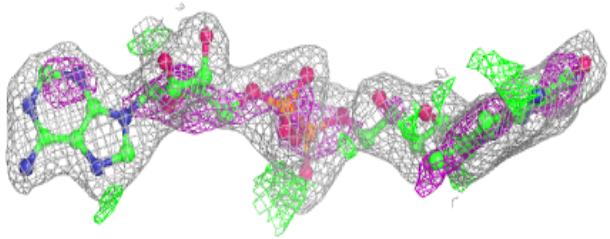
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

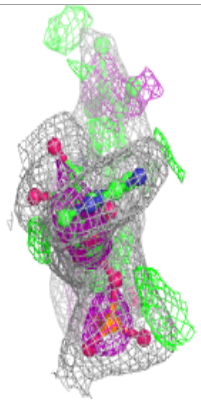


Electron density around FAD C 450:

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

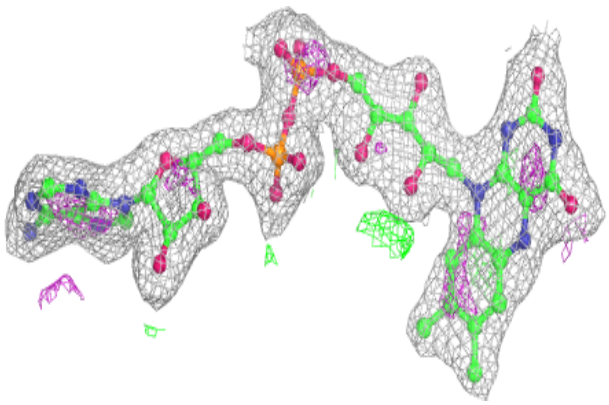


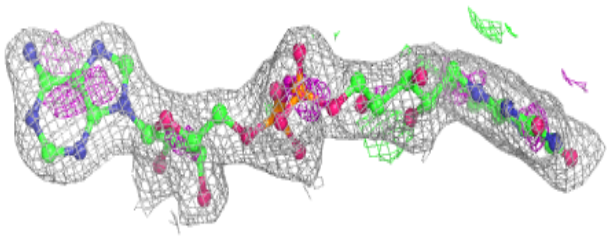


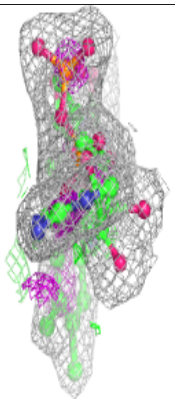


Electron density around FAD B 450:

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

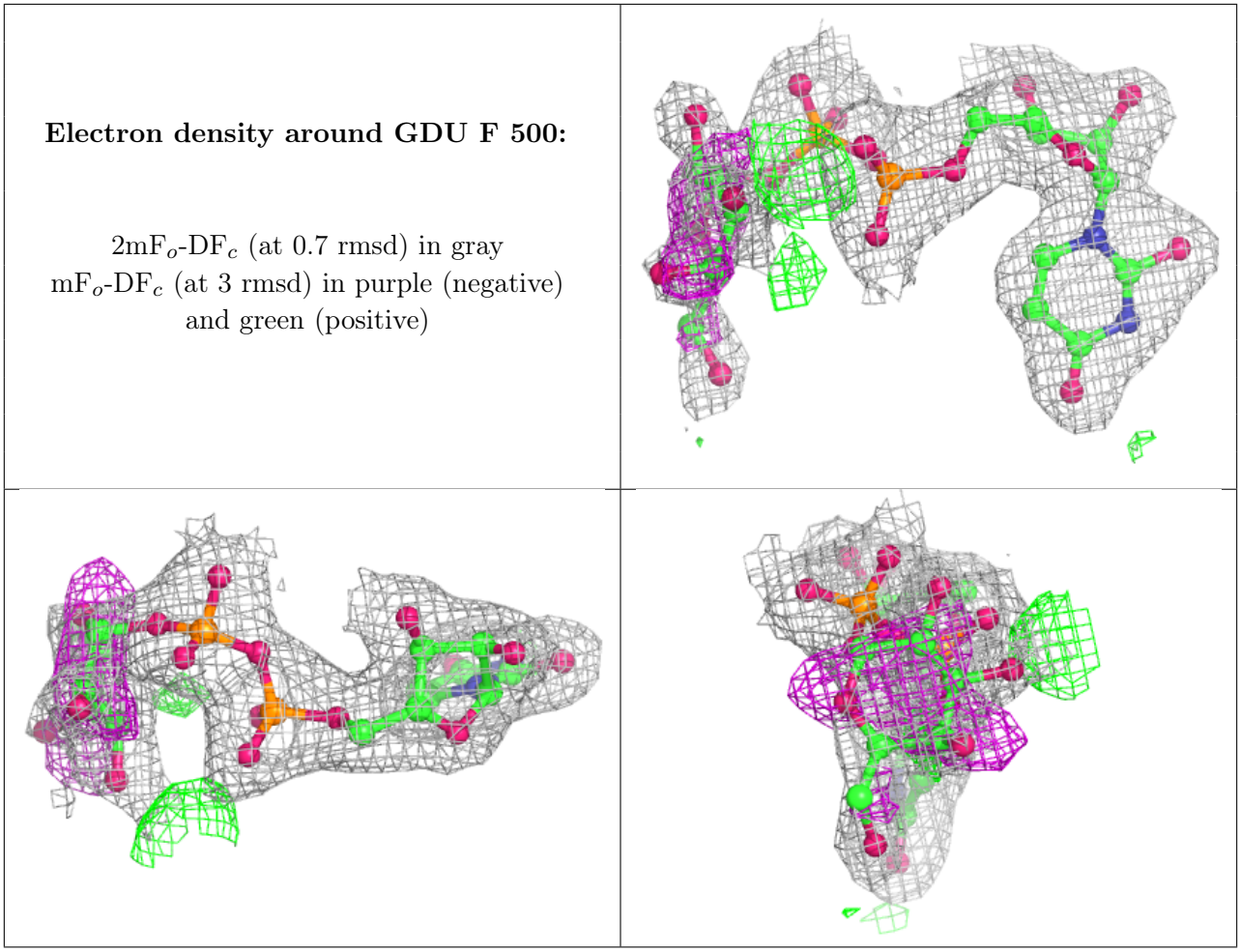






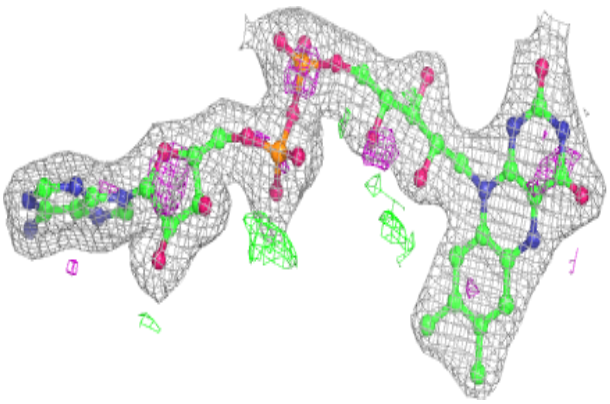
Electron density around GDU F 500:

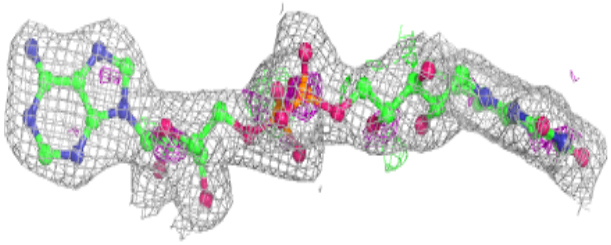
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

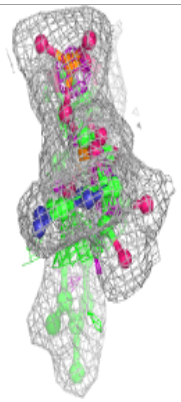


Electron density around FAD F 450:

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

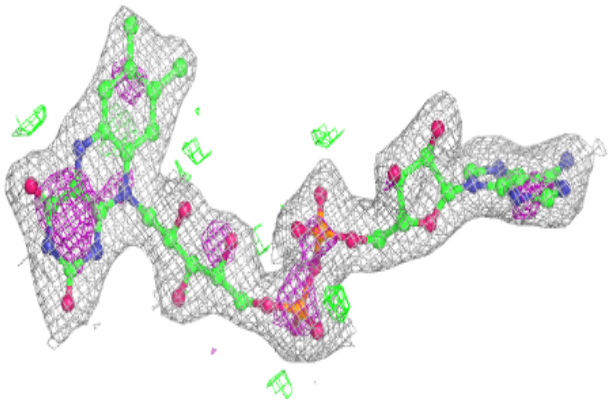


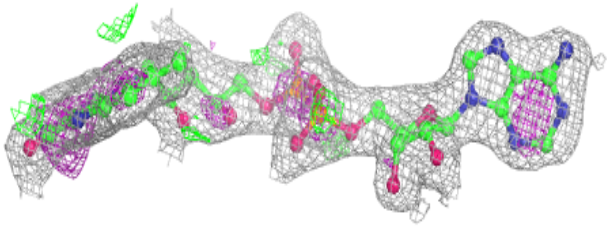


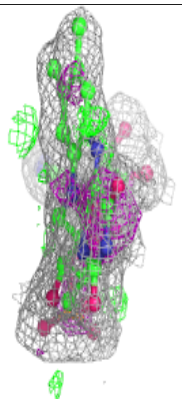


Electron density around FAD G 450:

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

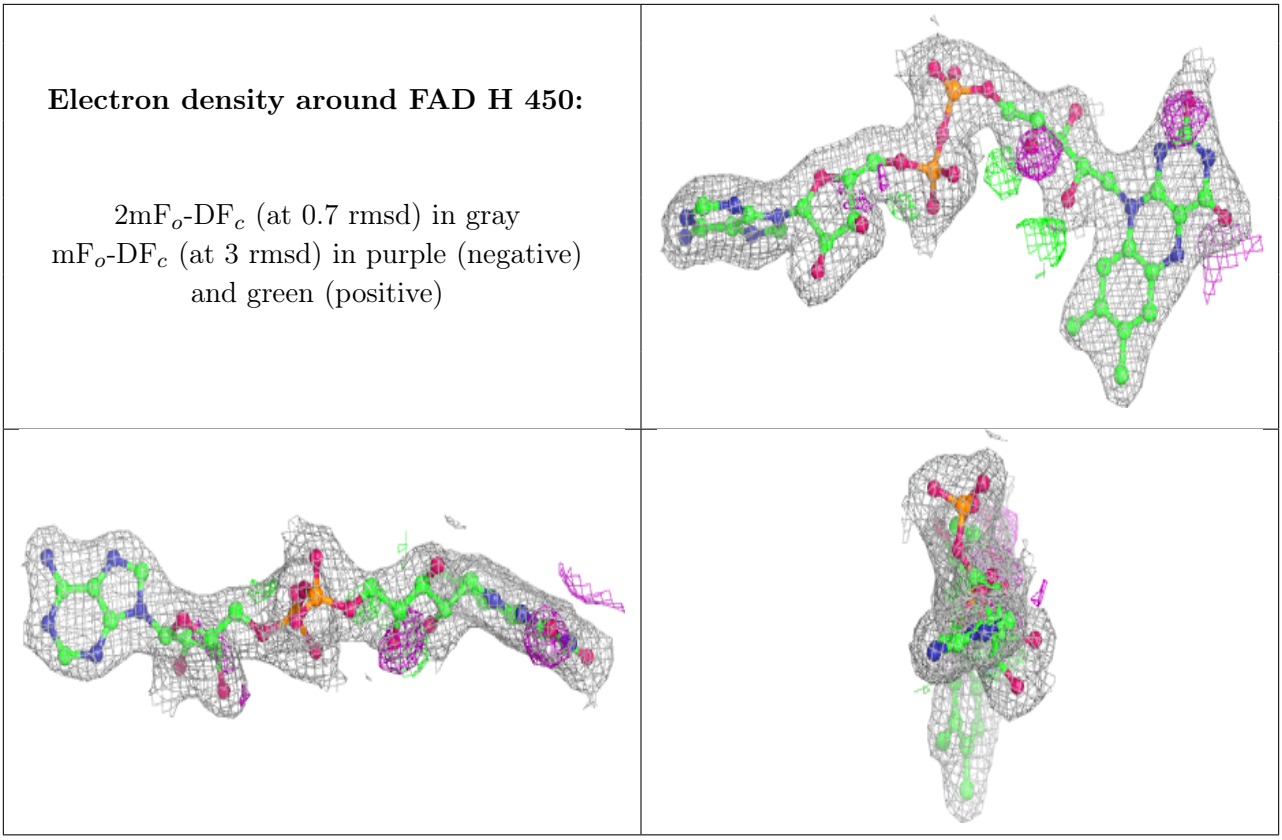






Electron density around FAD H 450:

$2mF_o$-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 J 450:

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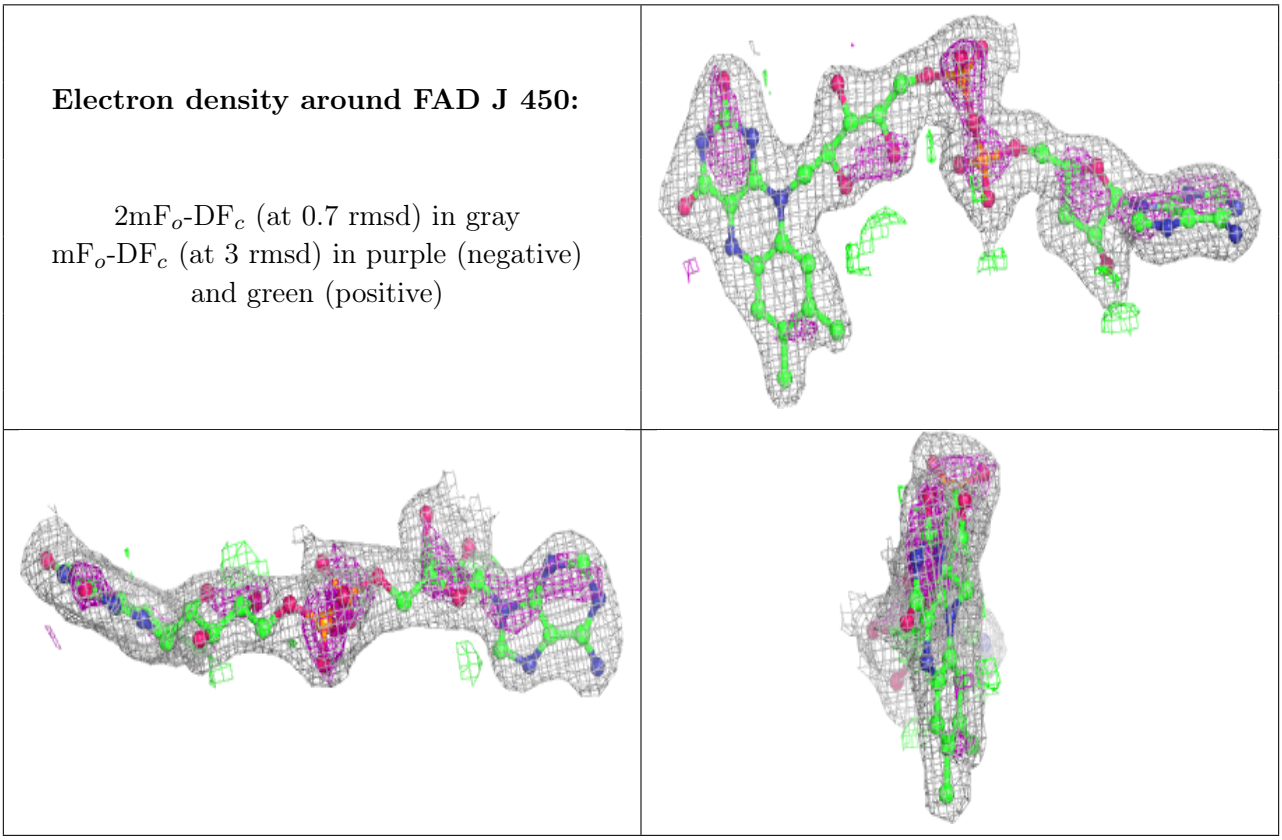
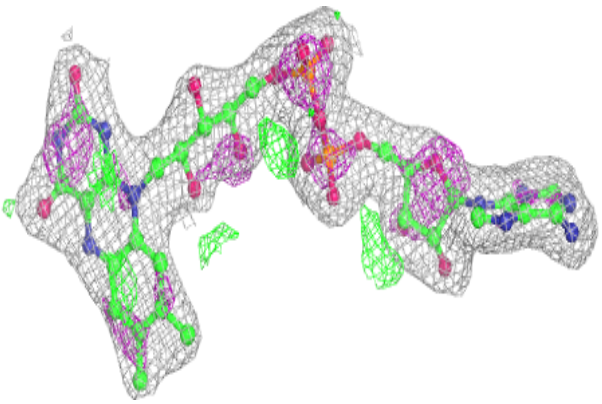
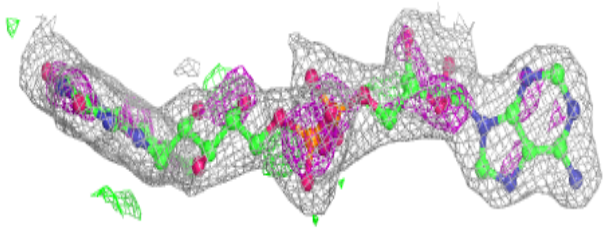
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

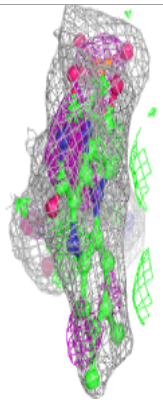


Electron density around FAD D 450:

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

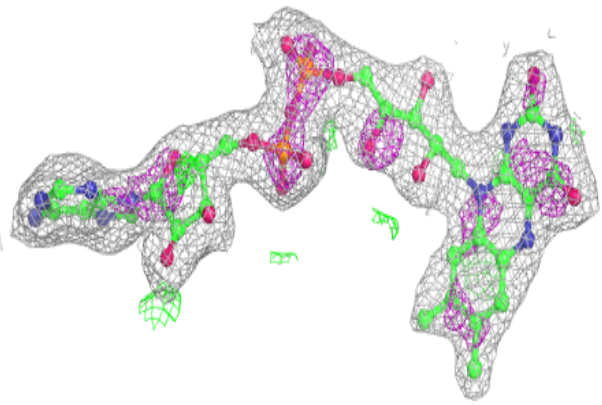


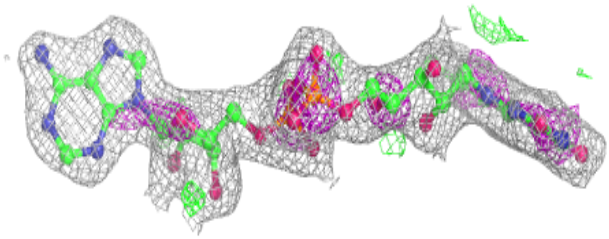


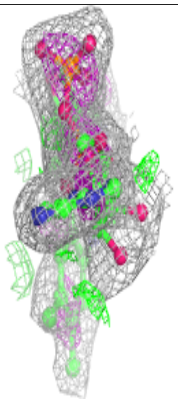


Electron density around FAD E 450:

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

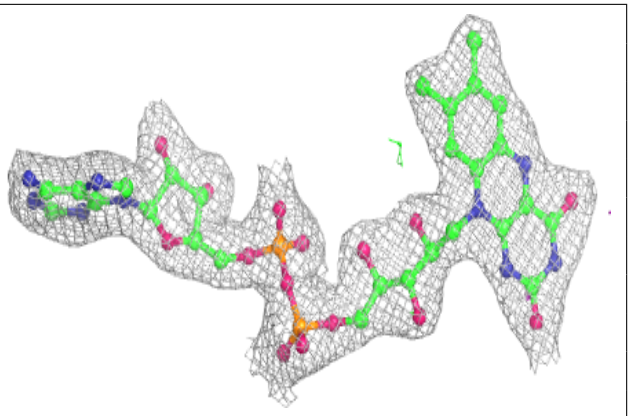


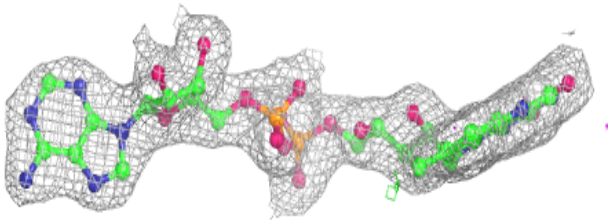


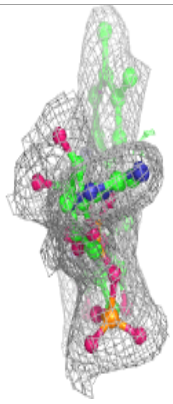


Electron density around FAD I 450:

$2mF_o$-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 450:

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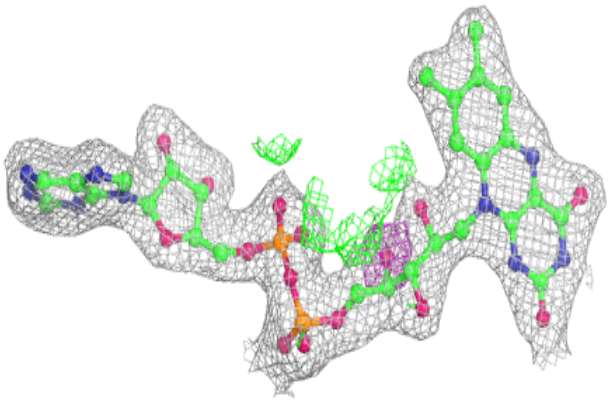
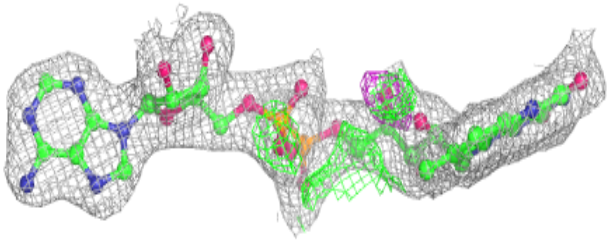
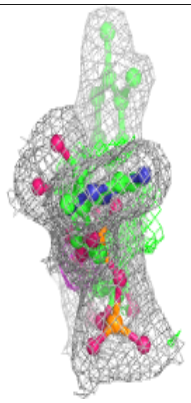
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

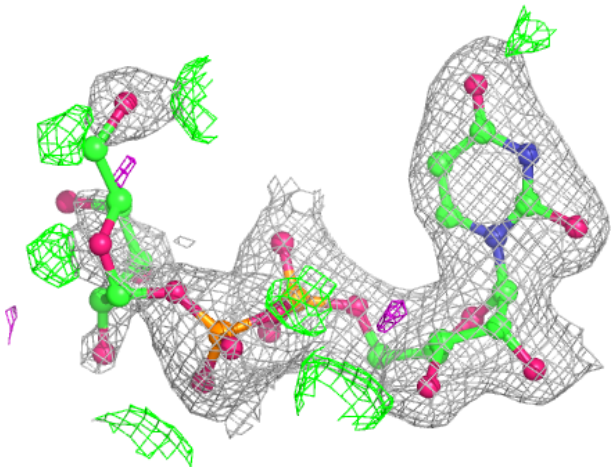


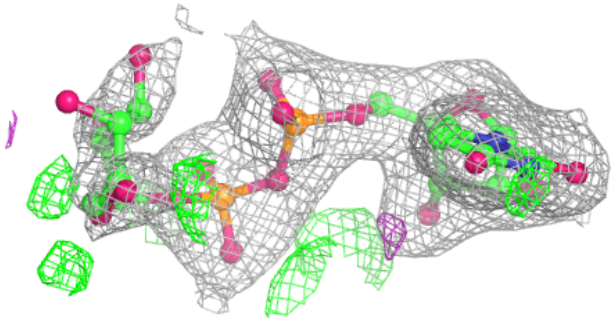


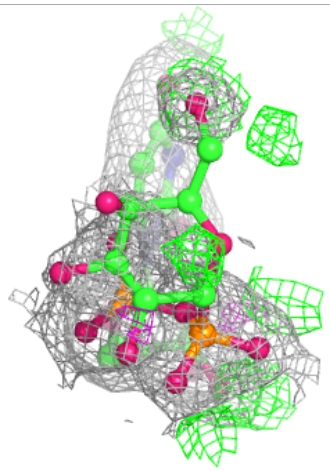


Electron density around GDU G 500:

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

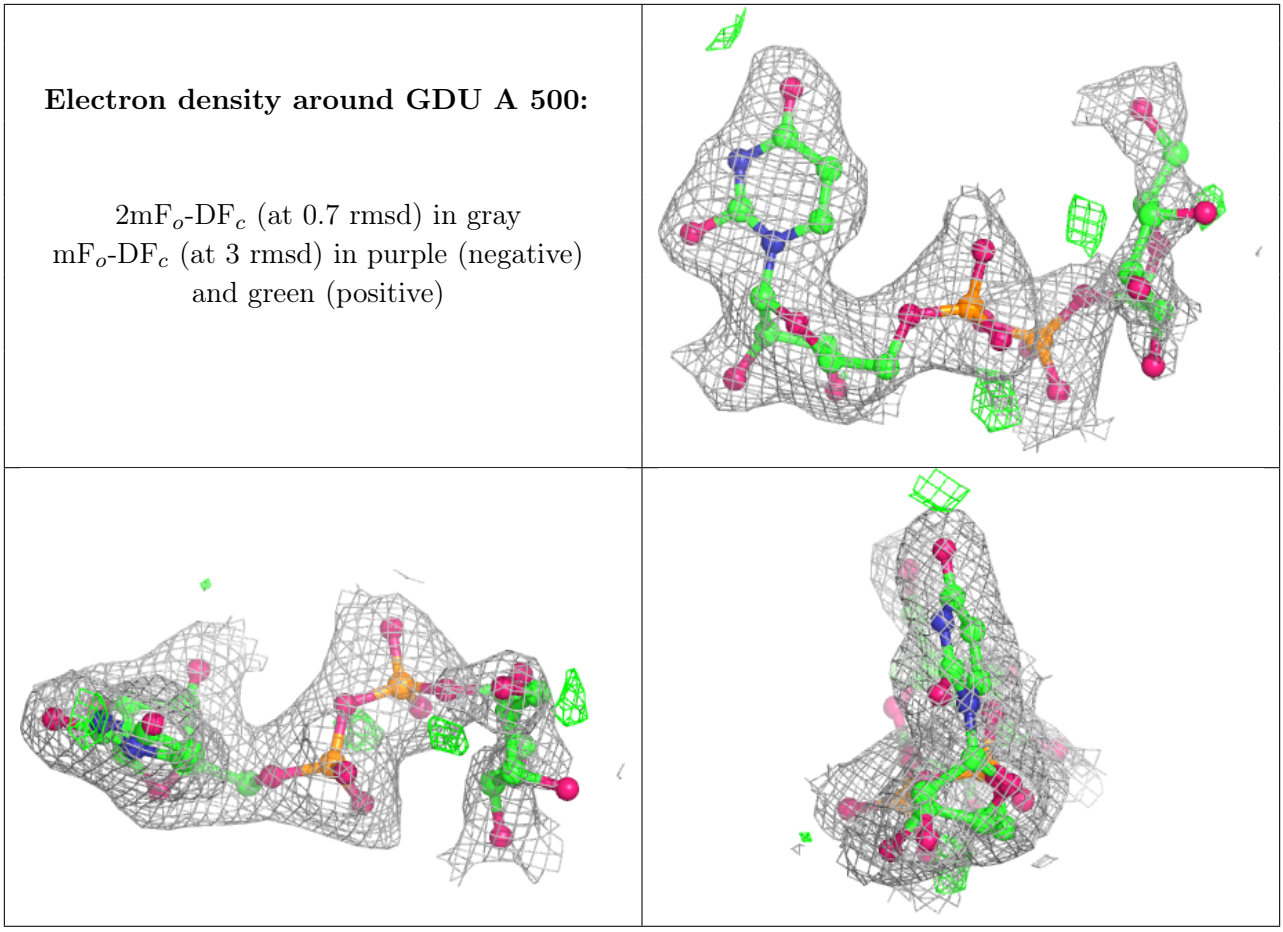






Electron density around GDU A 500:

$2mF_o$-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.