wwPDB X-ray Structure Validation Summary Report (i)

Nov 15, 2023 – 10:08 PM JST

PDB ID	:	6K0R
Title	:	Ruvbl1-Ruvbl2 with truncated domain II in complex with phosphorylated Cordycepin
Authors	:	Zhang, W.; Chen, L.; Li, W.; Ju, D.; Huang, N.; Zhang, E.
Deposited on	:	2019-05-07
Resolution	:	2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

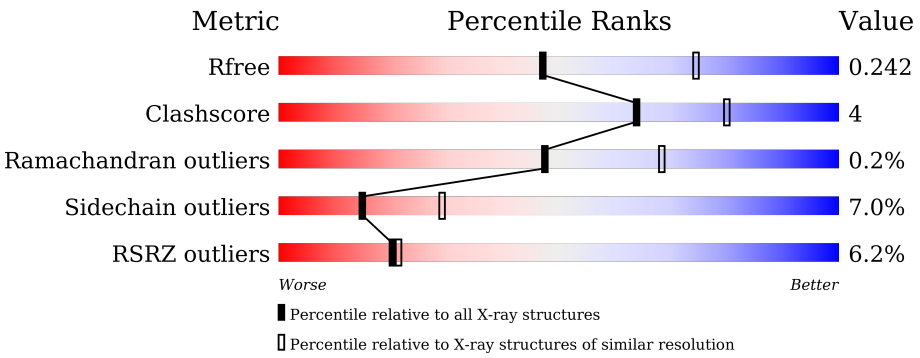
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	355	3%, 75%, 13%, • 11%
1	B	355	5%, 74%, 15%, • 10%
1	C	355	5%, 74%, 14%, 12%
1	G	355	6%, 80%, 7%, • 12%
1	H	355	8%, 79%, 10%, • 10%
1	I	355	6%, 75%, 12%, 12%

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Mol	Chain	Length	Quality of chain
2	D	366	4% 69% 13% • 17%
2	E	366	6% 68% 14% • 17%
2	F	366	2% 67% 16% • 16%
2	J	366	7% 72% 10% • 17%
2	K	366	4% 67% 15% • 18%
2	L	366	9% 70% 11% • 18%

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 27180 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 RuvB-like 1,RuvB-like 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	316	2286	1437	393	445	11	0	0	0
1	B	318	2292	1445	387	449	11	0	0	0
1	C	313	2320	1462	407	440	11	0	0	0
1	G	311	2211	1394	382	425	10	0	0	0
1	H	318	2338	1474	407	446	11	0	0	0
1	I	313	2273	1431	388	443	11	0	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP Q9Y265
A	0	PRO	-	expression tag	UNP Q9Y265
A	1	SER	-	expression tag	UNP Q9Y265
A	230	GLY	-	linker	UNP Q9Y265
A	231	PRO	-	linker	UNP Q9Y265
A	232	PRO	-	linker	UNP Q9Y265
A	233	GLY	-	linker	UNP Q9Y265
B	-1	GLY	-	expression tag	UNP Q9Y265
B	0	PRO	-	expression tag	UNP Q9Y265
B	1	SER	-	expression tag	UNP Q9Y265
B	230	GLY	-	linker	UNP Q9Y265
B	231	PRO	-	linker	UNP Q9Y265
B	232	PRO	-	linker	UNP Q9Y265
B	233	GLY	-	linker	UNP Q9Y265
C	-1	GLY	-	expression tag	UNP Q9Y265
C	0	PRO	-	expression tag	UNP Q9Y265
C	1	SER	-	expression tag	UNP Q9Y265

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Chain	Residue	Modelled	Actual	Comment	Reference
C	230	GLY	-	linker	UNP Q9Y265
C	231	PRO	-	linker	UNP Q9Y265
C	232	PRO	-	linker	UNP Q9Y265
C	233	GLY	-	linker	UNP Q9Y265
G	-1	GLY	-	expression tag	UNP Q9Y265
G	0	PRO	-	expression tag	UNP Q9Y265
G	1	SER	-	expression tag	UNP Q9Y265
G	230	GLY	-	linker	UNP Q9Y265
G	231	PRO	-	linker	UNP Q9Y265
G	232	PRO	-	linker	UNP Q9Y265
G	233	GLY	-	linker	UNP Q9Y265
H	-1	GLY	-	expression tag	UNP Q9Y265
H	0	PRO	-	expression tag	UNP Q9Y265
H	1	SER	-	expression tag	UNP Q9Y265
H	230	GLY	-	linker	UNP Q9Y265
H	231	PRO	-	linker	UNP Q9Y265
H	232	PRO	-	linker	UNP Q9Y265
H	233	GLY	-	linker	UNP Q9Y265
I	-1	GLY	-	expression tag	UNP Q9Y265
I	0	PRO	-	expression tag	UNP Q9Y265
I	1	SER	-	expression tag	UNP Q9Y265
I	230	GLY	-	linker	UNP Q9Y265
I	231	PRO	-	linker	UNP Q9Y265
I	232	PRO	-	linker	UNP Q9Y265
I	233	GLY	-	linker	UNP Q9Y265

- Molecule 2 is a protein called RuvB-like 2,RuvB-like 2.

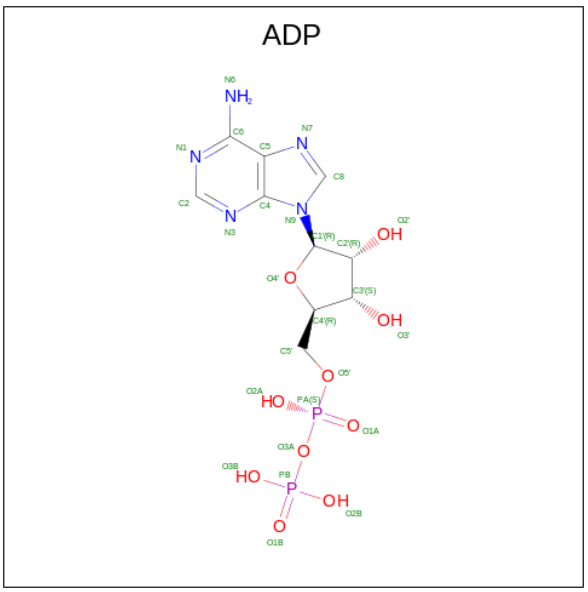
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	D	303	2197	1382	379	425	11	0	0	0
			Total	C	N	O	S			
2	E	304	2224	1395	388	430	11	0	0	0
			Total	C	N	O	S			
2	F	307	2278	1429	404	433	12	0	0	0
			Total	C	N	O	S			
2	J	302	2151	1347	382	410	12	0	0	0
			Total	C	N	O	S			
2	K	300	2161	1352	379	418	12	0	0	0
			Total	C	N	O	S			
2	L	300	2129	1338	372	409	10	0	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-2	GLY	-	expression tag	UNP Q9Y230
D	-1	GLY	-	expression tag	UNP Q9Y230
D	0	SER	-	expression tag	UNP Q9Y230
D	234	GLY	-	linker	UNP Q9Y230
D	235	PRO	-	linker	UNP Q9Y230
D	236	PRO	-	linker	UNP Q9Y230
D	237	GLY	-	linker	UNP Q9Y230
E	-2	GLY	-	expression tag	UNP Q9Y230
E	-1	GLY	-	expression tag	UNP Q9Y230
E	0	SER	-	expression tag	UNP Q9Y230
E	234	GLY	-	linker	UNP Q9Y230
E	235	PRO	-	linker	UNP Q9Y230
E	236	PRO	-	linker	UNP Q9Y230
E	237	GLY	-	linker	UNP Q9Y230
F	-2	GLY	-	expression tag	UNP Q9Y230
F	-1	GLY	-	expression tag	UNP Q9Y230
F	0	SER	-	expression tag	UNP Q9Y230
F	234	GLY	-	linker	UNP Q9Y230
F	235	PRO	-	linker	UNP Q9Y230
F	236	PRO	-	linker	UNP Q9Y230
F	237	GLY	-	linker	UNP Q9Y230
J	-2	GLY	-	expression tag	UNP Q9Y230
J	-1	GLY	-	expression tag	UNP Q9Y230
J	0	SER	-	expression tag	UNP Q9Y230
J	234	GLY	-	linker	UNP Q9Y230
J	235	PRO	-	linker	UNP Q9Y230
J	236	PRO	-	linker	UNP Q9Y230
J	237	GLY	-	linker	UNP Q9Y230
K	-2	GLY	-	expression tag	UNP Q9Y230
K	-1	GLY	-	expression tag	UNP Q9Y230
K	0	SER	-	expression tag	UNP Q9Y230
K	234	GLY	-	linker	UNP Q9Y230
K	235	PRO	-	linker	UNP Q9Y230
K	236	PRO	-	linker	UNP Q9Y230
K	237	GLY	-	linker	UNP Q9Y230
L	-2	GLY	-	expression tag	UNP Q9Y230
L	-1	GLY	-	expression tag	UNP Q9Y230
L	0	SER	-	expression tag	UNP Q9Y230
L	234	GLY	-	linker	UNP Q9Y230
L	235	PRO	-	linker	UNP Q9Y230
L	236	PRO	-	linker	UNP Q9Y230
L	237	GLY	-	linker	UNP Q9Y230

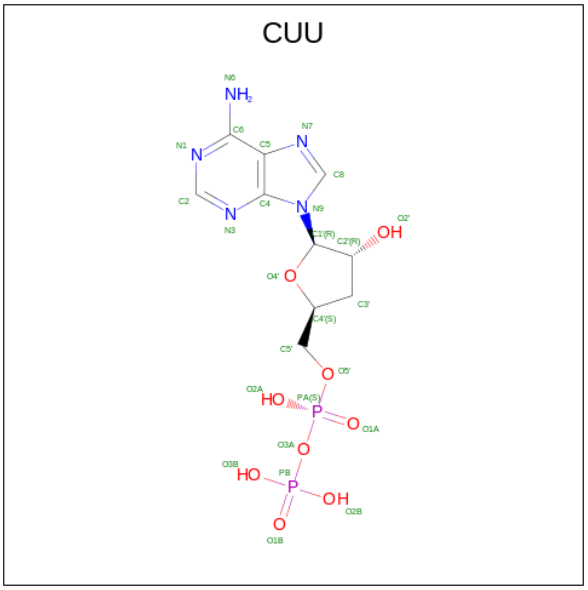
- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula:

$C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	27	10	5	10	2	0	0

- Molecule 4 is [(2 {S},4 {R},5 {R})-5-(6-aminopurin-9-yl)-4-oxidanyl-oxolan-2-yl]methyl phosphono hydrogen phosphate (three-letter code: CUU) (formula: $C_{10}H_{15}N_5O_9P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	B	1	26	10	5	9	2	0	0

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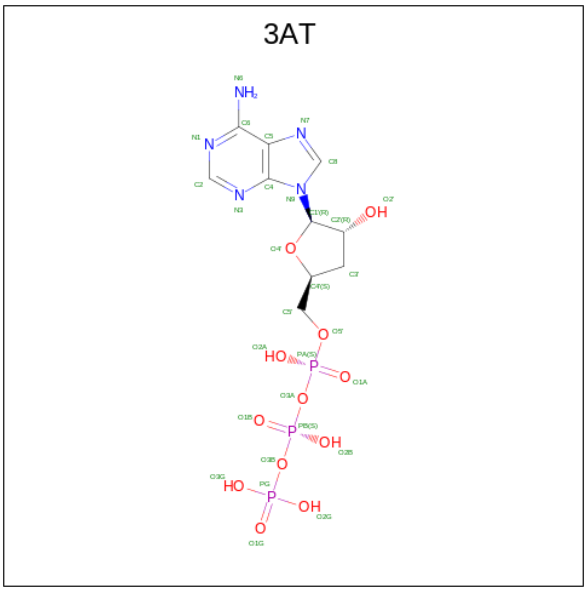
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	C	1	26	10	5	9	2	0	0
4	D	1	26	10	5	9	2	0	0
4	F	1	26	10	5	9	2	0	0
4	G	1	26	10	5	9	2	0	0
4	H	1	26	10	5	9	2	0	0
4	I	1	26	10	5	9	2	0	0
4	K	1	26	10	5	9	2	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

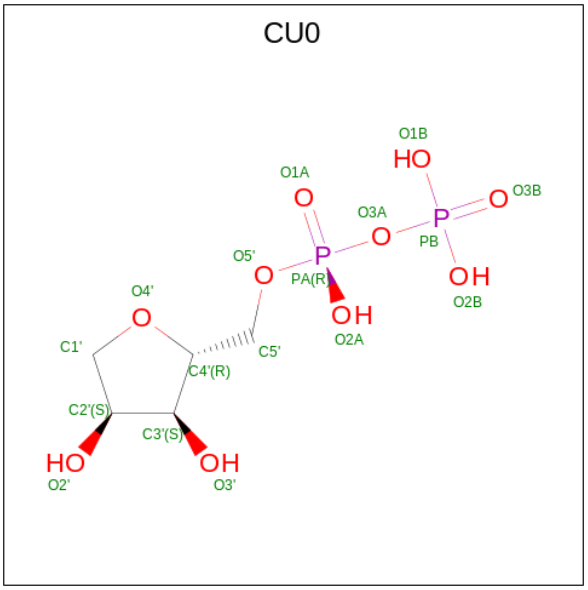
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
5	D	1	1	1	0	0
5	L	1	Total	Mg	0	0
			1	1		

- Molecule 6 is 3'-DEOXYADENOSINE-5'-TRIPHOSPHATE (three-letter code: 3AT) (formula: $C_{10}H_{16}N_5O_{12}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
6	E	1	30	10	5	12	3	0	0
			Total	C	N	O	P		
6	J	1	30	10	5	12	3	0	0

- Molecule 7 is [(2 {R},3 {S},4 {S})-3,4-bis(oxidanyl)oxolan-2-yl]methyl phosphono hydrogen phosphate (three-letter code: CU0) (formula: $C_5H_{12}O_{10}P_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
7	L	1	17	5	10	2	0	0

- Molecule 8 is water.

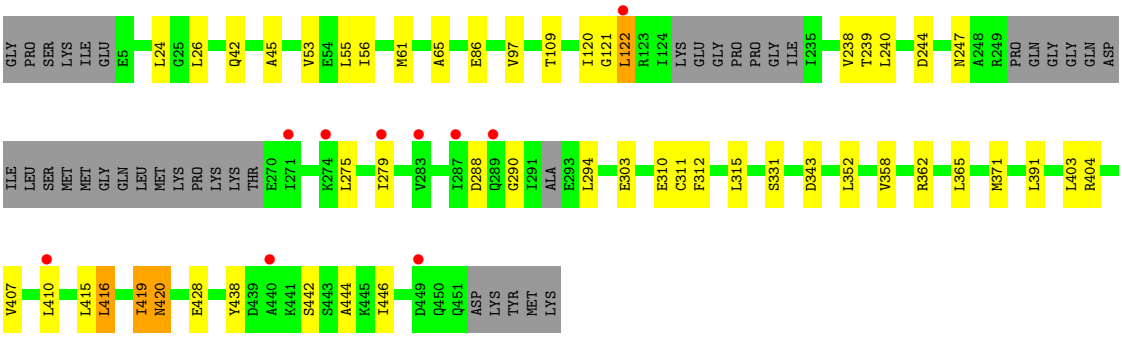
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
8	A	1	1	1	0	0
			Total	O		
8	E	2	2	2	0	0
			Total	O		
8	F	2	2	2	0	0
			Total	O		
8	J	1	1	1	0	0

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.

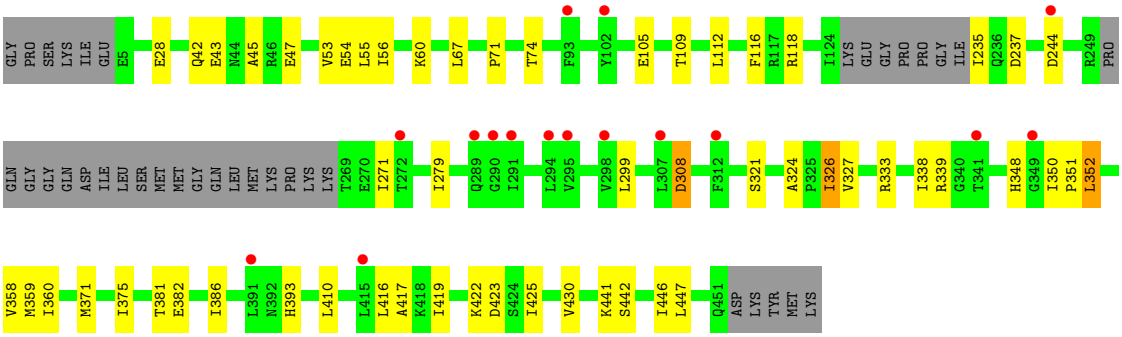
• Molecule 1: RuvB-like 1,RuvB-like 1

Chain A:



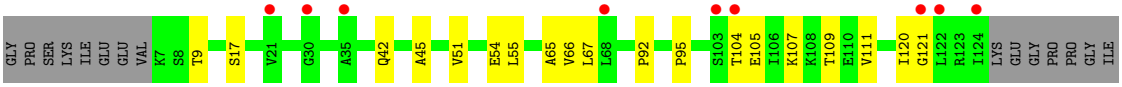
• Molecule 1: RuvB-like 1,RuvB-like 1

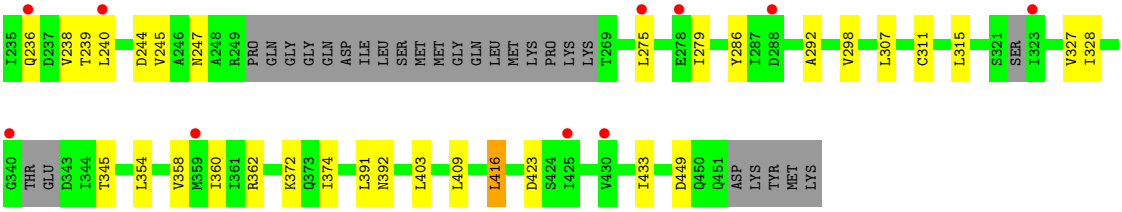
Chain B:



• Molecule 1: RuvB-like 1,RuvB-like 1

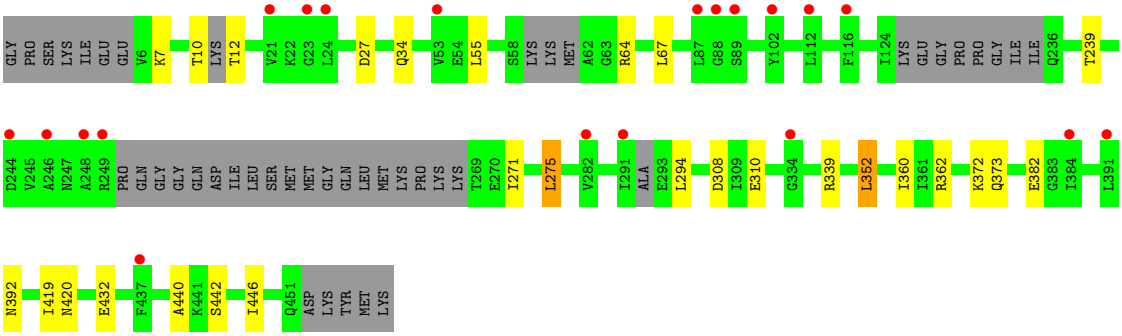
Chain C:





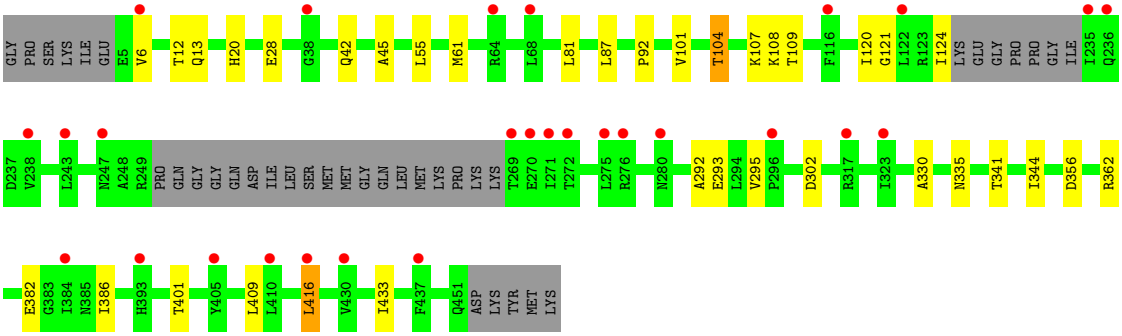
- Molecule 1: RuvB-like 1,RuvB-like 1

Chain G:



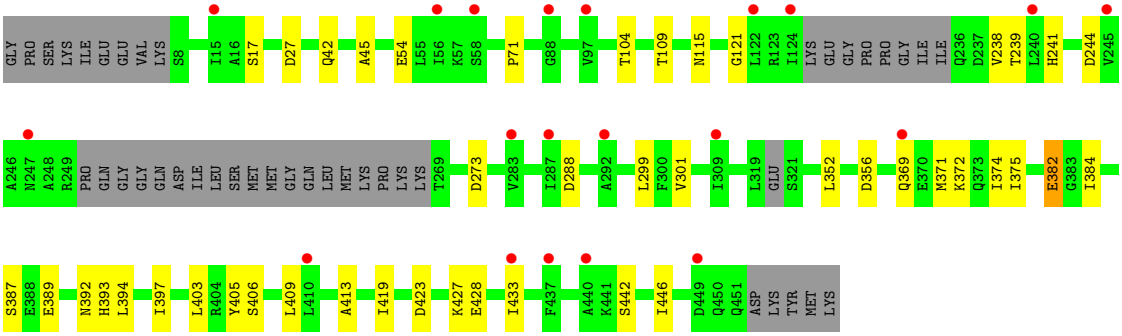
- Molecule 1: RuvB-like 1,RuvB-like 1

Chain H:



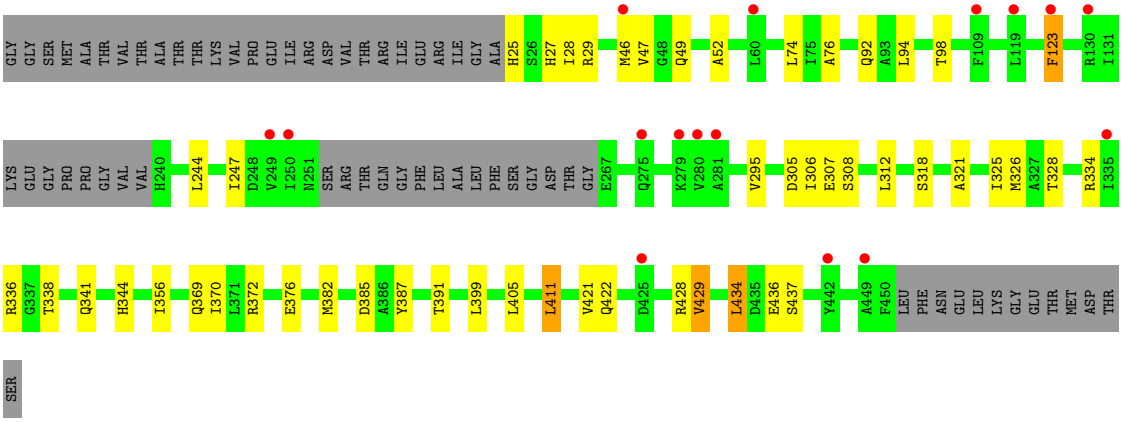
- Molecule 1: RuvB-like 1,RuvB-like 1

Chain I:



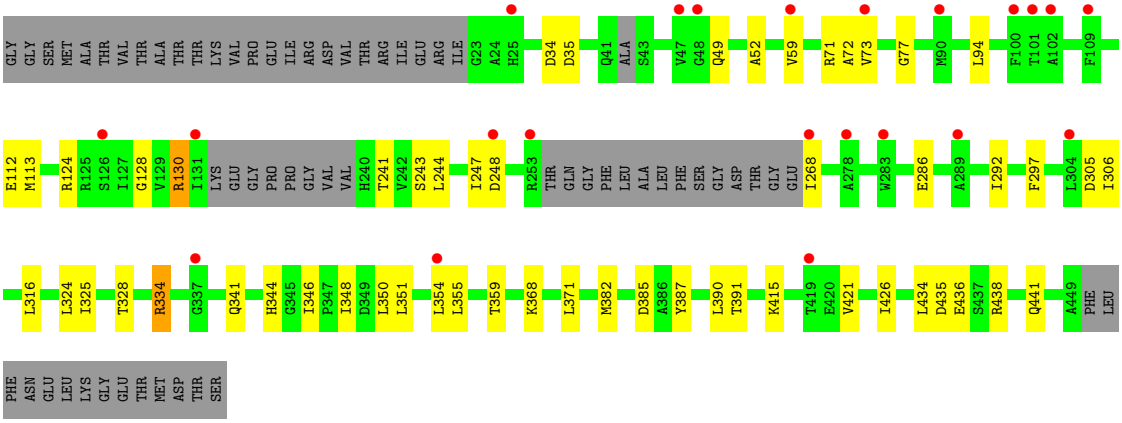
• Molecule 2: RuvB-like 2,RuvB-like 2

Chain D:



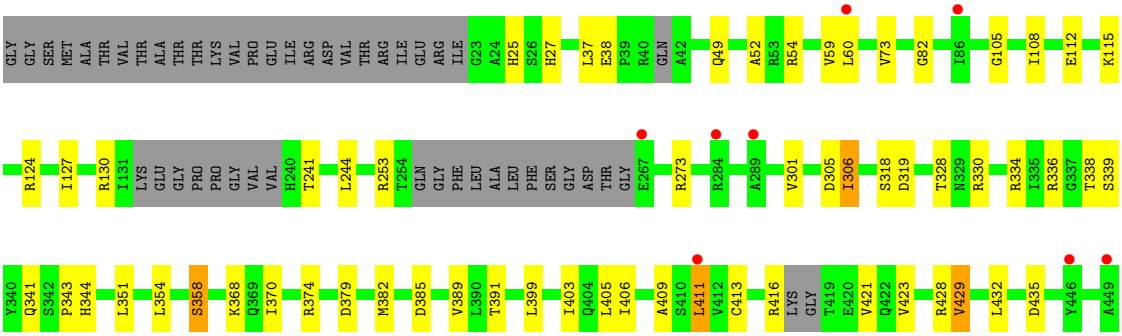
• Molecule 2: RuvB-like 2,RuvB-like 2

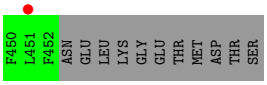
Chain E:



• Molecule 2: RuvB-like 2,RuvB-like 2

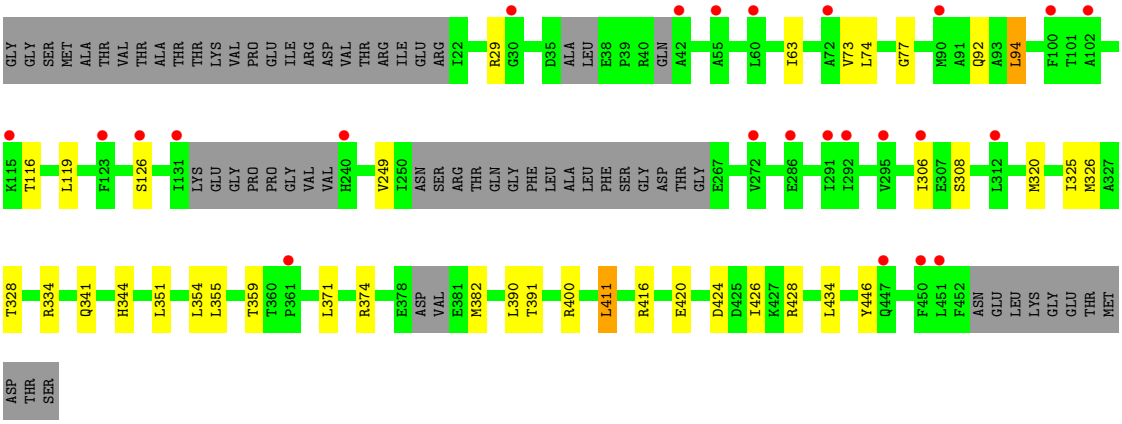
Chain F:





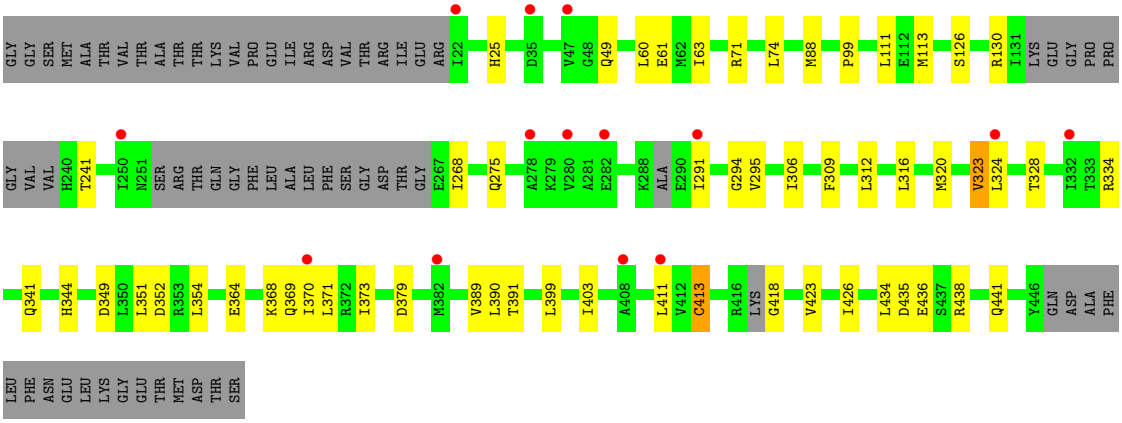
• Molecule 2: RuvB-like 2,RuvB-like 2

Chain J:



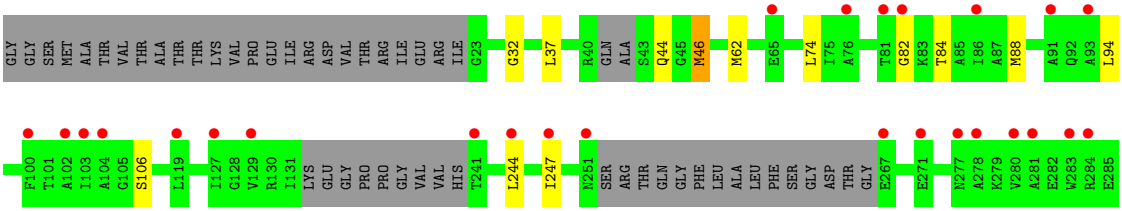
• Molecule 2: RuvB-like 2,RuvB-like 2

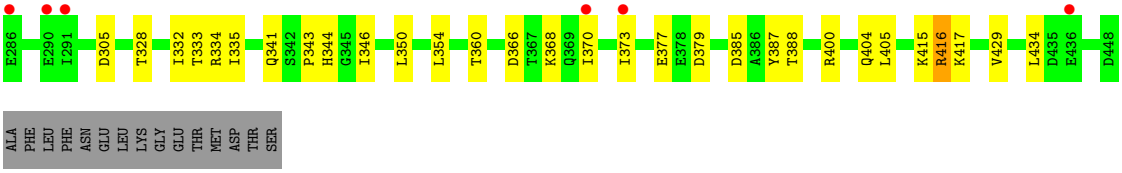
Chain K:



• Molecule 2: RuvB-like 2,RuvB-like 2

Chain L:




E286
E290
I291
D305
T328
I332
T333
R334
I335
Q341
S342
P343
H344
G345
I346
L350
L354
T360
D366
T367
K368
Q369
I370
I373
E377
E378
D379
D385
A386
Y387
T388
R400
Q404
L405
K415
R416
K417
V429
L434
D435
E436
D448
ALA
PHE
LEU
PHE
ASN
GLU
LEU
LYS
GLY
GLU
THR
MET
ASP
THR
SER

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	110.30Å 186.42Å 235.18Å 90.00° 91.04° 90.00°	Depositor
Resolution (Å)	49.72 – 2.50 49.72 – 2.50	Depositor EDS
% Data completeness (in resolution range)	55.7 (49.72-2.50) 55.7 (49.72-2.50)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.67 (at 2.51Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.228 , 0.269 0.241 , 0.242	Depositor DCC
R_{free} test set	4736 reflections (5.21%)	wwPDB-VP
Wilson B-factor (Å^2)	61.1	Xtriage
Anisotropy	0.277	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 48.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.43$, $< L^2 > = 0.26$	Xtriage
Estimated twinning fraction	0.044 for -1/2*h+1/2*k,3/2*h+1/2*k,-l 0.044 for -1/2*h-1/2*k,-3/2*h+1/2*k,-l 0.044 for 1/2*h+1/2*k,3/2*h-1/2*k,-l 0.038 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.219 for -h,-k,l	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	27180	wwPDB-VP
Average B, all atoms (Å^2)	70.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.78% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: CU0, ADP, CUU, MG, 3AT

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	0.41	0/2312	0.62	0/3143
1	B	0.42	0/2318	0.61	0/3151
1	C	0.41	0/2345	0.60	0/3172
1	G	0.42	0/2234	0.62	0/3039
1	H	0.42	0/2365	0.63	0/3208
1	I	0.41	0/2298	0.60	0/3119
2	D	0.41	0/2224	0.61	0/3023
2	E	0.41	0/2249	0.63	0/3050
2	F	0.41	0/2304	0.60	0/3118
2	J	0.42	0/2174	0.62	0/2947
2	K	0.41	0/2182	0.64	0/2959
2	L	0.41	0/2154	0.61	0/2927
All	All	0.41	0/27159	0.62	0/36856

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2286	0	2226	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	2292	0	2245	22	0
1	C	2320	0	2342	24	0
1	G	2211	0	2137	9	0
1	H	2338	0	2339	14	0
1	I	2273	0	2244	19	0
2	D	2197	0	2111	25	0
2	E	2224	0	2159	24	0
2	F	2278	0	2233	31	0
2	J	2151	0	2045	17	0
2	K	2161	0	2095	23	0
2	L	2129	0	2013	19	0
3	A	27	0	12	0	0
4	B	26	0	0	0	0
4	C	26	0	0	0	0
4	D	26	0	0	0	0
4	F	26	0	0	3	0
4	G	26	0	0	0	0
4	H	26	0	0	0	0
4	I	26	0	0	0	0
4	K	26	0	0	1	0
5	D	1	0	0	0	0
5	L	1	0	0	0	0
6	E	30	0	12	0	0
6	J	30	0	12	0	0
7	L	17	0	0	2	0
8	A	1	0	0	0	0
8	E	2	0	0	0	0
8	F	2	0	0	0	0
8	J	1	0	0	0	0
All	All	27180	0	26225	225	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

The worst 5 of 225 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)
2:D:382:MET:HB3	2:D:421:VAL:HB	1.59	0.85
2:D:94:LEU:HD23	2:D:98:THR:HG21	1.61	0.83
1:G:362:ARG:HB2	2:K:434:LEU:HD11	1.65	0.79
1:C:9:THR:HG21	1:C:245:VAL:HG21	1.68	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:84:THR:HB	7:L:501:CU0:O1A	1.88	0.73

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	308/355 (87%)	288 (94%)	19 (6%)	1 (0%)	41	61
1	B	312/355 (88%)	301 (96%)	10 (3%)	1 (0%)	41	61
1	C	303/355 (85%)	289 (95%)	13 (4%)	1 (0%)	41	61
1	G	299/355 (84%)	283 (95%)	14 (5%)	2 (1%)	22	39
1	H	312/355 (88%)	291 (93%)	20 (6%)	1 (0%)	41	61
1	I	305/355 (86%)	295 (97%)	10 (3%)	0	100	100
2	D	297/366 (81%)	288 (97%)	9 (3%)	0	100	100
2	E	296/366 (81%)	286 (97%)	10 (3%)	0	100	100
2	F	297/366 (81%)	293 (99%)	4 (1%)	0	100	100
2	J	290/366 (79%)	278 (96%)	10 (3%)	2 (1%)	22	39
2	K	290/366 (79%)	279 (96%)	11 (4%)	0	100	100
2	L	292/366 (80%)	280 (96%)	11 (4%)	1 (0%)	41	61
All	All	3601/4326 (83%)	3451 (96%)	141 (4%)	9 (0%)	47	68

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	H	401	THR
2	J	416	ARG
1	B	352	LEU
1	G	352	LEU

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Mol	Chain	Res	Type
2	L	37	LEU

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	233/299 (78%)	214 (92%)	19 (8%)	11	22
1	B	234/299 (78%)	211 (90%)	23 (10%)	8	15
1	C	243/299 (81%)	232 (96%)	11 (4%)	27	51
1	G	219/299 (73%)	206 (94%)	13 (6%)	19	37
1	H	243/299 (81%)	229 (94%)	14 (6%)	20	38
1	I	235/299 (79%)	221 (94%)	14 (6%)	19	37
2	D	215/304 (71%)	201 (94%)	14 (6%)	17	33
2	E	221/304 (73%)	206 (93%)	15 (7%)	16	30
2	F	228/304 (75%)	207 (91%)	21 (9%)	9	18
2	J	203/304 (67%)	193 (95%)	10 (5%)	25	47
2	K	214/304 (70%)	196 (92%)	18 (8%)	11	21
2	L	200/304 (66%)	183 (92%)	17 (8%)	10	21
All	All	2688/3618 (74%)	2499 (93%)	189 (7%)	15	29

5 of 189 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	432	GLU
1	I	428	GLU
1	H	28	GLU
1	I	17	SER
2	J	411	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 33 such sidechains are listed below:

Mol	Chain	Res	Type
2	J	277	ASN
2	J	302	HIS
2	L	329	ASN
1	G	18	HIS
2	F	25	HIS

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)

Of 14 ligands modelled in this entry, 2 are monoatomic - leaving 12 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	ADP	A	501	-	24,29,29	0.99	2 (8%)	29,45,45	0.90	1 (3%)
4	CUU	K	501	-	23,28,28	2.09	8 (34%)	26,43,43	2.00	9 (34%)
4	CUU	H	501	-	23,28,28	2.21	7 (30%)	26,43,43	2.08	9 (34%)
4	CUU	B	501	-	23,28,28	2.13	7 (30%)	26,43,43	2.02	9 (34%)
7	CU0	L	501	5	15,17,17	0.57	0	21,26,26	0.67	1 (4%)
4	CUU	C	501	-	23,28,28	2.08	7 (30%)	26,43,43	1.96	9 (34%)
4	CUU	G	501	-	23,28,28	2.17	7 (30%)	26,43,43	2.08	9 (34%)
4	CUU	D	501	5	23,28,28	2.10	7 (30%)	26,43,43	1.83	7 (26%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
6	3AT	J	501	-	25,32,32	2.14	9 (36%)	28,50,50	1.98	11 (39%)
6	3AT	E	501	-	25,32,32	2.22	10 (40%)	28,50,50	1.96	10 (35%)
4	CUU	I	501	-	23,28,28	2.14	7 (30%)	26,43,43	2.14	9 (34%)
4	CUU	F	501	-	23,28,28	2.09	8 (34%)	26,43,43	2.13	10 (38%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ADP	A	501	-	-	3/12/32/32	0/3/3/3
4	CUU	K	501	-	-	7/12/28/28	0/3/3/3
4	CUU	H	501	-	-	5/12/28/28	0/3/3/3
4	CUU	B	501	-	-	4/12/28/28	0/3/3/3
7	CU0	L	501	5	-	9/12/25/25	0/1/1/1
4	CUU	C	501	-	-	4/12/28/28	0/3/3/3
4	CUU	G	501	-	-	5/12/28/28	0/3/3/3
4	CUU	D	501	5	-	7/12/28/28	0/3/3/3
6	3AT	J	501	-	-	9/18/34/34	0/3/3/3
6	3AT	E	501	-	-	7/18/34/34	0/3/3/3
4	CUU	I	501	-	-	8/12/28/28	0/3/3/3
4	CUU	F	501	-	-	6/12/28/28	0/3/3/3

The worst 5 of 79 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	501	CUU	C2'-C1'	-6.16	1.48	1.54
4	H	501	CUU	C2'-C1'	-6.14	1.48	1.54
4	I	501	CUU	C2'-C1'	-6.06	1.48	1.54
6	E	501	3AT	C2'-C1'	-5.89	1.48	1.54
4	B	501	CUU	C2'-C1'	-5.77	1.48	1.54

The worst 5 of 94 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	I	501	CUU	C4'-O4'-C1'	-4.97	102.92	109.75
4	H	501	CUU	N3-C2-N1	-4.50	121.64	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	J	501	3AT	N3-C2-N1	-4.47	121.68	128.68
4	I	501	CUU	N3-C2-N1	-4.44	121.74	128.68
4	C	501	CUU	N3-C2-N1	-4.43	121.75	128.68

There are no chirality outliers.

5 of 74 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	501	ADP	C5'-O5'-PA-O1A
3	A	501	ADP	C5'-O5'-PA-O2A
4	B	501	CUU	C5'-O5'-PA-O2A
4	B	501	CUU	C5'-O5'-PA-O1A
4	C	501	CUU	C5'-O5'-PA-O2A

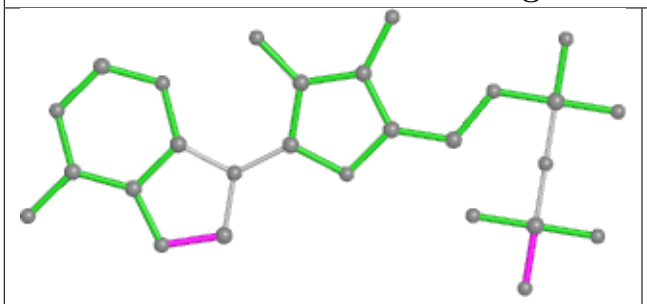
There are no ring outliers.

3 monomers are involved in 6 short contacts:

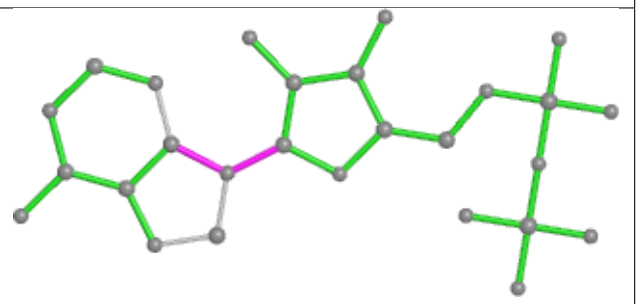
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	K	501	CUU	1	0
7	L	501	CU0	2	0
4	F	501	CUU	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

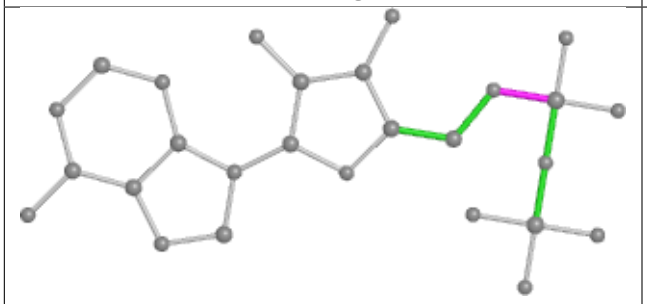
Ligand ADP A 501



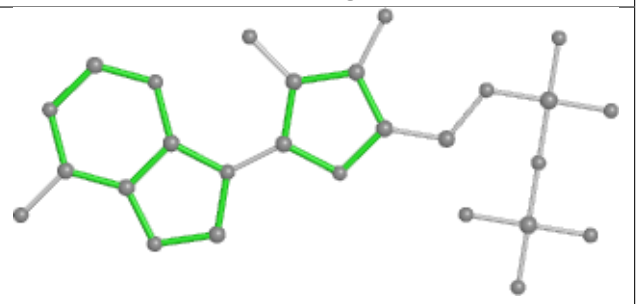
Bond lengths



Bond angles

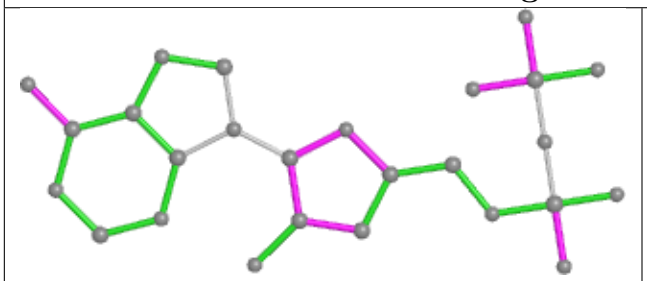


Torsions



Rings

Ligand CUU K 501



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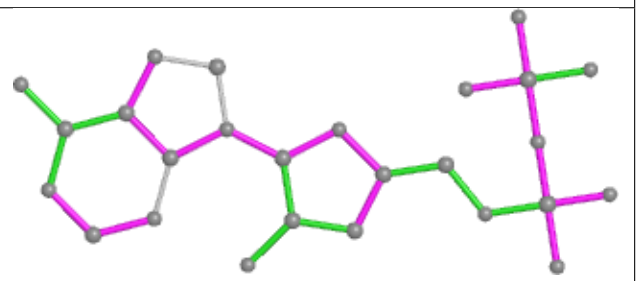

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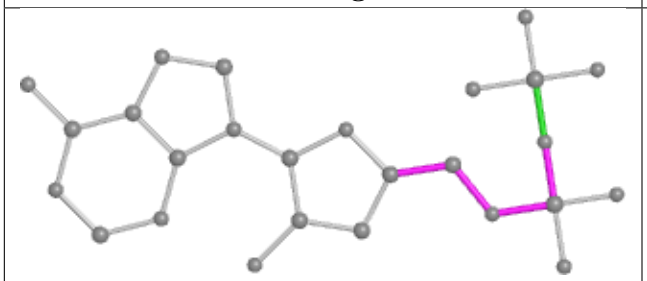

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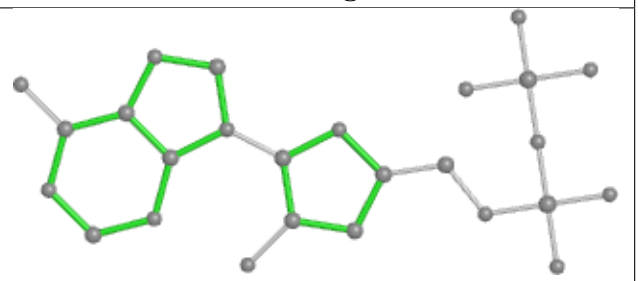
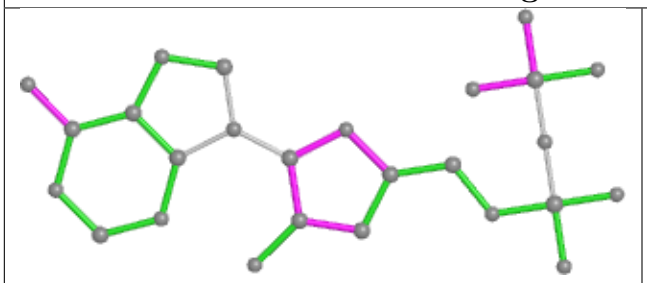
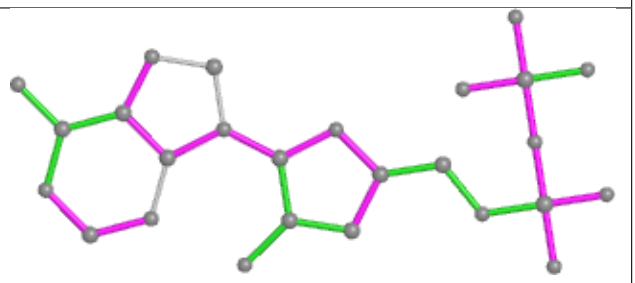


Rings

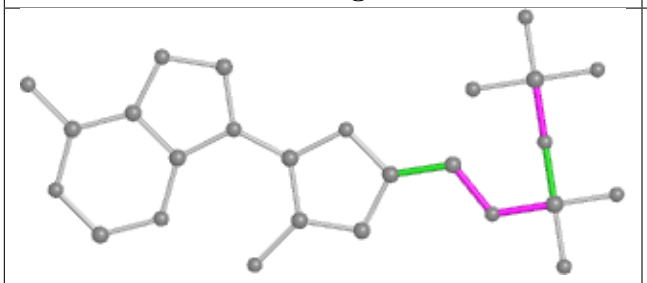
Ligand CUU H 501



Bond lengths



Bond angles



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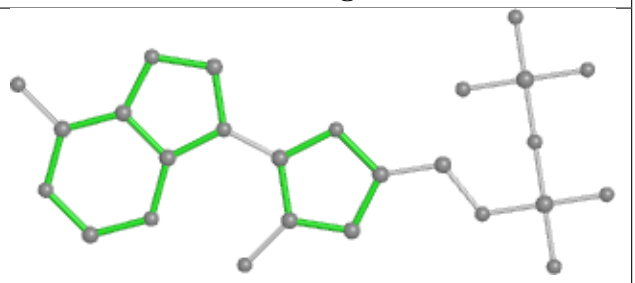
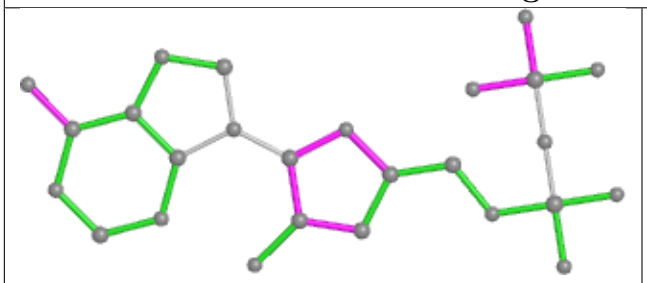
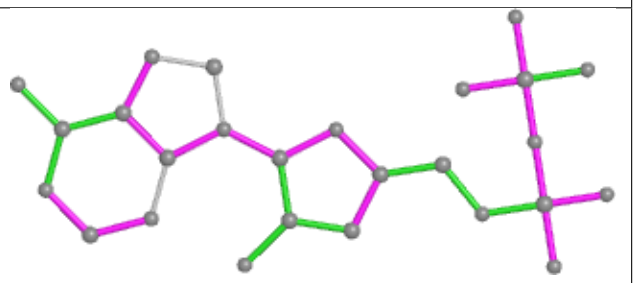


Rings

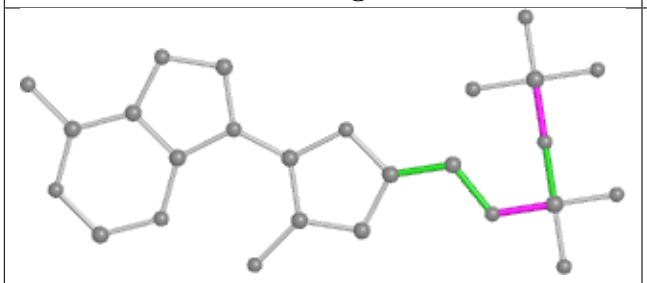
Ligand CUU B 501



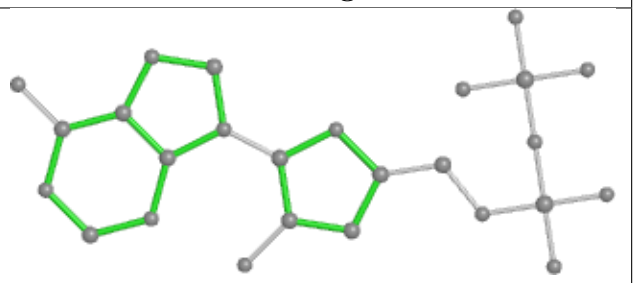
Bond lengths



Bond angles

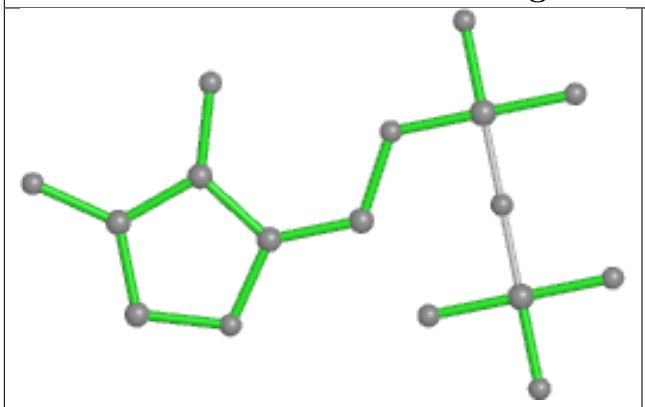


Torsions

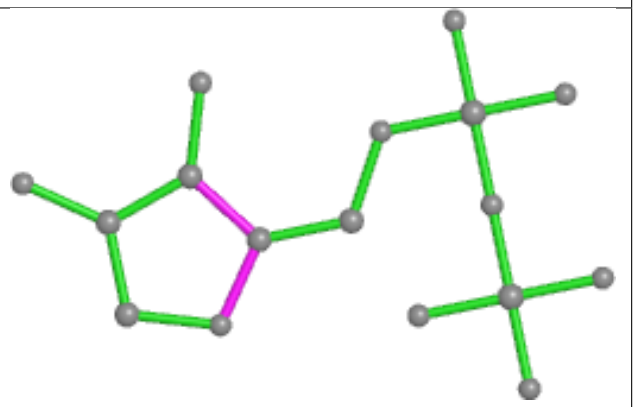


Rings

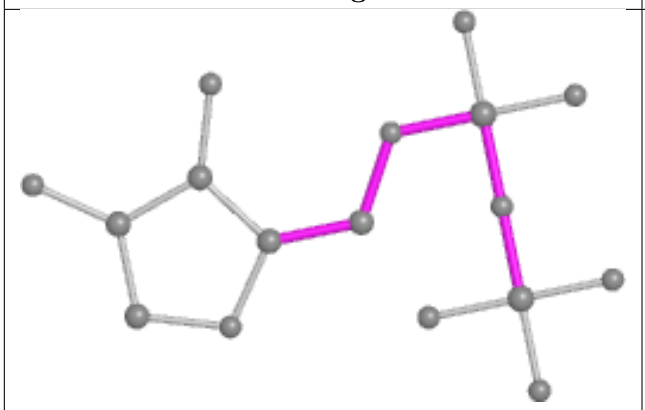
Ligand CU0 L 501



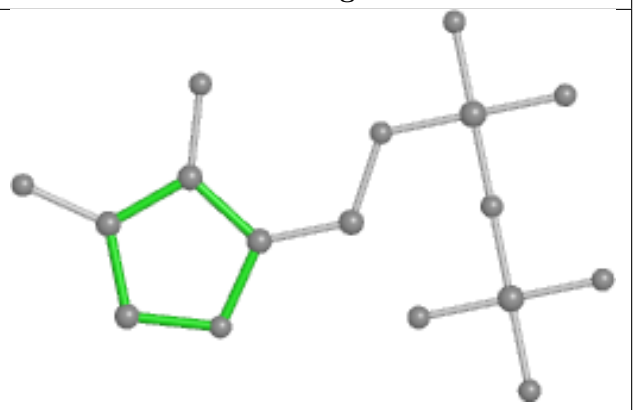
Bond lengths



Bond angles

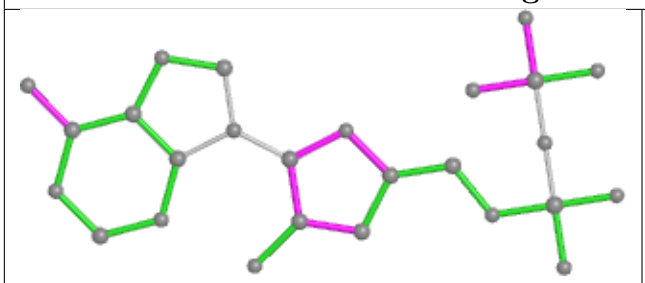


Torsions

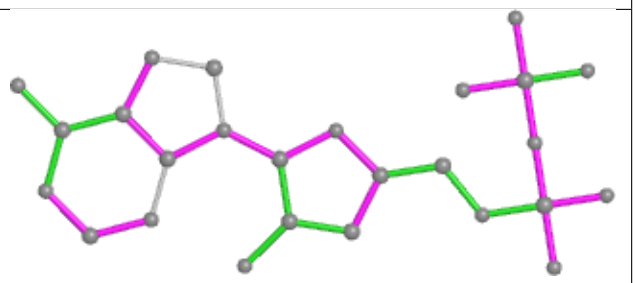


Rings

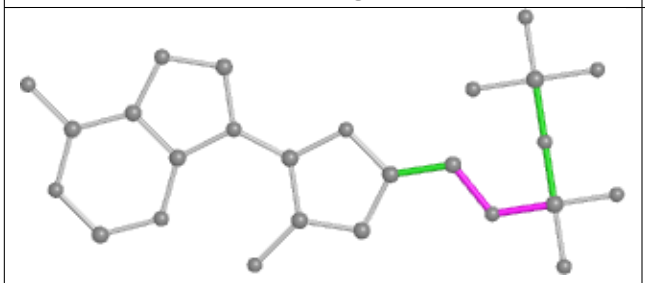
Ligand CUU C 501



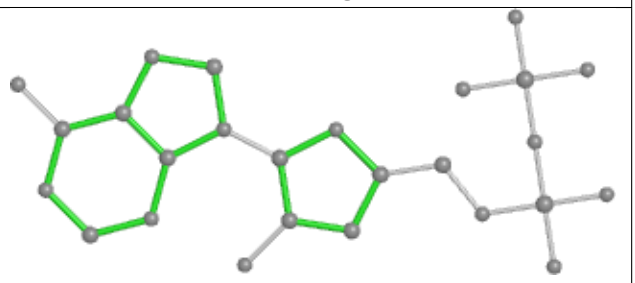
Bond lengths



Bond angles

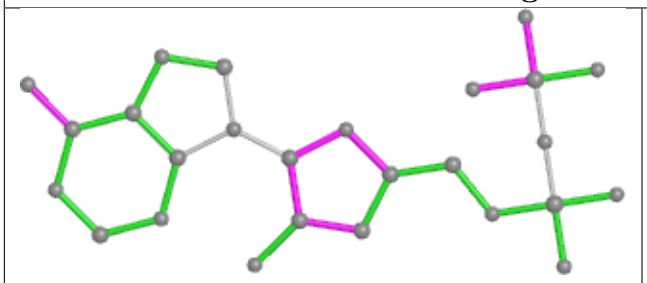


Torsions

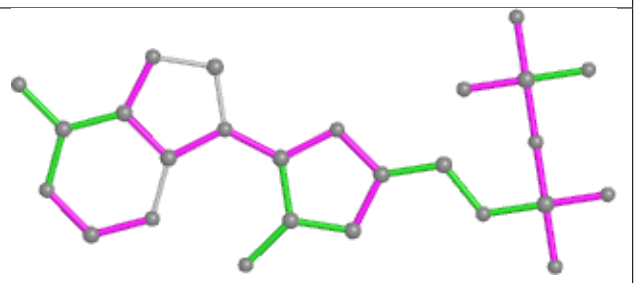


Rings

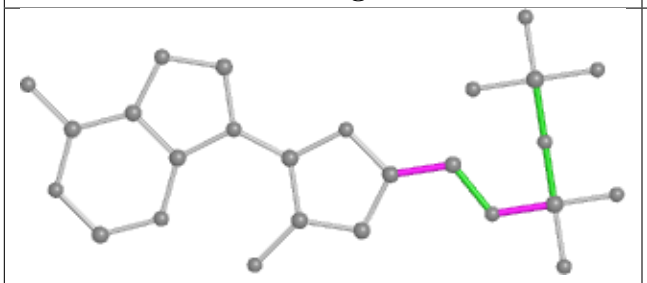
Ligand CUU G 501



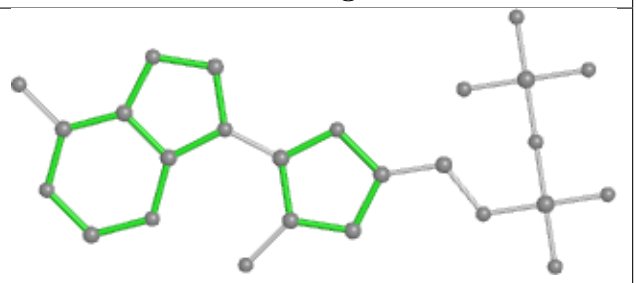
Bond lengths



Bond angles

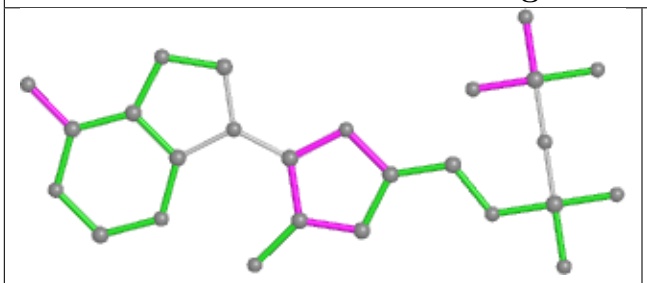


Torsions

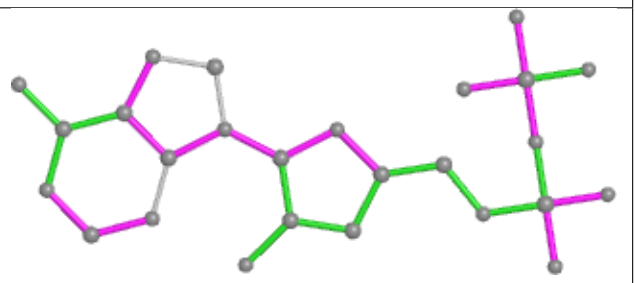


Rings

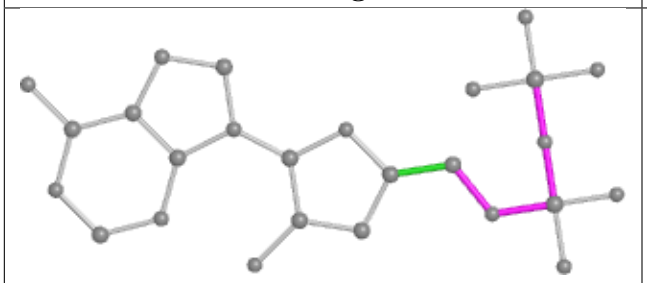
Ligand CUU D 501



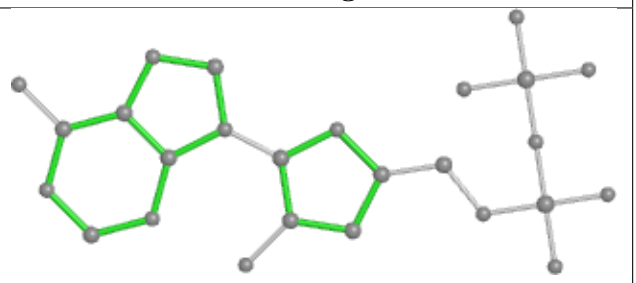
Bond lengths



Bond angles

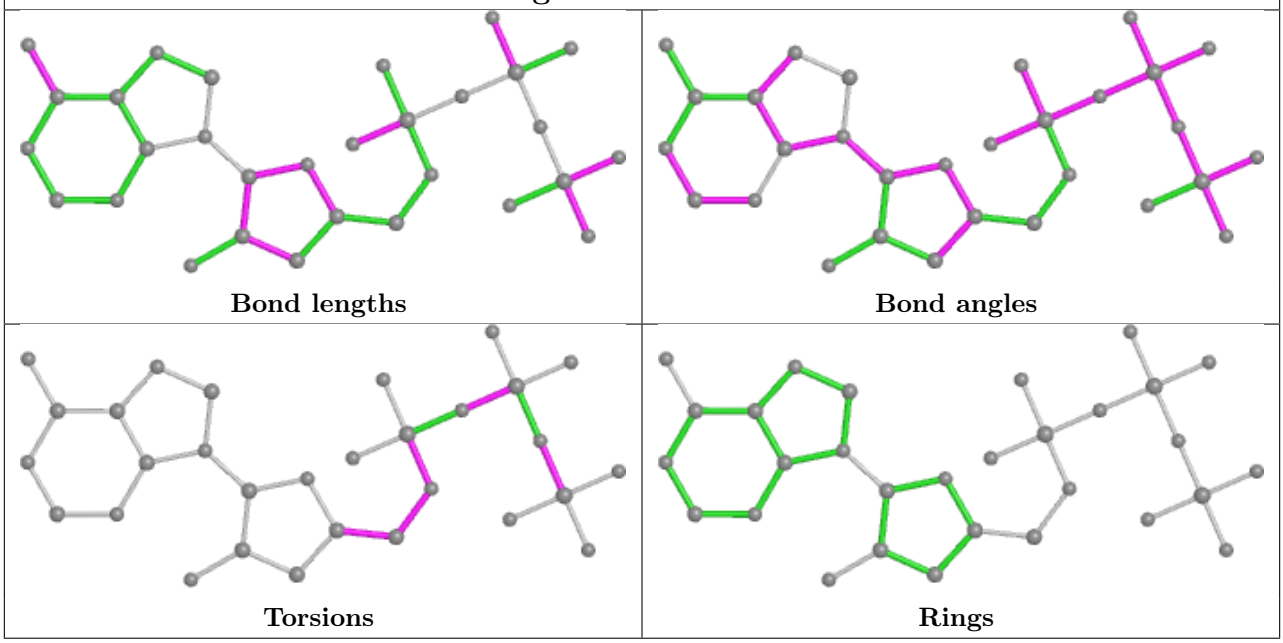


Torsions

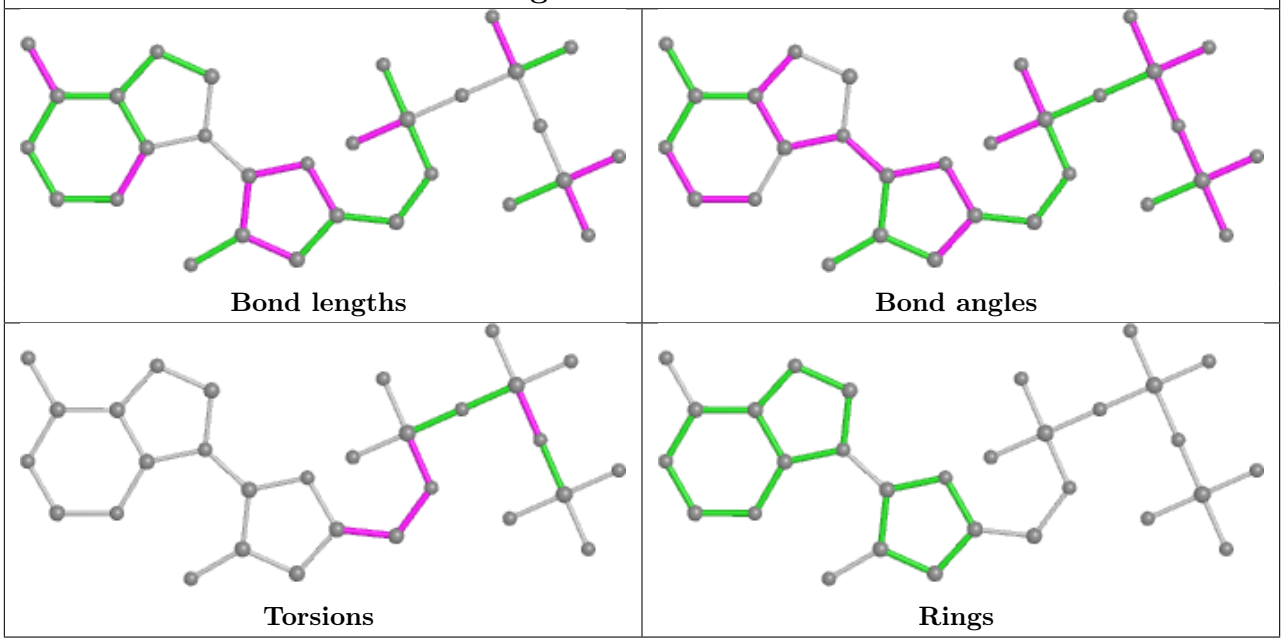


Rings

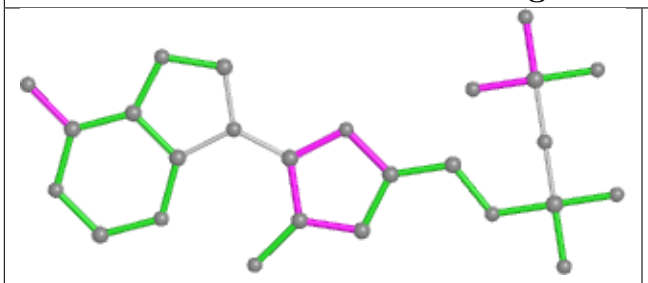
Ligand 3AT J 501



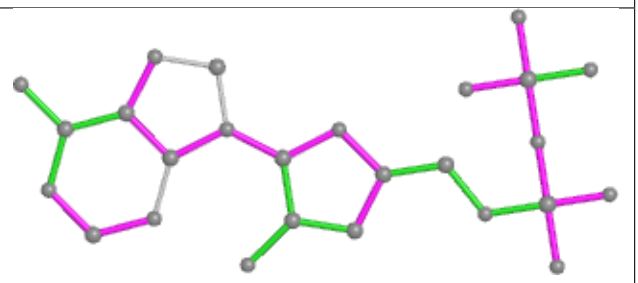
Ligand 3AT E 501



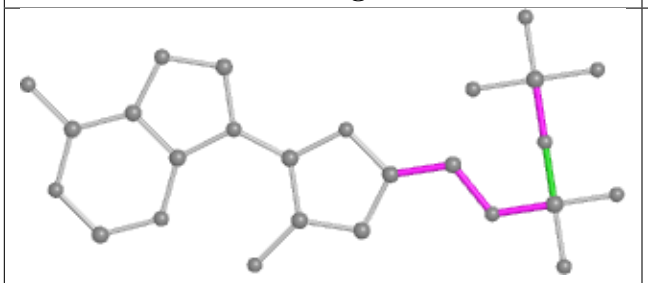
Ligand CUU I 501



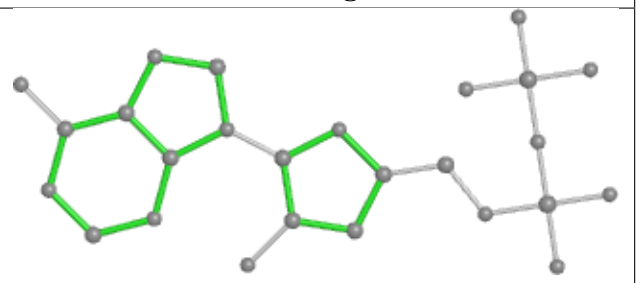
Bond lengths



Bond angles

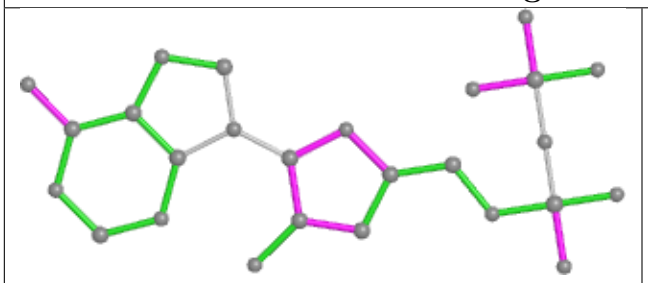


Torsions

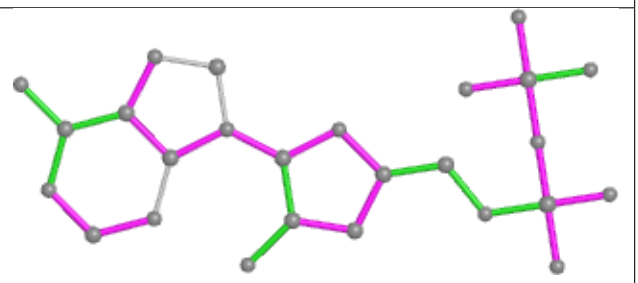


Rings

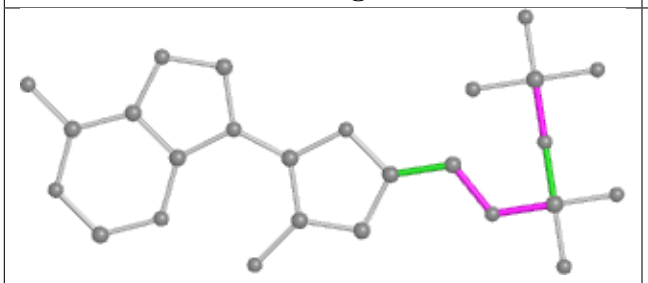
Ligand CUU F 501



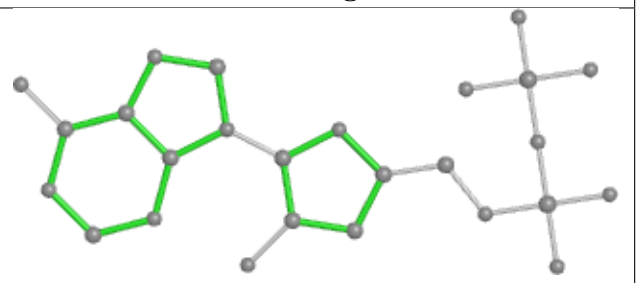
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	316/355 (89%)	0.28	10 (3%)	47	51	34, 59, 100, 119	0
1	B	318/355 (89%)	0.37	16 (5%)	28	30	45, 68, 107, 116	0
1	C	313/355 (88%)	0.52	19 (6%)	21	22	44, 66, 98, 111	0
1	G	311/355 (87%)	0.48	20 (6%)	19	20	45, 70, 109, 139	0
1	H	318/355 (89%)	0.49	28 (8%)	10	10	47, 72, 97, 123	0
1	I	313/355 (88%)	0.42	20 (6%)	19	20	40, 64, 100, 124	0
2	D	303/366 (82%)	0.45	16 (5%)	26	28	49, 70, 103, 128	0
2	E	304/366 (83%)	0.44	22 (7%)	15	16	42, 66, 108, 121	0
2	F	307/366 (83%)	0.37	9 (2%)	51	55	37, 62, 100, 120	0
2	J	302/366 (82%)	0.55	24 (7%)	12	12	46, 71, 120, 146	0
2	K	300/366 (81%)	0.37	14 (4%)	31	33	44, 67, 106, 120	0
2	L	300/366 (81%)	0.59	32 (10%)	6	5	49, 72, 117, 141	0
All	All	3705/4326 (85%)	0.44	230 (6%)	20	21	34, 67, 107, 146	0

The worst 5 of 230 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	278	ALA	6.6
2	E	289	ALA	6.3
2	K	291	ILE	6.1
1	I	292	ALA	5.7
2	D	281	ALA	5.6

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)

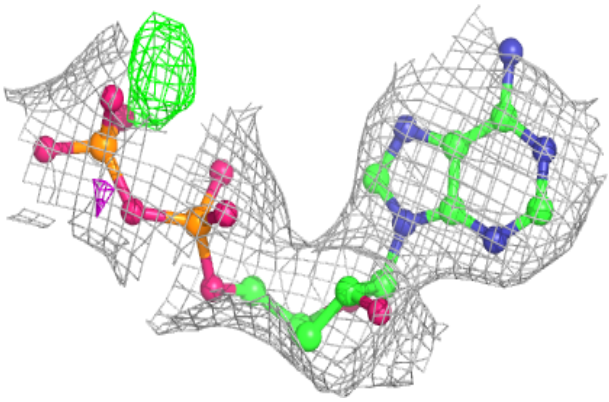
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

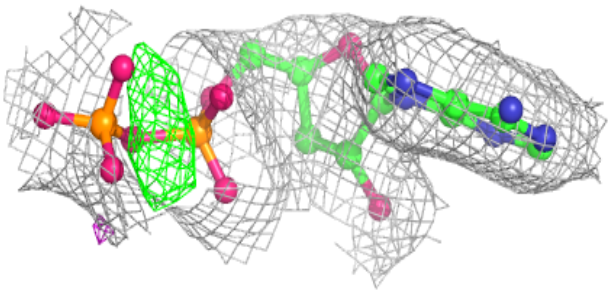
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	CUU	K	501	26/26	0.88	0.17	75,77,78,79	0
4	CUU	B	501	26/26	0.91	0.16	56,57,67,68	0
4	CUU	H	501	26/26	0.92	0.19	68,72,74,75	0
6	3AT	E	501	30/30	0.92	0.18	64,66,68,68	0
6	3AT	J	501	30/30	0.92	0.18	79,83,95,95	0
7	CU0	L	501	17/17	0.92	0.12	58,65,67,67	0
4	CUU	C	501	26/26	0.94	0.17	51,62,63,64	0
4	CUU	D	501	26/26	0.94	0.15	76,77,78,78	0
5	MG	L	502	1/1	0.94	0.12	56,56,56,56	0
4	CUU	F	501	26/26	0.95	0.13	61,63,65,65	0
4	CUU	G	501	26/26	0.95	0.16	54,59,76,76	0
4	CUU	I	501	26/26	0.96	0.16	44,47,50,51	0
3	ADP	A	501	27/27	0.97	0.14	38,48,51,52	0
5	MG	D	502	1/1	0.97	0.15	55,55,55,55	0

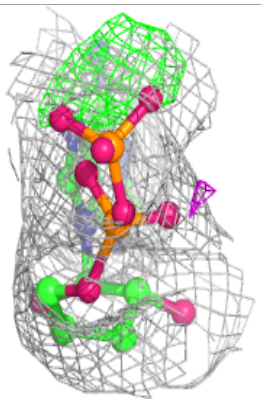
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around CUU K 501:

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

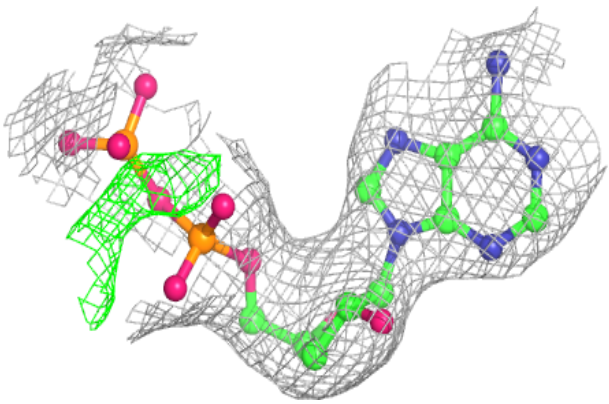


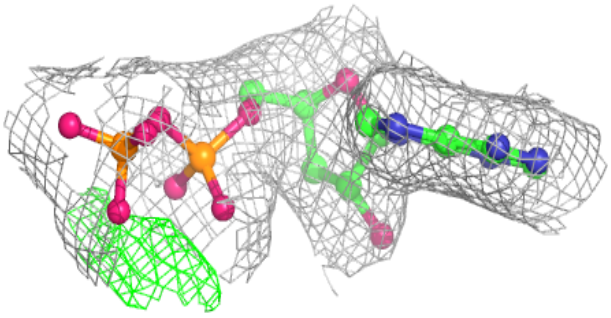


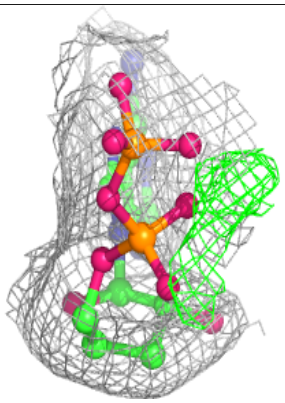


Electron density around CUU B 501:

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

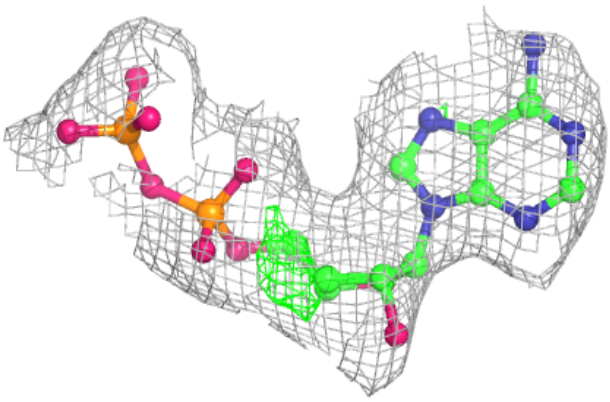


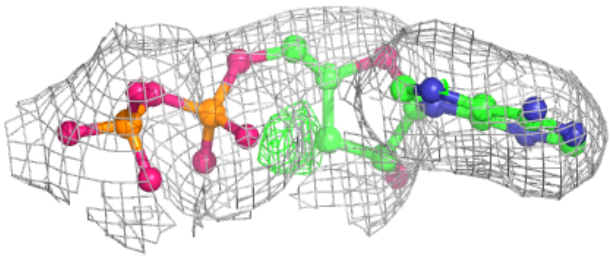


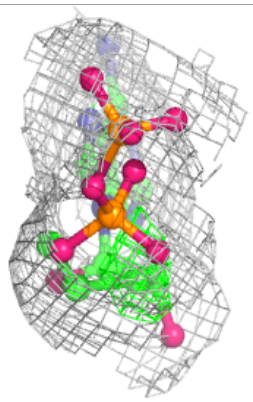


Electron density around CUU H 501:

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

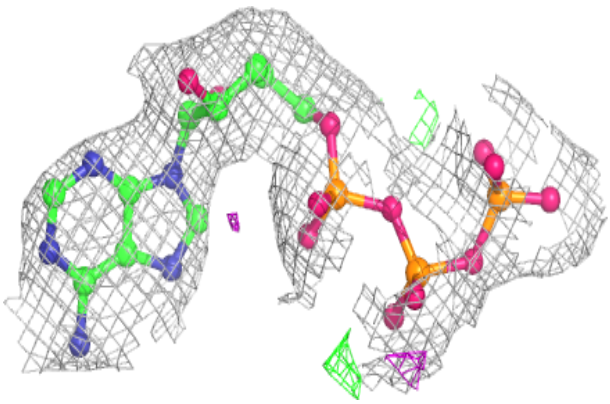


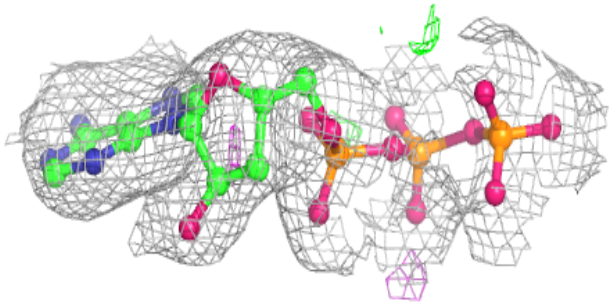


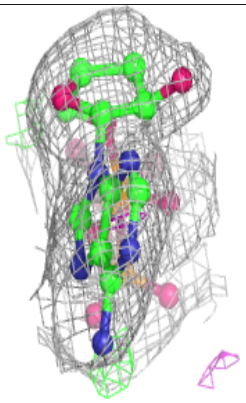


Electron density around 3AT E 501:

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

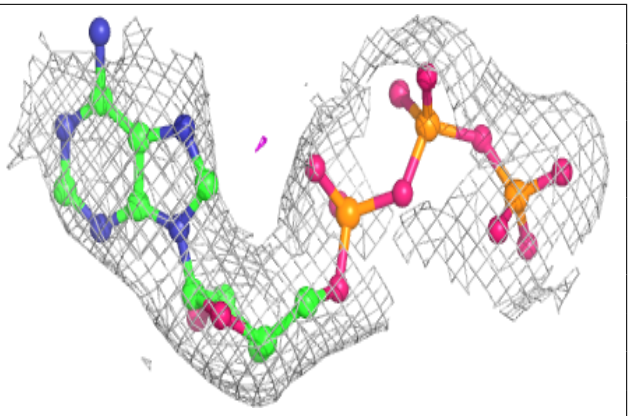


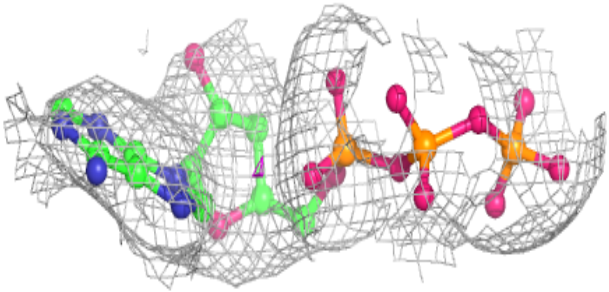


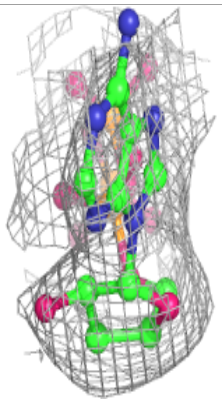


Electron density around 3AT J 501:

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







Electron density around CU0 L 501:

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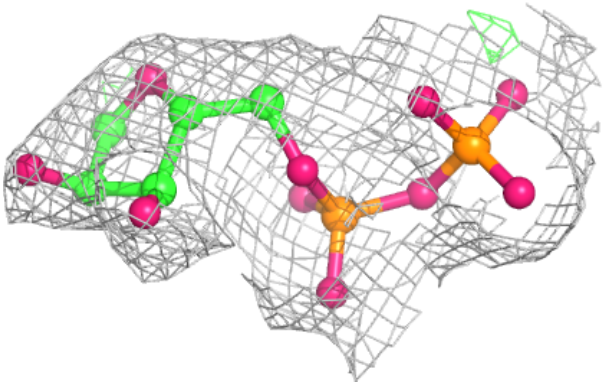
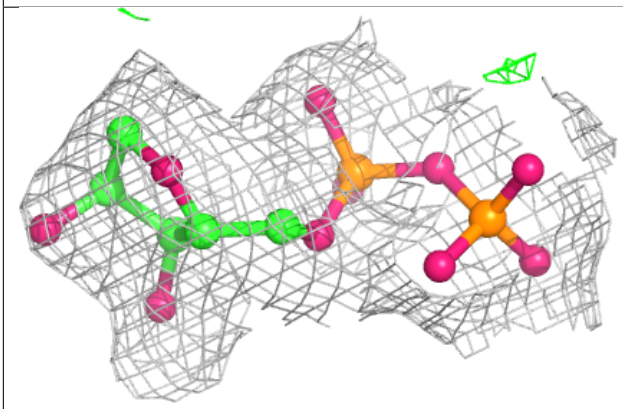
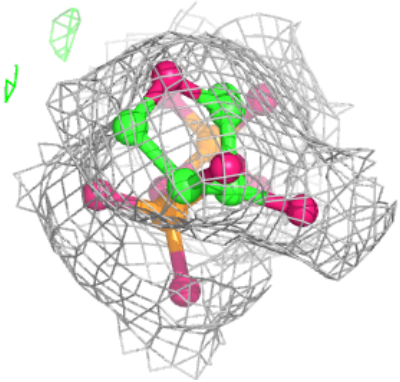
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

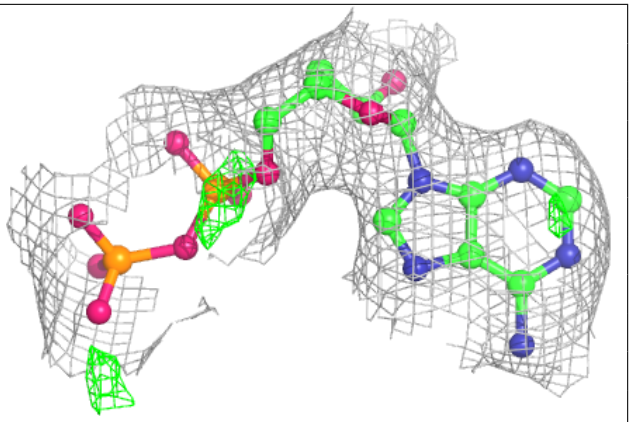


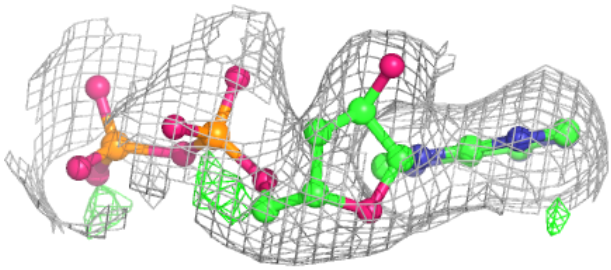




Electron density around CUU C 501:

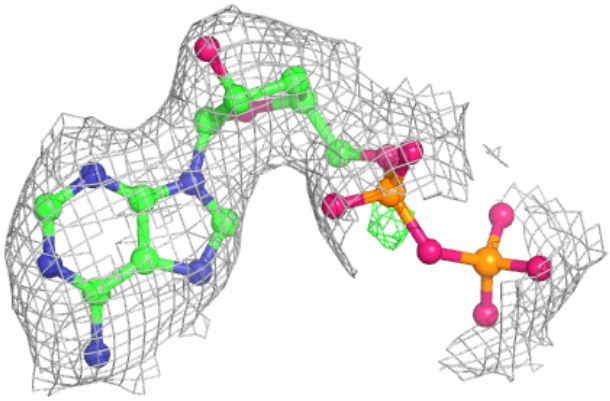
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

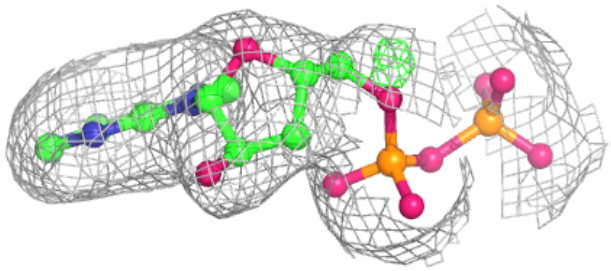


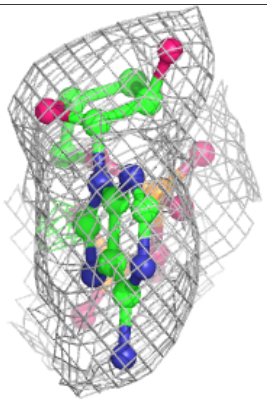


Electron density around CUU D 501:

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

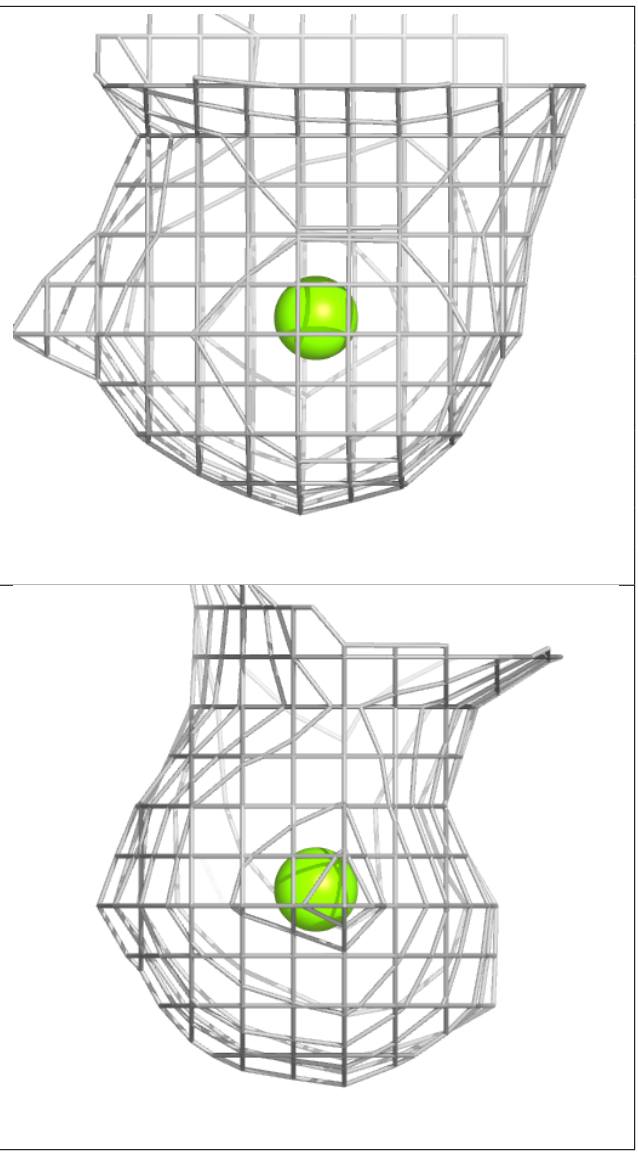






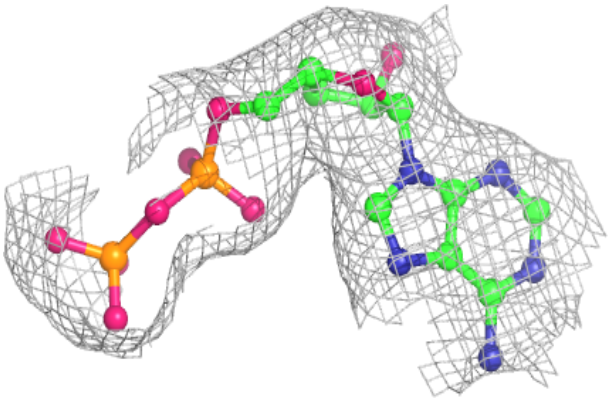
Electron density around MG L 502:

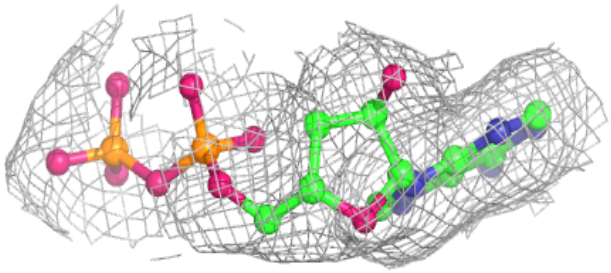
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

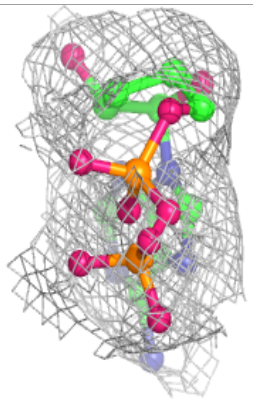


Electron density around CUU F 501:

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

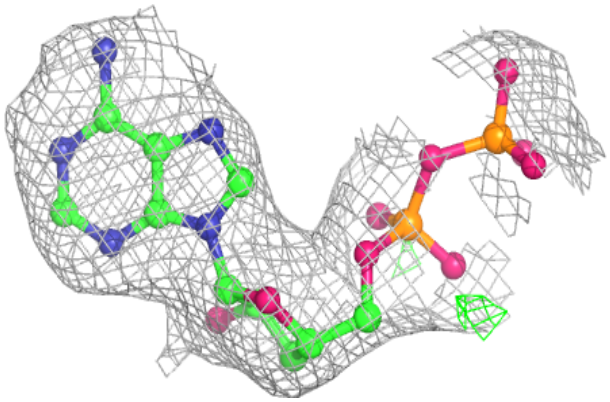


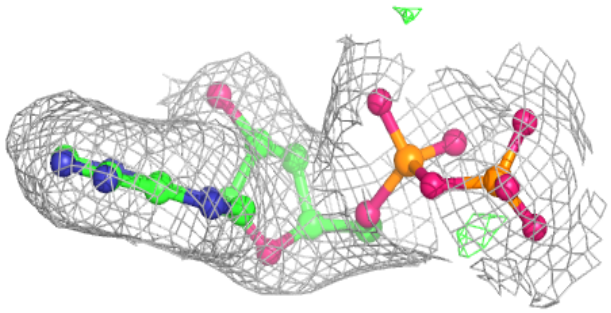


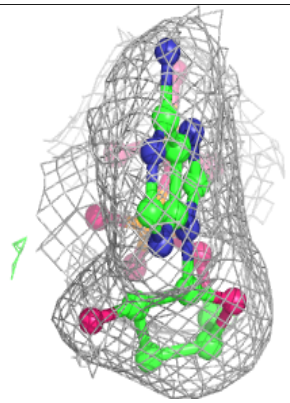


Electron density around CUU G 501:

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

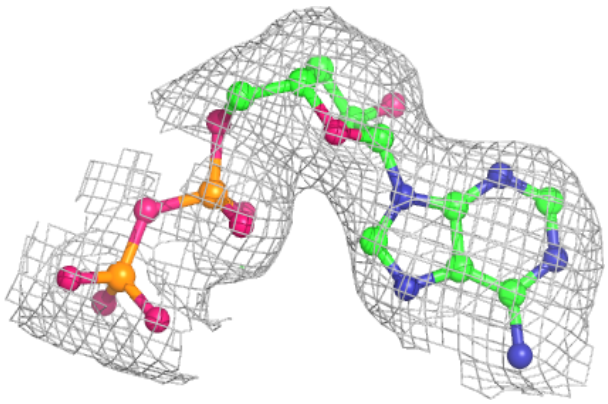


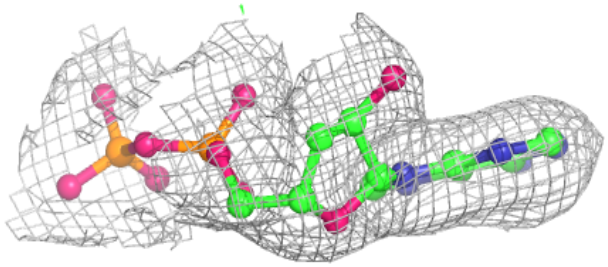


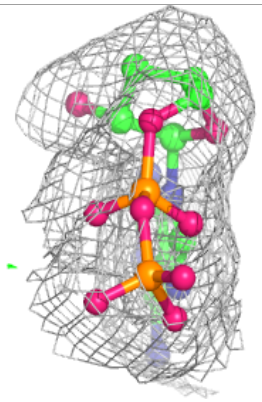


Electron density around CUU I 501:

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

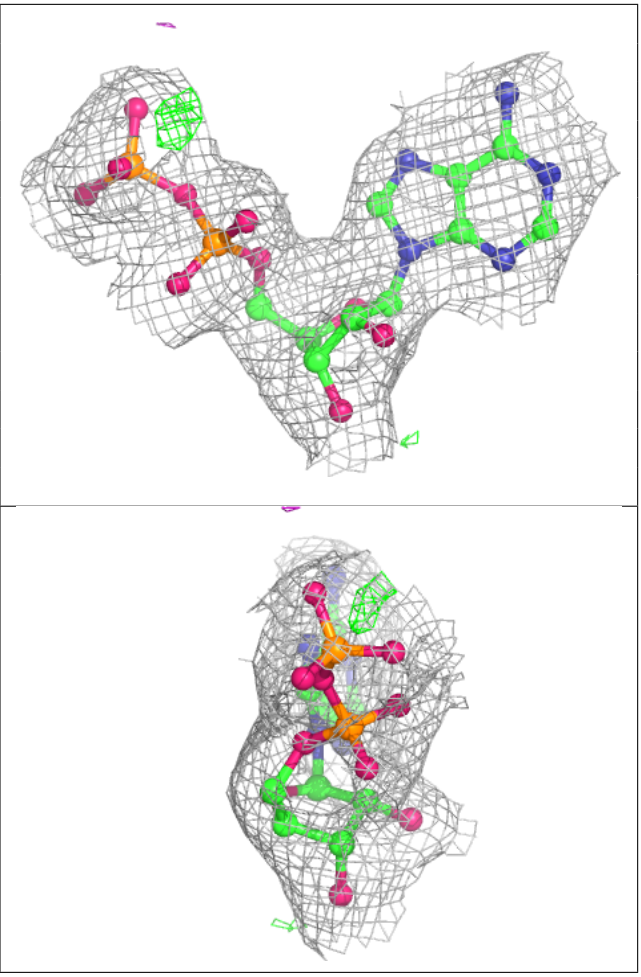






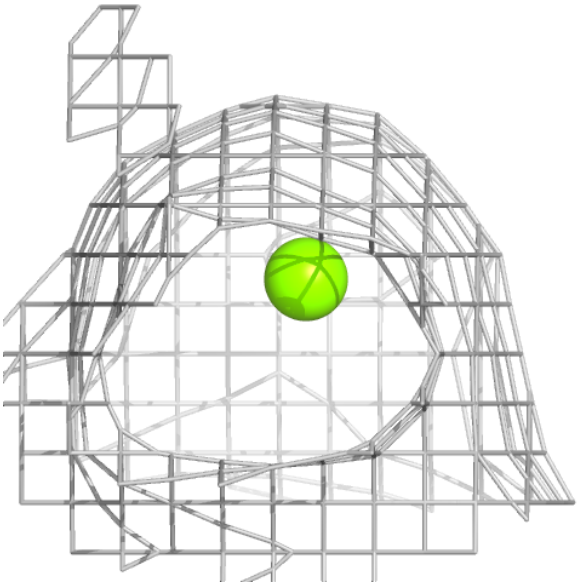
Electron density around ADP A 501:

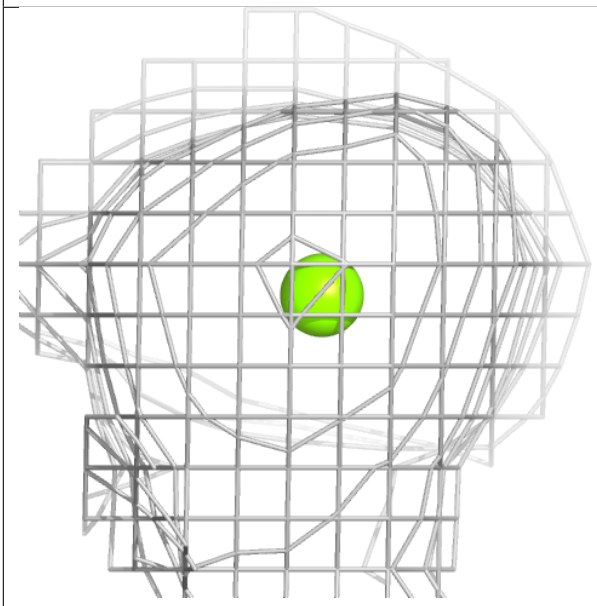
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

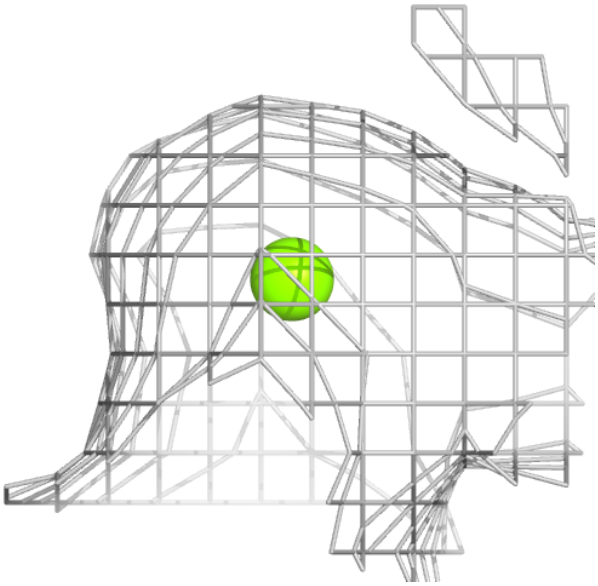


Electron density around MG D 502:

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







6.5 Other polymers (i)

There are no such residues in this entry.