



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 3, 2025 – 07:45 pm GMT

PDB ID : 9RKC / pdb_00009rkc
Title : Crystal Structure of ACBI4-mediated ternary complex of KRAS G12D C118S
GDP with pVHL:ElonginC:ElonginB
Authors : Karolak, N.K.; Ciulli, A.
Deposited on : 2025-06-13
Resolution : 2.19 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:

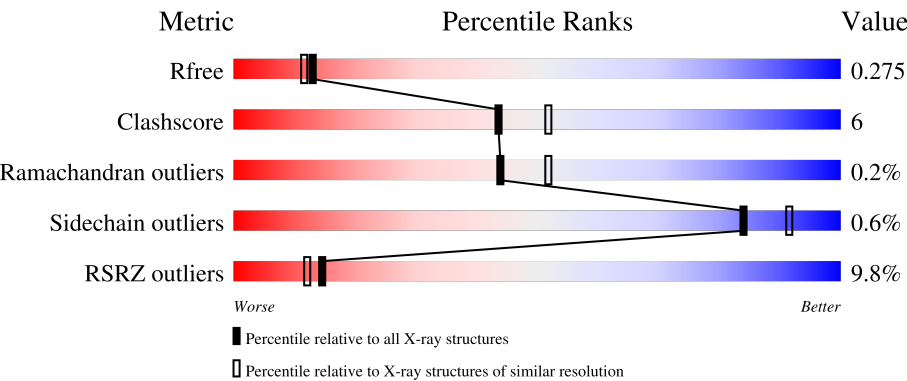
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 2.19 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.



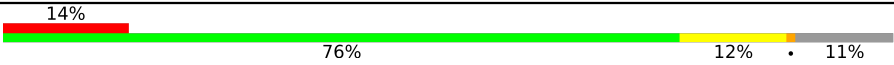


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	5791 (2.20-2.20)
Clashscore	180529	6634 (2.20-2.20)
Ramachandran outliers	177936	6560 (2.20-2.20)
Sidechain outliers	177891	6561 (2.20-2.20)
RSRZ outliers	164620	5791 (2.20-2.20)

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	104	<div><div>7%</div><div>85%</div><div>12%</div><div></div></div>
1	E	104	<div><div>30%</div><div>81%</div><div>13%</div><div>5%</div></div>
2	B	97	<div><div>%</div><div>75%</div><div>12%</div><div>12%</div></div>
2	F	97	<div><div>22%</div><div>73%</div><div>14%</div><div>12%</div></div>
3	C	162	<div><div>2%</div><div>77%</div><div>13%</div><div>10%</div></div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	G	162	
4	D	170	
4	H	170	

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 8044 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
1	A	101	Total	C	N	O	S	0	0	0
			774	495	130	145	4			
1	E	99	Total	C	N	O	S	0	0	0
			719	458	119	138	4			

- Molecule 2 is a protein called Elongin-C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	85	Total	C	N	O	S	0	0	0
			676	437	109	125	5			
2	F	85	Total	C	N	O	S	0	0	0
			666	429	106	125	6			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	16	MET	-	initiating methionine	UNP Q15369
F	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
3	C	146	Total	C	N	O	S	0	1	0
			1191	756	219	214	2			
3	G	144	Total	C	N	O	S	0	0	0
			1126	714	203	207	2			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	52	GLY	-	expression tag	UNP P40337
C	53	SER	-	expression tag	UNP P40337

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
G	52	GLY	-	expression tag	UNP P40337
G	53	SER	-	expression tag	UNP P40337

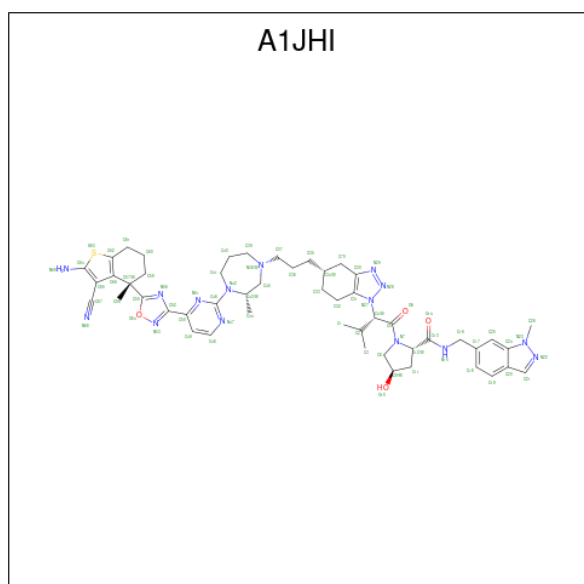
- Molecule 4 is a protein called GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	168	Total	C	N	O	S	0	1	0
			1333	836	228	263	6			
4	H	167	Total	C	N	O	S	0	0	0
			1313	823	225	259	6			

There are 6 discrepancies between the modelled and reference sequences:

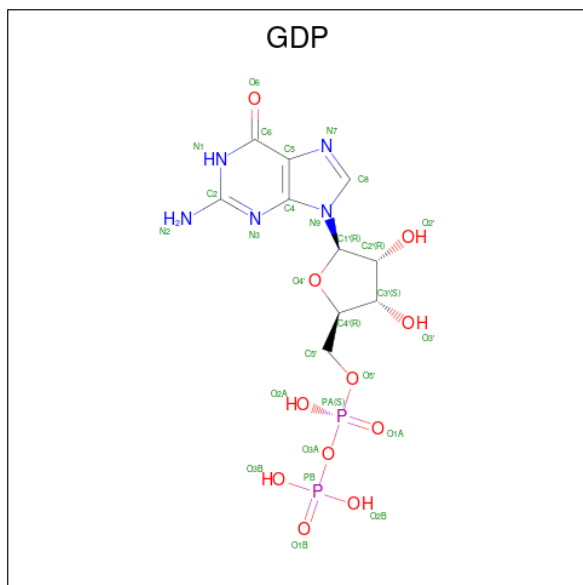
Chain	Residue	Modelled	Actual	Comment	Reference
D	0	GLY	-	expression tag	UNP P01116
D	12	ASP	GLY	engineered mutation	UNP P01116
D	118	SER	CYS	engineered mutation	UNP P01116
H	0	GLY	-	expression tag	UNP P01116
H	12	ASP	GLY	engineered mutation	UNP P01116
H	118	SER	CYS	engineered mutation	UNP P01116

- Molecule 5 is (2 {S},4 {R})-1-[(2 {S})-2-[(5 {S})-5-[3-[(3 {S})-4-[4-[5-[(4 {S})-2-azanyl-3-cyano-4-methyl-6,7-dihydro-5 {H}-1-benzothiophen-4-yl]-1,2,4-oxadiazol-3-yl]pyrimidin-2-yl]-3-methyl-1,4-diazepan-1-yl]propyl]-4,5,6,7-tetrahydrobenzotriazol-1-yl]-3-methyl-butanoyl]- {N}-[(1-methylindazol-6-yl)methyl]-4-oxidanyl-pyrrolidine-2-carboxamide (CCD ID: A1JHI) (formula: C₅₀H₆₃N₁₅O₄S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	D	1	Total	C	N	O	S	0	0
			70	50	15	4	1		
5	H	1	Total	C	N	O	S	0	0
			70	50	15	4	1		

- Molecule 6 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	D	1	Total	C	N	O	P	0	0
			28	10	5	11	2		
6	H	1	Total	C	N	O	P	0	0
			28	10	5	11	2		

- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	1	Total	Mg	0	0
			1	1		
7	H	1	Total	Mg	0	0
			1	1		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	2	Total	O	0	0
			2	2		

Continued on next page...

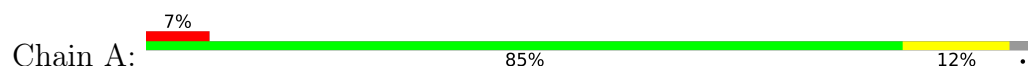
Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	5	Total 5	O 5	0	0
8	C	9	Total 9	O 9	0	0
8	D	14	Total 14	O 14	0	0
8	G	10	Total 10	O 10	0	0
8	H	8	Total 8	O 8	0	0

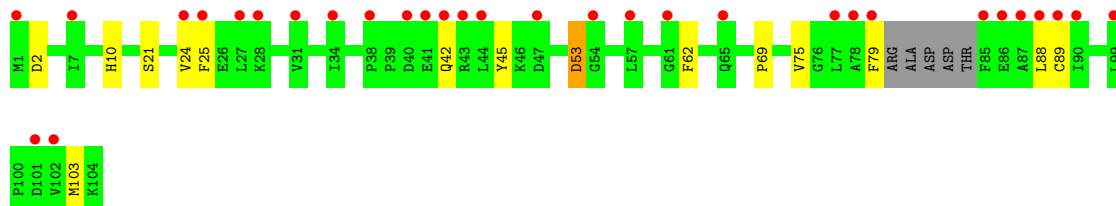
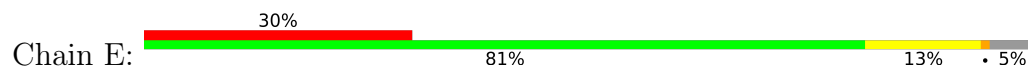
3 Residue-property plots [i](#)

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

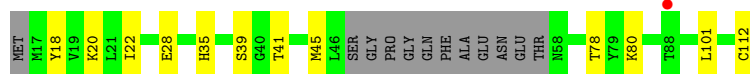
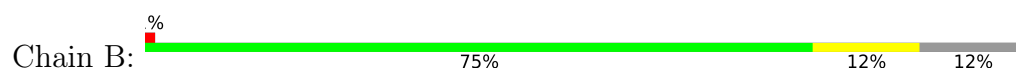
- Molecule 1: Elongin-B



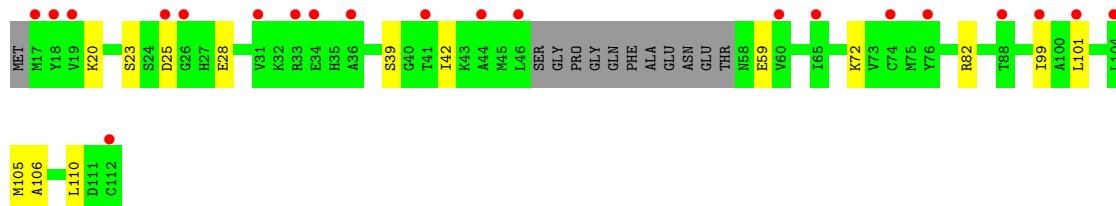
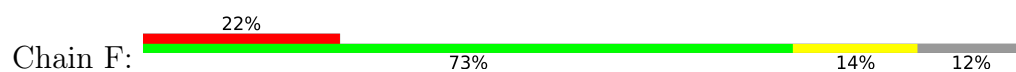
- Molecule 1: Elongin-B



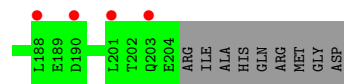
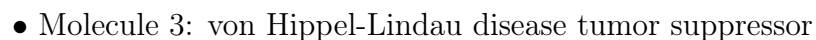
- Molecule 2: Elongin-C



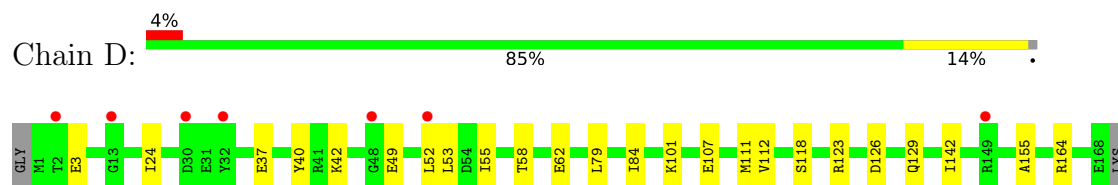
- Molecule 2: Elongin-C



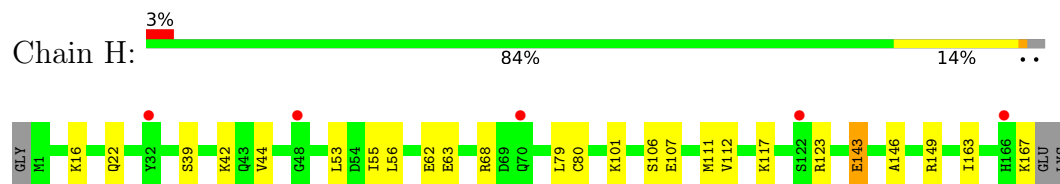
- Molecule 3: von Hippel-Lindau disease tumor suppressor



- Molecule 4: GTPase KRas



- Molecule 4: 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	71.92Å 106.47Å 82.74Å 90.00° 108.67° 90.00°	Depositor
Resolution (Å)	44.81 – 2.19 44.81 – 2.19	Depositor EDS
% Data completeness (in resolution range)	97.6 (44.81-2.19) 97.6 (44.81-2.19)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.01 (at 2.20Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.232 , 0.275 0.233 , 0.275	Depositor DCC
R_{free} test set	1987 reflections (3.31%)	wwPDB-VP
Wilson B-factor (Å ²)	45.1	Xtriage
Anisotropy	0.130	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 41.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8044	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.51% 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: A1JHI, MG, GDP

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	0.18	0/789	0.41	0/1068
1	E	0.29	0/734	0.49	0/1001
2	B	0.20	0/690	0.42	0/931
2	F	0.19	0/680	0.43	0/918
3	C	0.20	0/1222	0.41	0/1670
3	G	0.17	0/1156	0.40	0/1583
4	D	0.18	0/1354	0.39	0/1829
4	H	0.18	0/1334	0.38	0/1803
All	All	0.20	0/7959	0.41	0/10803

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	774	0	767	9	0
1	E	719	0	655	10	0
2	B	676	0	671	9	0
2	F	666	0	644	12	0
3	C	1191	0	1176	16	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	G	1126	0	1074	13	0
4	D	1333	0	1301	14	0
4	H	1313	0	1277	16	0
5	D	70	0	0	2	0
5	H	70	0	0	2	0
6	D	28	0	12	0	0
6	H	28	0	12	3	0
7	D	1	0	0	0	0
7	H	1	0	0	0	0
8	A	2	0	0	0	0
8	B	5	0	0	0	0
8	C	9	0	0	1	0
8	D	14	0	0	0	0
8	G	10	0	0	1	0
8	H	8	0	0	0	0
All	All	8044	0	7589	93	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 6.

All (93) 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)
4:D:101:LYS:HE3	4:D:107:GLU:HG2	1.52	0.92
4:D:142:ILE:HD12	4:D:155:ALA:HA	1.70	0.73
4:D:84:ILE:HD12	4:D:123:ARG:HG2	1.72	0.71
1:E:103:MET:SD	2:F:101:LEU:HD11	2.31	0.69
1:E:42:GLN:HG2	1:E:79:PHE:HE1	1.59	0.68
1:A:52:ASP:HB2	1:A:55:LYS:HG3	1.78	0.66
3:C:73:GLN:NE2	8:C:301:HOH:O	2.29	0.64
2:F:20:LYS:HB3	2:F:59:GLU:HG2	1.81	0.63
3:G:181:VAL:O	3:G:183:SER:N	2.30	0.62
3:G:128:LEU:HA	3:G:154:PRO:HD3	1.82	0.61
1:E:24:VAL:HB	1:E:53:ASP:HA	1.84	0.58
3:G:129:LEU:HG	3:G:154:PRO:HB3	1.86	0.58
3:C:142:VAL:O	3:C:145:GLN:HG2	2.05	0.57
4:H:39:SER:HB3	4:H:56:LEU:HD23	1.86	0.56
2:F:101:LEU:HD12	2:F:101:LEU:H	1.71	0.55
1:A:23:THR:HA	1:A:56:THR:HA	1.89	0.54
2:F:106:ALA:O	2:F:110:LEU:HD12	2.08	0.54
2:B:101:LEU:HD21	3:C:178:LEU:HD22	1.89	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:20:LYS:NZ	2:F:28:GLU:OE1	2.42	0.53
4:D:62:GLU:OE2	5:D:201:A1JHI:N38	2.41	0.53
4:H:163:ILE:HG22	4:H:167:LYS:HD3	1.90	0.53
4:D:24:ILE:HA	4:D:42:LYS:HD2	1.91	0.53
4:D:126:ASP:HB2	4:D:129:GLN:HG3	1.91	0.52
1:E:45:TYR:HD2	1:E:88:LEU:HD13	1.76	0.51
2:F:23:SER:OG	2:F:25:ASP:OD1	2.28	0.51
3:C:181:VAL:HG12	3:C:183:SER:H	1.76	0.51
2:F:72:LYS:HG3	2:F:99:ILE:HD12	1.91	0.51
4:H:53:LEU:HB3	4:H:55:ILE:HD11	1.91	0.51
1:E:25:PHE:HB2	1:E:53:ASP:HB3	1.93	0.50
2:B:22:ILE:HD12	2:B:28:GLU:HG2	1.93	0.50
4:H:22:GLN:HG3	4:H:149:ARG:HG3	1.94	0.50
2:B:20:LYS:HD3	2:B:22:ILE:HD11	1.94	0.49
2:F:101:LEU:HD12	2:F:101:LEU:N	2.27	0.49
3:C:112:TYR:HB2	3:C:115:HIS:CE1	2.47	0.49
3:C:178:LEU:O	3:C:185:TYR:OH	2.22	0.49
1:A:34:ILE:HD11	2:B:18:TYR:CZ	2.47	0.49
4:D:53:LEU:HB3	4:D:55:ILE:HD11	1.93	0.48
3:C:173:GLU:H	3:C:173:GLU:CD	2.21	0.48
1:A:29:ARG:NH1	1:A:32:GLU:OE1	2.46	0.48
4:H:101:LYS:HD3	4:H:106:SER:O	2.14	0.48
4:D:49:GLU:OE1	4:D:164:ARG:NH1	2.45	0.48
3:G:115:HIS:ND1	5:H:201:A1JHI:O10	2.36	0.48
2:B:41:THR:HG22	2:B:45:MET:HE3	1.95	0.47
1:E:69:PRO:HG2	2:F:82:ARG:HG2	1.97	0.47
4:H:80:CYS:SG	4:H:111:MET:HE3	2.54	0.47
2:B:80:LYS:HD3	2:B:80:LYS:C	2.39	0.46
4:H:146:ALA:N	6:H:202:GDP:O6	2.48	0.46
3:C:176:ARG:HA	3:C:185:TYR:CE1	2.50	0.46
4:D:37:GLU:HG3	4:D:58:THR:HA	1.98	0.46
3:G:141:ASN:OD1	3:G:147:ILE:HG12	2.15	0.46
3:G:89:LEU:HD12	3:G:116:LEU:HD23	1.98	0.45
3:C:113:ARG:HD3	3:C:140:LEU:HG	1.99	0.45
4:H:117:LYS:HG2	6:H:202:GDP:C6	2.51	0.45
2:B:39:SER:HA	2:B:112:CYS:HB3	1.99	0.45
4:H:123:ARG:NH2	4:H:143:GLU:OE2	2.48	0.44
3:C:120[B]:ARG:HD3	3:C:127:GLY:HA2	1.98	0.44
3:G:112:TYR:HB2	3:G:115:HIS:CE1	2.52	0.44
4:H:101:LYS:HD3	4:H:107:GLU:HA	1.99	0.44
1:A:37:ARG:HH21	1:A:41:GLU:CD	2.25	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:35:HIS:ND1	2:B:78:THR:HG22	2.33	0.44
1:E:45:TYR:CE2	1:E:88:LEU:HB2	2.52	0.44
3:G:172:PRO:HA	3:G:175:TYR:CG	2.53	0.44
3:G:113:ARG:HG2	8:G:302:HOH:O	2.17	0.44
4:H:123:ARG:HH22	4:H:143:GLU:CD	2.26	0.44
1:A:46:LYS:HG3	1:A:62:PHE:CZ	2.52	0.43
4:H:79:LEU:HD12	4:H:112:VAL:HB	2.00	0.43
1:E:10:HIS:CE1	1:E:89:CYS:HB3	2.53	0.43
2:F:106:ALA:C	2:F:110:LEU:HD12	2.44	0.43
3:C:161:ARG:O	3:C:165:VAL:HG23	2.18	0.43
4:D:84:ILE:HD13	4:D:118:SER:HA	2.00	0.43
4:D:24:ILE:HD13	4:D:40:TYR:CB	2.49	0.43
3:C:64:ARG:O	3:C:116:LEU:HD13	2.18	0.42
4:D:62:GLU:HG2	5:D:201:A1JHI:C48	2.49	0.42
1:A:103:MET:HG2	3:C:170:VAL:HG22	2.01	0.42
4:H:16:LYS:HE3	6:H:202:GDP:O3B	2.19	0.42
4:H:63:GLU:HB3	4:H:68:ARG:HD3	2.01	0.42
1:A:24:VAL:HG23	1:A:55:LYS:O	2.20	0.42
3:C:145:GLN:HE21	3:C:145:GLN:HB3	1.72	0.42
2:B:20:LYS:NZ	2:B:28:GLU:OE1	2.43	0.41
1:E:42:GLN:HG2	1:E:79:PHE:CE1	2.47	0.41
4:H:62:GLU:HB3	5:H:201:A1JHI:C49	2.50	0.41
3:G:90:ASN:OD1	3:G:94:GLU:N	2.47	0.41
4:D:3:GLU:HG2	4:D:52:LEU:HB2	2.02	0.41
3:G:120:ARG:HD3	3:G:127:GLY:HA2	2.02	0.41
4:H:42:LYS:HG3	4:H:44:VAL:HG13	2.02	0.41
1:A:55:LYS:HE2	1:A:55:LYS:HB3	1.88	0.41
2:F:105:MET:HE2	3:G:179:ASP:O	2.21	0.41
1:E:62:PHE:CZ	1:E:75:VAL:HG22	2.56	0.40
3:G:116:LEU:HD11	3:G:135:LEU:HD13	2.03	0.40
3:C:115:HIS:O	3:C:138:PRO:HD2	2.21	0.40
3:C:173:GLU:OE1	3:C:173:GLU:N	2.48	0.40
4:D:79:LEU:HD12	4:D:112:VAL:HB	2.04	0.40
2:F:39:SER:HB3	2:F:42:ILE:HB	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	97/104 (93%)	94 (97%)	3 (3%)	0	100	100
1	E	95/104 (91%)	92 (97%)	3 (3%)	0	100	100
2	B	81/97 (84%)	81 (100%)	0	0	100	100
2	F	81/97 (84%)	77 (95%)	4 (5%)	0	100	100
3	C	145/162 (90%)	141 (97%)	4 (3%)	0	100	100
3	G	142/162 (88%)	135 (95%)	5 (4%)	2 (1%)	9	7
4	D	167/170 (98%)	163 (98%)	4 (2%)	0	100	100
4	H	165/170 (97%)	162 (98%)	3 (2%)	0	100	100
All	All	973/1066 (91%)	945 (97%)	26 (3%)	2 (0%)	44	52

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	G	182	ARG
3	G	181	VAL

5.3.2 Protein sidechains

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	83/92 (90%)	83 (100%)	0	100	100
1	E	70/92 (76%)	67 (96%)	3 (4%)	25	32
2	B	75/86 (87%)	75 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	F	72/86 (84%)	72 (100%)	0	100	100
3	C	134/148 (90%)	134 (100%)	0	100	100
3	G	122/148 (82%)	122 (100%)	0	100	100
4	D	145/150 (97%)	144 (99%)	1 (1%)	81	90
4	H	142/150 (95%)	141 (99%)	1 (1%)	81	90
All	All	843/952 (89%)	838 (99%)	5 (1%)	84	91

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	D	111	MET
1	E	2	ASP
1	E	21	SER
1	E	53	ASP
4	H	143	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	42	GLN
3	G	195	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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
5	A1JHI	D	201	-	68,79,79	0.77	3 (4%)	67,117,117	0.93	5 (7%)
6	GDP	H	202	7	24,30,30	0.95	1 (4%)	30,47,47	1.29	4 (13%)
6	GDP	D	202	7	24,30,30	0.93	1 (4%)	30,47,47	1.18	4 (13%)
5	A1JHI	H	201	-	68,79,79	0.72	2 (2%)	67,117,117	0.88	4 (5%)

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
5	A1JHI	D	201	-	-	4/33/95/95	0/10/10/10
6	GDP	H	202	7	-	0/12/32/32	0/3/3/3
6	GDP	D	202	7	-	0/12/32/32	0/3/3/3
5	A1JHI	H	201	-	-	0/33/95/95	0/10/10/10

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	201	A1JHI	C45-N38	2.56	1.49	1.46
6	H	202	GDP	C6-N1	-2.54	1.34	1.37
5	D	201	A1JHI	C52-N56	2.28	1.38	1.35
6	D	202	GDP	C6-N1	-2.24	1.34	1.37
5	H	201	A1JHI	C52-N56	2.16	1.38	1.35
5	H	201	A1JHI	C65-C66	2.15	1.44	1.41
5	D	201	A1JHI	C65-C66	2.01	1.44	1.41

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	201	A1JHI	C60-C61-C62	-3.26	108.17	113.53
6	H	202	GDP	C3'-C2'-C1'	3.20	105.80	100.98
5	D	201	A1JHI	C41-C40-C39	3.17	121.53	114.17

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	201	A1JHI	C30-C31-N27	-2.97	104.15	106.44
5	H	201	A1JHI	C41-C40-C39	2.96	121.03	114.17
5	D	201	A1JHI	C30-C31-N27	-2.89	104.21	106.44
5	H	201	A1JHI	C60-C61-C62	-2.82	108.90	113.53
6	H	202	GDP	C5-C6-N1	2.52	118.39	113.95
6	D	202	GDP	PA-O3A-PB	-2.49	124.27	132.83
6	H	202	GDP	PA-O3A-PB	-2.47	124.36	132.83
6	D	202	GDP	C3'-C2'-C1'	2.44	104.66	100.98
6	D	202	GDP	C5-C6-N1	2.42	118.23	113.95
5	H	201	A1JHI	C59-C57-C66	2.42	111.59	105.65
6	D	202	GDP	C8-N7-C5	2.38	107.52	102.99
5	D	201	A1JHI	C59-C57-C66	2.31	111.33	105.65
6	H	202	GDP	C8-N7-C5	2.13	107.04	102.99
5	D	201	A1JHI	C60-C59-C57	2.12	116.12	112.48

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	D	201	A1JHI	C1-C2-C4-N27
5	D	201	A1JHI	C3-C2-C4-N27
5	D	201	A1JHI	C1-C2-C4-C5
5	D	201	A1JHI	C3-C2-C4-C5

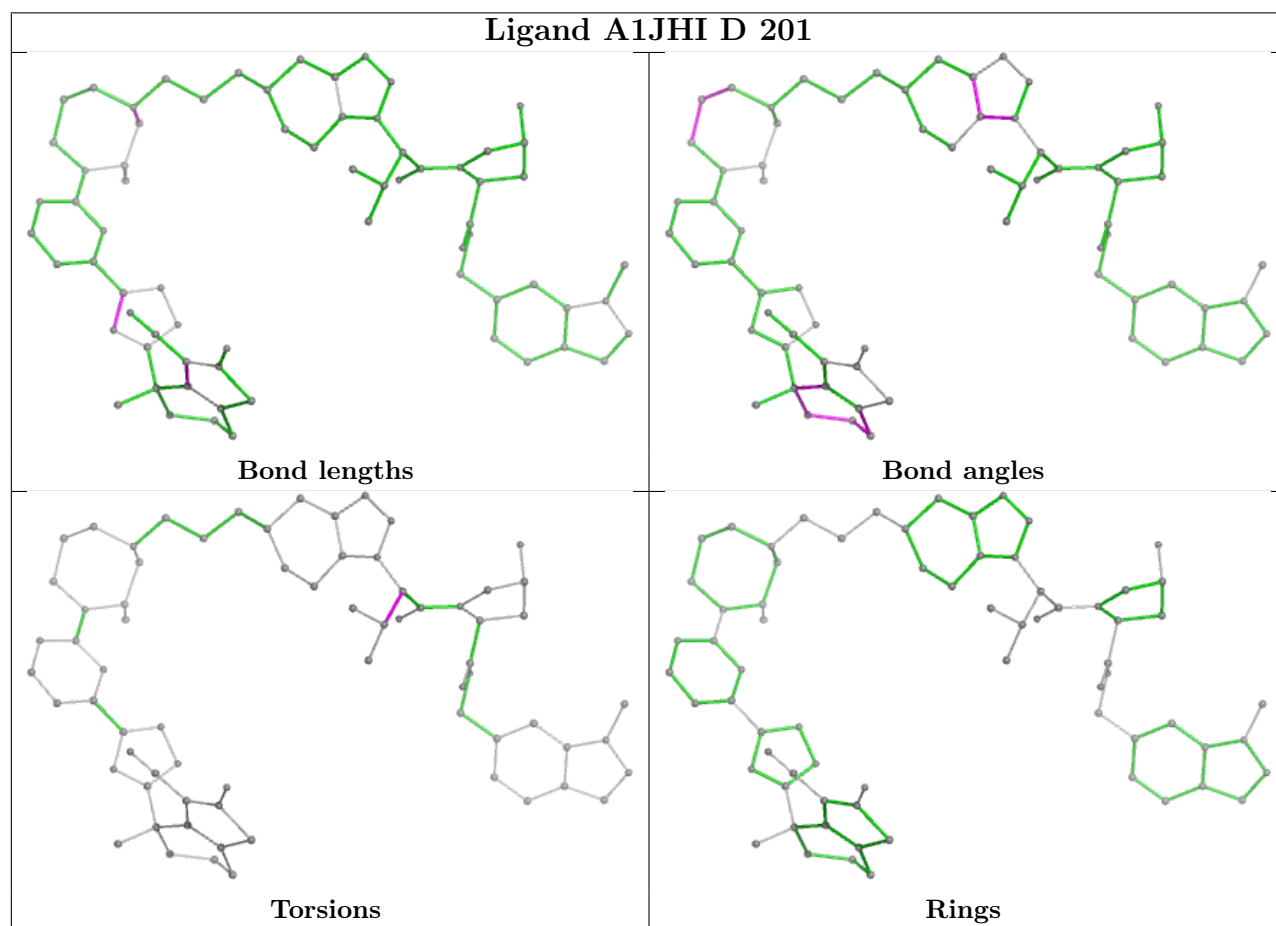
There are no ring outliers.

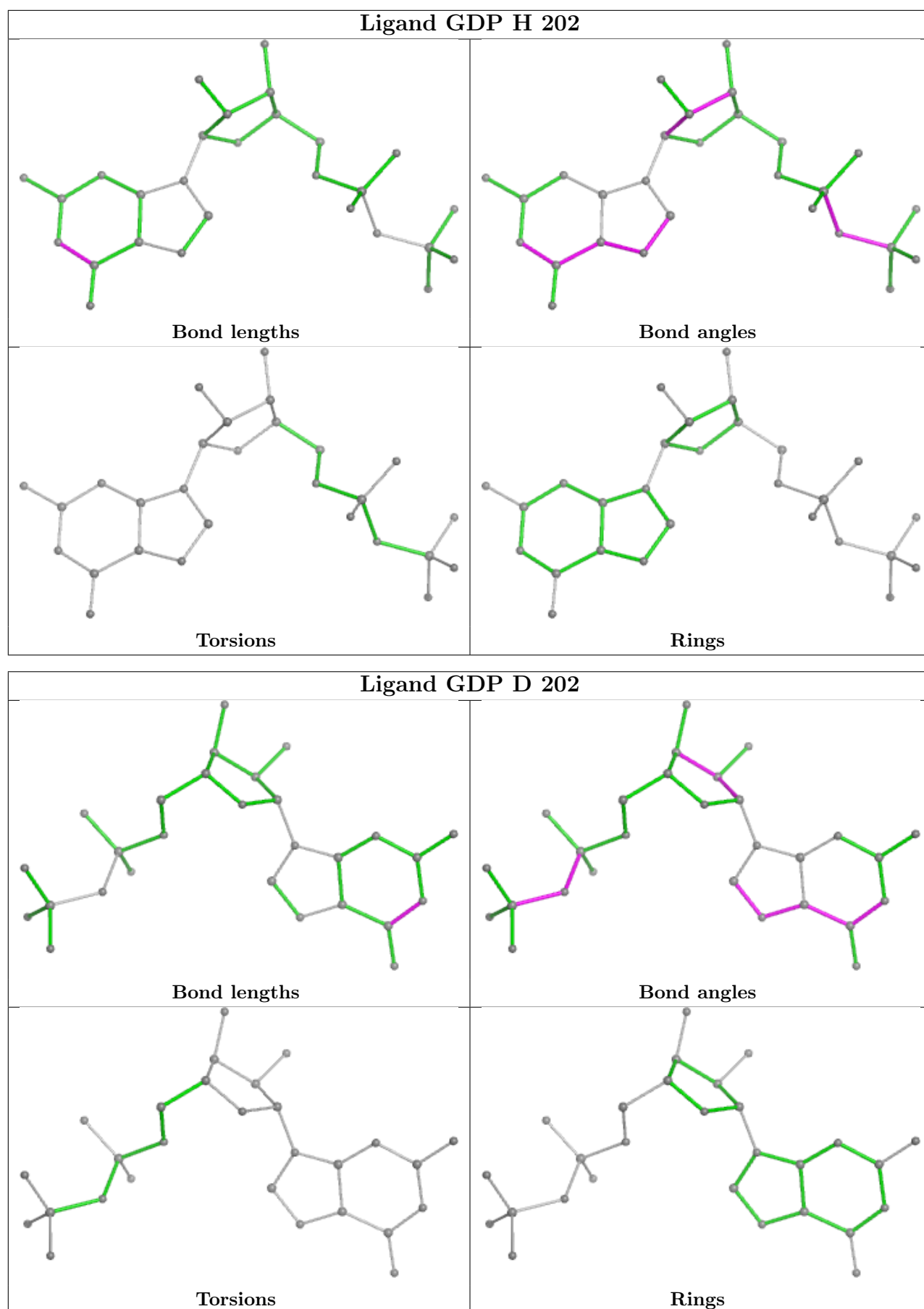
3 monomers are involved in 7 short contacts:

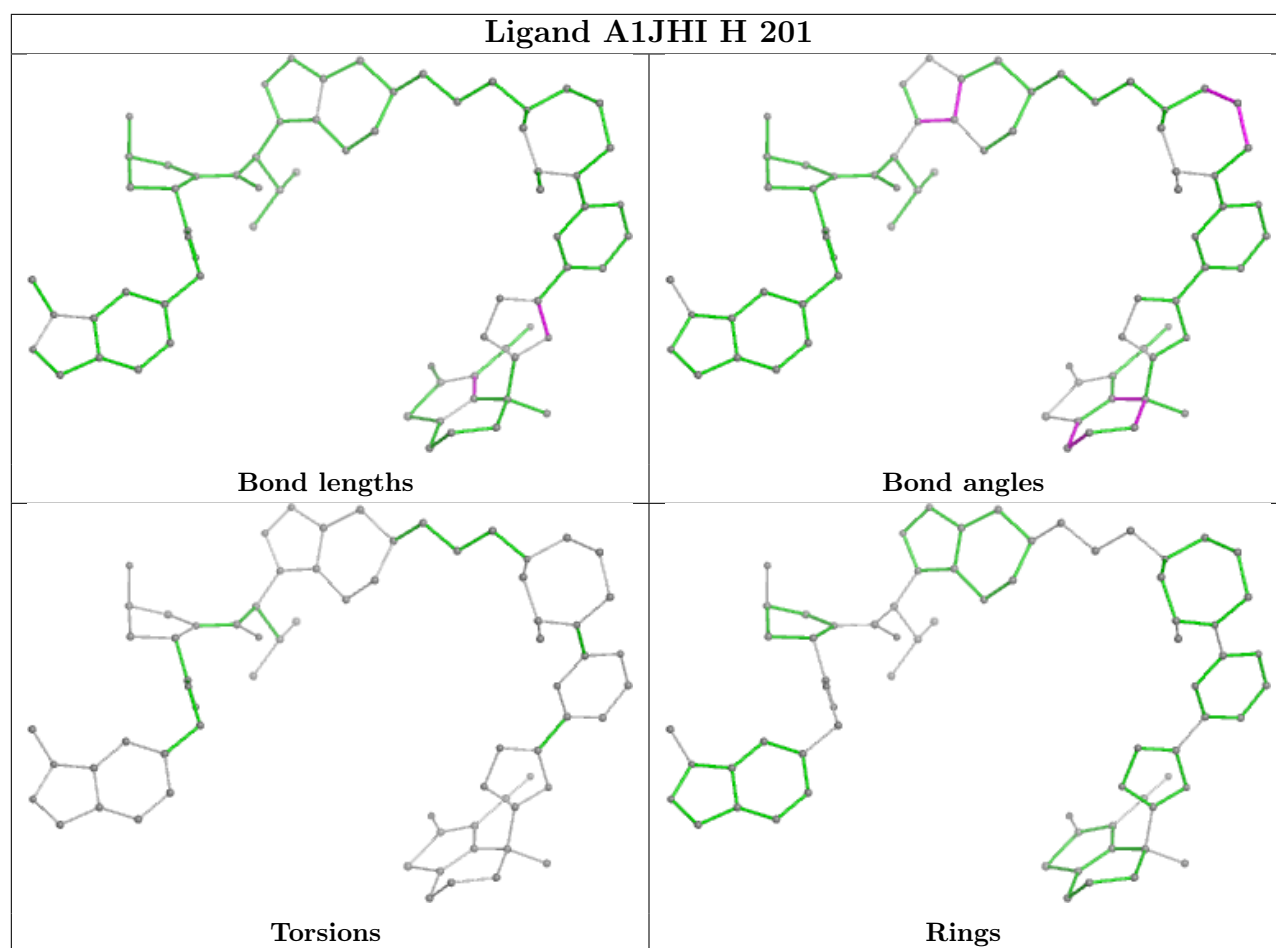
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	201	A1JHI	2	0
6	H	202	GDP	3	0
5	H	201	A1JHI	2	0

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	A	101/104 (97%)	0.77	7 (6%) 24 22	40, 54, 71, 76	0
1	E	99/104 (95%)	1.62	31 (31%) 1 1	52, 77, 94, 100	0
2	B	85/97 (87%)	0.36	1 (1%) 76 73	36, 44, 65, 95	0
2	F	85/97 (87%)	1.58	21 (24%) 2 2	47, 74, 88, 95	0
3	C	146/162 (90%)	0.51	4 (2%) 56 53	22, 46, 79, 100	1 (0%)
3	G	144/162 (88%)	0.95	22 (15%) 6 5	37, 51, 97, 109	0
4	D	168/170 (98%)	0.54	7 (4%) 41 37	25, 48, 73, 84	1 (0%)
4	H	167/170 (98%)	0.60	5 (2%) 52 49	35, 50, 70, 83	0
All	All	995/1066 (93%)	0.81	98 (9%) 14 12	22, 52, 87, 109	2 (0%)

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	G	170	VAL	4.5
2	F	33	ARG	4.3
1	E	102	VAL	4.1
3	G	178	LEU	4.1
3	G	181	VAL	4.0
3	G	185	TYR	3.9
3	G	142	VAL	3.7
1	E	88	LEU	3.6
4	D	149[A]	ARG	3.6
2	F	112	CYS	3.6
3	G	188	LEU	3.4
2	F	31	VAL	3.4
3	G	190	ASP	3.4
1	E	78	ALA	3.3
2	F	99	ILE	3.3
2	F	18	TYR	3.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
3	C	205	ARG	3.2
4	D	30	ASP	3.1
1	E	99	LEU	3.1
4	D	48	GLY	3.1
1	E	34	ILE	3.1
1	E	42	GLN	3.0
1	E	41	GLU	3.0
2	F	46	LEU	2.9
2	F	26	GLY	2.9
1	A	102	VAL	2.9
2	F	104	LEU	2.9
1	E	31	VAL	2.8
2	F	74	CYS	2.8
1	E	38	PRO	2.8
1	A	101	ASP	2.8
1	E	27	LEU	2.8
2	F	36	ALA	2.7
1	E	79	PHE	2.7
3	G	145	GLN	2.7
3	G	180	ILE	2.7
3	G	143	ASP	2.7
2	F	34	GLU	2.7
2	F	101	LEU	2.7
3	G	175	TYR	2.7
2	F	19	VAL	2.7
3	G	184	LEU	2.6
2	B	88	THR	2.6
1	E	25	PHE	2.6
3	G	176	ARG	2.5
3	G	177	ARG	2.5
1	E	1	MET	2.5
2	F	88	THR	2.5
3	C	185	TYR	2.5
4	H	122	SER	2.5
1	E	87	ALA	2.5
3	G	203	GLN	2.5
1	E	24	VAL	2.5
2	F	60	VAL	2.5
1	E	61	GLY	2.4
1	A	80	ARG	2.4
1	E	44	LEU	2.4
1	E	57	LEU	2.4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	F	25	ASP	2.4
3	G	182	ARG	2.4
1	E	101	ASP	2.4
4	D	2	THR	2.4
2	F	41	THR	2.3
1	E	43	ARG	2.3
4	D	13	GLY	2.3
4	H	48	GLY	2.3
1	A	1	MET	2.3
1	E	90	ILE	2.3
2	F	44	ALA	2.3
1	E	54	GLY	2.3
4	H	32	TYR	2.3
1	A	87	ALA	2.3
1	E	65	GLN	2.3
1	E	47	ASP	2.2
2	F	65	ILE	2.2
3	G	172	PRO	2.2
3	G	141	ASN	2.2
1	E	85	PHE	2.2
1	A	47	ASP	2.2
3	G	163	LEU	2.1
1	E	40	ASP	2.1
1	E	86	GLU	2.1
1	E	77	LEU	2.1
2	F	17	MET	2.1
3	G	166	VAL	2.1
1	E	28	LYS	2.1
1	E	89	CYS	2.1
3	C	60	ARG	2.1
3	G	201	LEU	2.1
4	D	52	LEU	2.1
4	H	166	HIS	2.1
3	C	175	TYR	2.0
4	D	32	TYR	2.0
1	A	35	LEU	2.0
3	G	169	LEU	2.0
4	H	70	GLN	2.0
1	E	7	ILE	2.0
2	F	76	TYR	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

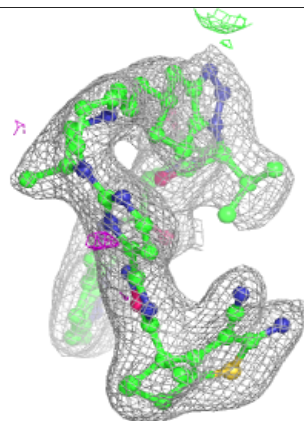
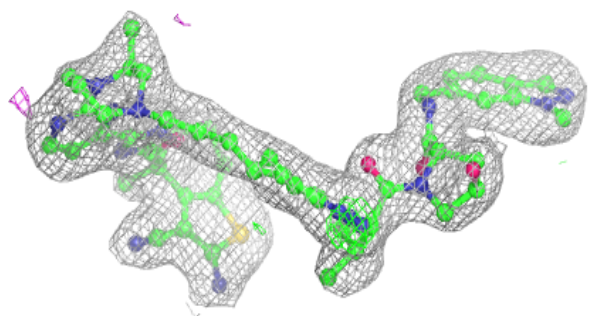
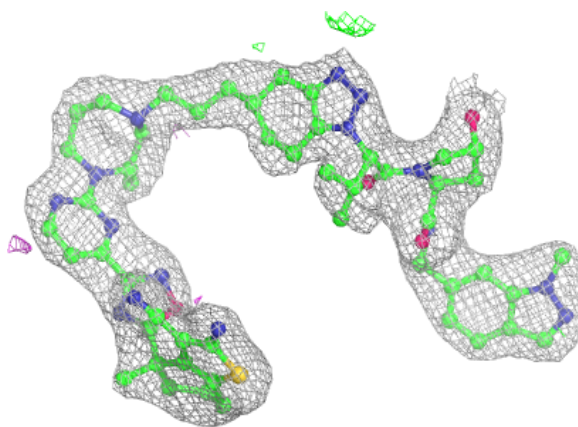
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	A1JHI	D	201	70/70	0.95	0.09	35,42,50,51	0
5	A1JHI	H	201	70/70	0.95	0.09	35,44,48,49	0
6	GDP	D	202	28/28	0.96	0.07	37,43,52,59	0
6	GDP	H	202	28/28	0.96	0.07	36,47,55,58	0
7	MG	H	203	1/1	0.97	0.04	38,38,38,38	0
7	MG	D	203	1/1	0.99	0.05	47,47,47,47	0

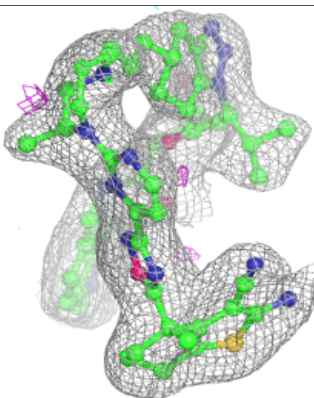
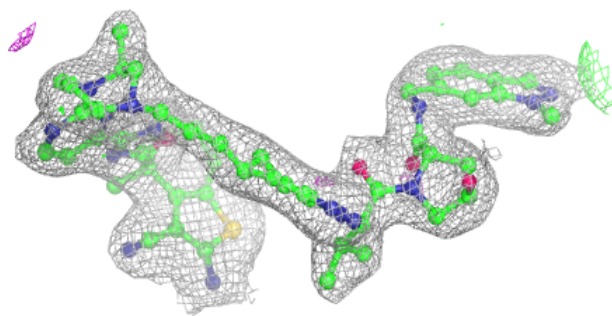
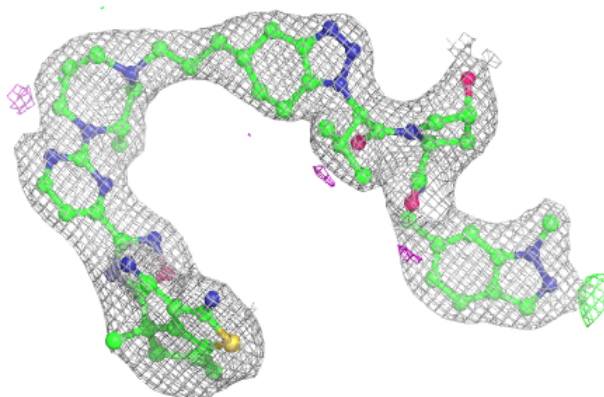
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1JHI D 201:

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

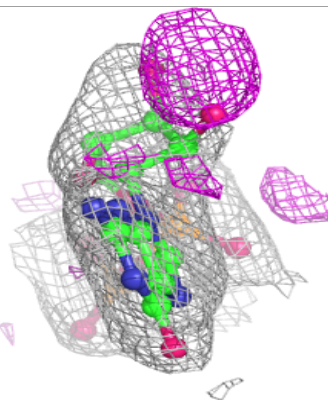
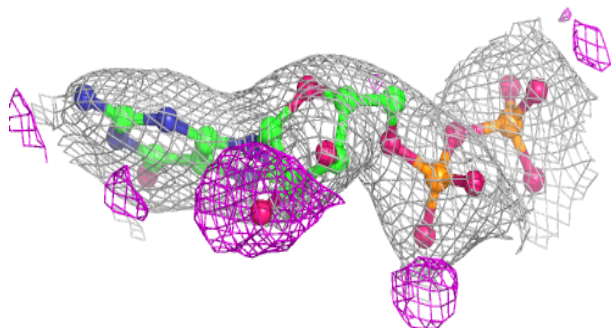
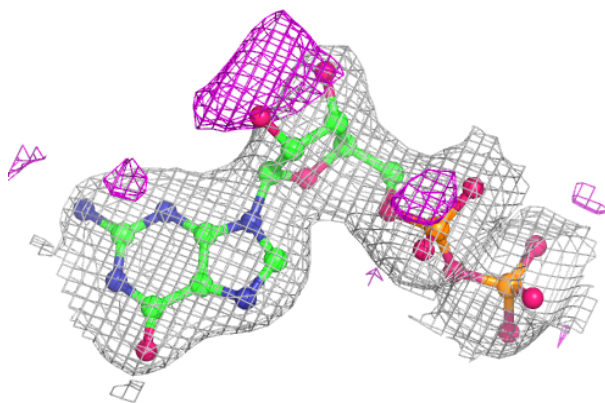
**Electron density around A1JHI H 201:**

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

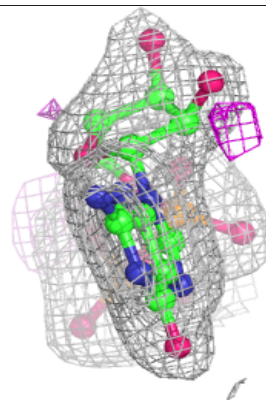
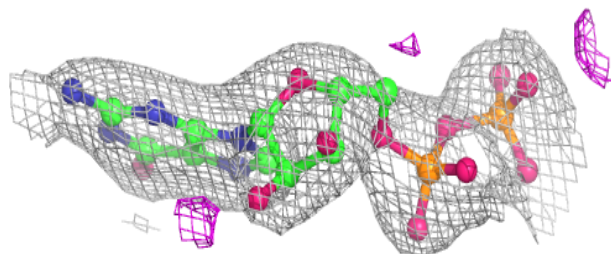
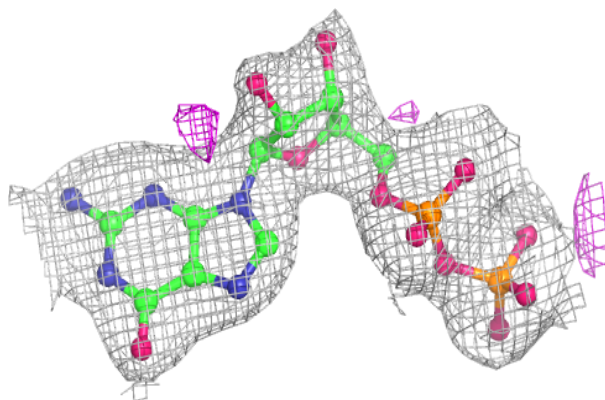


Electron density around GDP D 202:

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

**Electron density around GDP H 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.