



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 28, 2023 – 08:49 pm GMT

PDB ID : 8QVU
Title : Crystal Structure of ligand ACBI3 in complex with KRAS G12D C118S GDP and pVHL:ElonginC:ElonginB complex
Authors : Wijaya, A.J.; Zollman, D.; Farnaby, W.; Ciulli, A.
Deposited on : 2023-10-18
Resolution : 2.24 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 : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

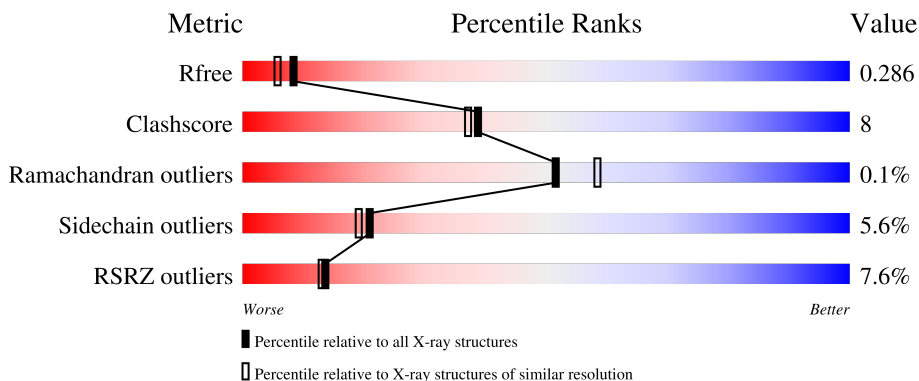
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.24 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.



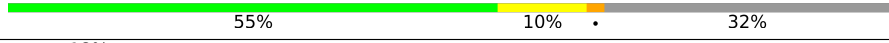


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2391 (2.26-2.22)
Clashscore	141614	2539 (2.26-2.22)
Ramachandran outliers	138981	2489 (2.26-2.22)
Sidechain outliers	138945	2490 (2.26-2.22)
RSRZ outliers	127900	2353 (2.26-2.22)

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	D	104	 4% 73% 24% ..
1	H	104	 10% 87% 12% ..
2	C	97	 2% 70% 21% 9%
2	G	97	 2% 67% 24% 9%
3	B	213	 % 62% 7% 31%

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Mol	Chain	Length	Quality of chain
3	F	213	
4	A	188	
4	E	188	

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 7887 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 Elongin-B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	H	103	799	506	132	156	5	0	0	0
1	D	102	805	510	135	155	5	0	0	0

- Molecule 2 is a protein called Elongin-C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	G	88	693	446	110	130	7	0	0	0
2	C	88	693	447	109	131	6	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	16	MET	-	initiating methionine	UNP Q15369
C	16	MET	-	initiating methionine	UNP Q15369

- Molecule 3 is a protein called von Hippel-Lindau disease tumor suppressor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	F	144	1171	745	212	212	2	0	0	0
3	B	147	1198	762	220	214	2	0	0	0

- Molecule 4 is a protein called Isoform 2B of GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	E	159	1132	711	191	225	5	0	0	0

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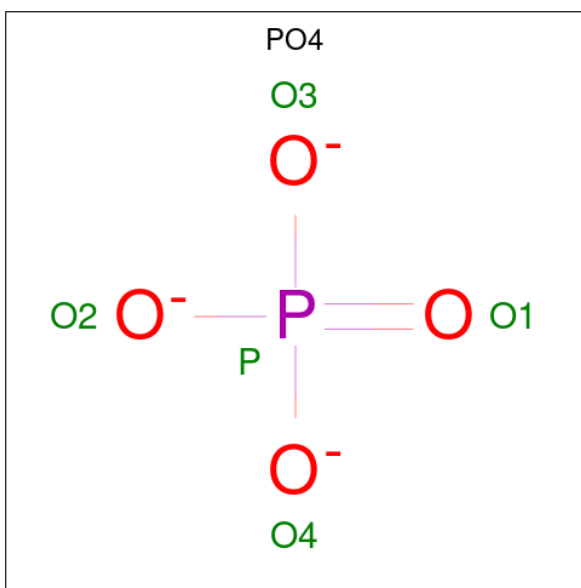
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	A	155	1123	705	193	221	4	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

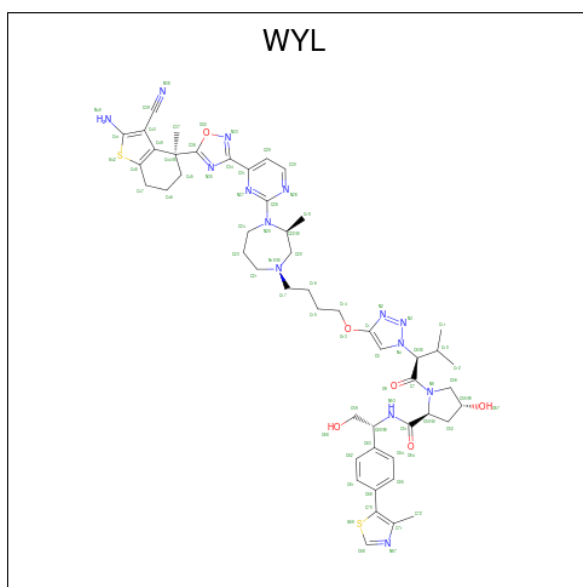
Chain	Residue	Modelled	Actual	Comment	Reference
E	12	ASP	GLY	engineered mutation	UNP P01116
E	118	SER	CYS	engineered mutation	UNP P01116
A	12	ASP	GLY	engineered mutation	UNP P01116
A	118	SER	CYS	engineered mutation	UNP P01116

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



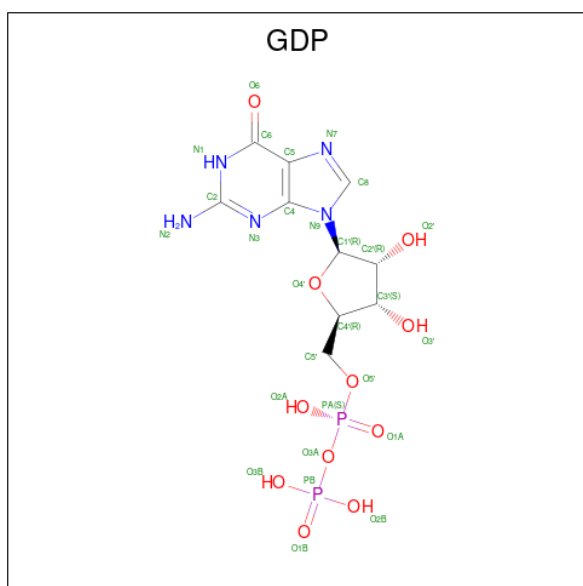
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
5	B	1	5	4	1	0	0

- Molecule 6 is (2S,4R)-1-[(2S)-2-[4-[4-[(3S)-4-[4-[5-[(4S)-2-azanyl-3-cyano-4-methyl-6,7-dihydro-5H-1-benzothiophen-4-yl]-1,2,4-oxadiazol-3-yl]pyrimidin-2-yl]-3-methyl-1,4-diazepan-1-yl]butoxy]-1,2,3-triazol-1-yl]-3-methyl-butanoyl]-N-[(1R)-1-[4-(4-methyl-1,3-thiazol-5-yl)phenyl]-2-oxidanyl-ethyl]-4-oxidanyl-pyrrolidine-2-carboxamide (three-letter code: WYL) (formula: C₅₀H₆₂N₁₄O₆S₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
6	B	1	Total	C	N	O	S	0	0
			72	50	14	6	2		
6	E	1	Total	C	N	O	S	0	0
			72	50	14	6	2		

- Molecule 7 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$) (labeled as "Ligand of Interest" by depositor).



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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
7	A	1	28	10	5	11	2	0	0

- Molecule 8 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
8	E	1	1	1	0	0
8	A	1	1	1	0	0

- Molecule 9 is water.

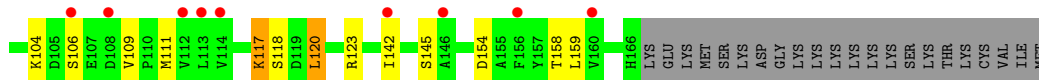
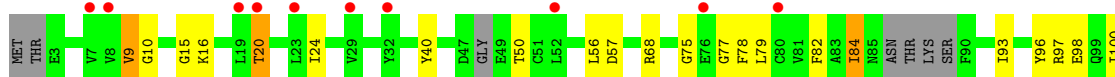
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
9	H	1	1	1	0	0
9	G	8	8	8	0	0
9	F	19	19	19	0	0
9	D	3	3	3	0	0
9	C	8	8	8	0	0
9	B	14	14	14	0	0
9	E	10	10	10	0	0
9	A	3	3	3	0	0

ASP

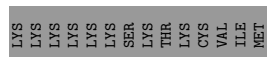
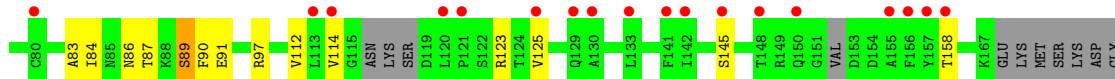
- Molecule 3: von Hippel-Lindau disease tumor suppressor



- Molecule 4: Isoform 2B of GTPase KRas



- Molecule 4: Isoform 2B of GTPase KRas



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	72.25Å 120.90Å 81.02Å 90.00° 111.67° 90.00°	Depositor
Resolution (Å)	55.86 – 2.24 55.86 – 2.24	Depositor EDS
% Data completeness (in resolution range)	58.9 (55.86-2.24) 58.8 (55.86-2.24)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.27 (at 2.25Å)	Xtrriage
Refinement program	PHENIX 1.19.2_4158, PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.248 , 0.287 0.249 , 0.286	Depositor DCC
R_{free} test set	1879 reflections (5.15%)	wwPDB-VP
Wilson B-factor (Å ²)	49.2	Xtrriage
Anisotropy	0.055	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 52.1	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	0.91	EDS
Total number of atoms	7887	wwPDB-VP
Average B, all atoms (Å ²)	60.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.57% 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: GDP, PO4, WYL, 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	D	0.37	0/820	0.63	0/1107
1	H	0.35	0/815	0.62	0/1105
2	C	0.34	0/707	0.55	0/955
2	G	0.40	0/707	0.60	0/957
3	B	0.45	0/1229	0.67	0/1677
3	F	0.43	0/1202	0.70	0/1642
4	A	0.44	0/1137	0.64	0/1538
4	E	0.46	0/1151	0.62	0/1568
All	All	0.42	0/7768	0.64	0/10549

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	D	805	0	806	19	0
1	H	799	0	785	10	0
2	C	693	0	686	13	0
2	G	693	0	682	12	0
3	B	1198	0	1201	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	1171	0	1161	21	0
4	A	1123	0	1000	21	0
4	E	1132	0	956	17	0
5	B	5	0	0	0	0
6	B	72	0	0	0	0
6	E	72	0	0	1	0
7	A	28	0	12	1	0
7	E	28	0	12	1	0
8	A	1	0	0	0	0
8	E	1	0	0	0	0
9	A	3	0	0	0	0
9	B	14	0	0	0	0
9	C	8	0	0	2	0
9	D	3	0	0	1	0
9	E	10	0	0	0	0
9	F	19	0	0	1	0
9	G	8	0	0	0	0
9	H	1	0	0	0	0
All	All	7887	0	7301	114	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 8.

All (114) 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:D:43:ARG:HD2	1:D:85:PHE:CD2	2.23	0.73
4:A:29:VAL:HG12	4:A:31:GLU:H	1.54	0.72
3:F:134:GLU:HG3	9:F:303:HOH:O	1.94	0.68
3:B:87:VAL:HB	3:B:118:LEU:HD12	1.75	0.68
4:A:86:ASN:HB3	4:A:89:SER:HB3	1.77	0.67
1:D:24:VAL:HG22	1:D:53:ASP:HA	1.79	0.65
4:E:20:THR:HG21	4:E:57:ASP:HB2	1.78	0.64
1:D:80:ARG:HD3	1:D:83:ASP:HA	1.78	0.64
1:D:37:ARG:O	1:D:42:GLN:NE2	2.31	0.63
1:H:42:GLN:HG2	1:H:79:PHE:HE1	1.63	0.63
4:E:154:ASP:O	4:E:158:THR:HG22	2.00	0.61
3:F:116:LEU:HD12	3:F:137:VAL:HG22	1.83	0.60
2:C:41:THR:O	2:C:45:MET:HG3	2.02	0.59
3:B:182:ARG:HA	3:B:185:TYR:CD2	2.37	0.59
3:F:73:GLN:OE1	3:F:108:ARG:NH2	2.34	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:80:ARG:HB2	1:D:85:PHE:CE1	2.38	0.58
3:F:198:LEU:O	3:F:202:THR:HG23	2.03	0.58
3:B:142:VAL:O	3:B:145:GLN:HG3	2.03	0.58
3:F:87:VAL:HB	3:F:118:LEU:HD12	1.86	0.58
4:E:15:GLY:HA2	7:E:202:GDP:H5'	1.85	0.58
1:D:68:ARG:HA	1:D:68:ARG:HE	1.69	0.58
3:F:142:VAL:O	3:F:145:GLN:HG3	2.04	0.57
4:E:142:ILE:HG13	4:E:158:THR:HG21	1.86	0.57
3:F:89:LEU:HD12	3:F:116:LEU:HD23	1.87	0.57
1:H:99:LEU:HG	2:G:98:GLU:HG3	1.87	0.56
3:F:73:GLN:HB3	3:F:108:ARG:NH1	2.21	0.56
2:G:69:VAL:HG21	2:G:102:GLU:HB3	1.88	0.56
4:A:24:ILE:HA	4:A:42:LYS:HD3	1.86	0.56
1:D:25:PHE:HB2	1:D:53:ASP:HB3	1.88	0.55
2:C:72:LYS:NZ	9:C:202:HOH:O	2.38	0.55
3:F:160:GLU:O	3:F:164:GLN:HG3	2.06	0.55
1:D:9:ARG:HB2	1:D:77:LEU:HB3	1.87	0.55
4:E:9:VAL:HG21	4:E:100:ILE:HD11	1.88	0.55
4:E:24:ILE:HD13	4:E:40:TYR:HB2	1.88	0.55
4:A:5:LYS:HB2	4:A:76:GLU:HG3	1.89	0.55
3:F:73:GLN:OE1	3:F:108:ARG:NH1	2.40	0.55
3:F:182:ARG:HA	3:F:185:TYR:CD2	2.42	0.54
2:G:29:PHE:CD2	2:G:70:LEU:HD23	2.44	0.53
1:H:42:GLN:HG2	1:H:79:PHE:CE1	2.44	0.53
3:F:139:SER:HB2	3:B:139:SER:HB2	1.91	0.52
1:D:8:ARG:HG2	1:D:13:THR:HG23	1.92	0.52
4:A:21:ILE:HA	4:A:24:ILE:HG12	1.92	0.51
4:A:71:TYR:O	4:A:74:THR:OG1	2.27	0.51
1:D:68:ARG:HA	1:D:68:ARG:NE	2.26	0.51
4:A:27:HIS:CD2	4:A:29:VAL:HG23	2.46	0.50
3:F:70:GLU:HB2	3:F:113:ARG:HG2	1.93	0.50
1:H:25:PHE:HB2	1:H:53:ASP:HB3	1.94	0.50
4:A:29:VAL:CG1	4:A:31:GLU:H	2.24	0.50
2:G:104:LEU:HG	3:F:184:LEU:HD13	1.95	0.48
3:F:197:ASP:OD1	3:F:200:ARG:NH1	2.47	0.48
1:H:9:ARG:HB2	1:H:77:LEU:HB3	1.95	0.48
3:F:73:GLN:HB3	3:F:108:ARG:HH12	1.76	0.48
1:H:23:THR:HG23	1:H:26:GLU:H	1.79	0.48
3:B:89:LEU:HD11	3:B:198:LEU:HD11	1.96	0.48
2:C:20:LYS:HE3	2:C:20:LYS:HB2	1.70	0.47
4:E:75:GLY:O	4:E:104:LYS:HE2	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:69:VAL:HG21	2:C:102:GLU:HB3	1.96	0.46
4:E:120:LEU:HD22	4:E:120:LEU:HA	1.75	0.46
4:E:82:PHE:HB3	4:E:93:ILE:HD11	1.96	0.46
1:D:28:LYS:HD3	1:D:42:GLN:HB2	1.96	0.46
4:E:98:GLU:HB3	6:E:201:WYL:C59	2.45	0.46
1:D:80:ARG:HD3	1:D:83:ASP:CA	2.45	0.46
1:D:40:ASP:OD2	1:D:80:ARG:NH2	2.49	0.46
4:A:7:VAL:HG11	4:A:72:MET:HE3	1.97	0.46
4:A:24:ILE:HG13	4:A:25:GLN:N	2.30	0.46
1:H:34:ILE:HD11	2:G:18:TYR:CE1	2.51	0.45
1:D:100:PRO:HG2	1:D:103:MET:SD	2.56	0.45
4:E:78:PHE:HB2	4:E:111:MET:HG2	1.98	0.45
4:E:106:SER:HB3	4:E:109:VAL:HG22	1.98	0.45
4:E:10:GLY:CA	4:E:16:LYS:HD3	2.46	0.45
2:G:95:ILE:HB	3:F:165:VAL:HG21	1.99	0.45
4:A:34:PRO:O	4:A:59:ALA:HB1	2.17	0.45
2:G:41:THR:O	2:G:45:MET:HG3	2.17	0.44
1:D:43:ARG:HD2	1:D:85:PHE:CG	2.52	0.44
3:B:129:LEU:HG	3:B:154:PRO:HB3	1.99	0.44
1:D:37:ARG:NH2	1:D:80:ARG:O	2.48	0.44
4:A:90:PHE:CG	4:A:125:VAL:HG11	2.52	0.44
2:C:25:ASP:OD1	2:C:67:SER:HB3	2.17	0.44
4:A:87:THR:O	4:A:91:GLU:HG3	2.17	0.44
4:A:27:HIS:NE2	4:A:29:VAL:HG23	2.32	0.44
2:G:80:LYS:O	2:G:81:VAL:HB	2.17	0.44
4:A:16:LYS:HB3	4:A:16:LYS:HE3	1.62	0.44
2:G:99:ILE:HG12	2:G:99:ILE:O	2.18	0.44
3:F:75:ILE:HG23	2:C:87:SER:HB3	2.00	0.43
2:G:23:SER:OG	2:G:25:ASP:OD1	2.22	0.43
2:C:77:PHE:O	2:C:81:VAL:HG23	2.19	0.43
2:C:37:LEU:HD22	2:C:43:LYS:HG3	2.00	0.43
4:A:33:ASP:HB3	4:A:36:ILE:HB	2.01	0.43
1:H:23:THR:OG1	1:H:53:ASP:O	2.36	0.43
3:F:109:ILE:HD11	3:F:111:SER:HB2	2.01	0.42
4:A:83:ALA:H	4:A:89:SER:HG	1.63	0.42
4:E:117:LYS:HB2	4:E:117:LYS:HE3	1.85	0.42
2:G:29:PHE:CE2	2:G:70:LEU:HD23	2.54	0.42
2:C:88:THR:HG23	2:C:89:GLU:N	2.35	0.42
3:F:182:ARG:H	3:F:182:ARG:HG2	1.61	0.42
4:E:77:GLY:CA	4:E:159:LEU:HD11	2.50	0.42
3:F:145:GLN:HG3	3:F:145:GLN:H	1.65	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:88:LEU:HA	9:D:201:HOH:O	2.20	0.42
1:D:4:PHE:CE1	1:D:69:PRO:HG3	2.55	0.42
2:C:62:PHE:CE1	2:C:110:LEU:HD21	2.55	0.42
1:H:44:LEU:HD23	1:H:44:LEU:HA	1.85	0.42
2:C:17:MET:CE	2:C:58:ASN:HD21	2.33	0.41
1:D:37:ARG:HH21	1:D:41:GLU:CD	2.23	0.41
3:B:161:ARG:HH11	3:B:164:GLN:HE21	1.68	0.41
2:C:82:ARG:NH1	9:C:201:HOH:O	2.32	0.41
2:G:65:ILE:HG22	2:G:70:LEU:HB2	2.03	0.41
4:E:96:TYR:O	4:E:100:ILE:HD12	2.20	0.41
4:A:84:ILE:HD12	4:A:123:ARG:HB3	2.01	0.41
4:E:84:ILE:O	4:E:123:ARG:HA	2.21	0.41
1:H:38:PRO:O	1:H:42:GLN:HG3	2.20	0.40
4:A:83:ALA:HB3	4:A:86:ASN:HB3	2.03	0.40
4:A:17:SER:HB2	7:A:201:GDP:PA	2.61	0.40
2:C:82:ARG:HD2	2:C:82:ARG:O	2.22	0.40
4:A:24:ILE:HG13	4:A:25:GLN:H	1.85	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	D	98/104 (94%)	93 (95%)	5 (5%)	0	100	100
1	H	101/104 (97%)	98 (97%)	3 (3%)	0	100	100
2	C	84/97 (87%)	82 (98%)	2 (2%)	0	100	100
2	G	84/97 (87%)	82 (98%)	2 (2%)	0	100	100
3	B	145/213 (68%)	141 (97%)	4 (3%)	0	100	100
3	F	142/213 (67%)	137 (96%)	5 (4%)	0	100	100
4	A	143/188 (76%)	136 (95%)	7 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	E	153/188 (81%)	145 (95%)	7 (5%)	1 (1%)	22	20
All	All	950/1204 (79%)	914 (96%)	35 (4%)	1 (0%)	51	58

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	E	84	ILE

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	D	90/92 (98%)	85 (94%)	5 (6%)	21	19
1	H	88/92 (96%)	86 (98%)	2 (2%)	50	57
2	C	78/86 (91%)	78 (100%)	0	100	100
2	G	78/86 (91%)	71 (91%)	7 (9%)	9	6
3	B	136/185 (74%)	133 (98%)	3 (2%)	52	59
3	F	133/185 (72%)	129 (97%)	4 (3%)	41	47
4	A	105/168 (62%)	92 (88%)	13 (12%)	4	2
4	E	100/168 (60%)	89 (89%)	11 (11%)	6	3
All	All	808/1062 (76%)	763 (94%)	45 (6%)	21	19

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	9	ARG
1	H	50	LEU
2	G	17	MET
2	G	35	HIS
2	G	57	THR
2	G	60	VAL
2	G	71	SER

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Mol	Chain	Res	Type
2	G	86	SER
2	G	87	SER
3	F	73	GLN
3	F	109	ILE
3	F	113	ARG
3	F	182	ARG
1	D	1	MET
1	D	24	VAL
1	D	46	LYS
1	D	51	LEU
1	D	55	LYS
3	B	139	SER
3	B	141	ASN
3	B	205	ARG
4	E	9	VAL
4	E	20	THR
4	E	50	THR
4	E	56	LEU
4	E	68	ARG
4	E	79	LEU
4	E	97	ARG
4	E	117	LYS
4	E	118	SER
4	E	120	LEU
4	E	145	SER
4	A	5	LYS
4	A	9	VAL
4	A	23	LEU
4	A	26	ASN
4	A	38	ASP
4	A	50	THR
4	A	68	ARG
4	A	89	SER
4	A	97	ARG
4	A	112	VAL
4	A	114	VAL
4	A	145	SER
4	A	158	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
3	F	132	GLN
2	C	85	ASN
3	B	132	GLN
3	B	164	GLN
4	E	61	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 2 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
7	GDP	E	202	8	24,30,30	0.99	1 (4%)	30,47,47	1.23	4 (13%)
7	GDP	A	201	8	24,30,30	0.95	1 (4%)	30,47,47	1.32	4 (13%)
6	WYL	E	201	-	67,80,80	0.73	2 (2%)	62,116,116	1.04	4 (6%)
6	WYL	B	302	-	67,80,80	0.61	0	62,116,116	1.12	5 (8%)
5	PO4	B	301	-	4,4,4	0.75	0	6,6,6	0.41	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
6	WYL	E	201	-	-	5/42/97/97	0/9/9/9
7	GDP	A	201	8	-	1/12/32/32	0/3/3/3
6	WYL	B	302	-	-	6/42/97/97	0/9/9/9
7	GDP	E	202	8	-	5/12/32/32	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	E	202	GDP	C6-N1	-2.87	1.33	1.37
6	E	201	WYL	C20-N19	2.62	1.49	1.46
7	A	201	GDP	C6-N1	-2.42	1.34	1.37
6	E	201	WYL	C26-N25	2.11	1.40	1.36

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	302	WYL	C5-N4-C6	5.58	131.79	125.62
6	E	201	WYL	C14-O13-C1	-4.18	111.01	117.59
6	E	201	WYL	C5-N4-C6	4.00	130.04	125.62
7	A	201	GDP	C3'-C2'-C1'	3.63	106.45	100.98
6	B	302	WYL	C37-C44-C49	3.32	115.65	107.66
6	B	302	WYL	C14-O13-C1	-3.28	112.42	117.59
7	A	201	GDP	PA-O3A-PB	-3.15	122.02	132.83
6	E	201	WYL	C37-C44-C49	3.09	115.10	107.66
7	E	202	GDP	PA-O3A-PB	-2.60	123.91	132.83
6	E	201	WYL	C46-C47-C48	-2.59	109.27	113.53
7	E	202	GDP	C5-C6-N1	2.38	118.15	113.95
6	B	302	WYL	C46-C47-C48	-2.27	109.80	113.53
6	B	302	WYL	C45-C44-C36	-2.26	105.08	110.39
7	A	201	GDP	C8-N7-C5	2.25	107.27	102.99
7	A	201	GDP	C5-C6-N1	2.16	117.77	113.95
7	E	202	GDP	O6-C6-C5	-2.08	120.31	124.37
7	E	202	GDP	C3'-C2'-C1'	2.05	104.07	100.98

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	302	WYL	O58-C59-C60-C63
6	B	302	WYL	O58-C59-C60-N53

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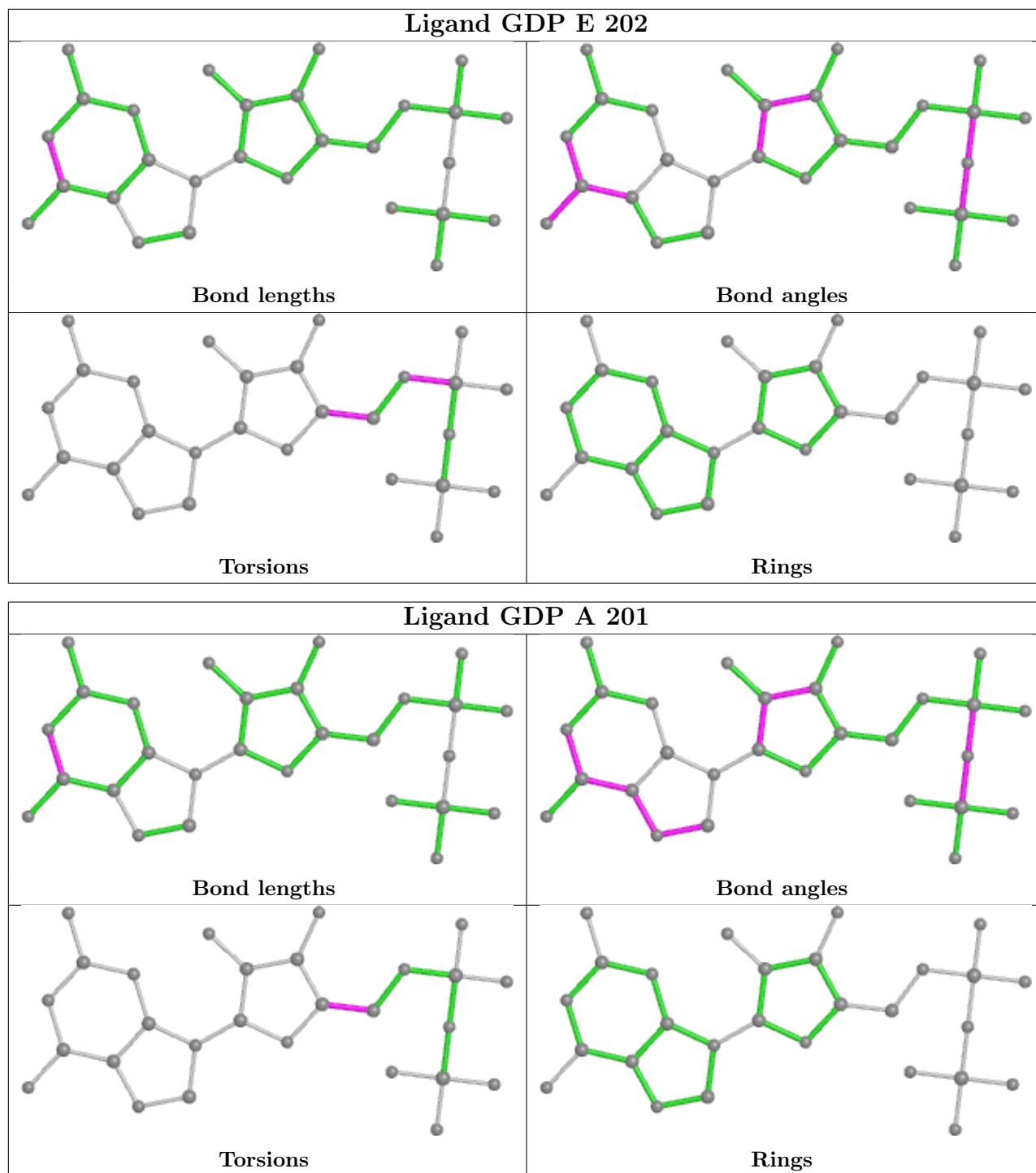
Mol	Chain	Res	Type	Atoms
6	E	201	WYL	O58-C59-C60-C63
6	E	201	WYL	O58-C59-C60-N53
7	E	202	GDP	C5'-O5'-PA-O3A
7	E	202	GDP	C5'-O5'-PA-O1A
7	E	202	GDP	O4'-C4'-C5'-O5'
6	E	201	WYL	C15-C16-C17-N19
6	B	302	WYL	O13-C14-C15-C16
6	E	201	WYL	O13-C14-C15-C16
7	E	202	GDP	C3'-C4'-C5'-O5'
6	B	302	WYL	C15-C16-C17-N19
6	B	302	WYL	C65-C66-C70-S69
7	A	201	GDP	O4'-C4'-C5'-O5'
6	E	201	WYL	N27-C31-C34-N33
7	E	202	GDP	C5'-O5'-PA-O2A
6	B	302	WYL	C16-C17-N19-C20

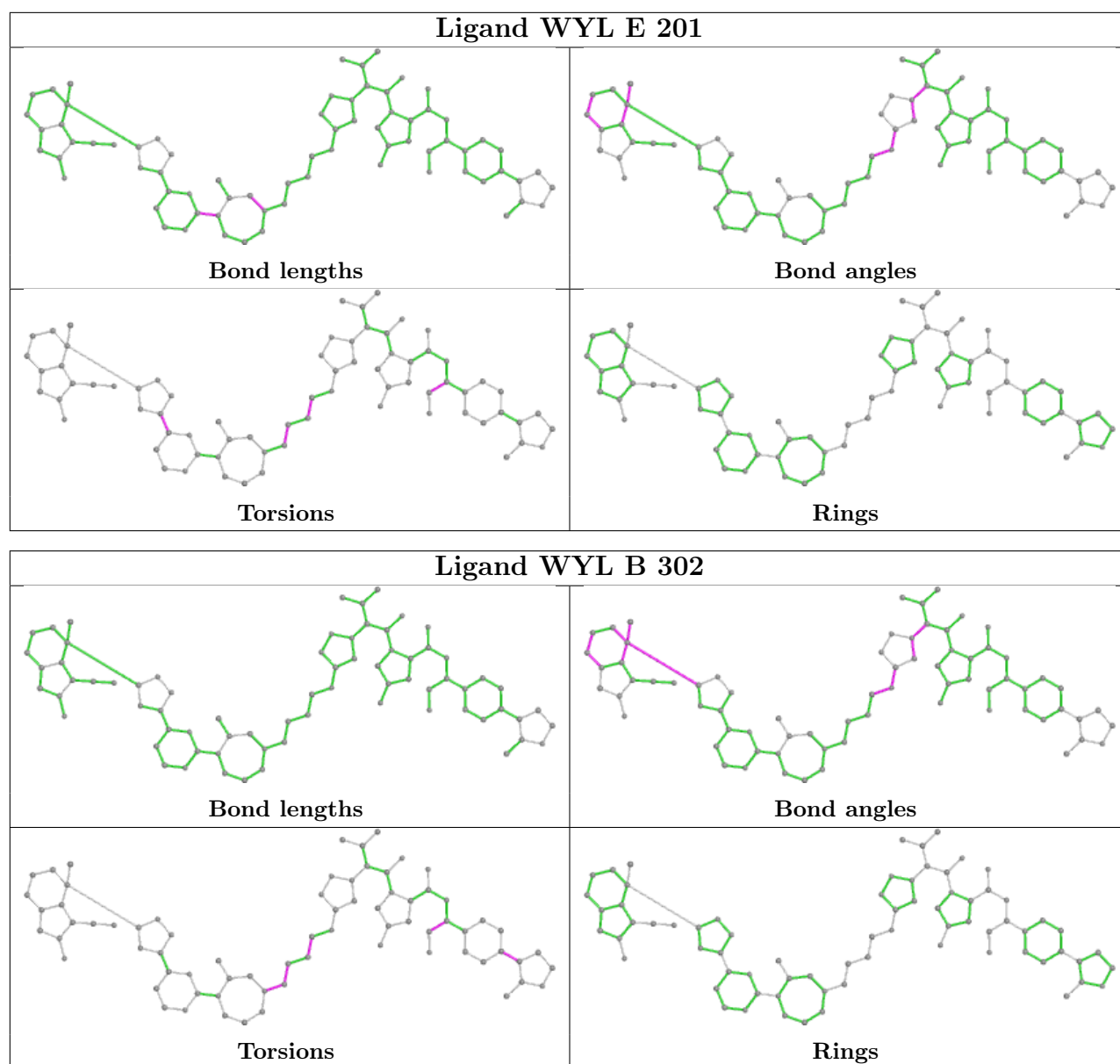
There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	E	202	GDP	1	0
7	A	201	GDP	1	0
6	E	201	WYL	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

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	D	102/104 (98%)	0.14	4 (3%) 39 39	26, 58, 86, 117	0
1	H	103/104 (99%)	0.48	10 (9%) 7 7	31, 70, 107, 149	0
2	C	88/97 (90%)	-0.05	2 (2%) 60 61	19, 40, 70, 88	0
2	G	88/97 (90%)	0.13	2 (2%) 60 61	24, 50, 87, 122	0
3	B	147/213 (69%)	-0.00	3 (2%) 65 66	16, 36, 72, 92	0
3	F	144/213 (67%)	0.08	1 (0%) 87 87	16, 37, 66, 104	0
4	A	155/188 (82%)	1.23	34 (21%) 0 0	40, 92, 134, 170	0
4	E	159/188 (84%)	0.79	19 (11%) 4 3	36, 79, 119, 145	0
All	All	986/1204 (81%)	0.40	75 (7%) 13 13	16, 57, 111, 170	0

All (75) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	A	156	PHE	6.8
4	A	31	GLU	6.5
4	A	155	ALA	5.2
4	A	4	TYR	5.1
1	H	62	PHE	5.1
4	A	141	PHE	4.8
4	E	20	THR	4.8
4	A	18	ALA	4.5
4	A	6	LEU	4.4
4	A	55	ILE	4.4
4	A	20	THR	4.3
4	E	29	VAL	4.2
3	F	140	LEU	4.0
1	H	51	LEU	3.9
4	A	27	HIS	3.9
4	E	19	LEU	3.9

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Mol	Chain	Res	Type	RSRZ
4	A	133	LEU	3.7
4	A	130	ALA	3.5
1	H	79	PHE	3.5
4	A	21	ILE	3.5
4	A	158	THR	3.5
4	A	145	SER	3.4
4	A	121	PRO	3.3
4	E	32	TYR	3.3
4	A	157	TYR	3.2
4	A	114	VAL	3.2
2	G	16	MET	3.1
1	H	30	ILE	3.1
4	A	30	ASP	3.0
4	A	80	CYS	3.0
4	A	24	ILE	3.0
4	A	40	TYR	3.0
4	E	156	PHE	2.9
3	B	140	LEU	2.9
4	A	75	GLY	2.9
3	B	62	VAL	2.8
4	E	23	LEU	2.7
4	E	113	LEU	2.7
1	H	84	THR	2.7
4	A	148	THR	2.7
4	E	112	VAL	2.7
4	E	80	CYS	2.7
4	A	150	GLN	2.6
4	E	114	VAL	2.6
4	E	76	GLU	2.6
4	E	8	VAL	2.5
4	A	125	VAL	2.5
1	H	82	ASP	2.5
4	A	129	GLN	2.4
4	A	76	GLU	2.4
1	H	76	GLY	2.4
4	E	52	LEU	2.4
1	H	81	ALA	2.4
4	A	113	LEU	2.4
1	H	27	LEU	2.3
1	H	75	VAL	2.3
4	E	106	SER	2.3
4	A	33	ASP	2.3

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Mol	Chain	Res	Type	RSRZ
4	E	7	VAL	2.3
4	A	29	VAL	2.3
4	A	23	LEU	2.2
1	D	1	MET	2.2
2	G	46	LEU	2.2
4	E	146	ALA	2.2
4	E	160	VAL	2.2
4	A	142	ILE	2.2
1	D	44	LEU	2.2
4	E	108	ASP	2.2
1	D	41	GLU	2.1
4	A	120	LEU	2.1
2	C	88	THR	2.1
2	C	18	TYR	2.1
4	E	142	ILE	2.0
1	D	81	ALA	2.0
3	B	205	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.

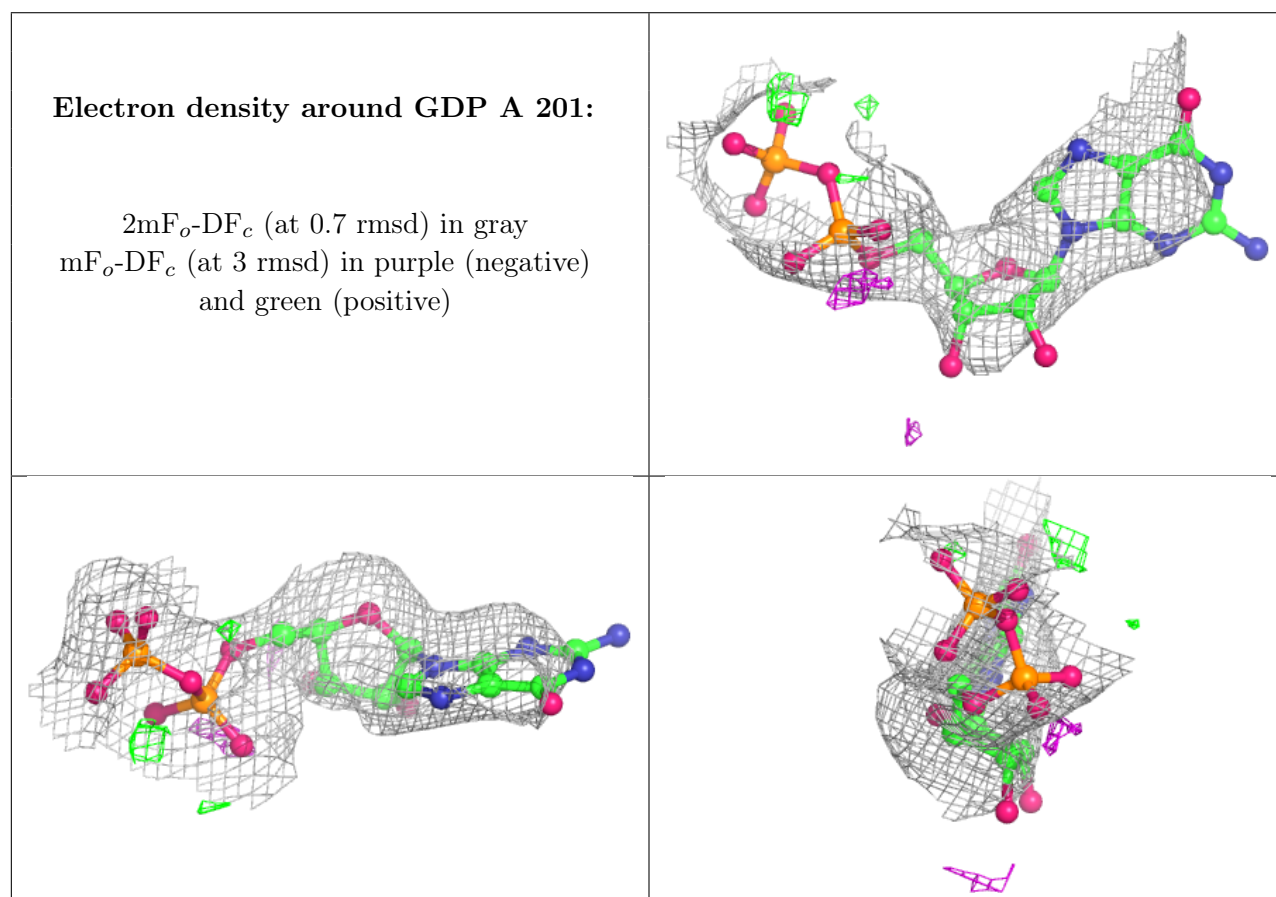
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	GDP	A	201	28/28	0.84	0.24	89,105,114,119	0
8	MG	E	203	1/1	0.84	0.11	59,59,59,59	0
7	GDP	E	202	28/28	0.86	0.18	63,88,99,104	0
5	PO4	B	301	5/5	0.92	0.27	27,27,27,27	0
6	WYL	E	201	72/72	0.94	0.14	20,39,59,72	0
8	MG	A	202	1/1	0.95	0.15	65,65,65,65	0

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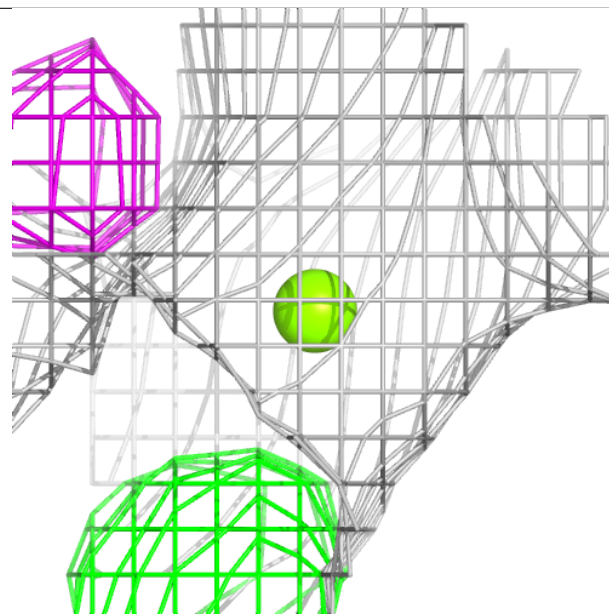
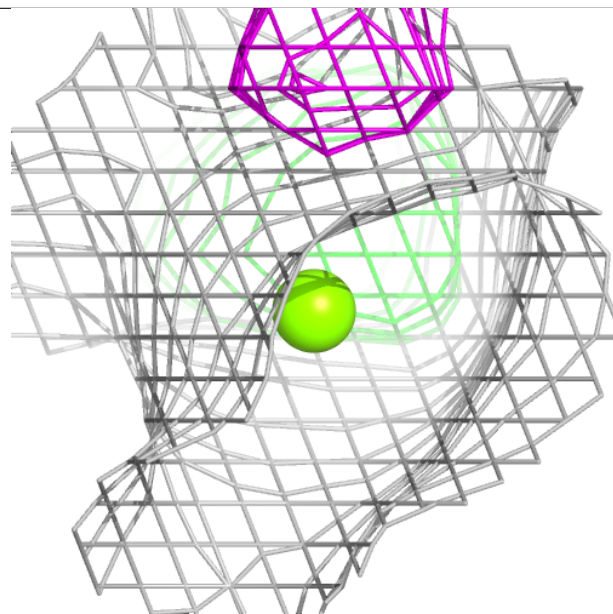
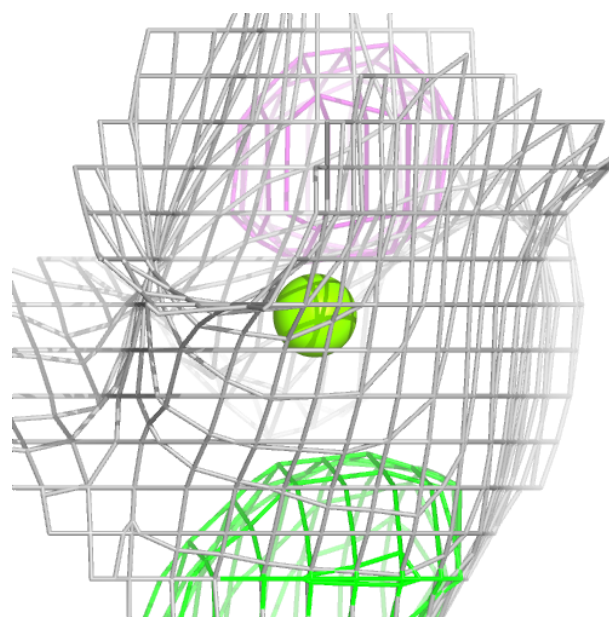
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
6	WYL	B	302	72/72	0.96	0.14	14,36,64,72	0

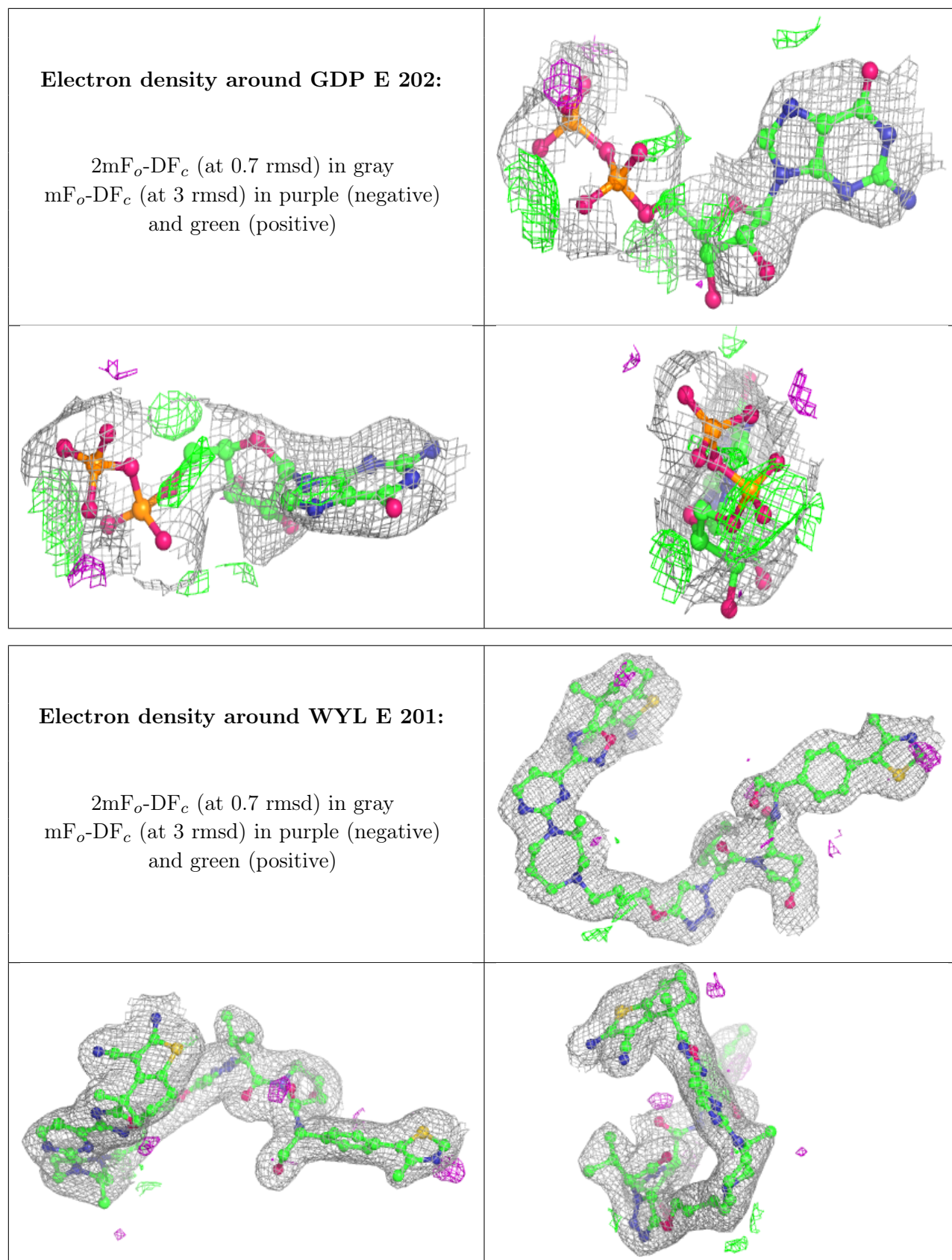
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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



Electron density around MG E 203:

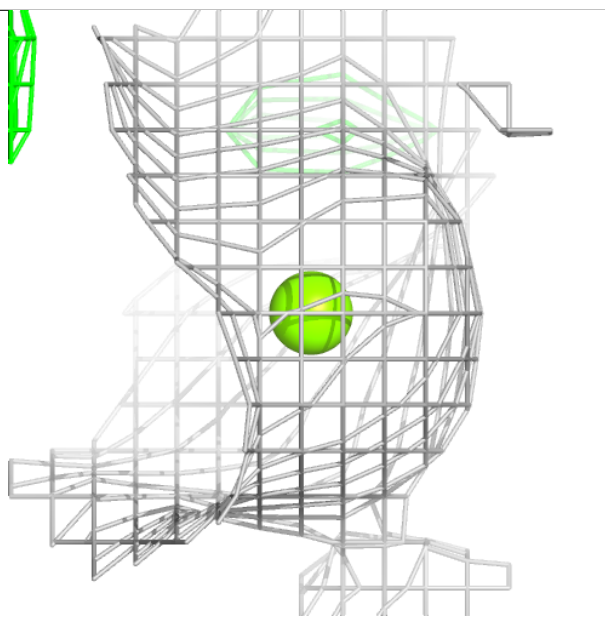
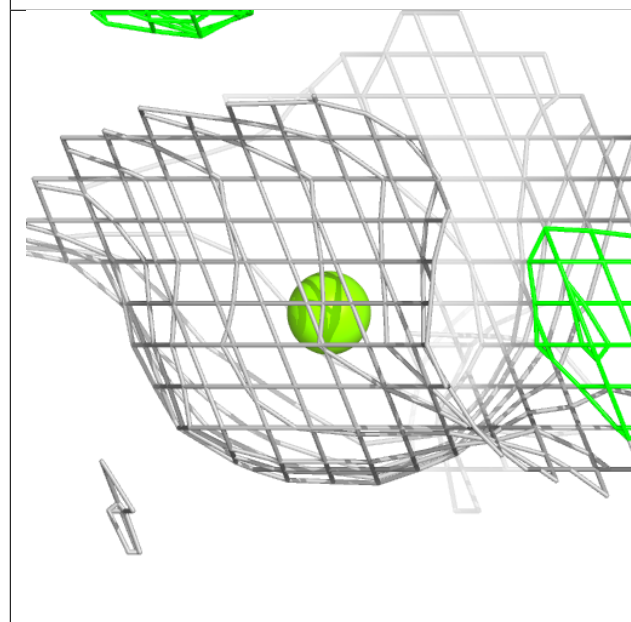
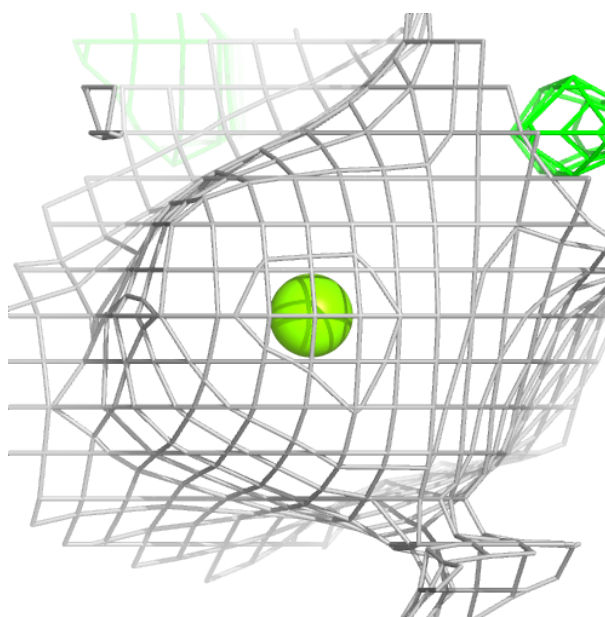
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

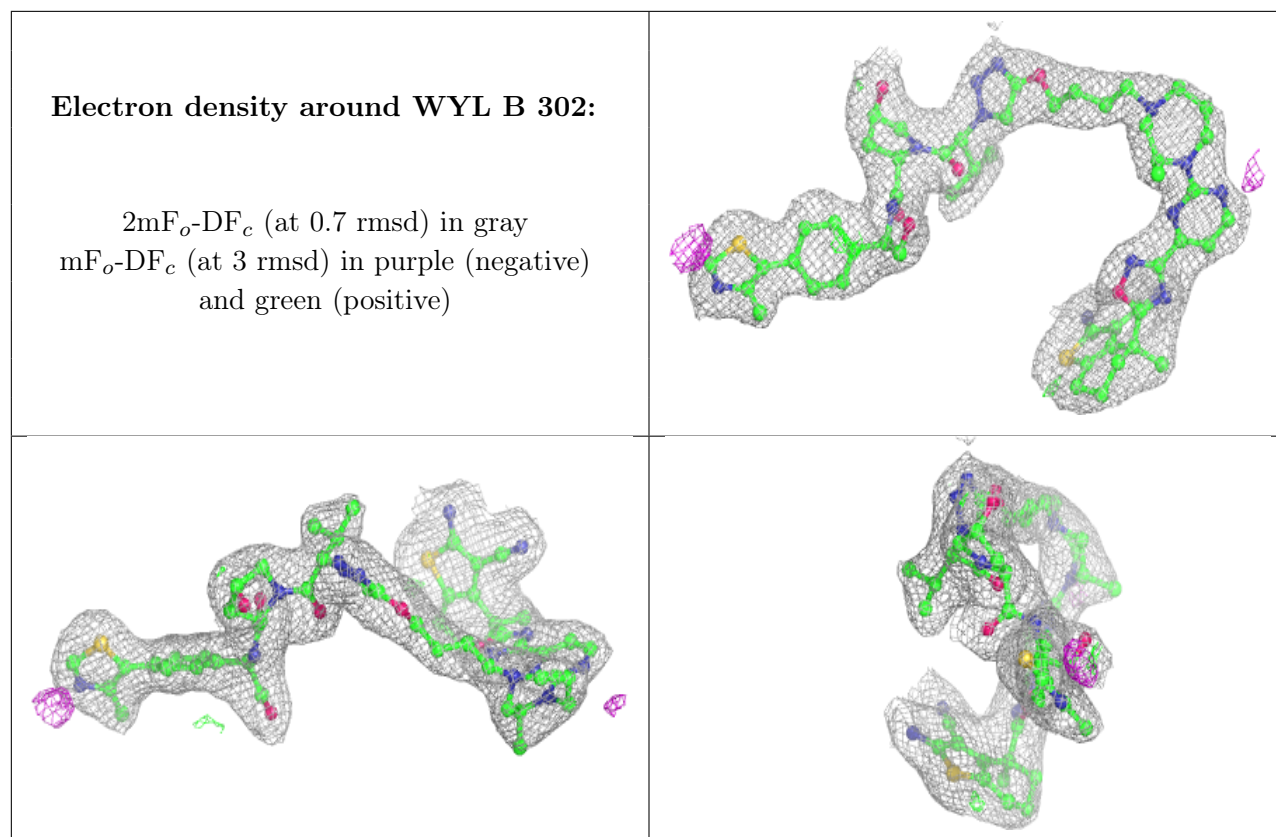




Electron density around MG A 202:

$2mF_o-DF_c$ (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.