



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:12 PM UTC

PDB ID : 6FA4 / pdb_00006fa4
Title : Antibody derived (Abd-7) small molecule binding to KRAS.
Authors : Quevedo, C.E.; Cruz-Migoni, A.; Ehebauer, M.T.; Carr, S.B.; Phillips, S.V.E.;
Rabbitts, T.H.
Deposited on : 2017-12-15
Resolution : 2.02 Å (reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

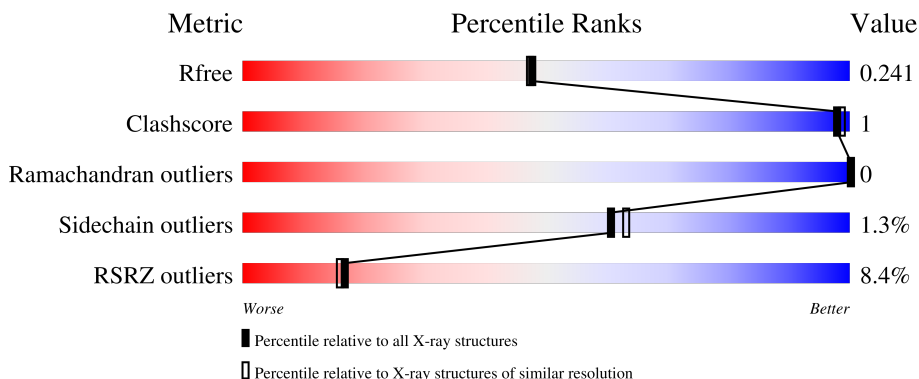
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.02 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



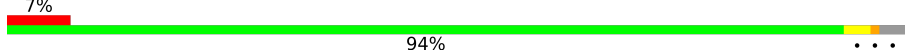
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	13299 (2.04-2.00)
Clashscore	190562	1022 (2.02-2.02)
Ramachandran outliers	187476	1014 (2.02-2.02)
Sidechain outliers	187428	1014 (2.02-2.02)
RSRZ outliers	180081	13314 (2.04-2.00)

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

Mol	Chain	Length	Quality of chain
1	B	173	 6% 97%
2	A	173	 5% 92% 8%
2	C	173	 7% 96%
2	D	173	 13% 94%
2	E	173	 12% 92% 5%

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Mol	Chain	Length	Quality of chain
2	F	173	 <p>7% 94%</p>

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 8665 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 GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	173	1382	868	238	269	7	0	1	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	ALA	-	expression tag	UNP P01116
B	-2	PHE	-	expression tag	UNP P01116
B	-1	GLN	-	expression tag	UNP P01116
B	0	GLY	-	expression tag	UNP P01116
B	61	HIS	GLN	engineered mutation	UNP P01116

- Molecule 2 is a protein called GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	172	1384	870	237	270	7	0	3	0
2	C	169	1351	847	234	264	6	0	2	0
2	D	167	1345	844	232	262	7	0	3	0
2	E	169	1359	851	236	266	6	0	3	0
2	F	168	1365	855	236	267	7	0	4	0

There are 25 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	ALA	-	expression tag	UNP P01116
A	-2	PHE	-	expression tag	UNP P01116
A	-1	GLN	-	expression tag	UNP P01116

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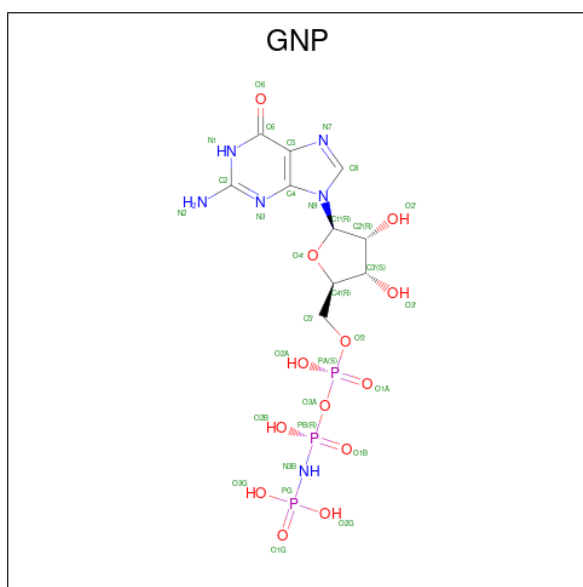
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Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP P01116
A	61	HIS	GLN	engineered mutation	UNP P01116
C	-3	ALA	-	expression tag	UNP P01116
C	-2	PHE	-	expression tag	UNP P01116
C	-1	GLN	-	expression tag	UNP P01116
C	0	GLY	-	expression tag	UNP P01116
C	61	HIS	GLN	engineered mutation	UNP P01116
D	-3	ALA	-	expression tag	UNP P01116
D	-2	PHE	-	expression tag	UNP P01116
D	-1	GLN	-	expression tag	UNP P01116
D	0	GLY	-	expression tag	UNP P01116
D	61	HIS	GLN	engineered mutation	UNP P01116
E	-3	ALA	-	expression tag	UNP P01116
E	-2	PHE	-	expression tag	UNP P01116
E	-1	GLN	-	expression tag	UNP P01116
E	0	GLY	-	expression tag	UNP P01116
E	61	HIS	GLN	engineered mutation	UNP P01116
F	-3	ALA	-	expression tag	UNP P01116
F	-2	PHE	-	expression tag	UNP P01116
F	-1	GLN	-	expression tag	UNP P01116
F	0	GLY	-	expression tag	UNP P01116
F	61	HIS	GLN	engineered mutation	UNP P01116

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

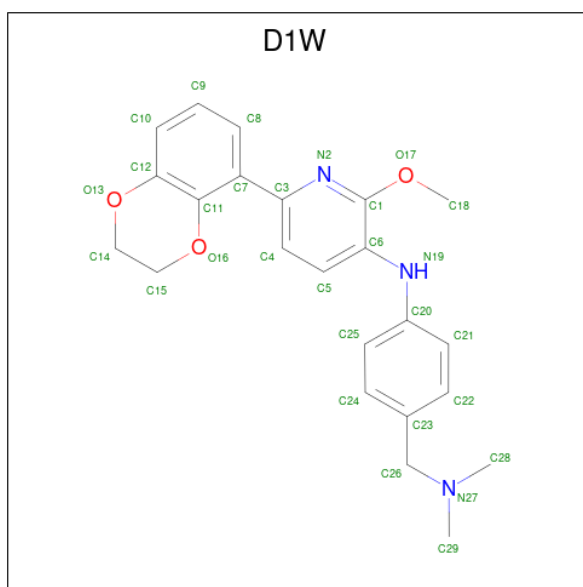
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Mg 1 1	0	0
3	A	1	Total Mg 1 1	0	0
3	C	1	Total Mg 1 1	0	0
3	D	1	Total Mg 1 1	0	0
3	E	1	Total Mg 1 1	0	0
3	F	1	Total Mg 1 1	0	0

- Molecule 4 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (CCD ID: GNP) (formula: C₁₀H₁₇N₆O₁₃P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	B	1	Total 32	C 10	N 6	O 13	P 3	0	0
4	A	1	Total 32	C 10	N 6	O 13	P 3	0	0
4	C	1	Total 32	C 10	N 6	O 13	P 3	0	0
4	D	1	Total 32	C 10	N 6	O 13	P 3	0	0
4	E	1	Total 32	C 10	N 6	O 13	P 3	0	0
4	F	1	Total 32	C 10	N 6	O 13	P 3	0	0

- Molecule 5 is 6-(2,3-dihydro-1,4-benzodioxin-5-yl)- {N}-[4-[(dimethylamino)methyl]phenyl]-2-methoxy-pyridin-3-amine (CCD ID: D1W) (formula: C₂₃H₂₅N₃O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	N	O	0	0
			29	23	3	3		
5	A	1	Total	C	N	O	0	0
			29	23	3	3		
5	A	1	Total	C	N	O	0	0
			29	23	3	3		
5	D	1	Total	C	N	O	0	0
			29	23	3	3		
5	F	1	Total	C	N	O	0	0
			29	23	3	3		

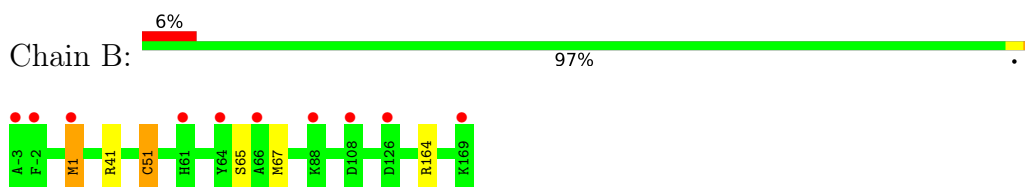
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	29	Total	O	0	0
			29	29		
6	A	43	Total	O	0	0
			43	43		
6	C	8	Total	O	0	0
			8	8		
6	D	17	Total	O	0	0
			17	17		
6	E	15	Total	O	0	0
			15	15		
6	F	24	Total	O	0	0
			24	24		

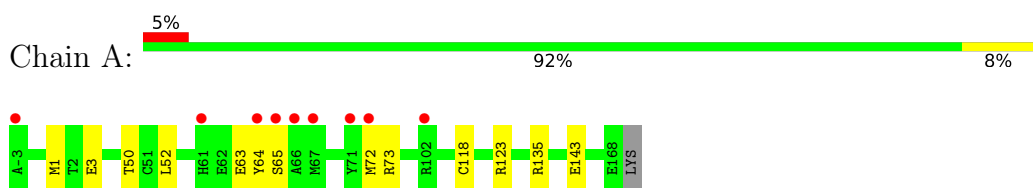
3 Residue-property plots [i](#)

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.

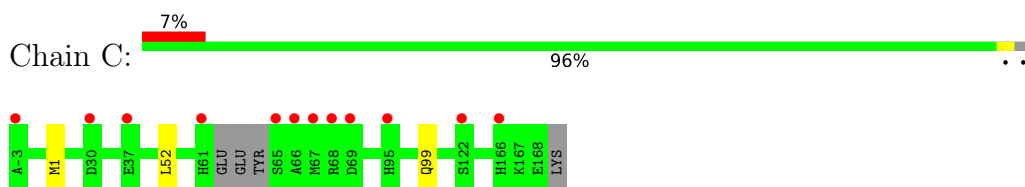
- Molecule 1: GTPase KRas



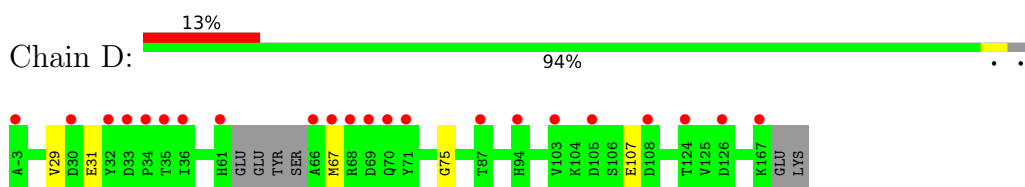
- Molecule 2: GTPase KRas



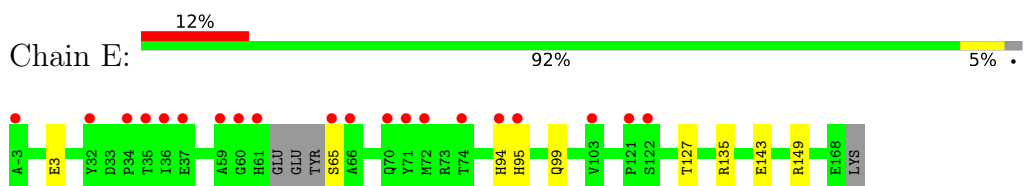
- Molecule 2: GTPase KRas



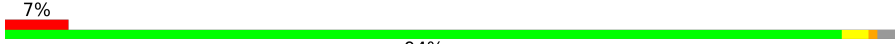
- Molecule 2: GTPase KRas

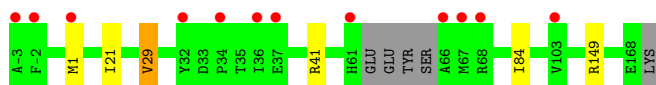


- Molecule 2: GTPase KRas



- Molecule 2: GTPase KRas

Chain F:  7% 94% ...



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	63.70Å 118.62Å 157.33Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	65.06 – 2.02 65.06 – 2.02	Depositor EDS
% Data completeness (in resolution range)	90.2 (65.06-2.02) 90.0 (65.06-2.02)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.04 (at 2.00Å)	Xtrriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.200 , 0.232 0.209 , 0.241	Depositor DCC
R_{free} test set	3662 reflections (4.50%)	wwPDB-VP
Wilson B-factor (Å ²)	30.4	Xtrriage
Anisotropy	0.065	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 31.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8665	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.67% 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: CSO, MG, GNP, D1W

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	B	1.10	0/1400	0.97	1/1886 (0.1%)
2	A	1.13	1/1410 (0.1%)	1.04	2/1903 (0.1%)
2	C	1.03	0/1375	0.97	2/1854 (0.1%)
2	D	1.01	0/1369	1.00	2/1846 (0.1%)
2	E	0.95	0/1383	0.97	2/1865 (0.1%)
2	F	1.03	1/1389 (0.1%)	1.00	3/1872 (0.2%)
All	All	1.04	2/8326 (0.0%)	0.99	12/11226 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	123	ARG	C-O	-5.49	1.17	1.23
2	F	29	VAL	C-O	5.13	1.29	1.23

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1	MET	CB-CG-SD	7.25	134.45	112.70
2	F	1	MET	CB-CG-SD	6.51	132.23	112.70
2	F	149	ARG	NE-CZ-NH1	6.47	127.97	121.50
2	E	149	ARG	NE-CZ-NH1	6.40	127.90	121.50
2	F	41	ARG	CG-CD-NE	-5.75	99.36	112.00
2	A	73	ARG	CA-CB-CG	5.67	125.44	114.10
2	C	1	MET	CG-SD-CE	-5.44	88.93	100.90
2	D	75	GLY	N-CA-C	5.42	117.70	111.36
2	D	31	GLU	CB-CG-CD	-5.39	103.44	112.60
2	E	99	GLN	CA-CB-CG	5.23	124.56	114.10
2	C	99	GLN	CA-CB-CG	5.22	124.54	114.10
2	A	72	MET	CG-SD-CE	-5.02	89.86	100.90

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1382	0	1362	3	0
2	A	1384	0	1357	4	0
2	C	1351	0	1328	0	0
2	D	1345	0	1320	2	0
2	E	1359	0	1335	2	0
2	F	1365	0	1340	1	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
4	A	32	0	13	0	0
4	B	32	0	13	0	0
4	C	32	0	13	0	0
4	D	32	0	13	0	0
4	E	32	0	13	0	0
4	F	32	0	13	0	0
5	A	58	0	0	0	0
5	B	29	0	0	0	0
5	D	29	0	0	0	0
5	F	29	0	0	0	0
6	A	43	0	0	0	0
6	B	29	0	0	0	0
6	C	8	0	0	0	0
6	D	17	0	0	0	0
6	E	15	0	0	0	0
6	F	24	0	0	0	0
All	All	8665	0	8120	11	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 1.

All (11) 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:B:51:CSO:OD	1:B:164:ARG:NH2	2.24	0.70
1:B:67:MET:HA	1:B:67:MET:HE3	1.83	0.60
2:F:21[B]:ILE:HD12	2:F:29:VAL:HG21	1.89	0.55
2:D:29:VAL:O	2:D:29:VAL:HG23	2.11	0.51
1:B:41:ARG:NH1	2:E:3:GLU:OE2	2.33	0.51
2:D:67:MET:HE3	2:D:67:MET:O	2.13	0.48
2:E:127:THR:HG22	2:E:143:GLU:OE2	2.13	0.48
2:A:1:MET:SD	2:A:50:THR:HG22	2.55	0.46
2:A:118:CYS:HB3	2:A:143:GLU:HG3	1.99	0.43
2:A:63:GLU:O	2:A:64:TYR:C	2.64	0.41
2:A:3:GLU:HG2	2:A:52:LEU:HB3	2.03	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	B	171/173 (99%)	168 (98%)	3 (2%)	0	100	100
2	A	173/173 (100%)	168 (97%)	5 (3%)	0	100	100
2	C	167/173 (96%)	164 (98%)	3 (2%)	0	100	100
2	D	166/173 (96%)	163 (98%)	3 (2%)	0	100	100
2	E	168/173 (97%)	165 (98%)	3 (2%)	0	100	100
2	F	168/173 (97%)	165 (98%)	3 (2%)	0	100	100
All	All	1013/1038 (98%)	993 (98%)	20 (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	B	150/150 (100%)	148 (99%)	2 (1%)	61	63
2	A	151/151 (100%)	149 (99%)	2 (1%)	61	63
2	C	148/151 (98%)	147 (99%)	1 (1%)	76	77
2	D	147/151 (97%)	145 (99%)	2 (1%)	59	61
2	E	149/151 (99%)	145 (97%)	4 (3%)	39	37
2	F	150/151 (99%)	149 (99%)	1 (1%)	76	77
All	All	895/905 (99%)	883 (99%)	12 (1%)	61	63

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1	MET
1	B	65	SER
2	A	65	SER
2	A	135	ARG
2	C	52	LEU
2	D	107[A]	GLU
2	D	107[B]	GLU
2	E	65	SER
2	E	94	HIS
2	E	95	HIS
2	E	135	ARG
2	F	84	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	43	GLN
1	B	150	GLN
2	C	70	GLN
2	C	94	HIS
2	D	-1	GLN

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Mol	Chain	Res	Type
2	E	-1	GLN
2	E	43	GLN
2	F	25	GLN
2	F	129	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	CSO	B	51	1	3,6,7	1.58	1 (33%)	1,6,8	0.36	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CSO	B	51	1	-	0/1/5/7	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	51	CSO	CB-CA	-2.27	1.47	1.53

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	51	CSO	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 17 ligands modelled in this entry, 6 are monoatomic - leaving 11 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
4	GNP	E	202	3	34,34,34	2.39	11 (32%)	47,54,54	1.78	10 (21%)
4	GNP	A	202	3	34,34,34	2.23	9 (26%)	47,54,54	1.67	16 (34%)
5	D1W	A	203	-	32,32,32	0.60	0	42,44,44	0.83	2 (4%)
5	D1W	D	203	-	32,32,32	1.37	1 (3%)	42,44,44	0.94	4 (9%)
4	GNP	C	202	3	34,34,34	2.37	10 (29%)	47,54,54	2.05	12 (25%)
4	GNP	B	202	3	34,34,34	3.09	11 (32%)	47,54,54	1.88	15 (31%)
5	D1W	A	204	-	32,32,32	0.73	1 (3%)	42,44,44	0.82	2 (4%)
5	D1W	F	203	-	32,32,32	1.32	1 (3%)	42,44,44	1.05	4 (9%)
5	D1W	B	203	-	32,32,32	0.65	1 (3%)	42,44,44	0.95	4 (9%)
4	GNP	F	202	3	34,34,34	1.92	6 (17%)	47,54,54	1.69	11 (23%)
4	GNP	D	201	3	34,34,34	2.12	10 (29%)	47,54,54	1.52	8 (17%)

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
4	GNP	E	202	3	-	4/18/38/38	0/3/3/3
4	GNP	A	202	3	-	4/18/38/38	0/3/3/3
5	D1W	A	203	-	-	5/14/21/21	0/4/4/4
5	D1W	D	203	-	-	2/14/21/21	0/4/4/4
4	GNP	C	202	3	-	5/18/38/38	0/3/3/3
4	GNP	B	202	3	-	3/18/38/38	0/3/3/3
5	D1W	A	204	-	-	2/14/21/21	0/4/4/4
5	D1W	F	203	-	-	2/14/21/21	0/4/4/4
5	D1W	B	203	-	-	2/14/21/21	0/4/4/4
4	GNP	F	202	3	-	5/18/38/38	0/3/3/3
4	GNP	D	201	3	-	3/18/38/38	0/3/3/3

All (61) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	202	GNP	PG-O1G	10.04	1.61	1.46
4	B	202	GNP	PA-O3A	9.99	1.70	1.59
4	C	202	GNP	PG-O1G	8.78	1.59	1.46
4	E	202	GNP	PG-O1G	8.65	1.59	1.46
4	F	202	GNP	PG-O1G	8.13	1.58	1.46
4	A	202	GNP	PG-O1G	7.30	1.57	1.46
5	D	203	D1W	C6-C1	7.19	1.50	1.41
5	F	203	D1W	C6-C1	6.66	1.49	1.41
4	D	201	GNP	PB-O1B	5.23	1.54	1.46
4	D	201	GNP	PB-O3A	4.59	1.64	1.59
4	D	201	GNP	PG-N3B	4.53	1.75	1.63
4	B	202	GNP	PB-O3A	4.46	1.64	1.59
4	A	202	GNP	PB-O1B	4.42	1.52	1.46
4	D	201	GNP	PB-O2B	-4.25	1.45	1.56
4	C	202	GNP	C6-N1	-4.24	1.30	1.38
4	C	202	GNP	PB-N3B	4.18	1.74	1.63
4	B	202	GNP	C4-N9	-4.17	1.27	1.38
4	A	202	GNP	PA-O3A	4.12	1.63	1.59
4	E	202	GNP	PA-O3A	4.10	1.63	1.59
4	B	202	GNP	PG-O3G	-4.07	1.46	1.56
4	E	202	GNP	PB-N3B	4.05	1.73	1.63
4	B	202	GNP	C5-N7	-3.99	1.31	1.39
4	A	202	GNP	PG-N3B	3.95	1.73	1.63
4	A	202	GNP	PB-O2B	-3.86	1.46	1.56
4	C	202	GNP	PG-N3B	3.69	1.73	1.63
4	D	201	GNP	C5-C4	3.52	1.48	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	202	GNP	PB-O3A	3.51	1.63	1.59
4	E	202	GNP	C6-N1	-3.50	1.32	1.38
4	E	202	GNP	PG-N3B	3.40	1.72	1.63
4	B	202	GNP	PG-N3B	3.34	1.72	1.63
4	C	202	GNP	C4-N9	-3.19	1.29	1.38
4	E	202	GNP	C5-C4	3.16	1.47	1.38
4	F	202	GNP	PG-O2G	-3.06	1.48	1.56
4	D	201	GNP	C4-N9	-3.05	1.30	1.38
4	E	202	GNP	C4-N9	-2.96	1.30	1.38
4	B	202	GNP	PB-N3B	2.91	1.71	1.63
4	A	202	GNP	C4-N9	-2.87	1.30	1.38
4	B	202	GNP	PB-O1B	2.83	1.50	1.46
4	F	202	GNP	C4-N9	-2.79	1.31	1.38
4	C	202	GNP	PG-O2G	-2.77	1.49	1.56
4	E	202	GNP	PG-O2G	-2.77	1.49	1.56
4	A	202	GNP	PG-O3G	-2.76	1.49	1.56
4	C	202	GNP	C5-C4	2.74	1.46	1.38
4	A	202	GNP	O4'-C1'	2.70	1.48	1.42
4	E	202	GNP	C5-N7	-2.65	1.33	1.39
4	D	201	GNP	PB-N3B	2.63	1.70	1.63
4	F	202	GNP	PB-N3B	2.53	1.70	1.63
4	D	201	GNP	O6-C6	2.50	1.28	1.23
5	A	204	D1W	C6-C1	2.50	1.44	1.41
4	C	202	GNP	C5-N7	-2.37	1.34	1.39
4	F	202	GNP	C5-C4	2.35	1.45	1.38
4	D	201	GNP	C5-N7	-2.34	1.34	1.39
4	B	202	GNP	C5-C4	2.33	1.45	1.38
4	B	202	GNP	C6-N1	-2.32	1.34	1.38
4	A	202	GNP	PB-O3A	2.28	1.61	1.59
4	D	201	GNP	PA-O3A	-2.27	1.57	1.59
4	E	202	GNP	PB-O1B	2.17	1.49	1.46
4	F	202	GNP	PA-O3A	2.14	1.61	1.59
4	C	202	GNP	PG-O3G	2.11	1.62	1.56
4	C	202	GNP	O4'-C4'	-2.07	1.40	1.45
5	B	203	D1W	C6-C1	2.04	1.44	1.41

All (88) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	202	GNP	C5-C4-N3	-5.75	119.24	128.39
4	C	202	GNP	C5-C4-N3	-5.58	119.50	128.39
4	B	202	GNP	C5-C4-N3	-5.15	120.19	128.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	202	GNP	O2G-PG-O3G	5.06	121.19	107.59
4	C	202	GNP	O2G-PG-O1G	-4.81	101.39	113.45
4	C	202	GNP	C2-N3-C4	4.42	119.92	112.30
4	F	202	GNP	C5-C4-N3	-4.40	121.38	128.39
4	C	202	GNP	N9-C4-N3	4.21	134.37	125.95
4	E	202	GNP	N9-C4-N3	4.18	134.31	125.95
4	B	202	GNP	N9-C4-N3	4.16	134.26	125.95
4	D	201	GNP	C5-C4-N3	-3.97	122.06	128.39
4	C	202	GNP	O3A-PB-N3B	-3.73	96.23	106.59
4	D	201	GNP	O1G-PG-N3B	-3.61	106.45	111.77
4	F	202	GNP	C2-N3-C4	3.56	118.43	112.30
4	B	202	GNP	C2-N3-C4	3.55	118.42	112.30
4	F	202	GNP	O2G-PG-O1G	-3.50	104.67	113.45
4	D	201	GNP	C6-C5-N7	3.41	136.49	130.29
4	E	202	GNP	C2-N3-C4	3.36	118.08	112.30
4	B	202	GNP	O6-C6-C5	-3.32	117.77	126.53
4	D	201	GNP	C4-C5-N7	-3.31	105.43	110.67
5	F	203	D1W	C20-N19-C6	3.20	134.89	126.73
4	D	201	GNP	O2G-PG-O3G	3.17	116.10	107.59
4	F	202	GNP	N9-C4-N3	3.16	132.28	125.95
4	E	202	GNP	O2G-PG-O3G	3.13	115.99	107.59
4	A	202	GNP	O2A-PA-O1A	3.10	126.86	112.44
4	A	202	GNP	C6-C5-N7	3.07	135.88	130.29
4	A	202	GNP	O3A-PA-O1A	-3.05	101.53	110.70
4	F	202	GNP	C6-C5-N7	2.96	135.69	130.29
5	B	203	D1W	C14-O13-C12	2.86	118.72	113.67
4	F	202	GNP	O3G-PG-O1G	-2.83	106.36	113.45
5	D	203	D1W	C20-N19-C6	2.81	133.91	126.73
4	F	202	GNP	O2G-PG-O3G	2.79	115.08	107.59
4	A	202	GNP	C5-C4-N3	-2.77	123.98	128.39
4	C	202	GNP	O3G-PG-O1G	-2.75	106.56	113.45
4	B	202	GNP	N9-C8-N7	-2.73	108.33	113.40
4	F	202	GNP	C5-C6-N1	2.73	120.19	113.25
4	C	202	GNP	C6-C5-N7	2.72	135.24	130.29
4	B	202	GNP	O2G-PG-O3G	2.68	114.81	107.59
5	F	203	D1W	C5-C6-N19	2.68	126.68	121.32
4	A	202	GNP	O3G-PG-O1G	-2.67	106.75	113.45
4	A	202	GNP	O1G-PG-N3B	-2.66	107.85	111.77
4	B	202	GNP	O2G-PG-O1G	-2.59	106.94	113.45
4	C	202	GNP	O1B-PB-N3B	-2.58	107.97	111.77
4	F	202	GNP	C2-N1-C6	-2.57	120.46	125.11
4	D	201	GNP	C2-N3-C4	2.55	116.69	112.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	202	GNP	O1B-PB-N3B	-2.55	108.02	111.77
4	E	202	GNP	C4-C5-N7	-2.53	106.67	110.67
4	B	202	GNP	O2B-PB-O1B	2.51	115.25	109.87
4	D	201	GNP	N9-C4-N3	2.50	130.95	125.95
4	A	202	GNP	C2-N3-C4	2.49	116.59	112.30
4	A	202	GNP	O2B-PB-O3A	2.47	112.87	104.64
4	E	202	GNP	O2G-PG-O1G	-2.46	107.29	113.45
4	B	202	GNP	O1G-PG-N3B	-2.42	108.20	111.77
4	E	202	GNP	N2-C2-N3	-2.42	114.95	119.67
5	A	204	D1W	C5-C6-N19	2.39	126.09	121.32
4	B	202	GNP	C2-N1-C6	-2.39	120.78	125.11
5	A	203	D1W	C14-O13-C12	2.38	117.86	113.67
4	B	202	GNP	C8-N7-C5	2.36	108.47	104.26
4	B	202	GNP	O6-C6-N1	2.36	124.56	120.11
4	B	202	GNP	O1B-PB-N3B	2.35	115.23	111.77
4	A	202	GNP	O2'-C2'-C3'	2.34	119.31	111.82
4	A	202	GNP	O3A-PB-N3B	-2.32	100.15	106.59
4	E	202	GNP	O2A-PA-O5'	2.31	118.03	107.57
4	F	202	GNP	C6-C5-C4	-2.30	115.37	118.83
5	A	204	D1W	C20-N19-C6	2.29	132.56	126.73
5	A	203	D1W	O17-C1-N2	2.28	121.99	118.96
4	D	201	GNP	O2G-PG-O1G	-2.27	107.75	113.45
4	A	202	GNP	C6-C5-C4	-2.27	115.42	118.83
5	D	203	D1W	C14-O13-C12	2.24	117.62	113.67
4	C	202	GNP	C4-C5-N7	-2.24	107.12	110.67
5	F	203	D1W	C25-C20-N19	-2.24	113.04	120.61
4	B	202	GNP	C8-N9-C4	2.23	110.21	106.03
5	D	203	D1W	C5-C6-N19	2.23	125.77	121.32
5	D	203	D1W	C5-C6-C1	-2.21	114.71	116.84
5	B	203	D1W	C5-C6-N19	2.18	125.69	121.32
4	A	202	GNP	N9-C4-N3	2.18	130.32	125.95
4	E	202	GNP	C6-C5-N7	2.17	134.25	130.29
5	B	203	D1W	C15-O16-C11	2.16	118.89	113.96
5	B	203	D1W	C5-C6-C1	-2.14	114.78	116.84
5	F	203	D1W	C21-C20-N19	2.13	127.82	120.61
4	E	202	GNP	C2-N1-C6	-2.11	121.28	125.11
4	F	202	GNP	O1G-PG-N3B	-2.10	108.68	111.77
4	A	202	GNP	C2'-C3'-C4'	2.08	106.63	102.61
4	A	202	GNP	O2A-PA-O3A	2.06	112.85	107.27
4	A	202	GNP	O3'-C3'-C4'	-2.05	105.20	111.08
4	B	202	GNP	C4-C5-N7	-2.04	107.44	110.67
4	C	202	GNP	O2A-PA-O1A	2.01	121.80	112.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	202	GNP	O1G-PG-N3B	-2.00	108.82	111.77

There are no chirality outliers.

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	202	GNP	PG-N3B-PB-O1B
4	B	202	GNP	PA-O3A-PB-O2B
4	A	202	GNP	PG-N3B-PB-O1B
4	A	202	GNP	PG-N3B-PB-O3A
4	A	202	GNP	PA-O3A-PB-O2B
4	C	202	GNP	PB-N3B-PG-O1G
4	C	202	GNP	PG-N3B-PB-O1B
4	C	202	GNP	PG-N3B-PB-O3A
4	C	202	GNP	PA-O3A-PB-O2B
4	D	201	GNP	PB-N3B-PG-O1G
4	D	201	GNP	PG-N3B-PB-O1B
4	D	201	GNP	PG-N3B-PB-O3A
4	E	202	GNP	PB-N3B-PG-O1G
4	E	202	GNP	PG-N3B-PB-O1B
4	F	202	GNP	PB-N3B-PG-O1G
4	F	202	GNP	PG-N3B-PB-O1B
4	F	202	GNP	PA-O3A-PB-O1B
4	F	202	GNP	PA-O3A-PB-O2B
5	B	203	D1W	N2-C1-O17-C18
5	B	203	D1W	C6-C1-O17-C18
5	A	203	D1W	N2-C1-O17-C18
5	A	203	D1W	C6-C1-O17-C18
5	A	203	D1W	C23-C26-N27-C28
5	A	204	D1W	C6-C1-O17-C18
5	D	203	D1W	C6-C1-O17-C18
5	F	203	D1W	C6-C1-O17-C18
5	A	203	D1W	C23-C26-N27-C29
5	D	203	D1W	N2-C1-O17-C18
5	F	203	D1W	N2-C1-O17-C18
5	A	204	D1W	N2-C1-O17-C18
4	F	202	GNP	PG-N3B-PB-O3A
4	E	202	GNP	PA-O3A-PB-O2B
5	A	203	D1W	C4-C3-C7-C11
4	B	202	GNP	PA-O3A-PB-O1B
4	A	202	GNP	PA-O3A-PB-O1B
4	C	202	GNP	PA-O3A-PB-O1B

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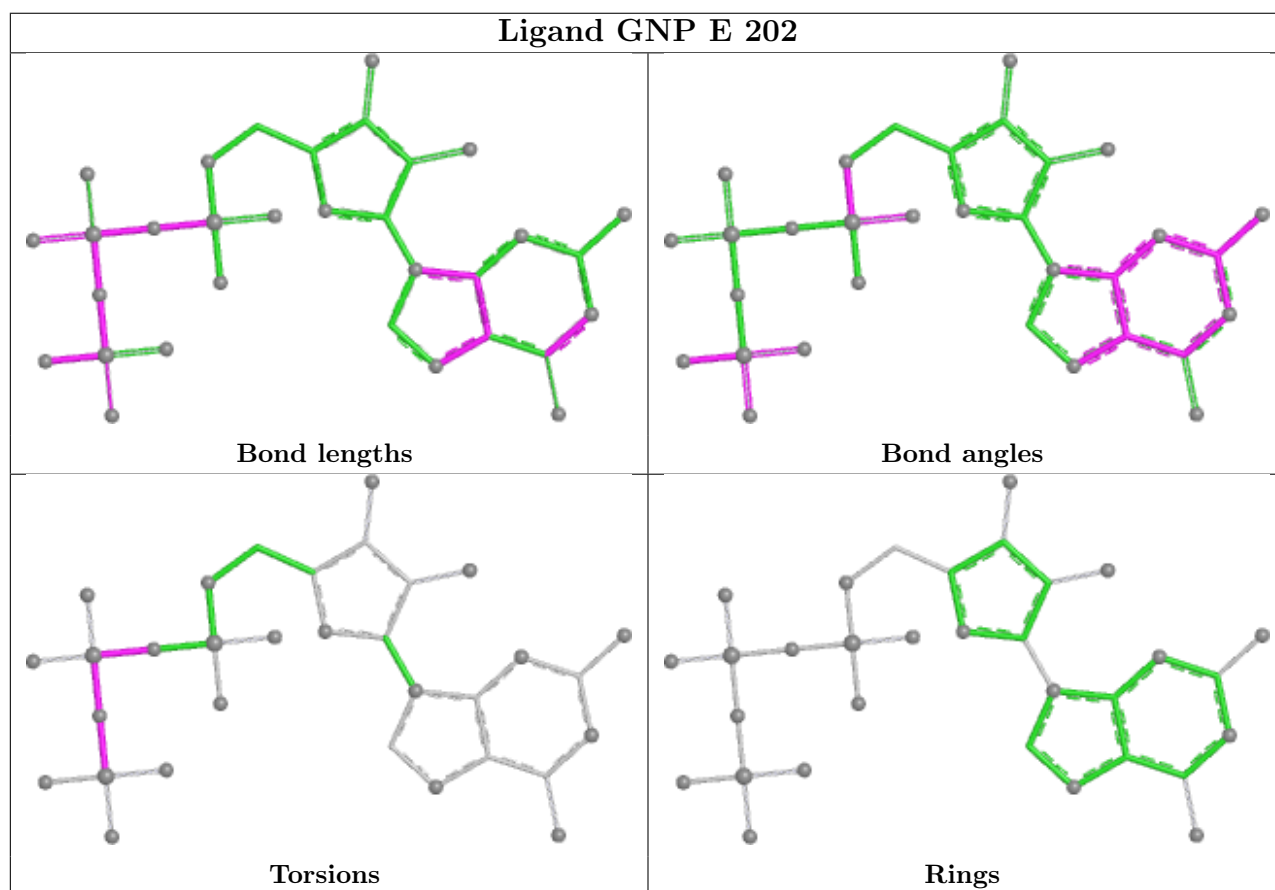
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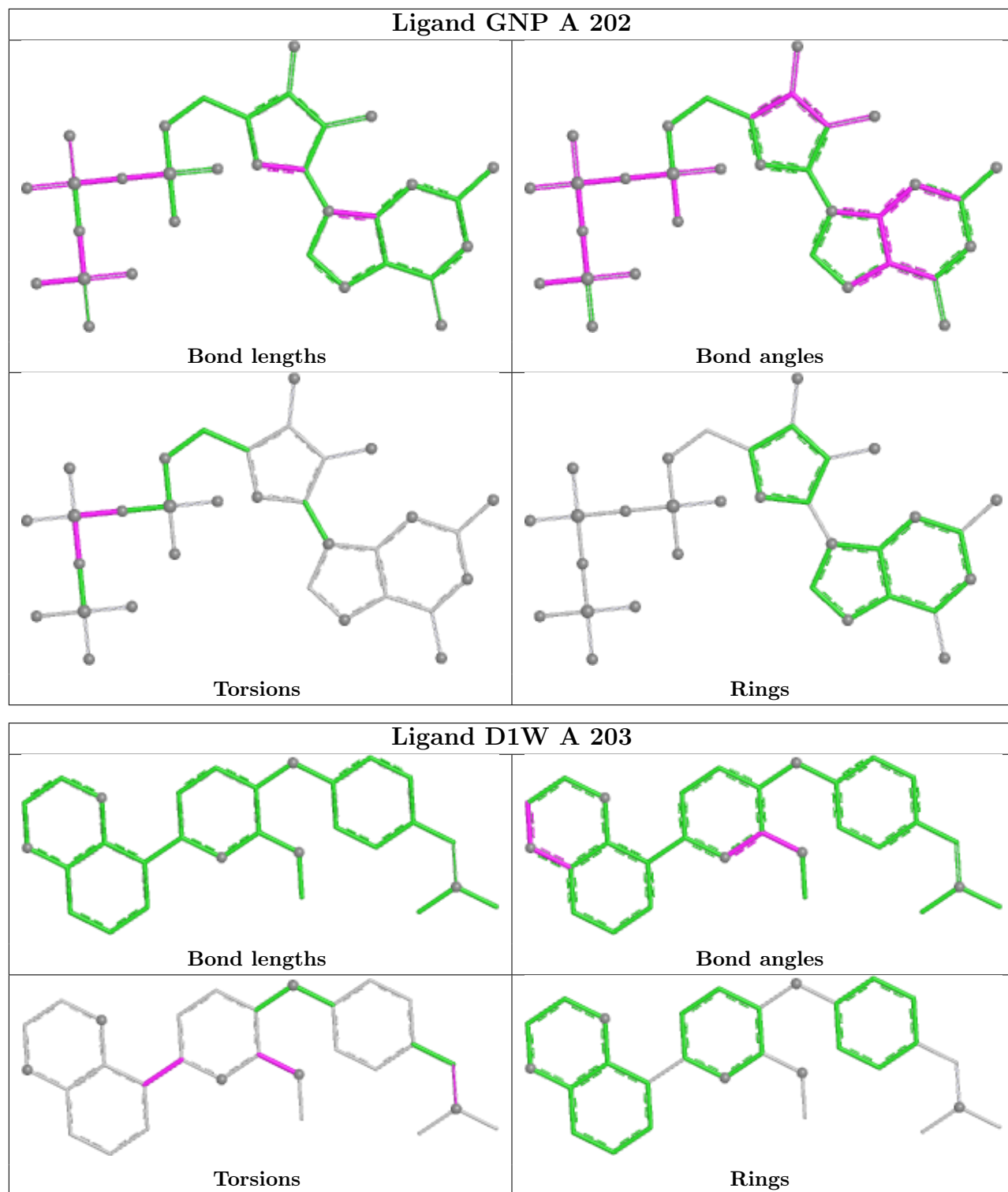
Mol	Chain	Res	Type	Atoms
4	E	202	GNP	PA-O3A-PB-O1B

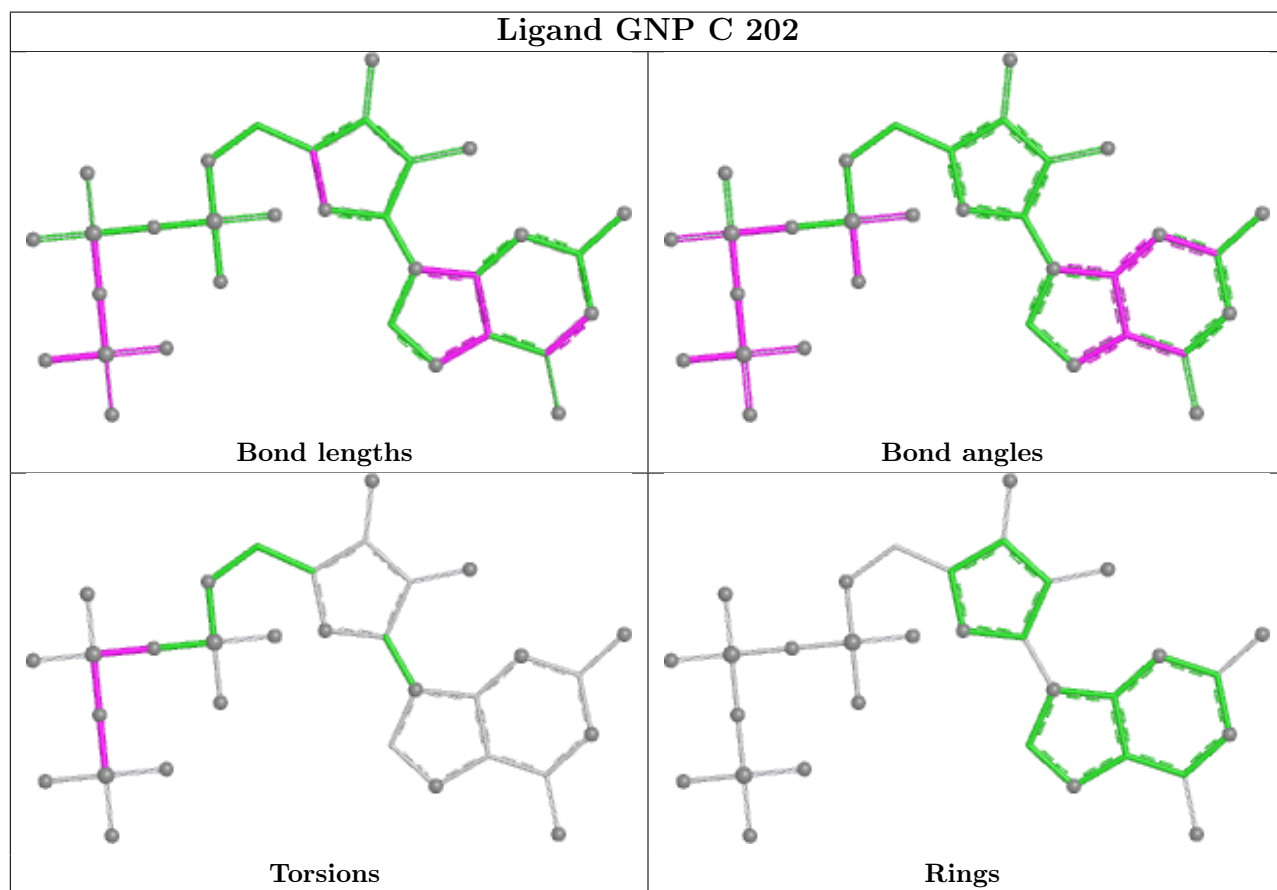
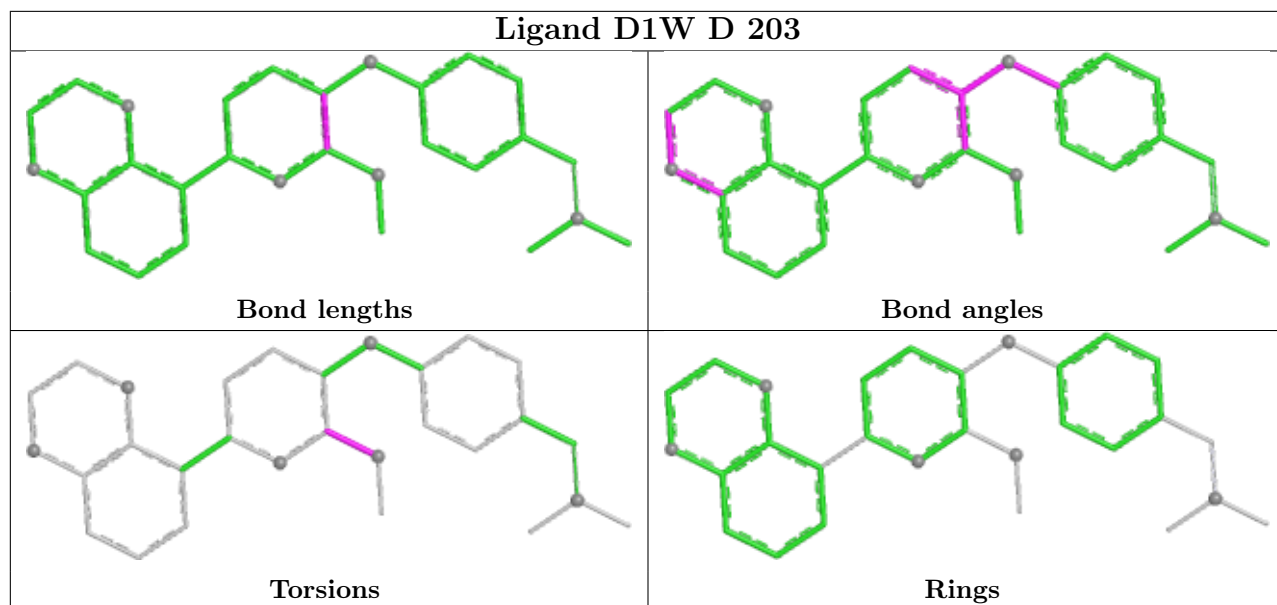
There are no ring outliers.

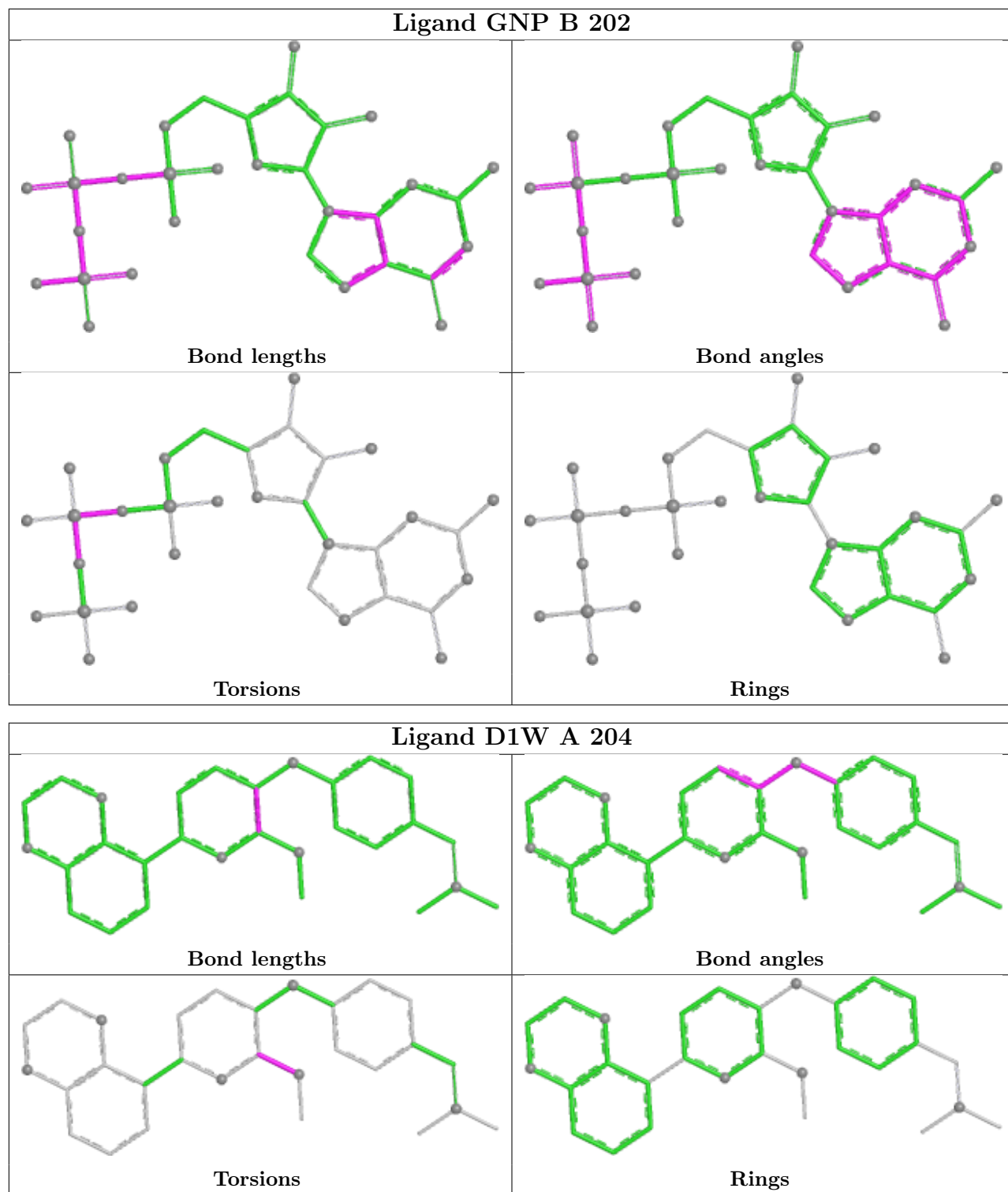
No monomer is involved in short contacts.

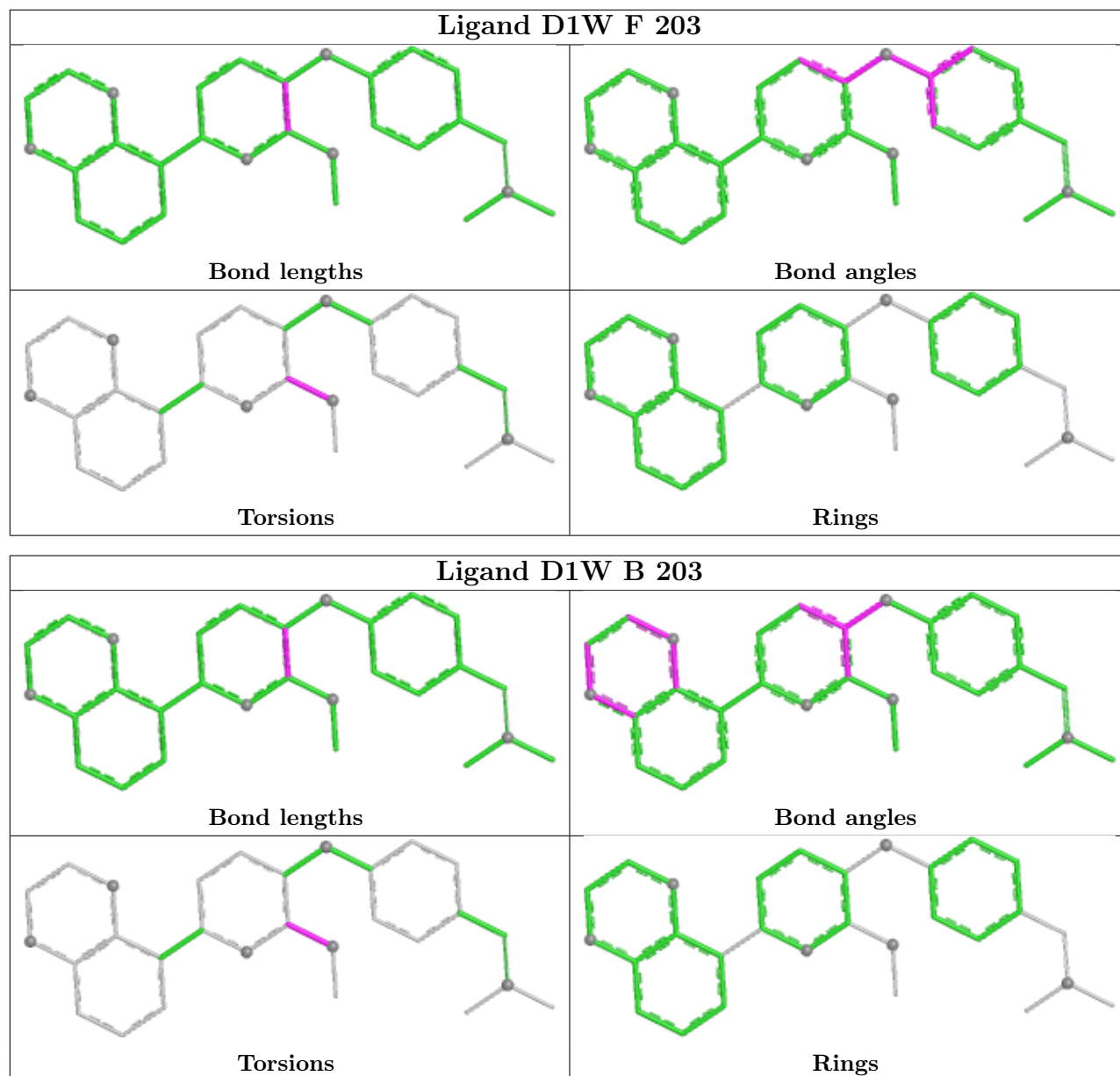
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

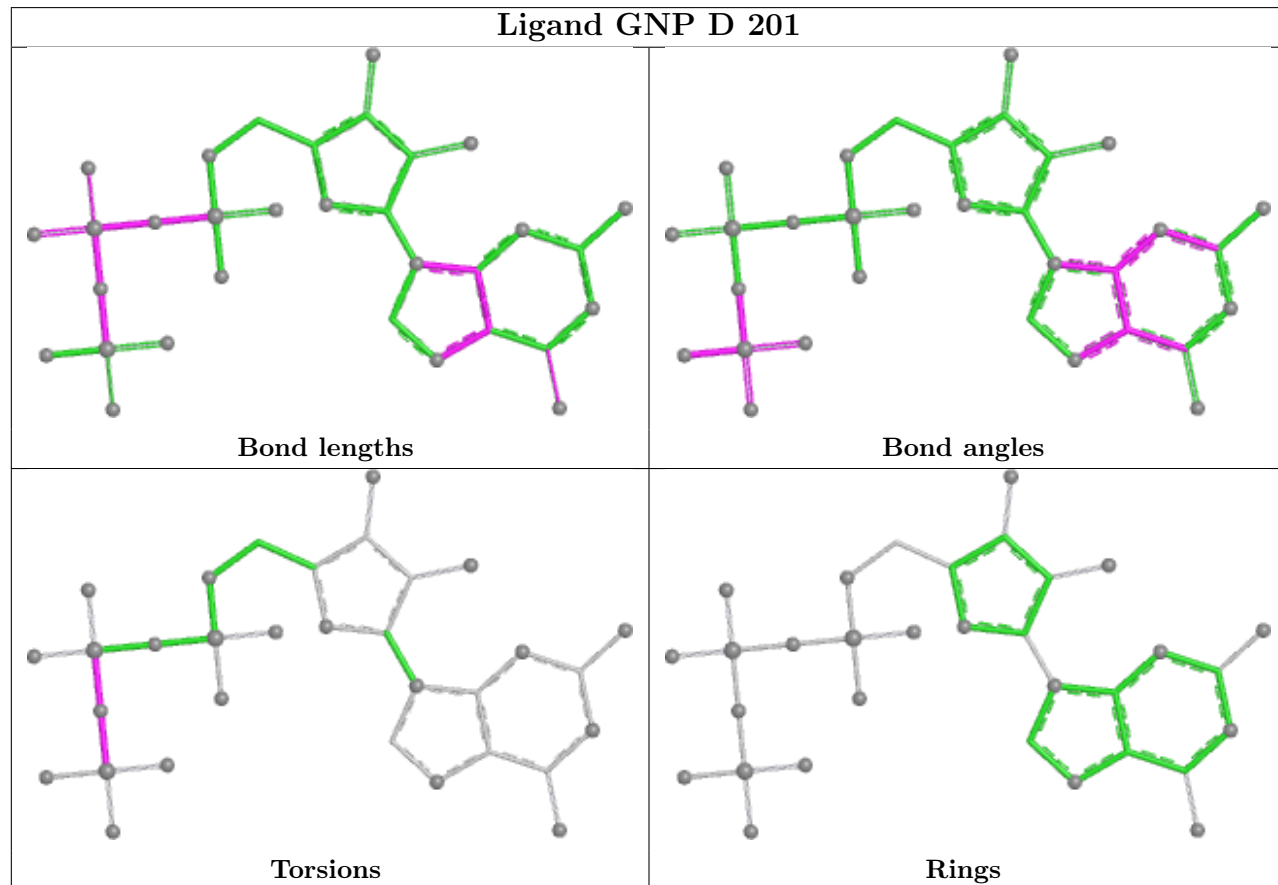
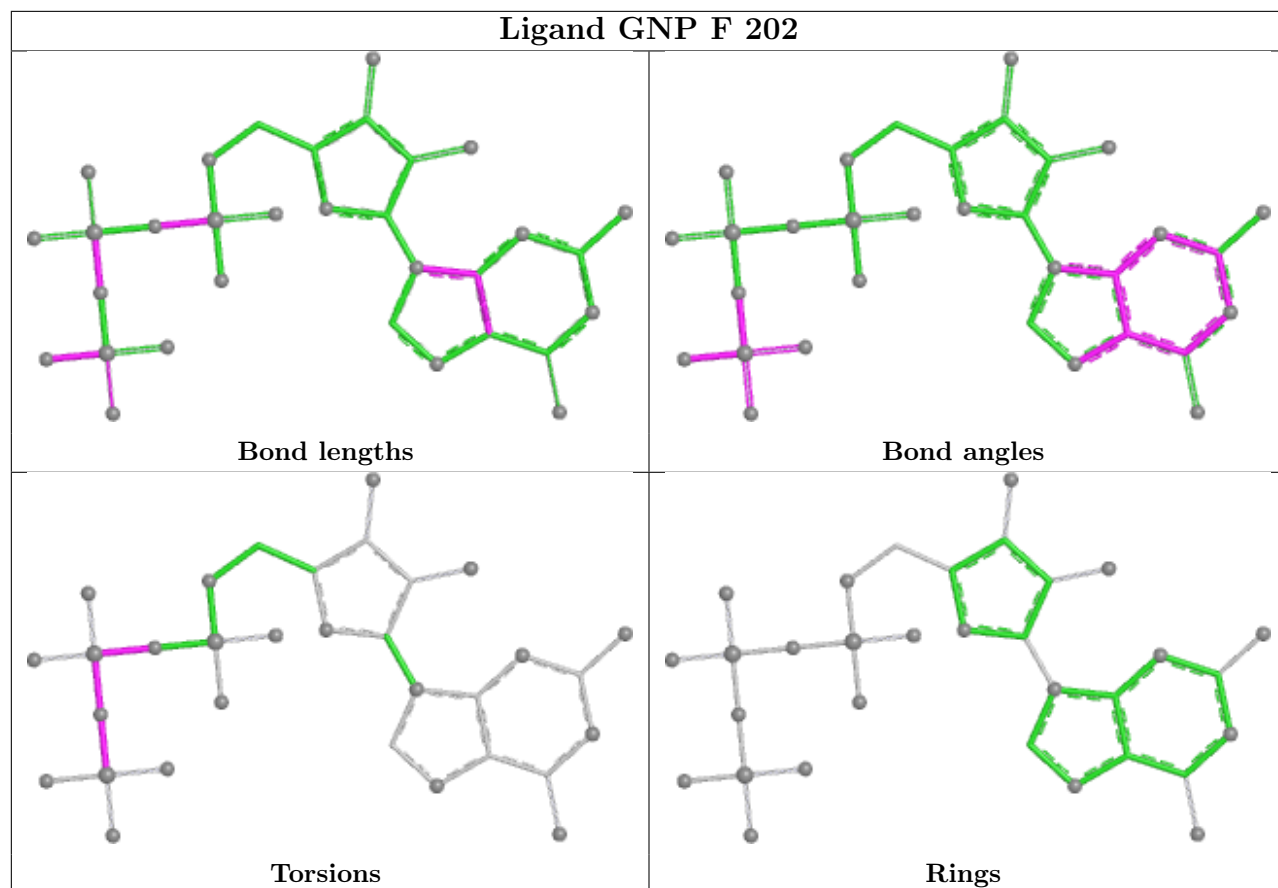












5.7 Other polymers [i](#)

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	B	172/173 (99%)	0.24	10 (5%) 29 28	13, 28, 66, 90	1 (0%)
2	A	172/173 (99%)	-0.02	9 (5%) 33 32	12, 24, 58, 84	3 (1%)
2	C	169/173 (97%)	0.46	12 (7%) 22 21	17, 35, 68, 100	2 (1%)
2	D	167/173 (96%)	0.68	22 (13%) 7 6	16, 36, 75, 126	3 (1%)
2	E	169/173 (97%)	0.68	20 (11%) 9 8	15, 37, 84, 105	3 (1%)
2	F	168/173 (97%)	0.42	12 (7%) 22 21	16, 31, 72, 89	4 (2%)
All	All	1017/1038 (97%)	0.41	85 (8%) 17 16	12, 32, 73, 126	16 (1%)

All (85) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	66	ALA	5.5
2	D	32	TYR	5.2
2	E	71	TYR	5.2
2	D	34	PRO	5.1
2	C	66	ALA	4.9
1	B	-2	PHE	4.6
1	B	-3	ALA	4.4
1	B	64	TYR	4.4
2	E	32	TYR	4.4
2	D	71	TYR	4.2
2	F	34	PRO	4.2
2	E	66	ALA	4.0
2	D	-3	ALA	3.9
2	E	36	ILE	3.9
2	C	67	MET	3.8
2	F	32	TYR	3.8
2	A	64	TYR	3.8
2	F	-2	PHE	3.7
2	C	61	HIS	3.6

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Mol	Chain	Res	Type	RSRZ
2	F	66	ALA	3.6
2	E	61	HIS	3.6
2	F	37[A]	GLU	3.5
2	D	67	MET	3.5
2	E	103	VAL	3.5
2	D	35	THR	3.4
2	E	35	THR	3.4
2	D	61	HIS	3.3
2	F	-3	ALA	3.3
2	F	67	MET	3.2
1	B	169	LYS	3.2
2	F	61	HIS	3.1
2	E	-3	ALA	3.1
2	D	36	ILE	3.0
2	C	95	HIS	3.0
2	C	122	SER	3.0
2	C	-3	ALA	2.9
2	C	69	ASP	2.8
2	F	103	VAL	2.8
2	A	-3	ALA	2.8
2	E	59	ALA	2.8
2	D	167	LYS	2.8
2	E	72	MET	2.7
2	C	37	GLU	2.7
2	E	60	GLY	2.7
1	B	1	MET	2.6
2	D	94	HIS	2.6
2	D	87	THR	2.6
2	D	108	ASP	2.6
2	A	65	SER	2.5
2	D	124	THR	2.4
2	C	65	SER	2.4
2	E	34	PRO	2.4
2	C	166	HIS	2.4
2	E	65	SER	2.4
1	B	61	HIS	2.4
2	E	74	THR	2.4
2	A	67	MET	2.3
1	B	108	ASP	2.3
2	F	1	MET	2.3
2	A	66	ALA	2.3
2	E	37	GLU	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	66	ALA	2.3
2	D	33	ASP	2.2
2	E	95	HIS	2.2
2	A	71	TYR	2.2
2	F	36	ILE	2.2
2	D	30	ASP	2.2
2	E	121	PRO	2.1
2	D	68	ARG	2.1
2	D	105	ASP	2.1
2	A	61	HIS	2.1
2	D	103	VAL	2.1
2	A	102	ARG	2.1
2	A	72	MET	2.1
1	B	88	LYS	2.1
2	E	122	SER	2.1
2	E	70	GLN	2.1
1	B	126	ASP	2.0
2	C	30	ASP	2.0
2	D	69	ASP	2.0
2	D	126	ASP	2.0
2	C	68	ARG	2.0
2	E	94	HIS	2.0
2	D	70	GLN	2.0
2	F	68	ARG	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	CSO	B	51	7/8	0.95	0.09	24,27,32,37	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands

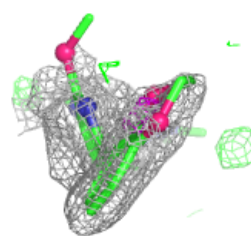
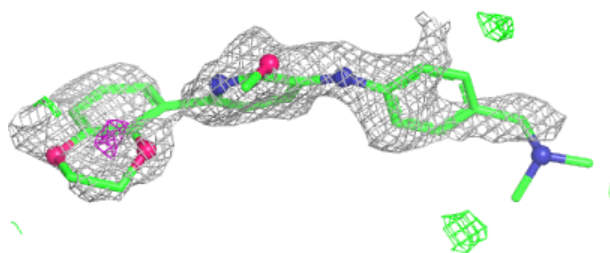
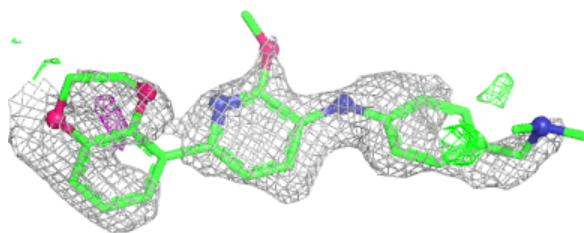
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	D1W	D	203	29/29	0.68	0.20	53,68,89,90	0
5	D1W	F	203	29/29	0.83	0.14	39,47,63,66	0
5	D1W	A	204	29/29	0.89	0.10	27,32,38,49	0
5	D1W	B	203	29/29	0.91	0.10	27,34,42,52	0
3	MG	D	202	1/1	0.92	0.11	49,49,49,49	0
3	MG	E	201	1/1	0.92	0.11	54,54,54,54	0
5	D1W	A	203	29/29	0.95	0.07	21,27,54,58	0
3	MG	F	201	1/1	0.96	0.08	37,37,37,37	0
4	GNP	E	202	32/32	0.97	0.06	30,32,42,48	0
4	GNP	C	202	32/32	0.97	0.06	25,31,34,35	0
4	GNP	D	201	32/32	0.97	0.06	25,31,39,45	0
4	GNP	F	202	32/32	0.98	0.04	21,26,32,39	0
3	MG	A	201	1/1	0.98	0.03	21,21,21,21	0
3	MG	C	201	1/1	0.98	0.03	32,32,32,32	0
3	MG	B	201	1/1	0.99	0.02	21,21,21,21	0
4	GNP	B	202	32/32	0.99	0.04	15,18,21,22	0
4	GNP	A	202	32/32	0.99	0.04	16,18,22,23	0

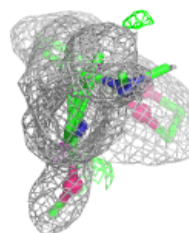
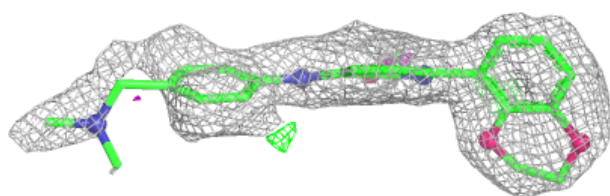
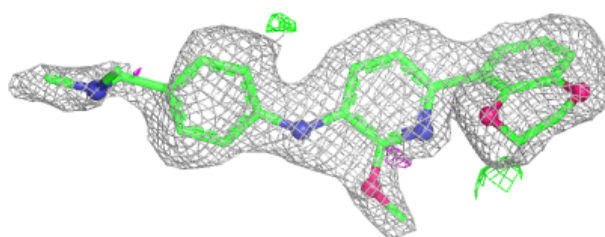
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around D1W D 203:

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

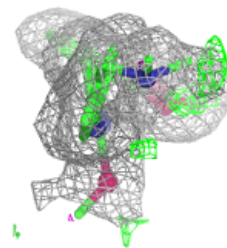
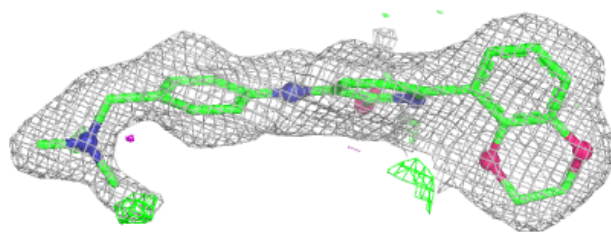
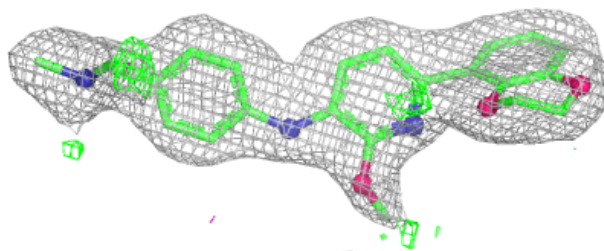
**Electron density around D1W F 203:**

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

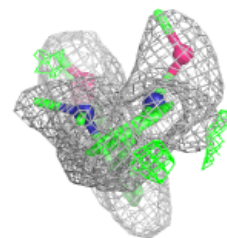
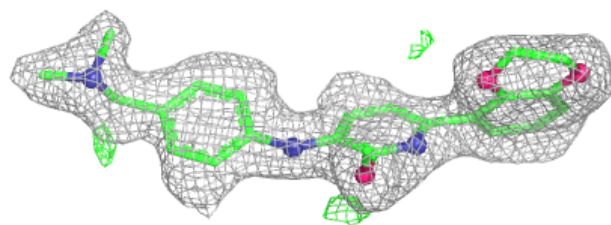
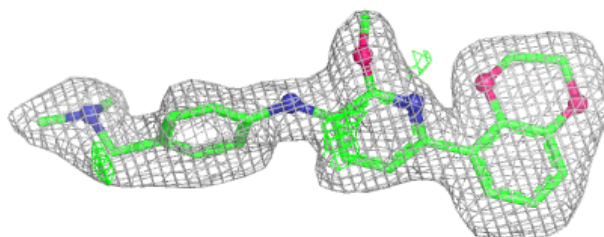


Electron density around D1W A 204:

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and green (positive)

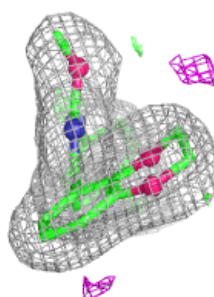
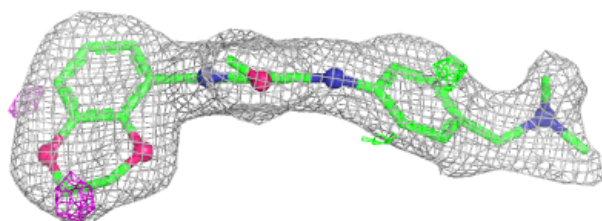
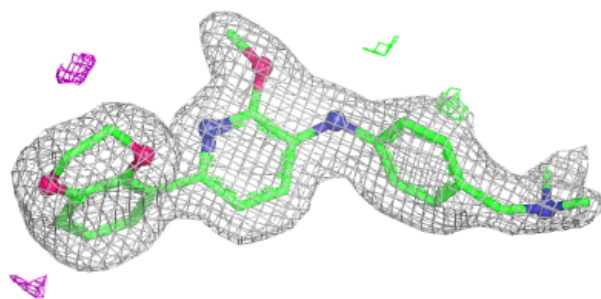
**Electron density around D1W B 203:**

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and green (positive)

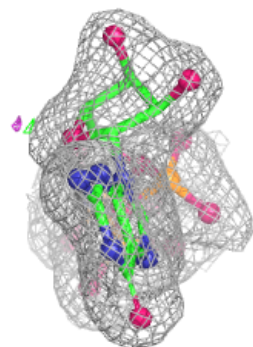
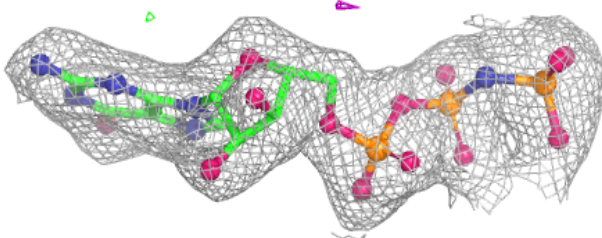
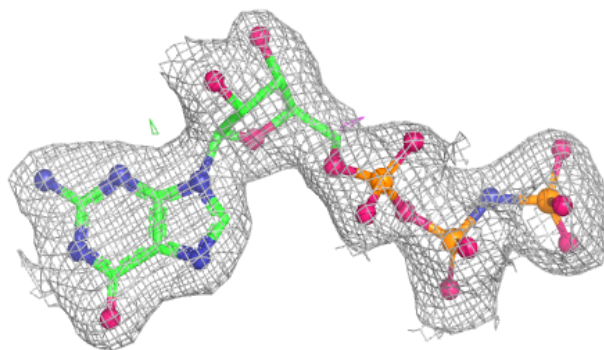


Electron density around D1W A 203:

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

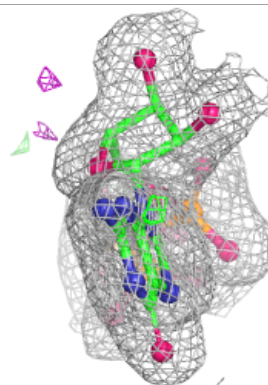
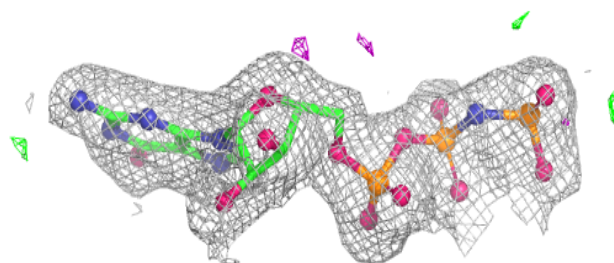
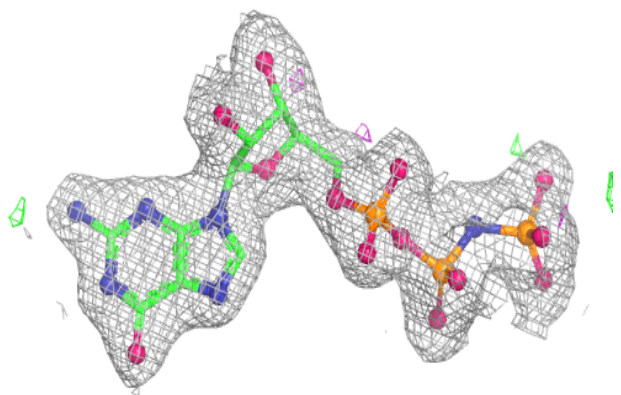
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and green (positive)

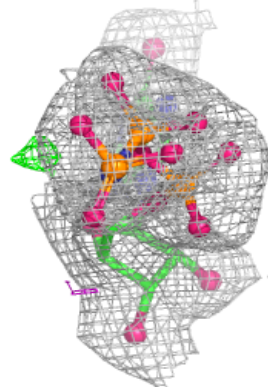
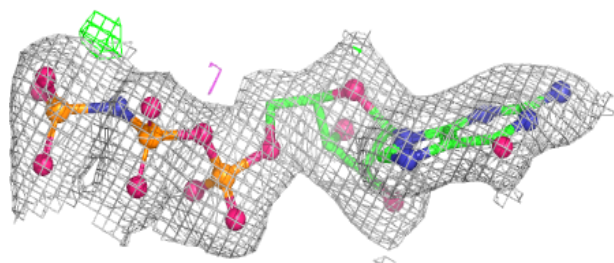
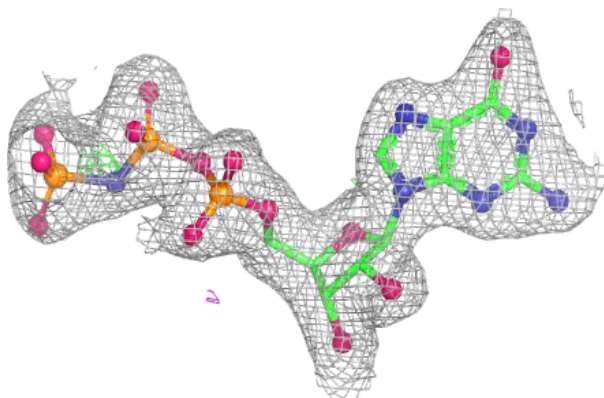


Electron density around GNP C 202:

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

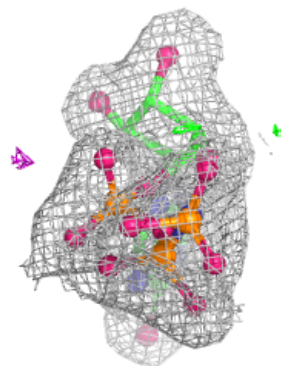
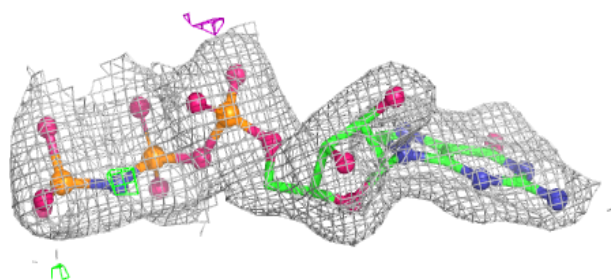
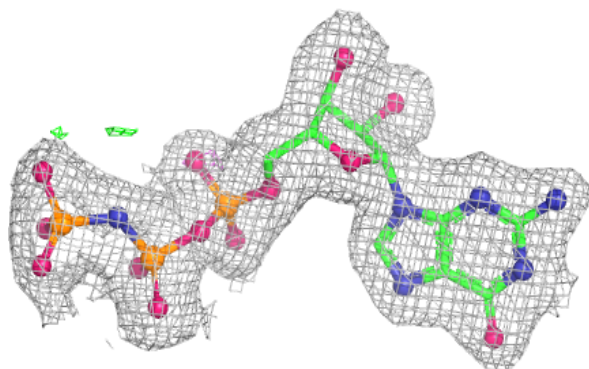
**Electron density around GNP D 201:**

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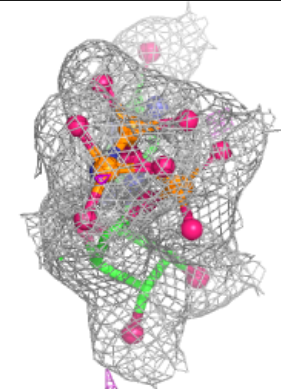
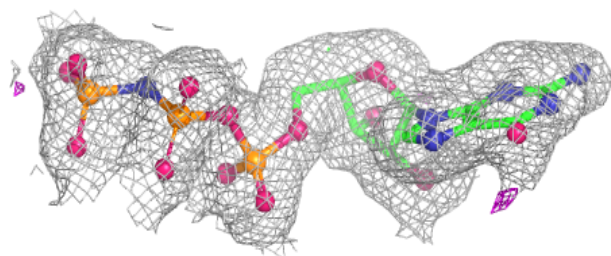
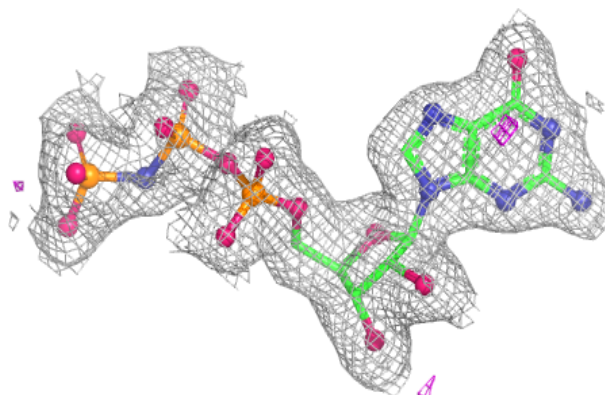


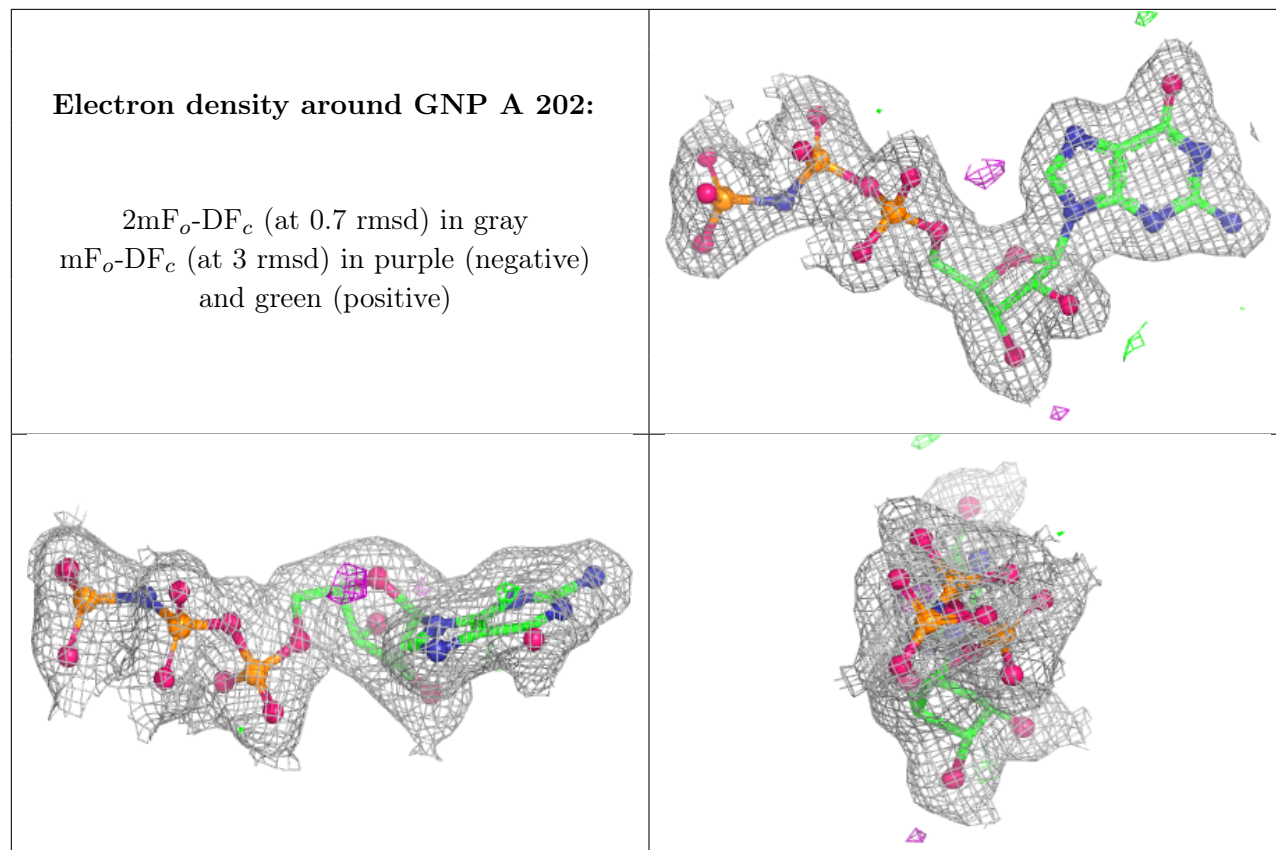
Electron density around GNP F 202:

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and green (positive)

**Electron density around GNP B 202:**

$2mF_o-DF_c$ (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.