



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2023 – 02:17 AM EDT

PDB ID : 7MNY
Title : Crystal Structure of Nup358/RanBP2 Ran-binding domain 3 in complex with Ran-GPPNHP
Authors : Bley, C.J.; Nie, S.; Mobbs, G.W.; Petrovic, S.; Gres, A.T.; Liu, X.; Mukherjee, S.; Harvey, S.; Huber, F.M.; Lin, D.H.; Brown, B.; Tang, A.W.; Rundlet, E.J.; Correia, A.R.; Chen, S.; Regmi, S.G.; Stevens, T.A.; Jette, C.A.; Dasso, M.; Patke, A.; Palazzo, A.F.; Kossiakoff, A.A.; Hoelz, A.
Deposited on : 2021-05-01
Resolution : 2.70 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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)

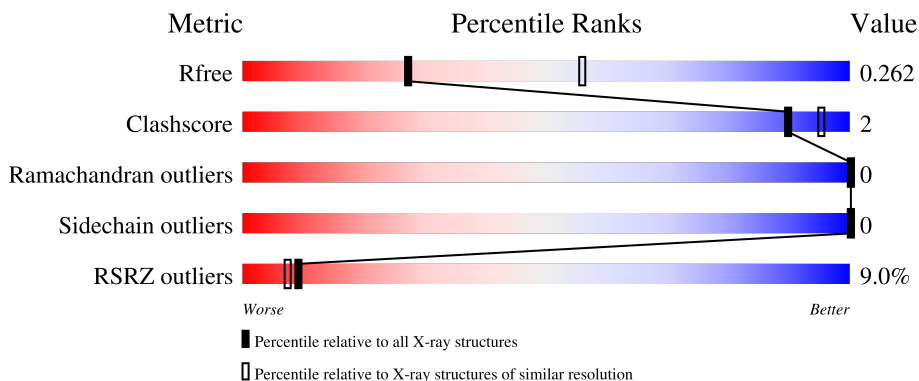
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	217	 3% 93%
1	C	217	 3% 89% 7%
1	E	217	 3% 90% 6%

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Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
 Validation Pipeline (wwPDB-VP) : 2.35.1

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Mol	Chain	Length	Quality of chain
1	G	217	<p>6% 91% 6% 6%</p>
1	I	217	<p>20% 88% 6% 6%</p>
1	K	217	<p>19% 92% 5% 5%</p>
2	B	141	<p>4% 88% 9% 9%</p>
2	D	141	<p>3% 91% 6% 6%</p>
2	F	141	<p>2% 82% 6% 13%</p>
2	H	141	<p>16% 88% 7% 5%</p>
2	J	141	<p>8% 84% 6% 9%</p>
2	L	141	<p>12% 86% 5% 9%</p>

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 32960 atoms, of which 16272 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 GTP-binding nuclear protein Ran.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	208	3331	1071	1668	284	302	6	0	0	0
1	C	202	3218	1039	1605	273	295	6	0	0	0
1	E	203	3257	1049	1630	280	292	6	0	0	0
1	G	205	3298	1063	1654	283	292	6	0	0	0
1	I	203	3244	1049	1618	278	293	6	0	0	0
1	K	206	3303	1067	1649	281	300	6	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	expression tag	UNP P62826
C	0	SER	-	expression tag	UNP P62826
E	0	SER	-	expression tag	UNP P62826
G	0	SER	-	expression tag	UNP P62826
I	0	SER	-	expression tag	UNP P62826
K	0	SER	-	expression tag	UNP P62826

- Molecule 2 is a protein called E3 SUMO-protein ligase RanBP2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	B	129	2122	668	1060	193	196	5	0	0	0
2	D	135	2212	700	1104	199	204	5	0	0	0
2	F	123	2022	635	1009	187	186	5	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O	S			
2	H	134	2202	697	1099	198	203	5	0	0	0
2	J	128	2107	663	1052	192	195	5	0	0	0
2	L	128	2107	663	1052	192	195	5	0	0	0

There are 36 discrepancies between the modelled and reference sequences:

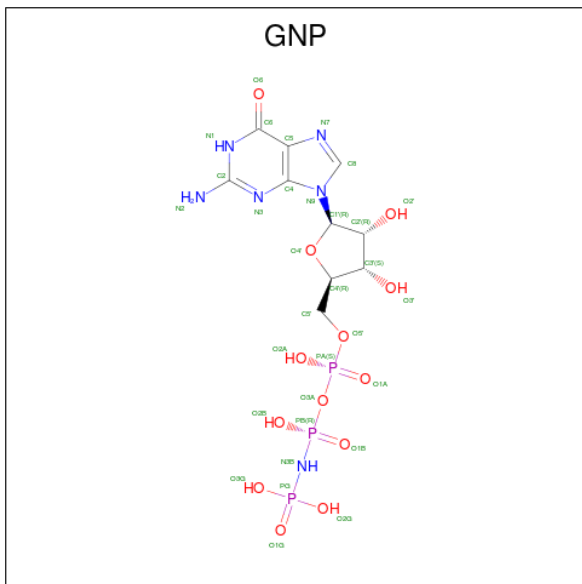
Chain	Residue	Modelled	Actual	Comment	Reference
B	2303	GLY	-	expression tag	UNP P49792
B	2304	PRO	-	expression tag	UNP P49792
B	2305	GLY	-	expression tag	UNP P49792
B	2306	SER	-	expression tag	UNP P49792
B	2442	ALA	-	expression tag	UNP P49792
B	2443	ALA	-	expression tag	UNP P49792
D	2303	GLY	-	expression tag	UNP P49792
D	2304	PRO	-	expression tag	UNP P49792
D	2305	GLY	-	expression tag	UNP P49792
D	2306	SER	-	expression tag	UNP P49792
D	2442	ALA	-	expression tag	UNP P49792
D	2443	ALA	-	expression tag	UNP P49792
F	2303	GLY	-	expression tag	UNP P49792
F	2304	PRO	-	expression tag	UNP P49792
F	2305	GLY	-	expression tag	UNP P49792
F	2306	SER	-	expression tag	UNP P49792
F	2442	ALA	-	expression tag	UNP P49792
F	2443	ALA	-	expression tag	UNP P49792
H	2303	GLY	-	expression tag	UNP P49792
H	2304	PRO	-	expression tag	UNP P49792
H	2305	GLY	-	expression tag	UNP P49792
H	2306	SER	-	expression tag	UNP P49792
H	2442	ALA	-	expression tag	UNP P49792
H	2443	ALA	-	expression tag	UNP P49792
J	2303	GLY	-	expression tag	UNP P49792
J	2304	PRO	-	expression tag	UNP P49792
J	2305	GLY	-	expression tag	UNP P49792
J	2306	SER	-	expression tag	UNP P49792
J	2442	ALA	-	expression tag	UNP P49792
J	2443	ALA	-	expression tag	UNP P49792
L	2303	GLY	-	expression tag	UNP P49792
L	2304	PRO	-	expression tag	UNP P49792

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Chain	Residue	Modelled	Actual	Comment	Reference
L	2305	GLY	-	expression tag	UNP P49792
L	2306	SER	-	expression tag	UNP P49792
L	2442	ALA	-	expression tag	UNP P49792
L	2443	ALA	-	expression tag	UNP P49792

- Molecule 3 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: C₁₀H₁₇N₆O₁₃P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	H	N	O			P
3	A	1	Total	C	H	N	O	P	0	0
			44	10	12	6	13	3		
3	C	1	Total	C	H	N	O	P	0	0
			44	10	12	6	13	3		
3	E	1	Total	C	H	N	O	P	0	0
			44	10	12	6	13	3		
3	G	1	Total	C	H	N	O	P	0	0
			44	10	12	6	13	3		
3	I	1	Total	C	H	N	O	P	0	0
			44	10	12	6	13	3		
3	K	1	Total	C	H	N	O	P	0	0
			44	10	12	6	13	3		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Mg 1 1	0	0
4	C	1	Total Mg 1 1	0	0
4	E	1	Total Mg 1 1	0	0
4	G	1	Total Mg 1 1	0	0
4	I	1	Total Mg 1 1	0	0
4	K	1	Total Mg 1 1	0	0

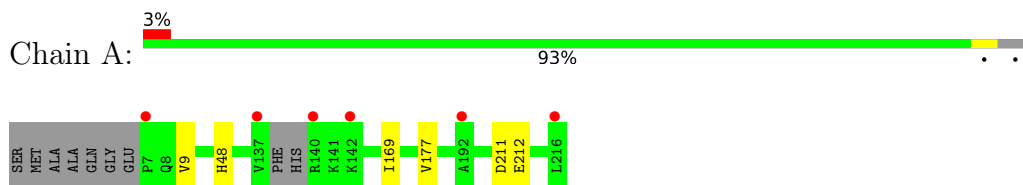
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	59	Total O 59 59	0	0
5	B	22	Total O 22 22	0	0
5	C	35	Total O 35 35	0	0
5	D	49	Total O 49 49	0	0
5	E	24	Total O 24 24	0	0
5	F	15	Total O 15 15	0	0
5	G	25	Total O 25 25	0	0
5	H	6	Total O 6 6	0	0
5	I	11	Total O 11 11	0	0
5	J	7	Total O 7 7	0	0
5	K	11	Total O 11 11	0	0
5	L	3	Total O 3 3	0	0

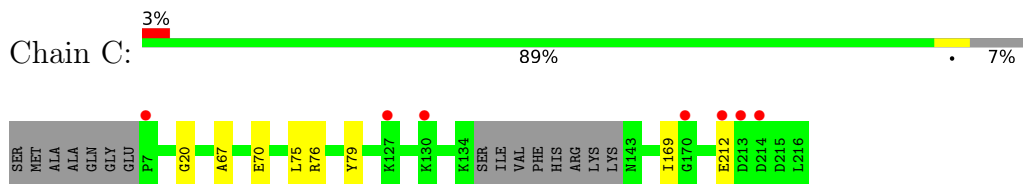
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

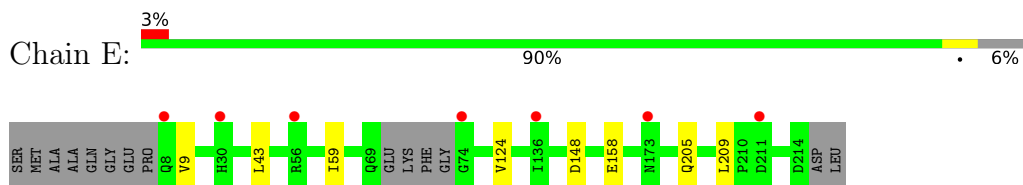
- Molecule 1: GTP-binding nuclear protein Ran



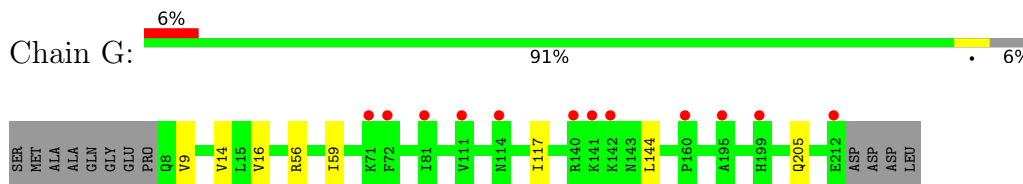
- Molecule 1: GTP-binding nuclear protein Ran



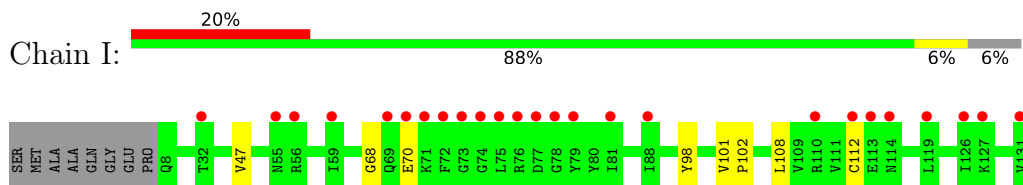
- Molecule 1: GTP-binding nuclear protein Ran

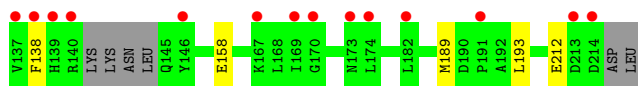


- Molecule 1: GTP-binding nuclear protein Ran

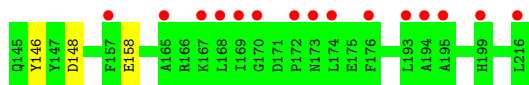
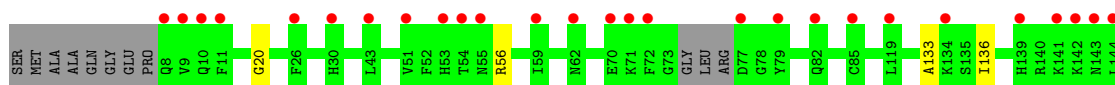
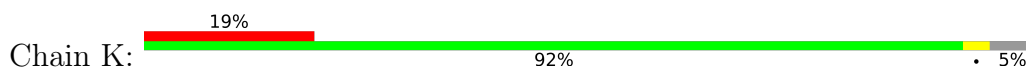


- Molecule 1: GTP-binding nuclear protein Ran

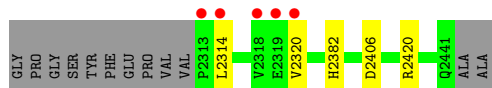
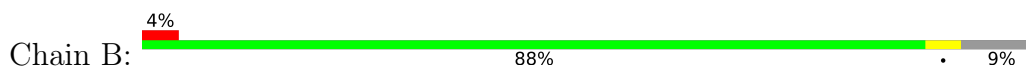




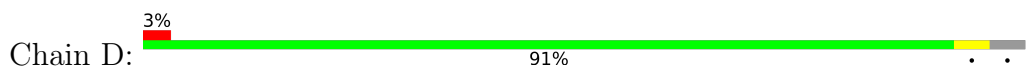
- Molecule 1: GTP-binding nuclear protein Ran



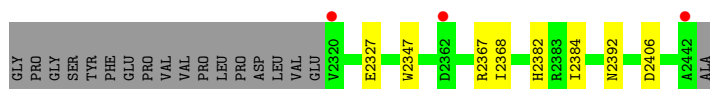
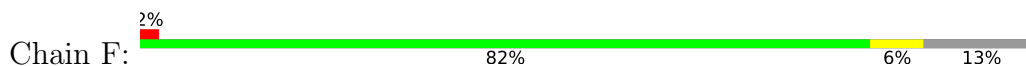
- Molecule 2: E3 SUMO-protein ligase RanBP2



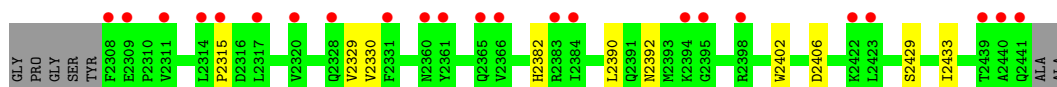
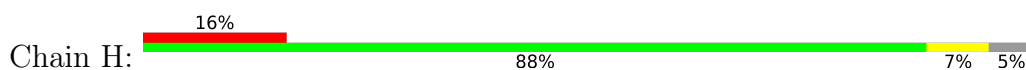
- Molecule 2: E3 SUMO-protein ligase RanBP2



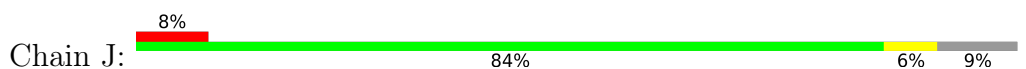
- Molecule 2: E3 SUMO-protein ligase RanBP2

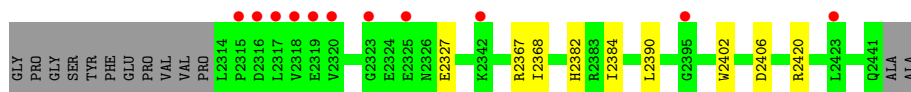


- Molecule 2: E3 SUMO-protein ligase RanBP2

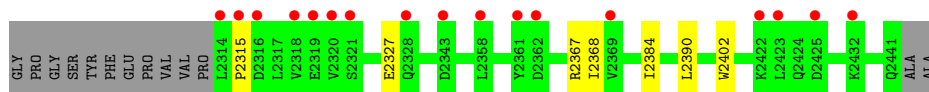
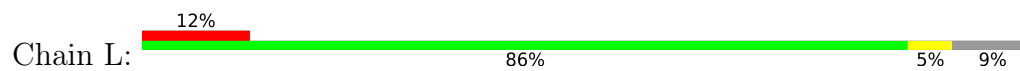


- Molecule 2: E3 SUMO-protein ligase RanBP2





- Molecule 2: E3 SUMO-protein ligase RanBP2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	110.20Å 136.03Å 158.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.93 – 2.70 29.93 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.93-2.70) 100.0 (29.93-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.38 (at 2.68Å)	Xtrriage
Refinement program	PHENIX 1.18.2	Depositor
R, R_{free}	0.214 , 0.262 0.214 , 0.262	Depositor DCC
R_{free} test set	3311 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	58.4	Xtrriage
Anisotropy	0.442	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 45.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	32960	wwPDB-VP
Average B, all atoms (Å ²)	84.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.36% 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: MG, GNP

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	0.27	0/1702	0.46	0/2306
1	C	0.27	0/1652	0.45	0/2241
1	E	0.26	0/1666	0.45	0/2260
1	G	0.27	0/1685	0.43	0/2285
1	I	0.27	0/1666	0.42	0/2260
1	K	0.26	0/1694	0.42	0/2296
2	B	0.26	0/1081	0.45	0/1453
2	D	0.26	0/1129	0.45	0/1521
2	F	0.26	0/1030	0.45	0/1382
2	H	0.26	0/1124	0.43	0/1514
2	J	0.25	0/1073	0.43	0/1442
2	L	0.25	0/1073	0.43	0/1442
All	All	0.26	0/16575	0.44	0/22402

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	1663	1668	1668	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1613	1605	1604	6	0
1	E	1627	1630	1630	7	0
1	G	1644	1654	1654	6	0
1	I	1626	1618	1618	9	0
1	K	1654	1649	1649	5	0
2	B	1062	1060	1060	8	0
2	D	1108	1104	1104	4	0
2	F	1013	1009	1009	5	0
2	H	1103	1099	1099	7	0
2	J	1055	1052	1052	5	0
2	L	1055	1052	1052	4	0
3	A	32	12	13	0	0
3	C	32	12	13	1	0
3	E	32	12	13	0	0
3	G	32	12	13	0	0
3	I	32	12	13	1	0
3	K	32	12	13	1	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
4	E	1	0	0	0	0
4	G	1	0	0	0	0
4	I	1	0	0	0	0
4	K	1	0	0	0	0
5	A	59	0	0	1	0
5	B	22	0	0	0	0
5	C	35	0	0	0	0
5	D	49	0	0	0	0
5	E	24	0	0	0	0
5	F	15	0	0	0	0
5	G	25	0	0	0	0
5	H	6	0	0	0	0
5	I	11	0	0	0	0
5	J	7	0	0	0	0
5	K	11	0	0	0	0
5	L	3	0	0	0	0
All	All	16688	16272	16277	59	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 2.

All (59) 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:L:2368:ILE:HG13	2:L:2384:ILE:HD11	1.68	0.75
2:J:2368:ILE:HG13	2:J:2384:ILE:HD11	1.69	0.74
1:C:212:GLU:OE1	2:D:2420:ARG:NH2	2.22	0.72
1:I:212:GLU:OE1	2:J:2420:ARG:NH2	2.23	0.72
2:L:2327:GLU:OE2	2:L:2367:ARG:NH2	2.26	0.67
2:H:2429:SER:O	2:H:2433:ILE:HG22	2.00	0.62
1:K:56:ARG:NH2	2:L:2315:PRO:O	2.34	0.61
1:G:205:GLN:NE2	2:H:2392:ASN:O	2.36	0.59
1:A:211:ASP:OD1	2:B:2420:ARG:NH1	2.36	0.59
1:A:9:VAL:HG21	2:B:2314:LEU:HD13	1.85	0.57
1:A:212:GLU:OE1	2:B:2420:ARG:NH2	2.39	0.56
1:G:9:VAL:HG11	1:G:59:ILE:HG22	1.87	0.56
1:K:20:GLY:H	3:K:301:GNP:HNB3	1.56	0.53
1:C:75:LEU:HD13	1:C:79:TYR:CZ	2.43	0.53
2:L:2390:LEU:HD23	2:L:2402:TRP:HB3	1.92	0.52
1:C:67:ALA:O	1:C:76:ARG:NH1	2.42	0.52
1:E:209:LEU:HD23	2:F:2347:TRP:CG	2.44	0.52
1:K:146:TYR:OH	1:K:148:ASP:OD1	2.25	0.52
1:I:189:MET:SD	1:I:193:LEU:HD23	2.50	0.51
1:E:205:GLN:NE2	2:F:2392:ASN:O	2.43	0.51
2:J:2390:LEU:HD23	2:J:2402:TRP:HB3	1.93	0.51
1:G:56:ARG:NH1	2:H:2315:PRO:O	2.44	0.50
1:I:68:GLY:N	3:I:301:GNP:O3G	2.45	0.50
1:E:124:VAL:HG11	1:E:148:ASP:HB3	1.93	0.50
1:E:158:GLU:OE1	1:E:158:GLU:N	2.39	0.50
1:G:117:ILE:HB	1:G:144:LEU:HD22	1.94	0.48
2:H:2329:VAL:O	2:H:2329:VAL:HG23	2.14	0.48
2:H:2330:VAL:HB	2:H:2433:ILE:HD11	1.96	0.48
1:G:9:VAL:CG1	1:G:59:ILE:HG22	2.44	0.47
2:H:2382:HIS:HB3	2:H:2406:ASP:HA	1.97	0.47
1:A:48:HIS:ND1	5:A:402:HOH:O	2.36	0.47
2:D:2365:GLN:OE1	2:D:2383:ARG:NH2	2.49	0.46
2:J:2327:GLU:OE2	2:J:2367:ARG:NH2	2.48	0.46
1:C:70:GLU:OE1	1:C:70:GLU:N	2.43	0.45
2:F:2382:HIS:HB3	2:F:2406:ASP:HA	1.98	0.45
2:D:2382:HIS:HB3	2:D:2406:ASP:HA	1.99	0.45
1:I:47:VAL:O	1:I:47:VAL:HG23	2.17	0.45
2:B:2382:HIS:HB3	2:B:2406:ASP:HA	1.99	0.45
1:I:98:TYR:HA	1:I:101:VAL:HG23	1.99	0.45
2:H:2390:LEU:HD23	2:H:2402:TRP:HB3	1.98	0.44
1:A:169:ILE:HD12	2:B:2314:LEU:HD22	2.00	0.44
1:I:70:GLU:N	1:I:70:GLU:OE1	2.50	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:169:ILE:HG23	2:D:2315:PRO:HD2	2.00	0.43
1:E:43:LEU:C	1:E:43:LEU:HD23	2.39	0.43
1:K:133:ALA:HA	1:K:136:ILE:HD12	2.00	0.43
1:K:158:GLU:OE1	1:K:158:GLU:N	2.47	0.43
1:E:9:VAL:HG11	1:E:59:ILE:HG22	2.00	0.42
1:I:158:GLU:OE1	1:I:158:GLU:N	2.39	0.42
1:I:102:PRO:HA	1:I:138:PHE:CZ	2.55	0.42
2:F:2327:GLU:OE2	2:F:2367:ARG:NH2	2.43	0.41
1:A:177:VAL:HB	2:B:2320:VAL:HG11	2.01	0.41
1:A:177:VAL:HG21	2:B:2320:VAL:HG11	2.02	0.41
1:A:9:VAL:HG21	2:B:2314:LEU:CD1	2.50	0.41
1:C:20:GLY:H	3:C:301:GNP:HNB3	1.68	0.41
2:F:2368:ILE:HD12	2:F:2384:ILE:HD11	2.02	0.41
2:J:2382:HIS:HB3	2:J:2406:ASP:HA	2.03	0.41
1:E:9:VAL:CG1	1:E:59:ILE:HG22	2.51	0.40
1:G:14:VAL:HG12	1:G:16:VAL:HG13	2.04	0.40
1:I:108:LEU:O	1:I:112:CYS:N	2.46	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	204/217 (94%)	201 (98%)	3 (2%)	0	100	100
1	C	198/217 (91%)	194 (98%)	4 (2%)	0	100	100
1	E	199/217 (92%)	197 (99%)	2 (1%)	0	100	100
1	G	203/217 (94%)	200 (98%)	3 (2%)	0	100	100
1	I	199/217 (92%)	196 (98%)	3 (2%)	0	100	100
1	K	202/217 (93%)	197 (98%)	5 (2%)	0	100	100
2	B	127/141 (90%)	122 (96%)	5 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	D	133/141 (94%)	131 (98%)	2 (2%)	0	100	100
2	F	121/141 (86%)	119 (98%)	2 (2%)	0	100	100
2	H	132/141 (94%)	128 (97%)	4 (3%)	0	100	100
2	J	126/141 (89%)	123 (98%)	3 (2%)	0	100	100
2	L	126/141 (89%)	123 (98%)	3 (2%)	0	100	100
All	All	1970/2148 (92%)	1931 (98%)	39 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	180/186 (97%)	180 (100%)	0	100	100
1	C	174/186 (94%)	174 (100%)	0	100	100
1	E	176/186 (95%)	176 (100%)	0	100	100
1	G	177/186 (95%)	177 (100%)	0	100	100
1	I	175/186 (94%)	175 (100%)	0	100	100
1	K	179/186 (96%)	179 (100%)	0	100	100
2	B	115/123 (94%)	115 (100%)	0	100	100
2	D	120/123 (98%)	120 (100%)	0	100	100
2	F	108/123 (88%)	108 (100%)	0	100	100
2	H	120/123 (98%)	120 (100%)	0	100	100
2	J	114/123 (93%)	114 (100%)	0	100	100
2	L	114/123 (93%)	114 (100%)	0	100	100
All	All	1752/1854 (94%)	1752 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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, 6 are monoatomic - leaving 6 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	GNP	I	301	4	29,34,34	1.43	4 (13%)	33,54,54	2.50	7 (21%)
3	GNP	K	301	4	29,34,34	1.45	4 (13%)	33,54,54	2.56	9 (27%)
3	GNP	E	301	4	29,34,34	1.46	4 (13%)	33,54,54	2.43	9 (27%)
3	GNP	C	301	4	29,34,34	1.45	4 (13%)	33,54,54	2.51	7 (21%)
3	GNP	A	301	4	29,34,34	1.42	4 (13%)	33,54,54	2.44	7 (21%)
3	GNP	G	301	4	29,34,34	1.45	4 (13%)	33,54,54	2.44	7 (21%)

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	GNP	I	301	4	-	3/14/38/38	0/3/3/3
3	GNP	K	301	4	-	4/14/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GNP	E	301	4	-	3/14/38/38	0/3/3/3
3	GNP	C	301	4	-	4/14/38/38	0/3/3/3
3	GNP	A	301	4	-	3/14/38/38	0/3/3/3
3	GNP	G	301	4	-	3/14/38/38	0/3/3/3

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	301	GNP	C6-N1	4.15	1.40	1.33
3	K	301	GNP	C6-N1	4.15	1.40	1.33
3	I	301	GNP	C6-N1	4.13	1.40	1.33
3	E	301	GNP	C6-N1	4.10	1.40	1.33
3	C	301	GNP	C6-N1	4.08	1.40	1.33
3	G	301	GNP	C6-N1	4.02	1.40	1.33
3	K	301	GNP	PG-O1G	3.85	1.52	1.46
3	C	301	GNP	PG-O1G	3.71	1.52	1.46
3	E	301	GNP	PG-O1G	3.70	1.52	1.46
3	G	301	GNP	PG-O1G	3.67	1.52	1.46
3	I	301	GNP	PG-O1G	3.62	1.51	1.46
3	A	301	GNP	PG-O1G	3.45	1.51	1.46
3	E	301	GNP	PB-O1B	2.68	1.50	1.46
3	K	301	GNP	PB-O1B	2.52	1.50	1.46
3	I	301	GNP	PB-O1B	2.45	1.50	1.46
3	C	301	GNP	PB-O1B	2.38	1.49	1.46
3	C	301	GNP	PB-O2B	-2.35	1.50	1.56
3	G	301	GNP	PB-O1B	2.35	1.49	1.46
3	K	301	GNP	PB-O2B	-2.29	1.50	1.56
3	A	301	GNP	PB-O2B	-2.28	1.50	1.56
3	A	301	GNP	PB-O1B	2.24	1.49	1.46
3	G	301	GNP	PB-O2B	-2.21	1.50	1.56
3	E	301	GNP	PB-O2B	-2.14	1.51	1.56
3	I	301	GNP	PB-O2B	-2.06	1.51	1.56

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	301	GNP	C5-C6-N1	-9.21	110.84	123.43
3	G	301	GNP	C5-C6-N1	-9.14	110.93	123.43
3	I	301	GNP	C5-C6-N1	-9.04	111.06	123.43
3	C	301	GNP	C5-C6-N1	-9.01	111.11	123.43
3	K	301	GNP	C5-C6-N1	-8.94	111.20	123.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	301	GNP	C5-C6-N1	-8.79	111.42	123.43
3	K	301	GNP	C2-N1-C6	6.39	126.09	115.93
3	G	301	GNP	C2-N1-C6	6.36	126.03	115.93
3	C	301	GNP	C2-N1-C6	6.34	126.01	115.93
3	I	301	GNP	C2-N1-C6	6.28	125.92	115.93
3	E	301	GNP	C2-N1-C6	6.17	125.73	115.93
3	A	301	GNP	C2-N1-C6	6.12	125.66	115.93
3	A	301	GNP	O1G-PG-N3B	-4.17	105.63	111.77
3	I	301	GNP	O2B-PB-O1B	4.08	118.48	109.92
3	C	301	GNP	O2B-PB-O1B	4.08	118.47	109.92
3	K	301	GNP	O2B-PB-O1B	3.96	118.21	109.92
3	I	301	GNP	O1G-PG-N3B	-3.95	105.96	111.77
3	G	301	GNP	O1G-PG-N3B	-3.88	106.05	111.77
3	A	301	GNP	O2B-PB-O1B	3.79	117.87	109.92
3	K	301	GNP	O1G-PG-N3B	-3.77	106.22	111.77
3	E	301	GNP	O2B-PB-O1B	3.74	117.75	109.92
3	C	301	GNP	O1G-PG-N3B	-3.71	106.31	111.77
3	A	301	GNP	O2G-PG-O1G	-3.63	104.34	113.45
3	K	301	GNP	N3-C2-N1	-3.61	122.41	127.22
3	C	301	GNP	O2G-PG-O1G	-3.54	104.56	113.45
3	K	301	GNP	O2G-PG-O1G	-3.52	104.61	113.45
3	A	301	GNP	N3-C2-N1	-3.48	122.58	127.22
3	I	301	GNP	N3-C2-N1	-3.47	122.60	127.22
3	C	301	GNP	N3-C2-N1	-3.40	122.68	127.22
3	E	301	GNP	O2G-PG-O1G	-3.36	105.00	113.45
3	G	301	GNP	N3-C2-N1	-3.36	122.75	127.22
3	G	301	GNP	O2B-PB-O1B	3.32	116.88	109.92
3	I	301	GNP	O2G-PG-O1G	-3.29	105.18	113.45
3	E	301	GNP	N3-C2-N1	-3.15	123.02	127.22
3	E	301	GNP	C2-N3-C4	-2.99	111.94	115.36
3	G	301	GNP	C2-N3-C4	-2.80	112.16	115.36
3	C	301	GNP	C2-N3-C4	-2.70	112.27	115.36
3	I	301	GNP	C2-N3-C4	-2.65	112.33	115.36
3	K	301	GNP	C2-N3-C4	-2.63	112.35	115.36
3	G	301	GNP	O2G-PG-O1G	-2.63	106.84	113.45
3	E	301	GNP	O1G-PG-N3B	-2.60	107.94	111.77
3	K	301	GNP	O1B-PB-N3B	2.48	115.42	111.77
3	A	301	GNP	C2-N3-C4	-2.25	112.78	115.36
3	E	301	GNP	C4-C5-N7	2.03	111.52	109.40
3	K	301	GNP	O3A-PB-N3B	-2.03	100.97	106.59
3	E	301	GNP	O3A-PB-N3B	-2.02	101.00	106.59

There are no chirality outliers.

All (20) torsion outliers are listed below:

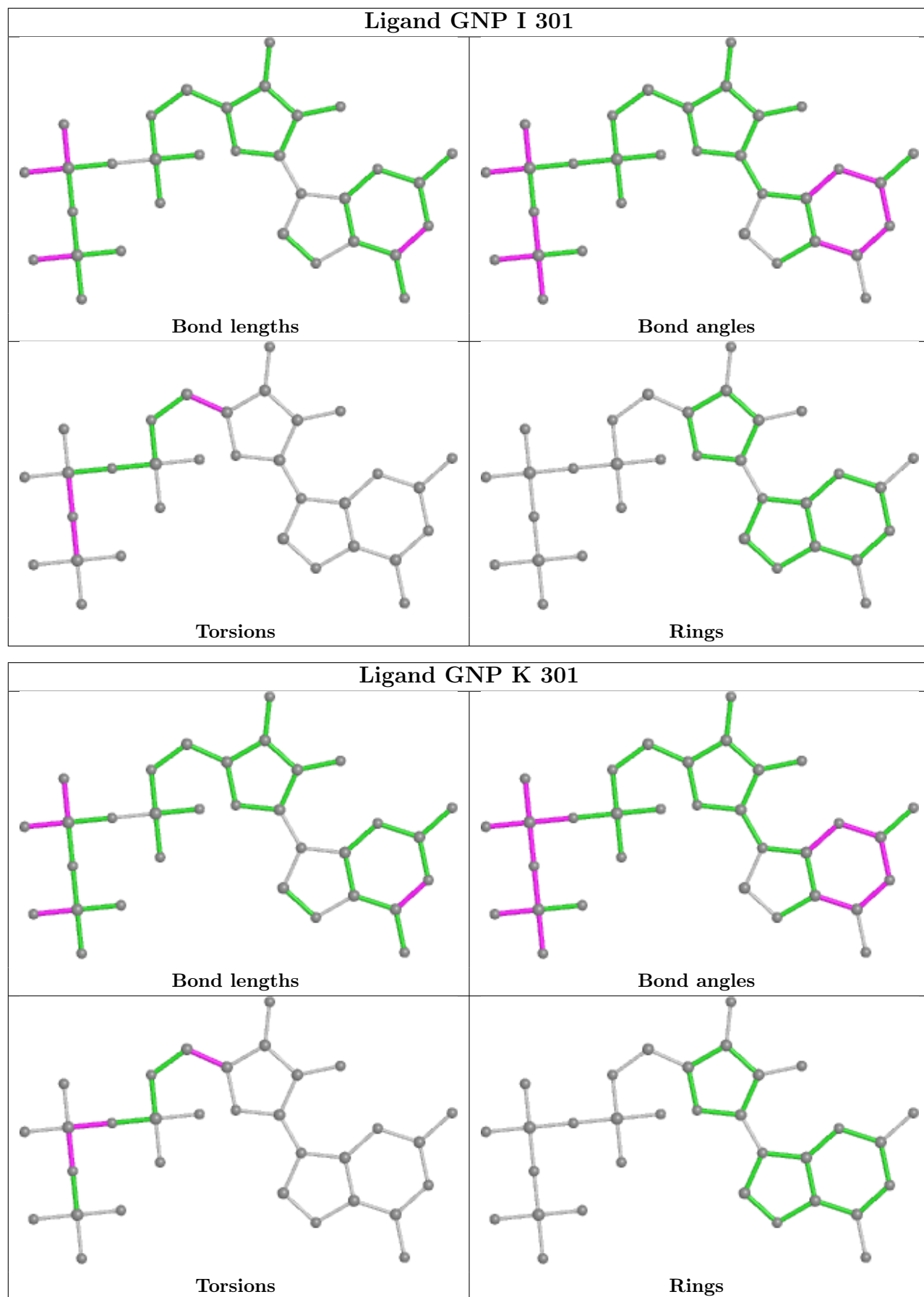
Mol	Chain	Res	Type	Atoms
3	A	301	GNP	PB-N3B-PG-O1G
3	A	301	GNP	PG-N3B-PB-O1B
3	C	301	GNP	PG-N3B-PB-O1B
3	C	301	GNP	PA-O3A-PB-O1B
3	C	301	GNP	PA-O3A-PB-O2B
3	E	301	GNP	PG-N3B-PB-O1B
3	E	301	GNP	PA-O3A-PB-O1B
3	E	301	GNP	PA-O3A-PB-O2B
3	G	301	GNP	PG-N3B-PB-O1B
3	G	301	GNP	PA-O3A-PB-O1B
3	G	301	GNP	PA-O3A-PB-O2B
3	I	301	GNP	PB-N3B-PG-O1G
3	I	301	GNP	PG-N3B-PB-O1B
3	K	301	GNP	PG-N3B-PB-O1B
3	K	301	GNP	PA-O3A-PB-O1B
3	K	301	GNP	PA-O3A-PB-O2B
3	C	301	GNP	O4'-C4'-C5'-O5'
3	K	301	GNP	O4'-C4'-C5'-O5'
3	A	301	GNP	O4'-C4'-C5'-O5'
3	I	301	GNP	O4'-C4'-C5'-O5'

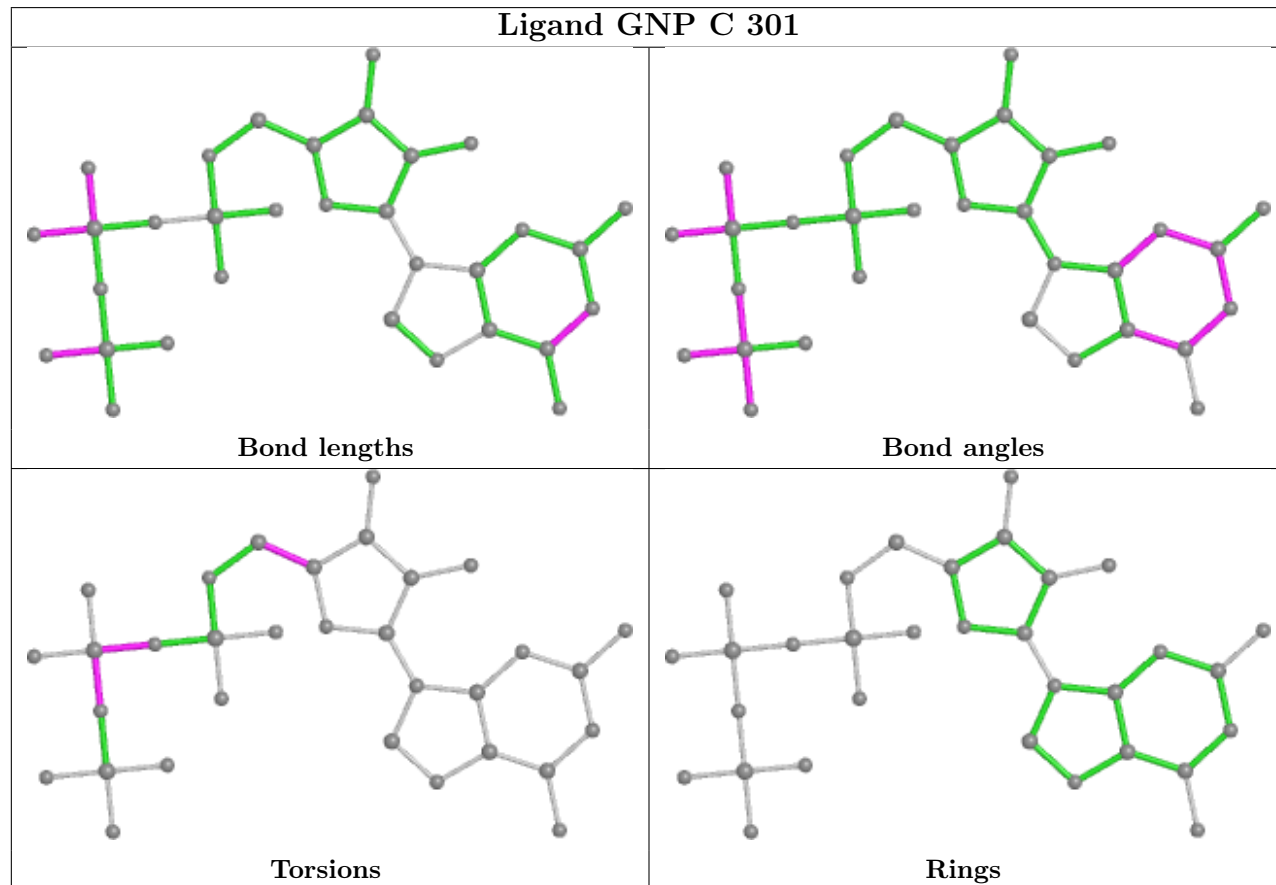
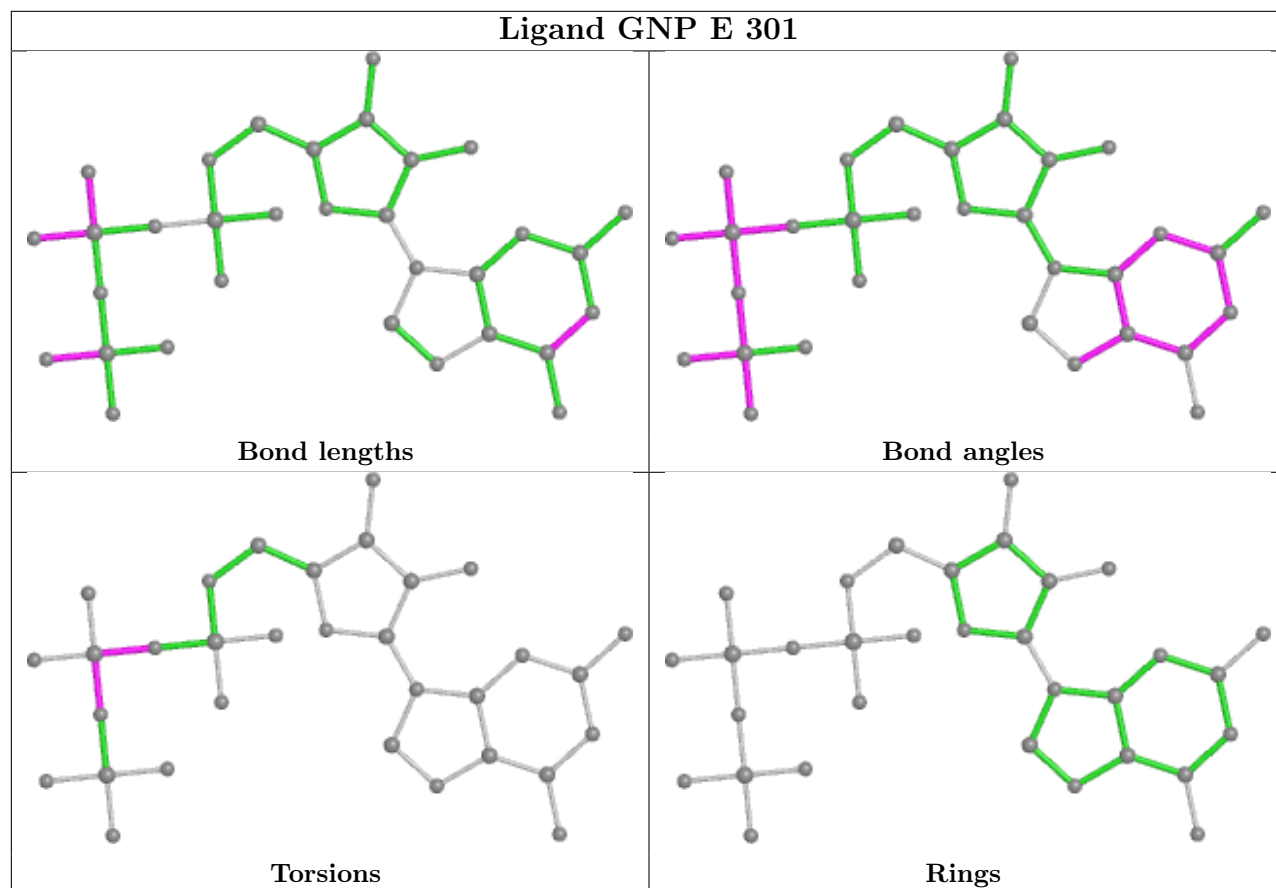
There are no ring outliers.

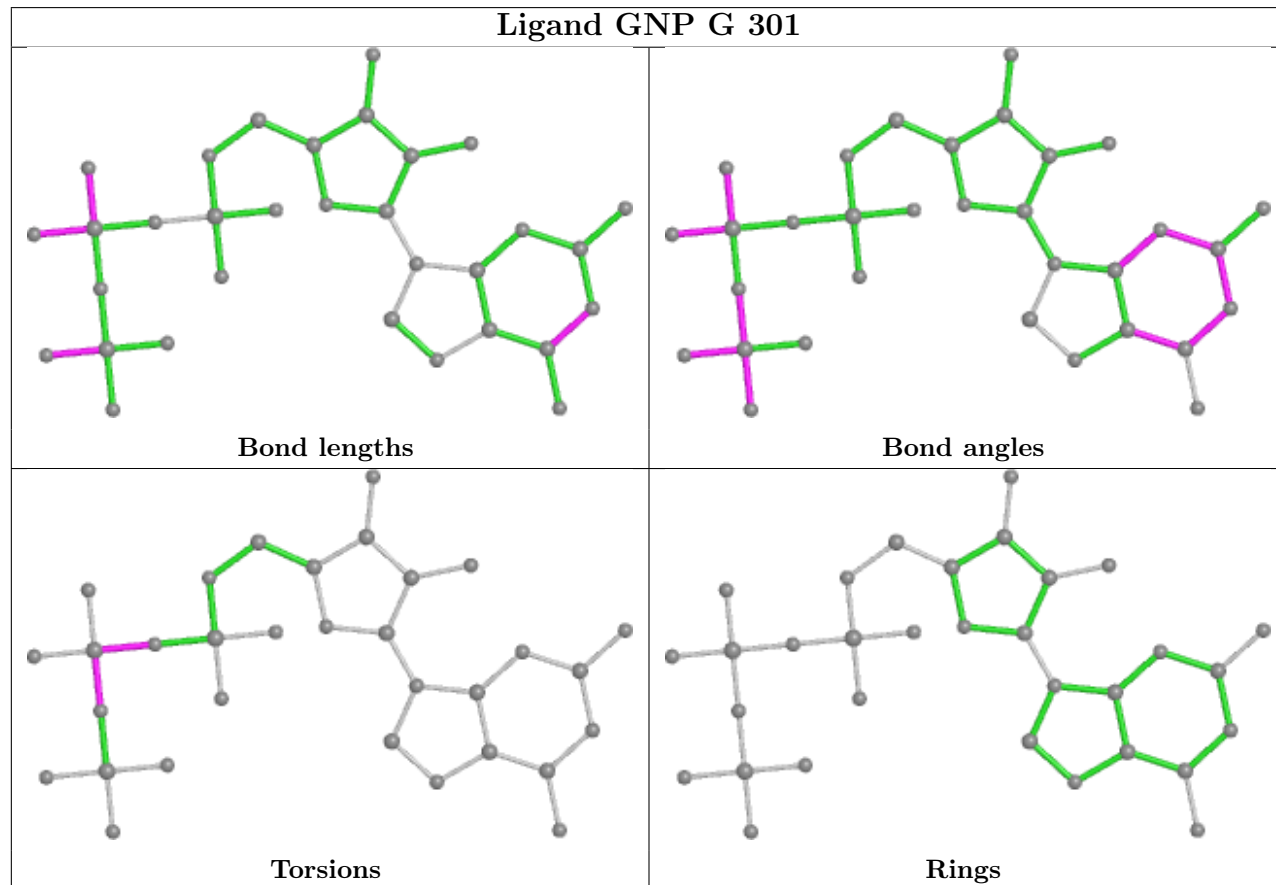
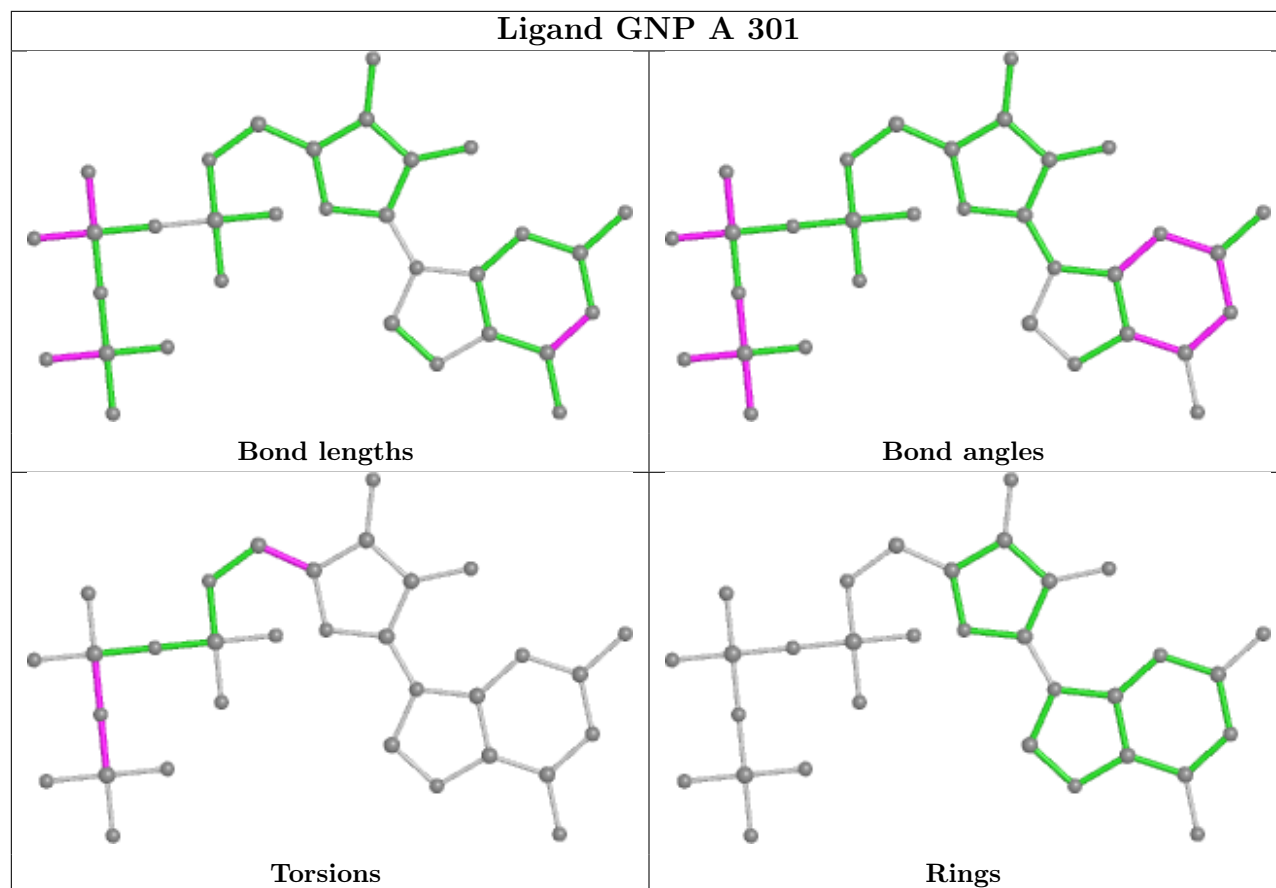
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	I	301	GNP	1	0
3	K	301	GNP	1	0
3	C	301	GNP	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	208/217 (95%)	0.28	6 (2%) 51 52	36, 52, 100, 134	0
1	C	202/217 (93%)	0.18	7 (3%) 44 44	39, 56, 107, 132	0
1	E	203/217 (93%)	0.37	7 (3%) 45 45	45, 64, 100, 135	0
1	G	205/217 (94%)	0.36	12 (5%) 22 21	40, 68, 114, 157	0
1	I	203/217 (93%)	1.25	44 (21%) 0 0	53, 95, 158, 182	0
1	K	206/217 (94%)	1.17	42 (20%) 1 0	55, 96, 148, 166	0
2	B	129/141 (91%)	0.19	5 (3%) 39 38	42, 58, 102, 132	0
2	D	135/141 (95%)	0.20	4 (2%) 50 51	37, 48, 93, 118	0
2	F	123/141 (87%)	0.28	3 (2%) 59 60	47, 61, 92, 118	0
2	H	134/141 (95%)	0.89	23 (17%) 1 1	55, 95, 137, 166	0
2	J	128/141 (90%)	0.64	11 (8%) 10 8	55, 78, 125, 158	0
2	L	128/141 (90%)	0.92	17 (13%) 3 2	66, 95, 133, 155	0
All	All	2004/2148 (93%)	0.57	181 (9%) 9 7	36, 71, 130, 182	0

All (181) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	I	73	GLY	15.3
1	I	74	GLY	13.8
1	I	169	ILE	7.4
1	K	169	ILE	7.3
1	I	114	ASN	6.6
1	K	174	LEU	6.4
1	K	172	PRO	6.2
2	J	2316	ASP	6.2
1	K	9	VAL	5.6
2	L	2423	LEU	5.6
1	I	79	TYR	5.6

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Mol	Chain	Res	Type	RSRZ
1	I	76	ARG	5.5
1	I	135	SER	5.4
1	C	7	PRO	5.1
1	A	140	ARG	5.0
1	I	170	GLY	5.0
1	K	144	LEU	5.0
1	I	72	PHE	5.0
1	I	136	ILE	4.9
1	K	143	ASN	4.9
2	J	2320	VAL	4.8
2	F	2320	VAL	4.7
2	J	2315	PRO	4.7
1	I	81	ILE	4.6
2	J	2319	GLU	4.4
1	K	199	HIS	4.4
2	H	2320	VAL	4.4
2	B	2314	LEU	4.4
1	I	137	VAL	4.1
2	H	2395	GLY	4.1
1	I	138	PHE	4.1
2	H	2439	THR	4.1
2	F	2442	ALA	4.1
2	H	2441	GLN	4.0
2	H	2440	ALA	4.0
1	K	54	THR	4.0
1	K	173	ASN	3.9
1	I	131	VAL	3.9
1	K	10	GLN	3.9
1	I	75	LEU	3.9
2	D	2394	LYS	3.8
1	A	142	LYS	3.8
1	K	141	LYS	3.7
2	H	2328	GLN	3.7
1	I	71	LYS	3.7
1	K	51	VAL	3.7
2	H	2361	TYR	3.7
2	L	2321	SER	3.6
1	K	167	LYS	3.6
1	I	119	LEU	3.6
2	B	2320	VAL	3.5
1	I	214	ASP	3.5
2	J	2318	VAL	3.5

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Mol	Chain	Res	Type	RSRZ
2	H	2384	ILE	3.5
1	I	134	LYS	3.4
1	A	7	PRO	3.4
1	G	140	ARG	3.4
2	B	2313	PRO	3.4
2	B	2319	GLU	3.4
1	K	72	PHE	3.3
1	K	8	GLN	3.3
2	H	2309	GLU	3.2
2	H	2331	PHE	3.1
1	I	140	ARG	3.1
1	I	113	GLU	3.1
2	H	2394	LYS	3.1
1	A	137	VAL	3.1
2	D	2311	VAL	3.1
1	I	173	ASN	3.1
2	H	2423	LEU	3.1
1	I	112	CYS	3.1
1	I	56	ARG	3.1
1	A	216	LEU	3.1
1	C	213	ASP	3.1
1	G	81	ILE	3.0
1	K	168	LEU	3.0
1	I	191	PRO	3.0
1	I	174	LEU	3.0
1	K	59	ILE	3.0
1	K	139	HIS	3.0
1	K	157	PHE	2.9
1	K	170	GLY	2.9
2	J	2317	LEU	2.9
2	L	2316	ASP	2.9
2	L	2328	GLN	2.8
1	I	55	ASN	2.8
1	I	69	GLN	2.8
1	K	30	HIS	2.8
1	K	26	PHE	2.8
1	K	85	CYS	2.8
1	I	213	ASP	2.8
1	K	71	LYS	2.8
1	G	195	ALA	2.7
2	L	2315	PRO	2.7
1	E	211	ASP	2.7

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Mol	Chain	Res	Type	RSRZ
1	K	55	ASN	2.7
1	I	70	GLU	2.7
2	J	2395	GLY	2.6
1	I	77	ASP	2.6
1	I	59	ILE	2.6
1	E	173	ASN	2.6
2	H	2365	GLN	2.6
2	H	2315	PRO	2.6
2	H	2317	LEU	2.6
2	L	2319	GLU	2.6
1	I	132	LYS	2.6
2	H	2311	VAL	2.6
2	H	2314	LEU	2.6
1	K	11	PHE	2.6
2	H	2308	PHE	2.6
1	E	30	HIS	2.5
2	D	2442	ALA	2.5
1	C	170	GLY	2.5
2	L	2361	TYR	2.5
1	E	74	GLY	2.5
1	K	43	LEU	2.5
1	E	136	ILE	2.5
2	L	2362	ASP	2.5
2	D	2308	PHE	2.5
2	J	2325	GLU	2.5
1	G	212	GLU	2.5
2	J	2423	LEU	2.5
2	H	2366	VAL	2.4
1	K	62	ASN	2.4
2	L	2369	VAL	2.4
2	L	2318	VAL	2.4
1	G	160	PRO	2.4
1	K	165	ALA	2.4
1	K	216	LEU	2.4
1	G	142	LYS	2.4
1	K	119	LEU	2.4
2	L	2314	LEU	2.4
2	L	2343	ASP	2.3
1	K	134	LYS	2.3
1	K	142	LYS	2.3
1	E	56	ARG	2.3
1	I	133	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	K	79	TYR	2.3
2	L	2432	LYS	2.3
2	B	2318	VAL	2.3
1	K	77	ASP	2.3
1	G	72	PHE	2.3
1	I	127	LYS	2.3
1	I	78	GLY	2.2
1	I	32	THR	2.2
2	F	2362	ASP	2.2
2	L	2425	ASP	2.2
2	J	2323	GLY	2.2
2	L	2358	LEU	2.2
1	C	214	ASP	2.2
1	I	146	TYR	2.2
1	I	139	HIS	2.2
1	K	53	HIS	2.2
1	A	192	ALA	2.2
1	K	195	ALA	2.2
1	G	114	ASN	2.2
2	H	2360	ASN	2.2
2	L	2320	VAL	2.2
1	C	127	LYS	2.2
1	G	71	LYS	2.2
1	K	193	LEU	2.2
1	C	212	GLU	2.1
1	G	111	VAL	2.1
1	I	182	LEU	2.1
1	G	199	HIS	2.1
1	G	141	LYS	2.1
1	I	126	ILE	2.1
1	C	130	LYS	2.1
1	I	167	LYS	2.1
2	J	2342	LYS	2.1
1	I	110	ARG	2.1
1	I	88	ILE	2.1
1	E	8	GLN	2.1
2	L	2422	LYS	2.1
2	H	2398	ARG	2.1
1	K	194	ALA	2.1
1	K	176	PHE	2.1
2	H	2422	LYS	2.0
1	K	82	GLN	2.0

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Mol	Chain	Res	Type	RSRZ
1	K	70	GLU	2.0
2	H	2383	ARG	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

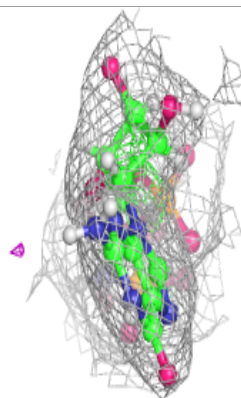
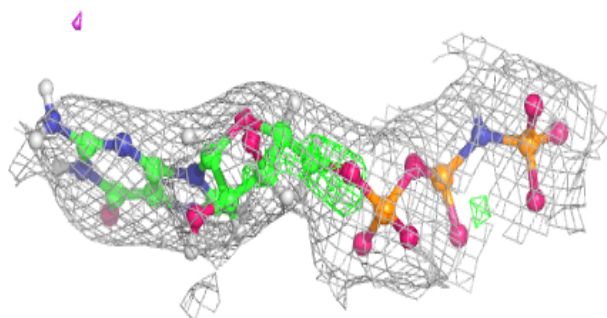
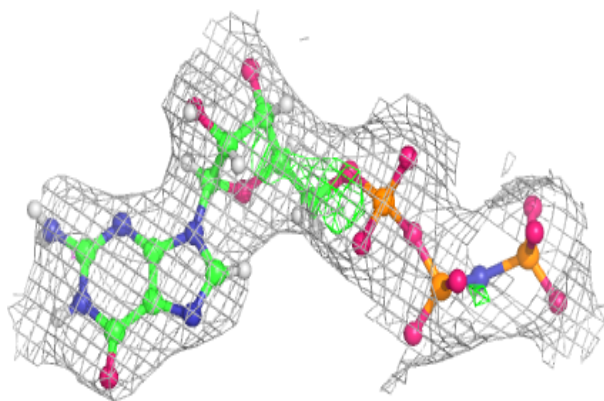
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists 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	MG	I	302	1/1	0.85	0.12	69,69,69,69	0
4	MG	G	302	1/1	0.89	0.17	43,43,43,43	0
4	MG	A	302	1/1	0.90	0.21	39,39,39,39	0
4	MG	K	302	1/1	0.93	0.10	65,65,65,65	0
4	MG	E	302	1/1	0.94	0.14	48,48,48,48	0
4	MG	C	302	1/1	0.95	0.15	45,45,45,45	0
3	GNP	I	301	32/32	0.96	0.18	55,66,79,85	0
3	GNP	K	301	32/32	0.96	0.15	54,60,69,76	0
3	GNP	C	301	32/32	0.97	0.17	43,45,54,57	0
3	GNP	G	301	32/32	0.98	0.16	40,42,52,54	0
3	GNP	A	301	32/32	0.98	0.21	36,38,46,49	0
3	GNP	E	301	32/32	0.98	0.16	46,49,60,63	0

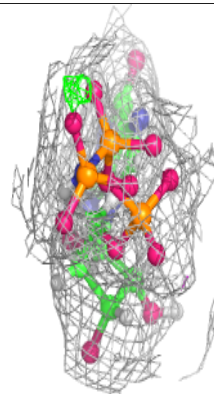
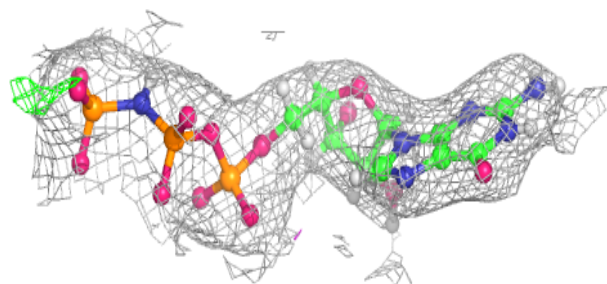
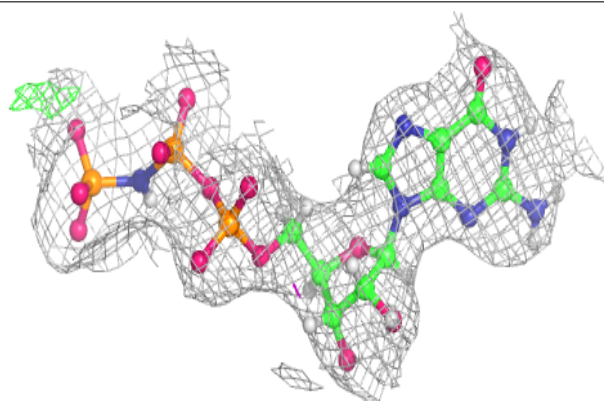
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GNP I 301:

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

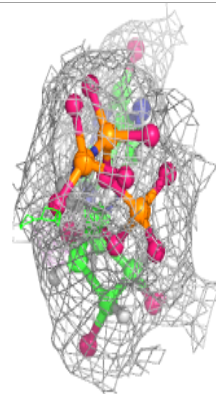
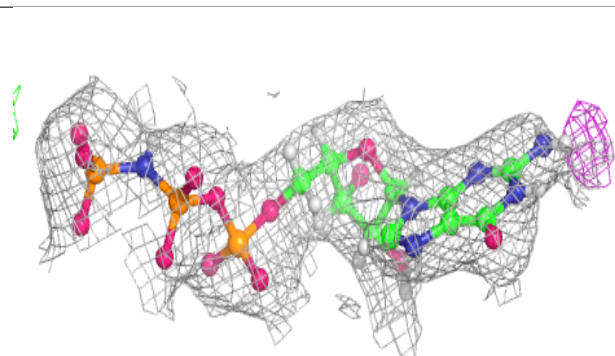
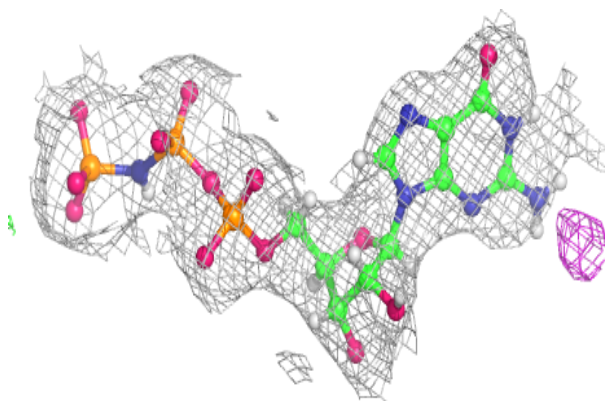
**Electron density around GNP K 301:**

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

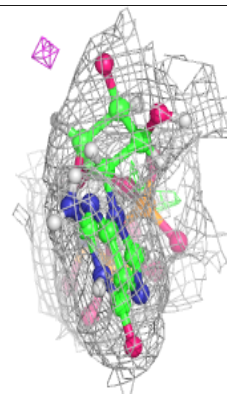
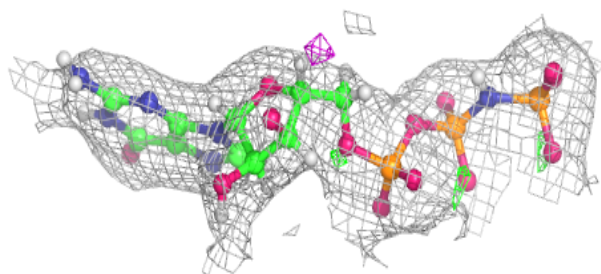
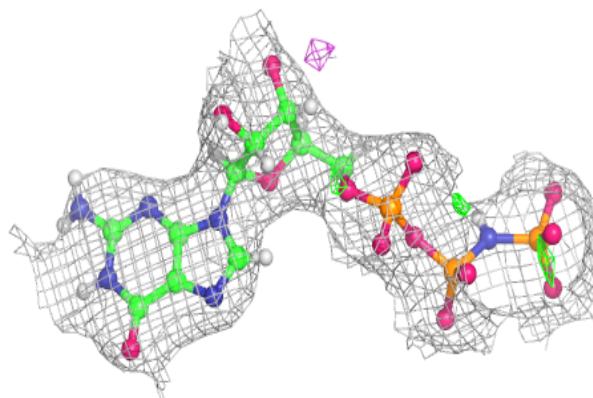


Electron density around GNP C 301:

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

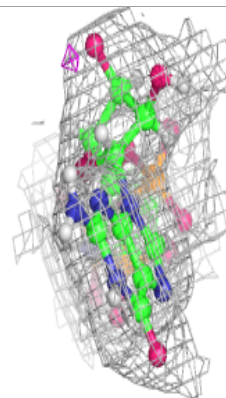
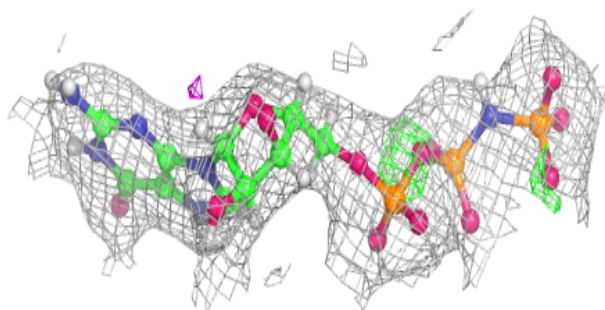
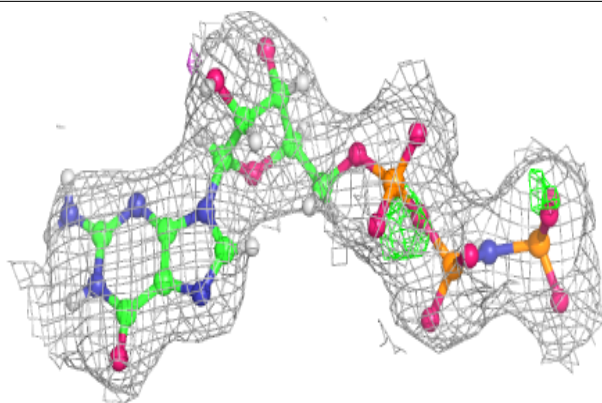
**Electron density around GNP G 301:**

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

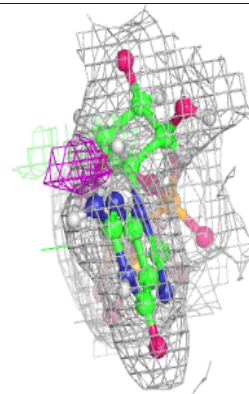
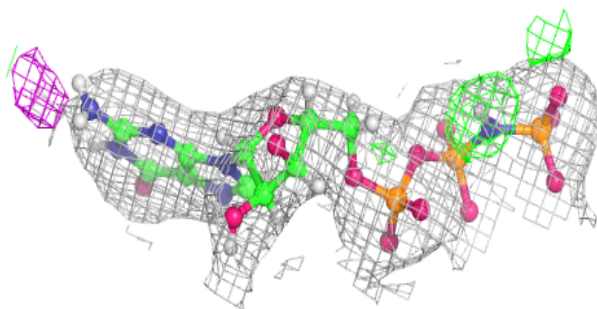
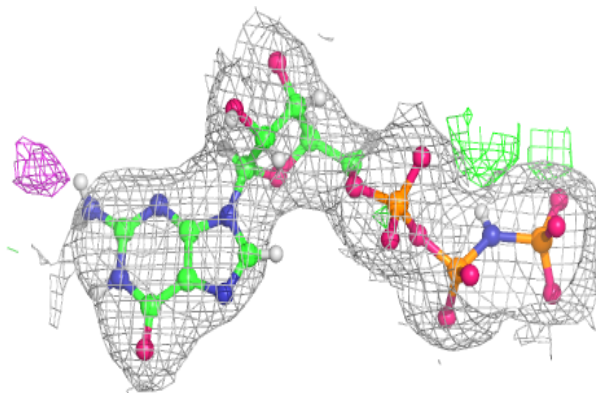


Electron density around GNP A 301:

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

**Electron density around GNP E 301:**

$2mF_o-DF_c$ (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.