



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 20, 2023 – 12:05 PM EST

PDB ID : 8SOQ
Title : S127A variant of LarB, a carboxylase/hydrolase involved in synthesis of the cofactor for lactate racemase, in complex with authentic substrate NaAD
Authors : Chatterjee, S.; Rankin, J.A.; Hu, J.; Hausinger, R.P.
Deposited on : 2023-04-29
Resolution : 3.10 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 : 2.36
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

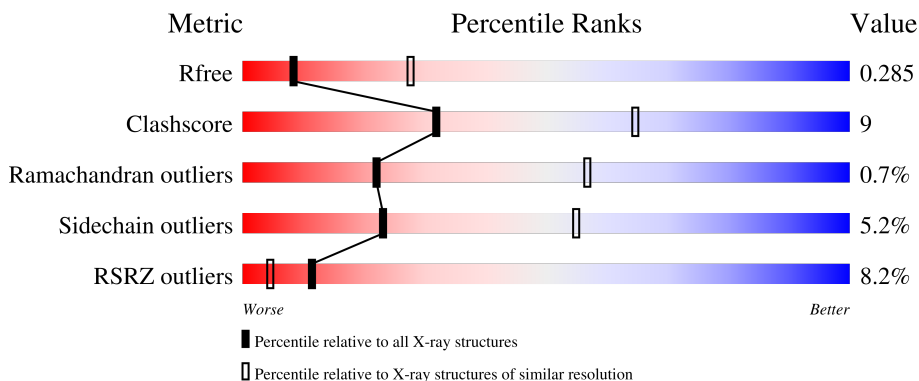
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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.



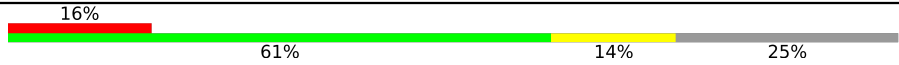
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	256	<div style="display: flex; align-items: center;"> <div style="width: 10%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 59%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 21%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">59% 20% 21%</p>
1	B	256	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 63%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 15%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 21%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">63% 15% 21%</p>
1	C	256	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 58%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 18%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 23%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">58% 18% 23%</p>
1	D	256	<div style="display: flex; align-items: center;"> <div style="width: 6%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 68%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">68% 11% 20%</p>
1	E	256	<div style="display: flex; align-items: center;"> <div style="width: 11%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 61%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 14%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 25%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">61% 14% 25%</p>

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Mol	Chain	Length	Quality of chain
1	F	256	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment (16%), a green segment (61%), a yellow segment (14%), and a grey segment (25%).</p>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 8241 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 Pyridinium-3,5-biscarboxylic acid mononucleotide synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	203	1377	871	236	263	7	0	1	0
1	B	201	1390	886	238	258	8	0	1	0
1	C	198	1388	884	235	263	6	0	0	0
1	D	205	1426	898	248	271	9	0	6	0
1	E	191	1247	787	212	243	5	0	0	0
1	F	193	1195	751	205	234	5	0	0	0

There are 66 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	127	ALA	SER	conflict	UNP F9UST0
A	247	ALA	-	expression tag	UNP F9UST0
A	248	SER	-	expression tag	UNP F9UST0
A	249	TRP	-	expression tag	UNP F9UST0
A	250	SER	-	expression tag	UNP F9UST0
A	251	HIS	-	expression tag	UNP F9UST0
A	252	PRO	-	expression tag	UNP F9UST0
A	253	GLN	-	expression tag	UNP F9UST0
A	254	PHE	-	expression tag	UNP F9UST0
A	255	GLU	-	expression tag	UNP F9UST0
A	256	LYS	-	expression tag	UNP F9UST0
B	127	ALA	SER	conflict	UNP F9UST0
B	247	ALA	-	expression tag	UNP F9UST0
B	248	SER	-	expression tag	UNP F9UST0
B	249	TRP	-	expression tag	UNP F9UST0
B	250	SER	-	expression tag	UNP F9UST0
B	251	HIS	-	expression tag	UNP F9UST0

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Chain	Residue	Modelled	Actual	Comment	Reference
B	252	PRO	-	expression tag	UNP F9UST0
B	253	GLN	-	expression tag	UNP F9UST0
B	254	PHE	-	expression tag	UNP F9UST0
B	255	GLU	-	expression tag	UNP F9UST0
B	256	LYS	-	expression tag	UNP F9UST0
C	127	ALA	SER	conflict	UNP F9UST0
C	247	ALA	-	expression tag	UNP F9UST0
C	248	SER	-	expression tag	UNP F9UST0
C	249	TRP	-	expression tag	UNP F9UST0
C	250	SER	-	expression tag	UNP F9UST0
C	251	HIS	-	expression tag	UNP F9UST0
C	252	PRO	-	expression tag	UNP F9UST0
C	253	GLN	-	expression tag	UNP F9UST0
C	254	PHE	-	expression tag	UNP F9UST0
C	255	GLU	-	expression tag	UNP F9UST0
C	256	LYS	-	expression tag	UNP F9UST0
D	127	ALA	SER	conflict	UNP F9UST0
D	247	ALA	-	expression tag	UNP F9UST0
D	248	SER	-	expression tag	UNP F9UST0
D	249	TRP	-	expression tag	UNP F9UST0
D	250	SER	-	expression tag	UNP F9UST0
D	251	HIS	-	expression tag	UNP F9UST0
D	252	PRO	-	expression tag	UNP F9UST0
D	253	GLN	-	expression tag	UNP F9UST0
D	254	PHE	-	expression tag	UNP F9UST0
D	255	GLU	-	expression tag	UNP F9UST0
D	256	LYS	-	expression tag	UNP F9UST0
E	127	ALA	SER	conflict	UNP F9UST0
E	247	ALA	-	expression tag	UNP F9UST0
E	248	SER	-	expression tag	UNP F9UST0
E	249	TRP	-	expression tag	UNP F9UST0
E	250	SER	-	expression tag	UNP F9UST0
E	251	HIS	-	expression tag	UNP F9UST0
E	252	PRO	-	expression tag	UNP F9UST0
E	253	GLN	-	expression tag	UNP F9UST0
E	254	PHE	-	expression tag	UNP F9UST0
E	255	GLU	-	expression tag	UNP F9UST0
E	256	LYS	-	expression tag	UNP F9UST0
F	127	ALA	SER	conflict	UNP F9UST0
F	247	ALA	-	expression tag	UNP F9UST0
F	248	SER	-	expression tag	UNP F9UST0
F	249	TRP	-	expression tag	UNP F9UST0

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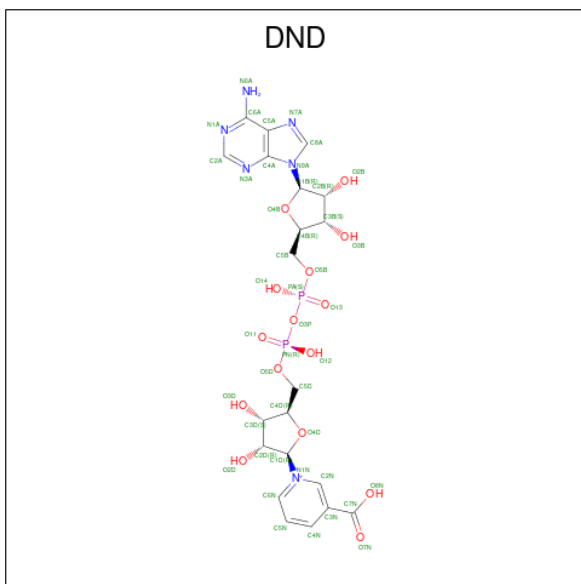
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Chain	Residue	Modelled	Actual	Comment	Reference
F	250	SER	-	expression tag	UNP F9UST0
F	251	HIS	-	expression tag	UNP F9UST0
F	252	PRO	-	expression tag	UNP F9UST0
F	253	GLN	-	expression tag	UNP F9UST0
F	254	PHE	-	expression tag	UNP F9UST0
F	255	GLU	-	expression tag	UNP F9UST0
F	256	LYS	-	expression tag	UNP F9UST0

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	2	Total Mg 2 2	0	0
2	B	1	Total Mg 1 1	0	0
2	C	1	Total Mg 1 1	0	0
2	D	2	Total Mg 2 2	0	0
2	E	1	Total Mg 1 1	0	0

- Molecule 3 is NICOTINIC ACID ADENINE DINUCLEOTIDE (three-letter code: DND) (formula: C₂₁H₂₇N₆O₁₅P₂) (labeled as "Ligand of Interest" by depositor).

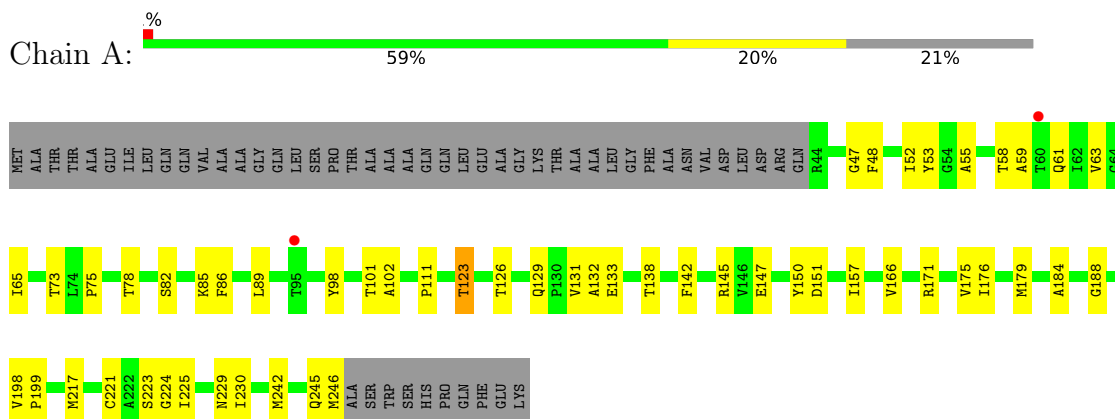


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 44	C 21	N 6	O 15	P 2	0	0
3	B	1	Total 44	C 21	N 6	O 15	P 2	0	0
3	C	1	Total 44	C 21	N 6	O 15	P 2	0	0
3	D	1	Total 44	C 21	N 6	O 15	P 2	0	0
3	E	1	Total 35	C 15	N 5	O 13	P 2	0	0

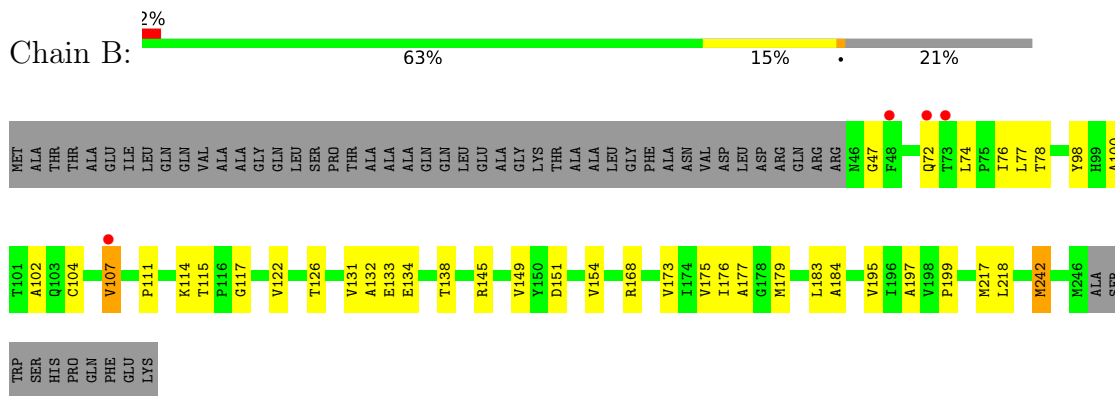
3 Residue-property plots [i](#)

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.

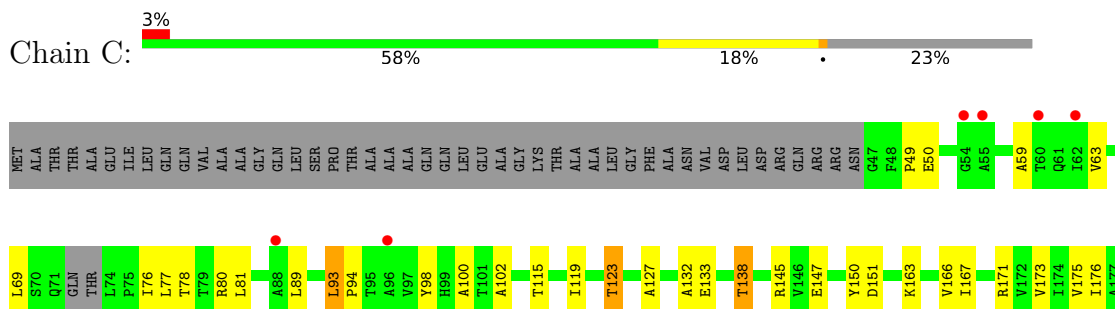
- Molecule 1: Pyridinium-3,5-biscarboxylic acid mononucleotide synthase

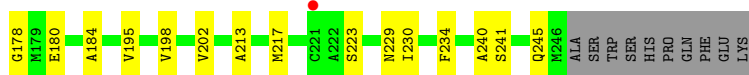


- Molecule 1: Pyridinium-3,5-biscarboxylic acid mononucleotide synthase

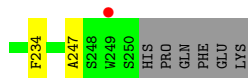
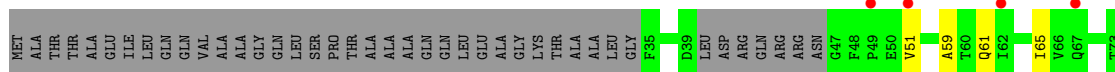


- Molecule 1: Pyridinium-3,5-biscarboxylic acid mononucleotide synthase

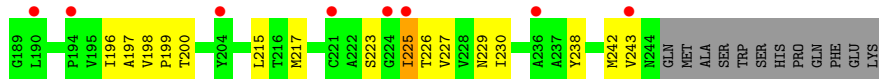
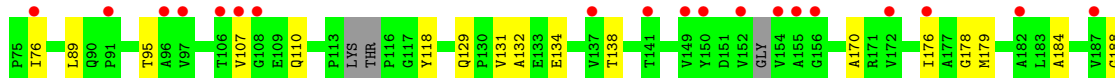
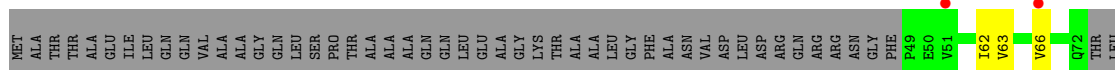




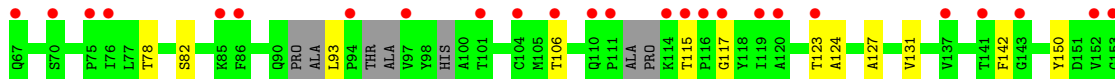
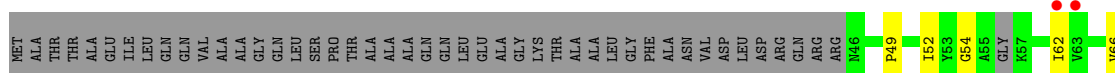
- Molecule 1: Pyridinium-3,5-biscarboxylic acid mononucleotide synthase



- Molecule 1: Pyridinium-3,5-biscarboxylic acid mononucleotide synthase



- Molecule 1: Pyridinium-3,5-biscarboxylic acid mononucleotide synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 4 21 2	Depositor
Cell constants a, b, c, α , β , γ	120.91Å 120.91Å 212.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	61.15 – 3.10 79.84 – 3.10	Depositor EDS
% Data completeness (in resolution range)	99.4 (61.15-3.10) 99.5 (79.84-3.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.78 (at 3.13Å)	Xtrriage
Refinement program	PHENIX (1.19_4092: ???)	Depositor
R, R_{free}	0.236 , 0.286 0.238 , 0.285	Depositor DCC
R_{free} test set	1512 reflections (5.17%)	wwPDB-VP
Wilson B-factor (Å ²)	84.5	Xtrriage
Anisotropy	0.213	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 105.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	8241	wwPDB-VP
Average B, all atoms (Å ²)	112.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.49% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DND, MG

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	0.48	0/1399	0.68	0/1922
1	B	0.54	0/1414	0.69	0/1937
1	C	0.52	0/1410	0.72	0/1929
1	D	0.50	0/1441	0.71	0/1965
1	E	0.41	0/1263	0.64	0/1736
1	F	0.37	0/1203	0.60	0/1655
All	All	0.48	0/8130	0.68	0/11144

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	1377	0	1311	34	0
1	B	1390	0	1401	21	0
1	C	1388	0	1390	30	0
1	D	1426	0	1365	17	0
1	E	1247	0	1169	23	0
1	F	1195	0	1056	23	0
2	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	2	0	0	0	0
2	E	1	0	0	0	0
3	A	44	0	24	1	0
3	B	44	0	25	0	0
3	C	44	0	24	1	0
3	D	44	0	25	0	0
3	E	35	0	19	0	0
All	All	8241	0	7809	142	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 9.

All (142) 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:C:63:VAL:CG2	1:C:89:LEU:HD23	1.96	0.95
1:A:123:THR:HG22	1:A:151:ASP:H	1.35	0.91
1:B:77:LEU:HD21	1:B:138:THR:HG22	1.59	0.85
1:E:196:ILE:HD13	1:E:226:THR:OG1	1.77	0.84
1:C:63:VAL:HG23	1:C:89:LEU:HD23	1.58	0.84
1:A:53:TYR:CE1	1:A:55:ALA:HB3	2.14	0.81
1:A:53:TYR:HE1	1:A:55:ALA:HB3	1.44	0.81
1:A:52:ILE:HG22	1:A:53:TYR:O	1.84	0.75
1:D:188:GLY:HA3	1:D:225:ILE:HD11	1.66	0.75
1:A:52:ILE:HB	1:A:78:THR:HG22	1.72	0.71
1:E:196:ILE:HD13	1:E:226:THR:HG1	1.56	0.69
1:E:242:MET:SD	1:F:192:ASP:O	2.50	0.69
1:F:154:VAL:HG23	1:F:183:LEU:HB2	1.78	0.66
1:A:82:SER:HB2	1:A:85:LYS:HG2	1.79	0.65
1:F:154:VAL:HG12	1:F:154:VAL:O	1.97	0.64
1:B:173:VAL:HB	1:B:195:VAL:HG22	1.80	0.64
1:D:77:LEU:HB2	1:D:141:THR:HG21	1.79	0.63
1:C:77:LEU:HD21	1:C:138:THR:HG22	1.80	0.63
1:C:123:THR:HG22	1:C:151:ASP:H	1.63	0.62
1:C:173:VAL:HB	1:C:195:VAL:HG22	1.82	0.61
1:C:63:VAL:HA	1:C:93:LEU:HD11	1.83	0.61
1:B:115:THR:HG22	1:B:117:GLY:H	1.66	0.61
1:F:179:MET:O	1:F:213:ALA:HB2	2.01	0.60
1:E:243:VAL:HG13	1:F:243:VAL:HG13	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:154:VAL:CG2	1:F:183:LEU:HA	2.33	0.59
1:A:61:GLN:HG2	1:A:65:ILE:HD11	1.84	0.59
1:A:58:THR:OG1	1:A:61:GLN:HB2	2.02	0.59
1:A:138:THR:O	1:A:142:PHE:HD1	1.86	0.59
1:D:220[A]:SER:O	1:D:221[A]:CYS:CB	2.50	0.59
1:E:129:GLN:HA	1:E:132:ALA:HB3	1.87	0.57
1:F:170:ALA:O	1:F:193:LYS:HG3	2.05	0.57
1:F:167:ILE:HG22	1:F:191:VAL:HG11	1.86	0.57
1:E:199:PRO:HG2	1:E:230:ILE:HA	1.86	0.56
1:B:102:ALA:HB2	1:B:133:GLU:HB3	1.87	0.56
1:C:147:GLU:HG2	1:C:166:VAL:HG11	1.87	0.55
1:C:171:ARG:NH1	1:D:247:ALA:O	2.39	0.55
1:B:197:ALA:HB1	1:B:217:MET:SD	2.47	0.55
1:C:50:GLU:HB2	1:C:76:ILE:HG12	1.88	0.54
1:F:49:PRO:HD2	1:F:142:PHE:CD2	2.43	0.54
1:A:102:ALA:HB2	1:A:133:GLU:HB3	1.88	0.54
1:B:126:THR:HG23	1:B:151:ASP:OD2	2.08	0.54
1:F:219:ASN:O	1:F:220:SER:C	2.46	0.54
1:D:175:VAL:HG11	1:D:184:ALA:HA	1.90	0.54
1:F:115:THR:HG22	1:F:117:GLY:H	1.72	0.54
1:A:63:VAL:HG23	1:A:89:LEU:HD22	1.91	0.53
1:C:50:GLU:OE2	1:C:69:LEU:HD13	2.09	0.53
1:A:229:ASN:OD1	1:A:230:ILE:N	2.37	0.53
1:E:197:ALA:HB3	1:E:227:VAL:HG22	1.91	0.52
1:E:229:ASN:OD1	1:E:230:ILE:N	2.37	0.52
1:C:132:ALA:HA	1:C:176:ILE:HD12	1.91	0.52
1:C:63:VAL:HG23	1:C:89:LEU:CD2	2.36	0.51
1:C:213:ALA:O	1:C:217:MET:HG3	2.11	0.51
1:D:51:VAL:HG21	1:D:234:PHE:HE1	1.75	0.51
1:B:145:ARG:NH2	1:C:166:VAL:HG22	2.26	0.51
1:A:199:PRO:HD3	1:A:217:MET:HE1	1.95	0.49
1:D:59:ALA:HB1	1:D:89:LEU:HD11	1.93	0.49
1:E:63:VAL:HG23	1:E:89:LEU:HD22	1.94	0.49
1:C:180:GLU:N	1:C:180:GLU:OE1	2.45	0.49
1:B:76:ILE:HB	1:B:107:VAL:HG13	1.93	0.49
1:F:154:VAL:O	1:F:154:VAL:CG1	2.61	0.49
1:E:176:ILE:HD13	1:E:198:VAL:HB	1.94	0.48
1:A:224:GLY:HA2	1:B:242:MET:HE1	1.95	0.48
1:A:132:ALA:HA	1:A:176:ILE:HD13	1.95	0.48
1:B:98:TYR:CE2	1:B:100:ALA:HA	2.49	0.48
1:F:200:THR:OG1	1:F:202:VAL:HG22	2.14	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:102:ALA:HB2	1:C:133:GLU:HB3	1.96	0.48
1:F:154:VAL:CG2	1:F:183:LEU:CA	2.92	0.48
1:A:171:ARG:HH22	1:A:246:MET:C	2.18	0.47
1:C:145:ARG:HB2	1:C:145:ARG:NH1	2.30	0.47
1:A:188:GLY:HA3	1:A:225:ILE:HD11	1.96	0.47
1:A:129:GLN:HA	1:A:132:ALA:HB3	1.97	0.47
1:C:138:THR:HG21	1:C:234:PHE:HD1	1.79	0.47
1:C:59:ALA:HB1	1:C:89:LEU:HD11	1.96	0.47
1:C:229:ASN:OD1	1:C:230:ILE:N	2.46	0.47
1:A:229:ASN:HB2	1:B:218:LEU:O	2.15	0.47
1:A:86:PHE:CD1	1:A:98:TYR:HB2	2.49	0.46
1:C:98:TYR:CE2	1:C:100:ALA:HA	2.50	0.46
1:C:175:VAL:HG11	1:C:184:ALA:HA	1.98	0.46
1:E:188:GLY:HA3	1:E:225:ILE:HD11	1.97	0.46
1:E:217:MET:HE2	1:E:217:MET:HB2	1.82	0.46
1:C:127:ALA:HB3	3:C:302:DND:H5	1.98	0.45
1:E:62:ILE:O	1:E:66:VAL:HG23	2.17	0.45
1:E:184:ALA:HB3	1:E:217:MET:HG2	1.98	0.45
1:F:131:VAL:HG21	1:F:200:THR:HG22	1.98	0.45
1:A:53:TYR:HD1	1:A:55:ALA:H	1.65	0.44
1:C:176:ILE:HG23	1:C:198:VAL:HB	1.98	0.44
1:E:238:TYR:HD1	1:E:242:MET:HE2	1.81	0.44
1:A:147:GLU:HG2	1:A:166:VAL:CG1	2.47	0.44
1:D:147:GLU:HG2	1:D:166:VAL:CG1	2.47	0.44
3:A:303:DND:H16	3:A:303:DND:H10	1.99	0.44
1:B:183:LEU:HD12	1:B:183:LEU:HA	1.72	0.44
1:E:242:MET:HE3	1:F:194:PRO:HA	2.00	0.44
1:C:163:LYS:O	1:C:167:ILE:HG13	2.16	0.44
1:B:122:VAL:HA	1:B:149:VAL:O	2.18	0.44
1:A:175:VAL:HG11	1:A:184:ALA:HA	2.00	0.44
1:F:124:ALA:HB2	1:F:183:LEU:HD22	1.99	0.43
1:A:126:THR:HG23	1:A:151:ASP:OD2	2.18	0.43
1:D:98:TYR:CE2	1:D:100:ALA:HA	2.52	0.43
1:D:118:TYR:CD2	1:D:147:GLU:HB2	2.52	0.43
1:D:102:ALA:HB2	1:D:133:GLU:HB3	2.00	0.43
1:C:119:ILE:HD13	1:C:240:ALA:HB1	2.01	0.43
1:E:178:GLY:O	1:E:179:MET:C	2.57	0.43
1:A:199:PRO:CD	1:A:217:MET:HE1	2.48	0.43
1:A:123:THR:HB	1:A:150:TYR:HA	2.01	0.42
1:D:218:LEU:C	1:D:220[A]:SER:N	2.72	0.42
1:D:59:ALA:HB1	1:D:89:LEU:HD21	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:47:GLY:O	1:B:114:LYS:NZ	2.52	0.42
1:B:134:GLU:O	1:B:138:THR:HG23	2.18	0.42
1:E:76:ILE:HB	1:E:107:VAL:HG22	2.02	0.42
1:F:123:THR:HB	1:F:150:TYR:HA	2.01	0.42
1:A:86:PHE:CE1	1:A:98:TYR:HB2	2.55	0.42
1:C:123:THR:HB	1:C:150:TYR:HA	2.00	0.42
1:C:147:GLU:HG2	1:C:166:VAL:CG1	2.48	0.42
1:E:134:GLU:O	1:E:138:THR:OG1	2.32	0.42
1:B:131:VAL:HG22	1:B:176:ILE:HG21	2.01	0.42
1:F:52:ILE:O	1:F:78:THR:HA	2.19	0.42
1:F:127:ALA:HB1	1:F:202:VAL:HG11	2.01	0.42
1:B:78:THR:O	1:B:104:CYS:HA	2.20	0.42
1:A:176:ILE:HG12	1:A:198:VAL:HB	2.01	0.42
1:B:132:ALA:HA	1:B:176:ILE:HD12	2.02	0.41
1:E:118:TYR:CE2	1:E:170:ALA:HB2	2.55	0.41
1:E:215:LEU:HD23	1:E:215:LEU:HA	1.76	0.41
1:B:175:VAL:HG11	1:B:184:ALA:HA	2.01	0.41
1:D:220[A]:SER:O	1:D:221[A]:CYS:HB2	2.18	0.41
1:E:196:ILE:CD1	1:E:226:THR:HG1	2.27	0.41
1:A:53:TYR:CD1	1:A:55:ALA:HB3	2.51	0.41
1:A:242:MET:O	1:A:246:MET:HG3	2.20	0.41
1:D:167:ILE:HG22	1:D:191:VAL:HG11	2.02	0.41
1:F:197:ALA:HB1	1:F:217:MET:SD	2.61	0.41
1:E:131:VAL:HG11	1:E:200:THR:HG22	2.03	0.41
1:A:59:ALA:HB1	1:A:89:LEU:HD21	2.03	0.41
1:A:75:PRO:HG2	1:A:111:PRO:HD3	2.03	0.41
1:C:59:ALA:HB1	1:C:89:LEU:HD21	2.03	0.41
1:D:229:ASN:OD1	1:D:230:ILE:N	2.50	0.41
1:B:132:ALA:HA	1:B:176:ILE:CD1	2.51	0.40
1:C:241:SER:O	1:C:245:GLN:HG3	2.20	0.40
1:B:177:ALA:O	1:B:199:PRO:HA	2.21	0.40
1:D:61:GLN:O	1:D:65:ILE:HG12	2.22	0.40
1:F:62:ILE:O	1:F:66:VAL:HG23	2.22	0.40
1:F:166:VAL:O	1:F:166:VAL:HG22	2.21	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	202/256 (79%)	187 (93%)	14 (7%)	1 (0%)	29	64
1	B	200/256 (78%)	188 (94%)	9 (4%)	3 (2%)	10	39
1	C	194/256 (76%)	180 (93%)	11 (6%)	3 (2%)	10	39
1	D	199/256 (78%)	180 (90%)	19 (10%)	0	100	100
1	E	183/256 (72%)	170 (93%)	13 (7%)	0	100	100
1	F	181/256 (71%)	169 (93%)	11 (6%)	1 (1%)	25	59
All	All	1159/1536 (76%)	1074 (93%)	77 (7%)	8 (1%)	22	57

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	47	GLY
1	B	179	MET
1	C	49	PRO
1	B	72	GLN
1	F	54	GLY
1	B	111	PRO
1	C	94	PRO
1	C	178	GLY

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.

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	125/190 (66%)	115 (92%)	10 (8%)	12	40
1	B	136/190 (72%)	131 (96%)	5 (4%)	34	66
1	C	137/190 (72%)	128 (93%)	9 (7%)	16	47
1	D	130/190 (68%)	124 (95%)	6 (5%)	27	59
1	E	110/190 (58%)	106 (96%)	4 (4%)	35	67
1	F	92/190 (48%)	87 (95%)	5 (5%)	22	53
All	All	730/1140 (64%)	691 (95%)	39 (5%)	23	54

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	PHE
1	A	73	THR
1	A	101	THR
1	A	123	THR
1	A	131	VAL
1	A	157	ILE
1	A	179	MET
1	A	221	CYS
1	A	223	SER
1	A	245	GLN
1	B	74	LEU
1	B	107	VAL
1	B	154	VAL
1	B	168	ARG
1	B	242	MET
1	C	78	THR
1	C	80	ARG
1	C	81	LEU
1	C	93	LEU
1	C	115	THR
1	C	123	THR
1	C	138	THR
1	C	202	VAL
1	C	223	SER
1	D	89	LEU
1	D	95	THR
1	D	107	VAL

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Mol	Chain	Res	Type
1	D	131	VAL
1	D	221[A]	CYS
1	D	221[B]	CYS
1	E	95	THR
1	E	110	GLN
1	E	223	SER
1	E	225	ILE
1	F	82	SER
1	F	93	LEU
1	F	106	THR
1	F	214	LEU
1	F	229	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 12 ligands modelled in this entry, 7 are monoatomic - leaving 5 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	DND	D	303	2	42,48,48	0.87	2 (4%)	50,73,73	1.06	4 (8%)
3	DND	C	302	2	42,48,48	0.86	2 (4%)	50,73,73	1.34	6 (12%)
3	DND	B	302	2	42,48,48	0.80	1 (2%)	50,73,73	0.93	4 (8%)
3	DND	E	302	2	33,38,48	0.60	0	37,58,73	0.88	2 (5%)
3	DND	A	303	2	42,48,48	0.84	2 (4%)	50,73,73	0.98	4 (8%)

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	DND	D	303	2	-	7/26/62/62	0/5/5/5
3	DND	C	302	2	-	10/26/62/62	0/5/5/5
3	DND	B	302	2	-	11/26/62/62	0/5/5/5
3	DND	E	302	2	-	7/18/51/62	0/4/4/5
3	DND	A	303	2	-	10/26/62/62	0/5/5/5

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	302	DND	O8N-C7N	-3.35	1.20	1.30
3	D	303	DND	O8N-C7N	-3.26	1.20	1.30
3	A	303	DND	O8N-C7N	-3.19	1.20	1.30
3	C	302	DND	O8N-C7N	-3.01	1.21	1.30
3	A	303	DND	C4N-C3N	-2.10	1.35	1.39
3	D	303	DND	C4N-C3N	-2.07	1.35	1.39
3	C	302	DND	C4N-C3N	-2.03	1.35	1.39

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	302	DND	C3D-C2D-C1D	-5.00	93.45	100.98
3	D	303	DND	O4D-C1D-C2D	-4.35	100.58	106.93
3	C	302	DND	O4D-C1D-C2D	-3.96	101.14	106.93
3	E	302	DND	O4D-C1D-C2D	-3.14	99.92	105.99
3	B	302	DND	C3D-C2D-C1D	2.90	105.34	100.98
3	C	302	DND	O3D-C3D-C2D	-2.89	102.47	111.82
3	A	303	DND	O4D-C1D-C2D	-2.76	102.89	106.93
3	C	302	DND	O3D-C3D-C4D	-2.62	103.49	111.05

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	303	DND	C3D-C2D-C1D	2.52	104.77	100.98
3	C	302	DND	C6N-N1N-C2N	-2.50	119.70	121.97
3	A	303	DND	C6N-N1N-C2N	-2.49	119.70	121.97
3	D	303	DND	C6N-N1N-C2N	-2.46	119.73	121.97
3	B	302	DND	O4D-C1D-C2D	-2.42	103.38	106.93
3	D	303	DND	C5A-C6A-N6A	2.32	123.88	120.35
3	B	302	DND	C6N-N1N-C2N	-2.32	119.86	121.97
3	B	302	DND	C5A-C6A-N6A	2.25	123.77	120.35
3	E	302	DND	C5A-C6A-N6A	2.21	123.71	120.35
3	A	303	DND	C5A-C6A-N6A	2.18	123.67	120.35
3	C	302	DND	C5A-C6A-N6A	2.17	123.65	120.35
3	D	303	DND	O3D-C3D-C2D	-2.03	105.26	111.82

There are no chirality outliers.

All (45) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	303	DND	O4D-C4D-C5D-O5D
3	A	303	DND	C5B-O5B-PA-O13
3	A	303	DND	O4B-C4B-C5B-O5B
3	B	302	DND	C5B-O5B-PA-O13
3	B	302	DND	C5B-O5B-PA-O14
3	B	302	DND	O4B-C4B-C5B-O5B
3	C	302	DND	PN-O3P-PA-O5B
3	C	302	DND	O4D-C4D-C5D-O5D
3	C	302	DND	C3D-C4D-C5D-O5D
3	C	302	DND	O4D-C1D-N1N-C2N
3	D	303	DND	C5B-O5B-PA-O13
3	D	303	DND	C5B-O5B-PA-O14
3	E	302	DND	O4D-C4D-C5D-O5D
3	A	303	DND	C3D-C4D-C5D-O5D
3	A	303	DND	C3B-C4B-C5B-O5B
3	C	302	DND	O4B-C4B-C5B-O5B
3	D	303	DND	O4D-C4D-C5D-O5D
3	D	303	DND	C3D-C4D-C5D-O5D
3	E	302	DND	C3D-C4D-C5D-O5D
3	E	302	DND	O4B-C4B-C5B-O5B
3	C	302	DND	C3B-C4B-C5B-O5B
3	A	303	DND	C4N-C3N-C7N-O7N
3	E	302	DND	C3B-C4B-C5B-O5B
3	B	302	DND	C4N-C3N-C7N-O8N
3	B	302	DND	C2N-C3N-C7N-O8N

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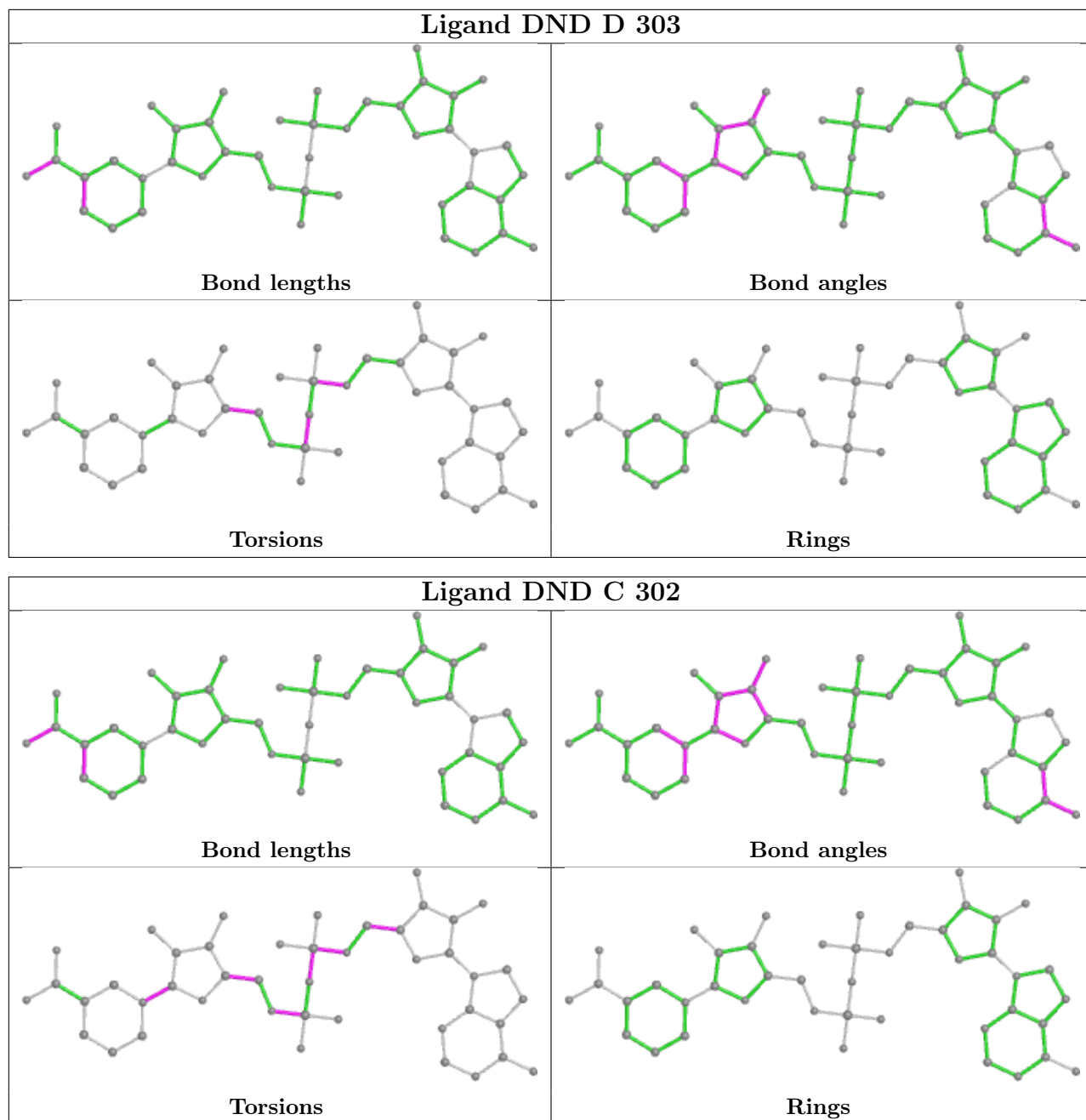
Mol	Chain	Res	Type	Atoms
3	B	302	DND	PN-O3P-PA-O5B
3	E	302	DND	PN-O3P-PA-O5B
3	B	302	DND	C4N-C3N-C7N-O7N
3	B	302	DND	C5B-O5B-PA-O3P
3	D	303	DND	PA-O3P-PN-O11
3	B	302	DND	C2N-C3N-C7N-O7N
3	A	303	DND	C5B-O5B-PA-O14
3	C	302	DND	C5D-O5D-PN-O11
3	C	302	DND	C5B-O5B-PA-O14
3	A	303	DND	C4N-C3N-C7N-O8N
3	A	303	DND	C4B-C5B-O5B-PA
3	D	303	DND	PA-O3P-PN-O12
3	E	302	DND	PA-O3P-PN-O11
3	E	302	DND	PA-O3P-PN-O12
3	B	302	DND	C3B-C4B-C5B-O5B
3	B	302	DND	C4B-C5B-O5B-PA
3	A	303	DND	C5B-O5B-PA-O3P
3	C	302	DND	C5B-O5B-PA-O3P
3	D	303	DND	C5B-O5B-PA-O3P
3	C	302	DND	C5B-O5B-PA-O13

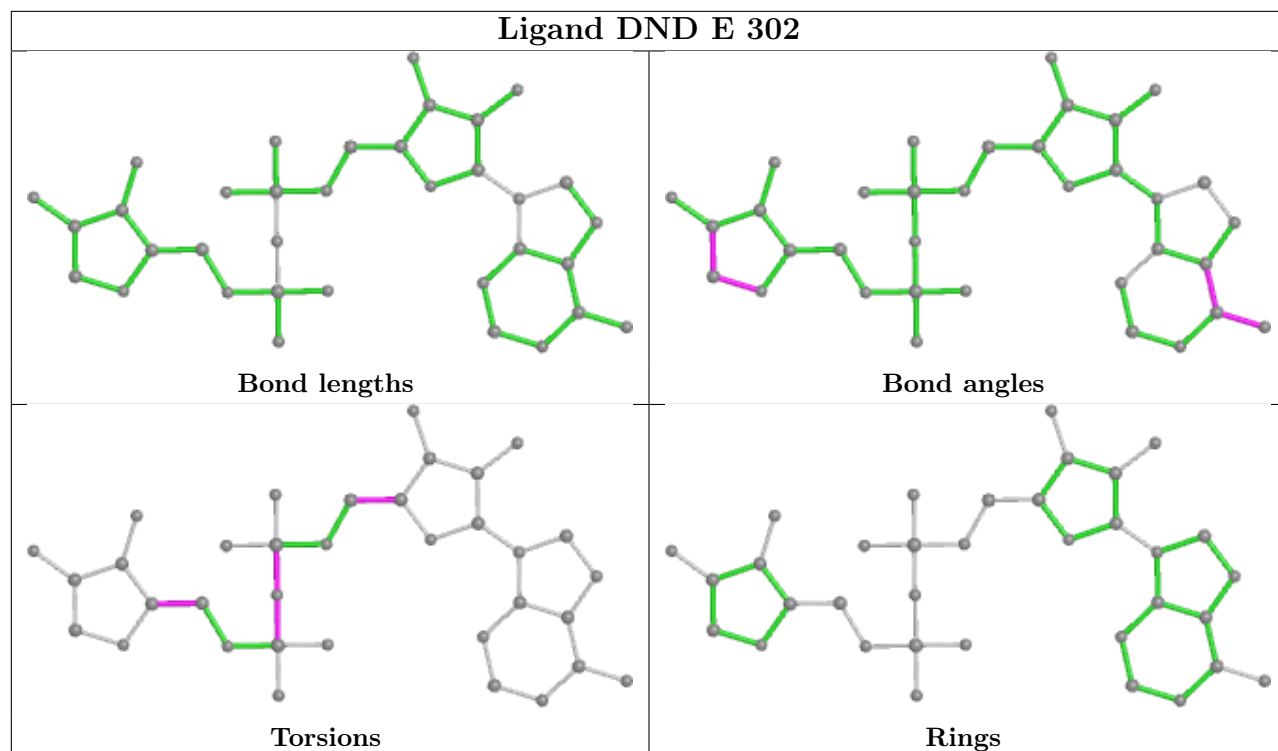
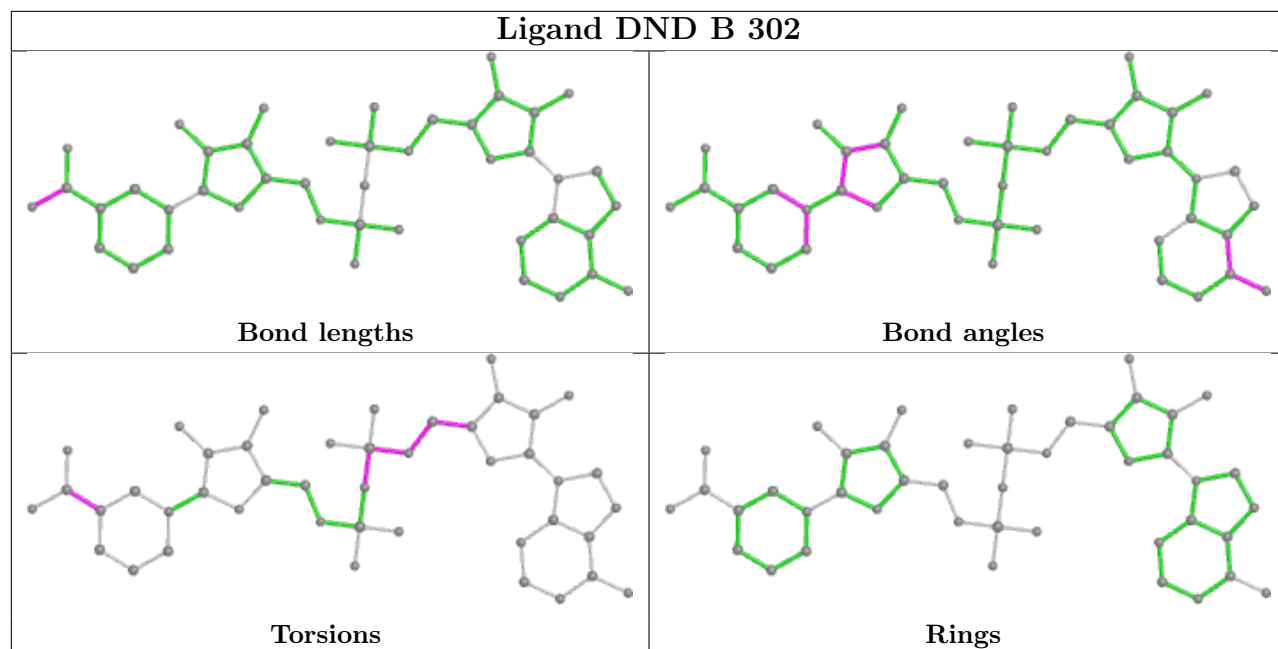
There are no ring outliers.

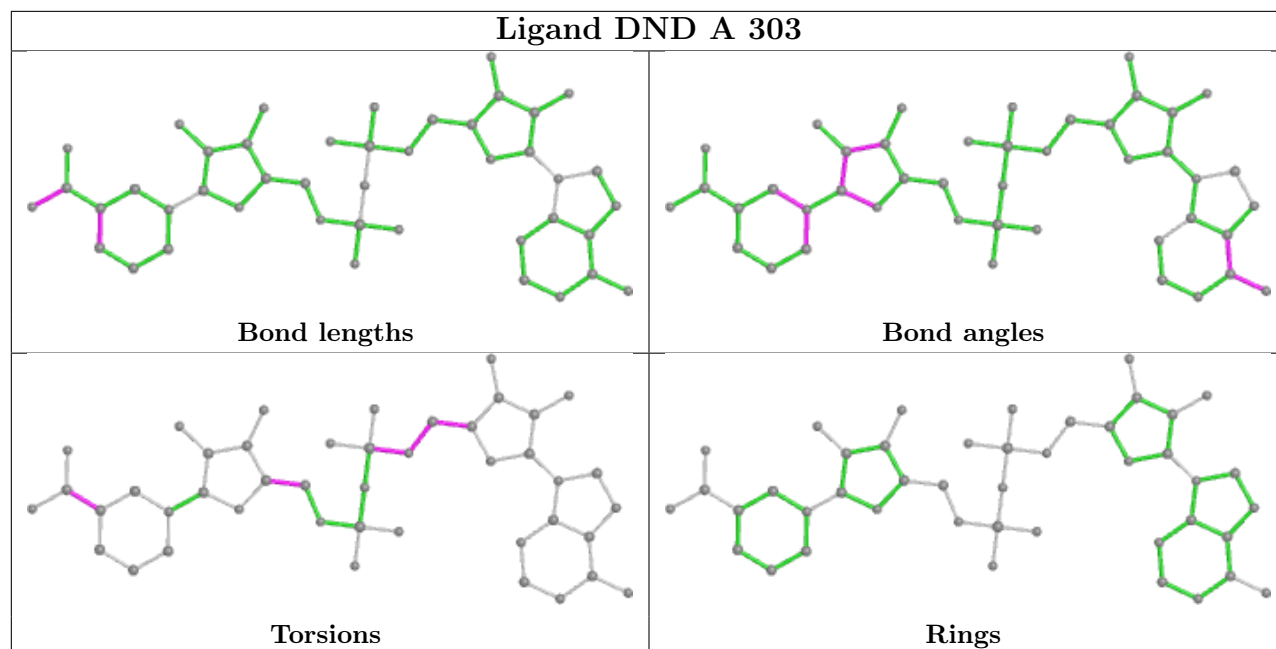
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	302	DND	1	0
3	A	303	DND	1	0

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







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	203/256 (79%)	-0.04	2 (0%) 82 67	38, 79, 174, 227	0
1	B	201/256 (78%)	0.01	4 (1%) 65 44	33, 69, 125, 190	0
1	C	198/256 (77%)	0.13	7 (3%) 44 23	37, 76, 184, 240	0
1	D	205/256 (80%)	0.33	16 (7%) 13 5	42, 90, 188, 209	0
1	E	191/256 (74%)	0.70	29 (15%) 2 1	117, 144, 192, 247	0
1	F	193/256 (75%)	0.95	40 (20%) 1 0	126, 171, 247, 274	0
All	All	1191/1536 (77%)	0.34	98 (8%) 11 4	33, 117, 198, 274	0

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	96	ALA	4.8
1	F	173	VAL	4.6
1	E	152	VAL	4.5
1	E	155	ALA	4.4
1	F	120	ALA	4.3
1	F	110	GLN	4.2
1	E	187	VAL	4.0
1	F	97	VAL	4.0
1	D	92	ALA	4.0
1	F	86	PHE	4.0
1	E	76	ILE	3.9
1	D	67	GLN	3.9
1	F	111	PRO	3.8
1	E	221	CYS	3.8
1	D	97	VAL	3.8
1	F	157	ILE	3.7
1	E	107	VAL	3.7
1	F	243	VAL	3.6
1	F	114	LYS	3.6

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Mol	Chain	Res	Type	RSRZ
1	D	96	ALA	3.5
1	F	76	ILE	3.5
1	F	104	CYS	3.4
1	C	221	CYS	3.4
1	F	141	THR	3.3
1	D	107	VAL	3.3
1	C	62	ILE	3.2
1	F	116	PRO	3.2
1	E	225	ILE	3.2
1	F	167	ILE	3.2
1	F	70	SER	3.2
1	F	85	LYS	3.1
1	D	249	TRP	3.1
1	E	236	ALA	3.1
1	F	75	PRO	3.1
1	C	55	ALA	3.1
1	F	160	LEU	3.1
1	D	79	THR	3.1
1	F	188	GLY	3.1
1	E	66	VAL	3.1
1	F	187	VAL	3.0
1	E	154	VAL	3.0
1	F	137	VAL	3.0
1	F	101	THR	3.0
1	F	119	ILE	2.9
1	D	62	ILE	2.9
1	E	141	THR	2.9
1	E	194	PRO	2.9
1	F	63	VAL	2.9
1	F	154	VAL	2.9
1	F	117	GLY	2.9
1	F	62	ILE	2.9
1	E	243	VAL	2.9
1	E	97	VAL	2.8
1	F	191	VAL	2.8
1	B	72	GLN	2.7
1	C	60	THR	2.7
1	F	67	GLN	2.7
1	F	106	THR	2.7
1	F	143	GLY	2.7
1	C	96	ALA	2.7
1	F	152	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	E	182	ALA	2.6
1	E	172	VAL	2.5
1	E	176	ILE	2.5
1	B	73	THR	2.5
1	E	156	GLY	2.5
1	E	108	GLY	2.5
1	F	115	THR	2.5
1	C	88	ALA	2.4
1	F	182	ALA	2.4
1	E	150	TYR	2.4
1	D	51	VAL	2.4
1	D	77	LEU	2.4
1	B	48	PHE	2.4
1	F	236	ALA	2.4
1	E	51	VAL	2.4
1	A	60	THR	2.4
1	E	137	VAL	2.4
1	D	90	GLN	2.4
1	D	49	PRO	2.4
1	B	107	VAL	2.3
1	F	94	PRO	2.3
1	E	190	LEU	2.3
1	C	54	GLY	2.3
1	F	123	THR	2.2
1	D	93	LEU	2.2
1	E	204	TYR	2.2
1	E	106	THR	2.2
1	E	224	GLY	2.2
1	F	153	GLY	2.2
1	E	149	VAL	2.1
1	D	104	CYS	2.1
1	A	95	THR	2.1
1	E	91	PRO	2.1
1	F	194	PRO	2.1
1	F	181	GLY	2.1
1	D	221[A]	CYS	2.0
1	D	106	THR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

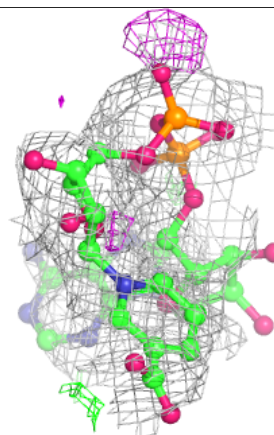
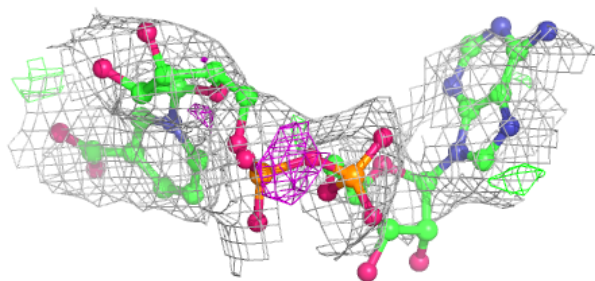
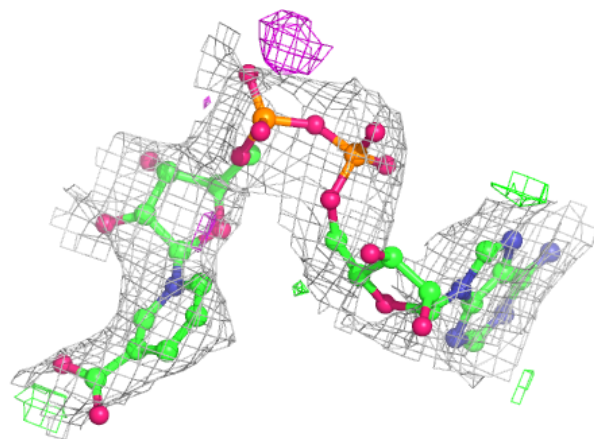
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	MG	C	301	1/1	0.74	0.19	118,118,118,118	0
2	MG	D	302	1/1	0.80	0.13	72,72,72,72	0
3	DND	B	302	44/44	0.82	0.27	82,111,144,151	8
3	DND	C	302	44/44	0.83	0.28	110,149,173,210	0
3	DND	D	303	44/44	0.84	0.49	134,164,201,206	0
3	DND	A	303	44/44	0.85	0.34	71,115,152,165	0
2	MG	A	302	1/1	0.86	0.13	77,77,77,77	0
3	DND	E	302	35/44	0.89	0.24	130,141,156,168	0
2	MG	A	301	1/1	0.91	0.09	116,116,116,116	0
2	MG	B	301	1/1	0.92	0.15	149,149,149,149	0
2	MG	E	301	1/1	0.94	0.07	167,167,167,167	0
2	MG	D	301	1/1	0.96	0.11	167,167,167,167	0

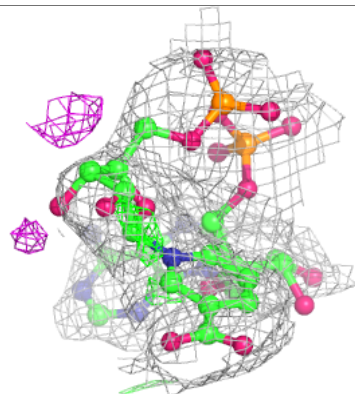
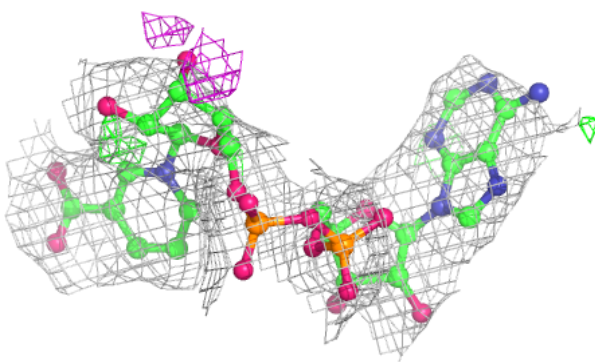
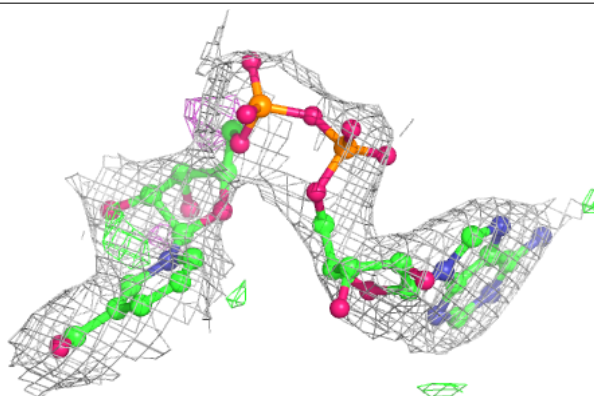
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around DND B 302:

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

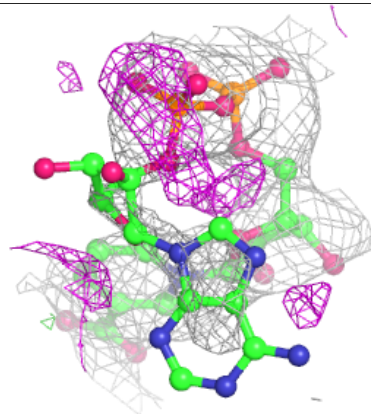
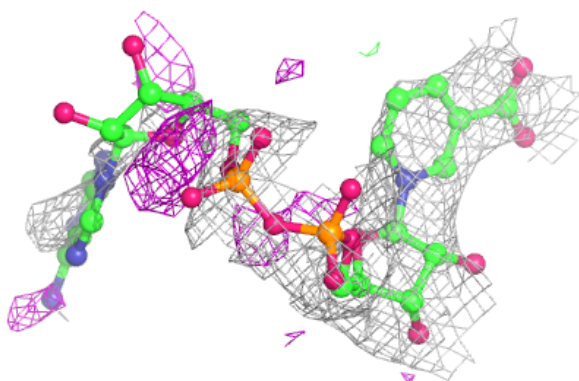
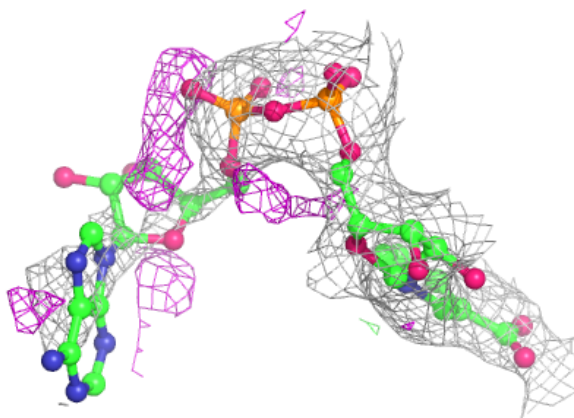
**Electron density around DND C 302:**

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



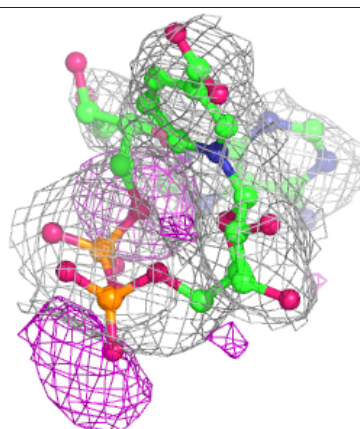
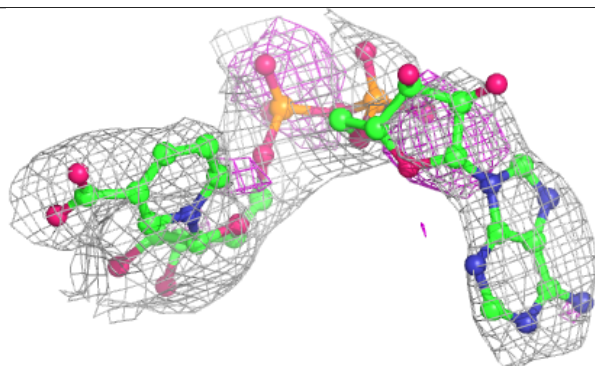
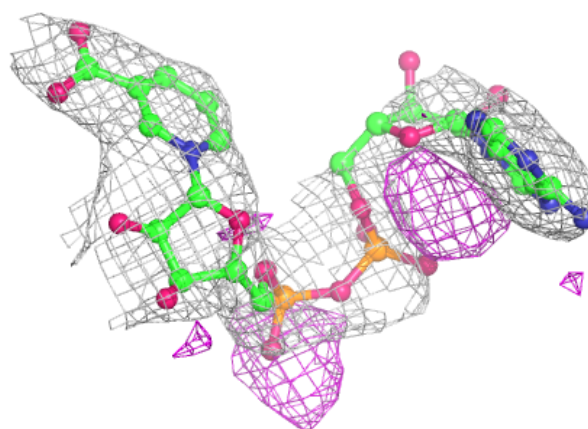
Electron density around DND D 303:

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

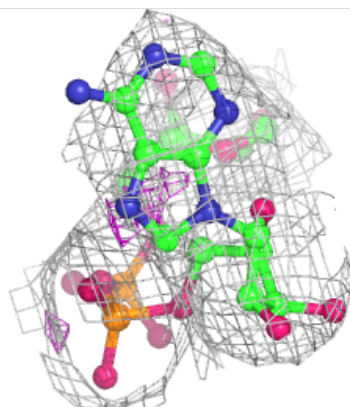
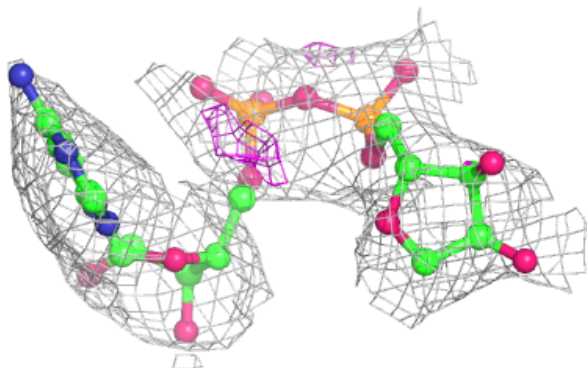
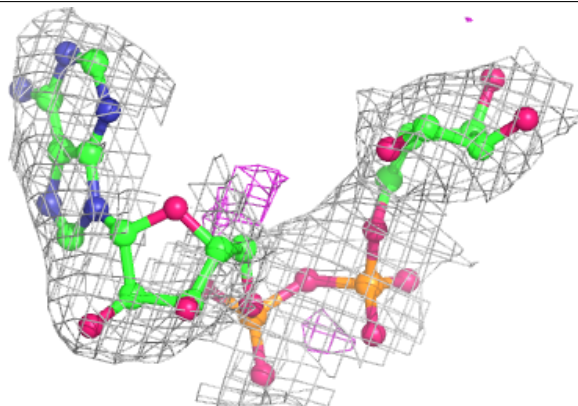


Electron density around DND A 303:

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

**Electron density around DND E 302:**

$2mF_o-DF_c$ (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.