



Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 09:32 am BST

PDB ID : 3X0A
Title : Crystal structure of PIP4KIIBETA F205L complex with GMP
Authors : Takeuchi, K.; Lo, Y.H.; Sumita, K.; Senda, M.; Terakawa, J.; Dimitoris, A.; Locasale, J.W.; Sasaki, M.; Yoshino, H.; Zhang, Y.; Kahoud, E.R.; Takano, T.; Yokota, T.; Emerling, B.; Asara, J.A.; Ishida, T.; Shimada, I.; Daikoku, T.; Cantley, L.C.; Senda, T.; Sasaki, A.T.
Deposited on : 2014-10-09
Resolution : 2.60 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.11
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) : 2.11

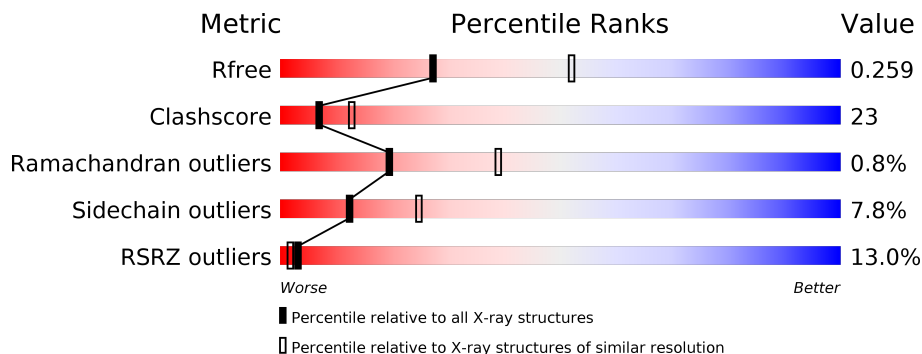
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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 on 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	393	
1	B	393	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 5324 atoms, of which 58 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.

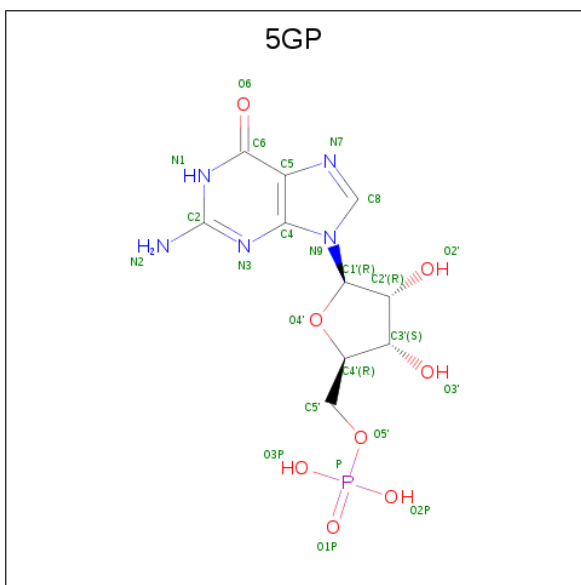
- Molecule 1 is a protein called Phosphatidylinositol 5-phosphate 4-kinase type-2 beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	319	2620	1667	447	492	14	0	0	0
1	B	303	2491	1593	426	459	13	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	24	GLY	-	EXPRESSION TAG	UNP P78356
A	25	PRO	-	EXPRESSION TAG	UNP P78356
A	26	ASN	-	EXPRESSION TAG	UNP P78356
A	27	CYS	-	EXPRESSION TAG	UNP P78356
A	28	ALA	-	EXPRESSION TAG	UNP P78356
A	29	PRO	-	EXPRESSION TAG	UNP P78356
A	30	GLY	-	EXPRESSION TAG	UNP P78356
A	205	LEU	PHE	ENGINEERED MUTATION	UNP P78356
B	24	GLY	-	EXPRESSION TAG	UNP P78356
B	25	PRO	-	EXPRESSION TAG	UNP P78356
B	26	ASN	-	EXPRESSION TAG	UNP P78356
B	27	CYS	-	EXPRESSION TAG	UNP P78356
B	28	ALA	-	EXPRESSION TAG	UNP P78356
B	29	PRO	-	EXPRESSION TAG	UNP P78356
B	30	GLY	-	EXPRESSION TAG	UNP P78356
B	205	LEU	PHE	ENGINEERED MUTATION	UNP P78356

- Molecule 2 is GUANOSINE-5'-MONOPHOSPHATE (three-letter code: 5GP) (formula: C₁₀H₁₄N₅O₈P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
2	A	1	Total	C	H	N	O	P	0	0
			36	10	12	5	8	1		
2	A	1	Total	C	H	N	O	P	0	0
			34	10	10	5	8	1		
2	A	1	Total	C	H	N	O		0	0
			31	10	12	5	4			
2	B	1	Total	C	H	N	O	P	0	0
			36	10	12	5	8	1		
2	B	1	Total	C	H	N	O	P	0	0
			36	10	12	5	8	1		

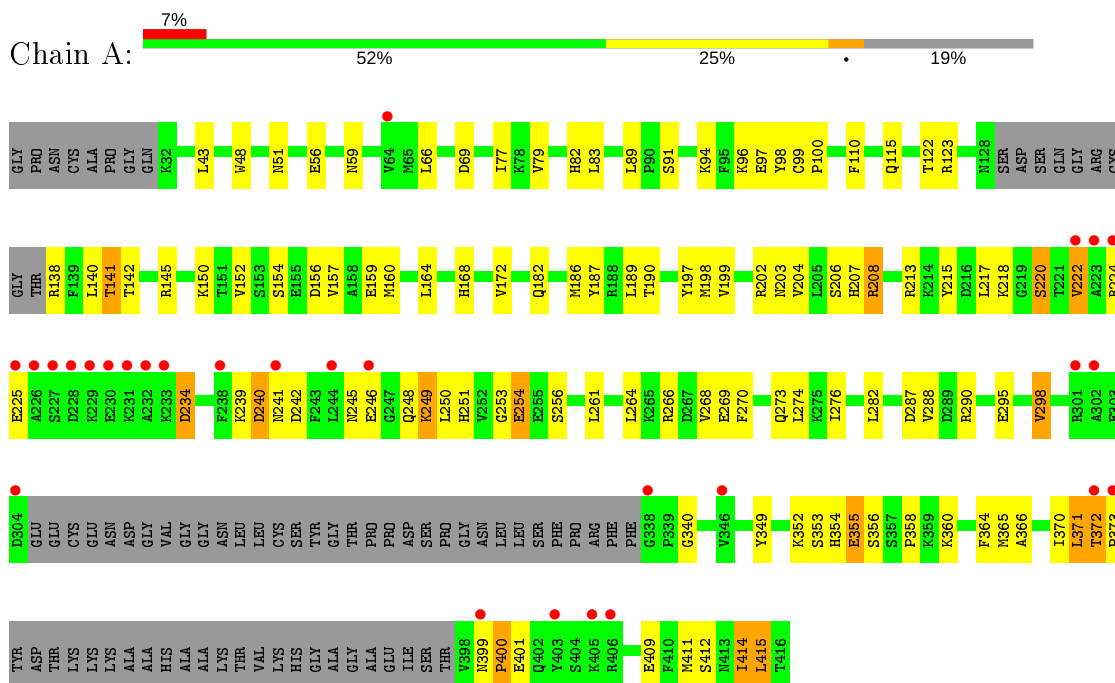
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	21	Total	O	0	0
			21	21		
3	B	19	Total	O	0	0
			19	19		

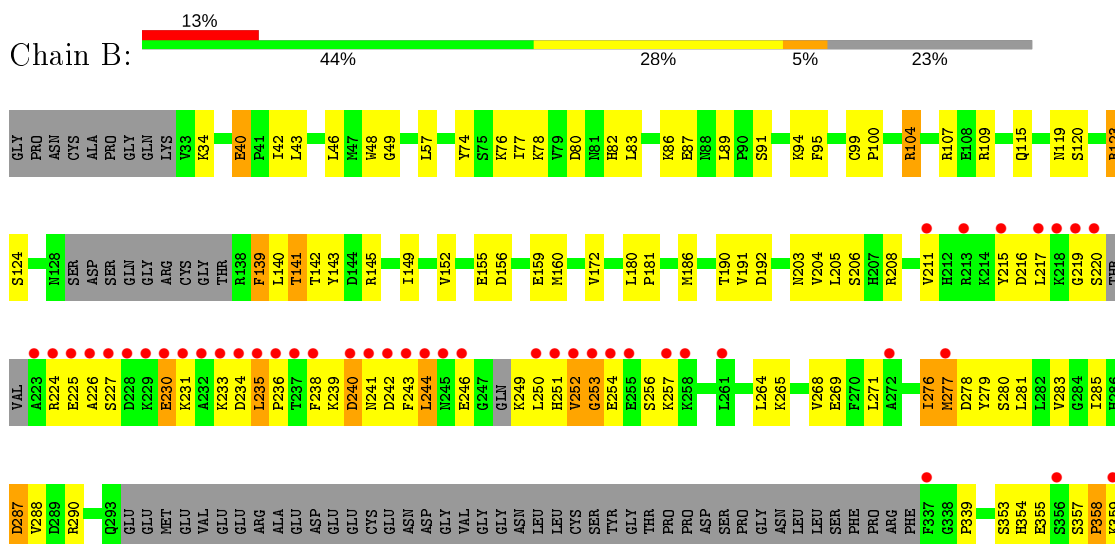
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Phosphatidylinositol 5-phosphate 4-kinase type-2 beta



- Molecule 1: Phosphatidylinositol 5-phosphate 4-kinase type-2 beta



K360	
E361	
V362	
Y363	
F364	
M365	
A366	
I367	
I368	
D369	
I370	
L371	
T372	
PRO	
TYR	
ASP	
THR	
LYS	
LYS	
LYS	
ALA	
ALA	
HIS	
ALA	
ALA	
LYS	
THR	
VAL	
LYS	
HIS	
GLY	
ALA	
GLY	
ALA	
GLU	
ILE	
SER	
THR	
VAL	
N399	
P400	
E401	
Q402	
Y403	
S404	
F405	
R406	
F407	
F410	
M411	
S412	
N413	
T414	
L415	
T416	

4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	107.93Å 183.01Å 106.98Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.18 – 2.60 48.18 – 2.60	Depositor EDS
% Data completeness (in resolution range)	98.2 (48.18-2.60) 98.4 (48.18-2.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.85 (at 2.61Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE: 1.7.3_928)	Depositor
R, R_{free}	0.228 , 0.272 0.213 , 0.259	Depositor DCC
R_{free} test set	1622 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	69.0	Xtrriage
Anisotropy	0.261	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 71.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.006 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.010 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5324	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.79% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical 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: 5GP

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	0.47	0/2673	0.60	0/3597
1	B	0.49	0/2542	0.61	1/3418 (0.0%)
All	All	0.48	0/5215	0.61	1/7015 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	40	GLU	CB-CA-C	5.64	121.69	110.40

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	2620	0	2598	94	0
1	B	2491	0	2476	149	0
2	A	67	34	34	5	0
2	B	48	24	24	1	0
3	A	21	0	0	1	0
3	B	19	0	0	0	0
All	All	5266	58	5132	238	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 23.

All (238) 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:225:GLU:HG2	1:B:242:ASP:OD1	1.46	1.11
1:B:42:ILE:HD12	1:B:42:ILE:H	1.21	1.02
1:B:251:HIS:ND1	1:B:416:THR:HG21	1.75	1.01
1:A:370:ILE:O	1:A:370:ILE:HG13	1.59	1.01
1:B:249:LYS:HD2	1:B:249:LYS:O	1.64	0.97
1:A:217:LEU:CD1	1:A:414:ILE:HD11	1.99	0.92
1:A:77:ILE:HD11	1:B:77:ILE:HG12	1.50	0.90
1:B:234:ASP:O	1:B:236:PRO:HD3	1.72	0.90
1:B:251:HIS:ND1	1:B:416:THR:CG2	2.35	0.89
1:A:77:ILE:HD11	1:B:77:ILE:CG1	2.01	0.89
1:B:357:SER:OG	1:B:358:PRO:HD2	1.73	0.89
1:A:79:VAL:HG22	1:B:77:ILE:CD1	2.01	0.89
1:B:219:GLY:O	1:B:406:ARG:HG2	1.73	0.88
1:B:243:PHE:CZ	1:B:414:ILE:CG2	2.58	0.87
1:A:399:ASN:HB3	1:A:400:PRO:CD	2.06	0.85
1:B:94:LYS:HB2	1:B:190:THR:HB	1.57	0.84
1:B:243:PHE:CE2	1:B:414:ILE:CG2	2.62	0.83
1:A:217:LEU:HD13	1:A:414:ILE:HD11	1.62	0.81
1:A:399:ASN:HB3	1:A:400:PRO:HD2	1.63	0.80
1:B:249:LYS:CD	1:B:249:LYS:O	2.30	0.79
1:B:242:ASP:O	1:B:246:GLU:CG	2.30	0.78
1:B:251:HIS:CE1	1:B:416:THR:HG21	2.19	0.78
1:A:79:VAL:HG22	1:B:77:ILE:HD12	1.66	0.77
1:B:249:LYS:CG	1:B:249:LYS:O	2.32	0.77
1:B:42:ILE:H	1:B:42:ILE:CD1	1.97	0.77
1:B:243:PHE:CZ	1:B:414:ILE:HG21	2.18	0.76
1:A:371:LEU:O	1:A:372:THR:HG22	1.87	0.75
1:B:242:ASP:O	1:B:246:GLU:HG3	1.85	0.74
1:B:243:PHE:CE2	1:B:414:ILE:HG21	2.23	0.73
1:A:415:LEU:HD23	1:A:415:LEU:H	1.52	0.73
1:B:254:GLU:OE2	1:B:257:LYS:HD3	1.89	0.72
1:A:69:ASP:HB3	1:B:83:LEU:HD13	1.69	0.71
1:B:243:PHE:HE1	1:B:249:LYS:CG	2.03	0.71
1:A:141:THR:HG22	1:A:142:THR:O	1.90	0.71
1:A:370:ILE:O	1:A:370:ILE:CG1	2.30	0.71
1:A:218:LYS:HD2	1:A:224:ARG:CZ	2.21	0.70
1:B:281:LEU:HD12	1:B:366:ALA:O	1.92	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:357:SER:OG	1:B:358:PRO:CD	2.38	0.69
1:B:243:PHE:HE1	1:B:249:LYS:HG2	1.57	0.69
1:B:271:LEU:HD21	1:B:370:ILE:HD12	1.75	0.69
1:B:243:PHE:HE2	1:B:414:ILE:HG23	1.57	0.69
1:B:243:PHE:CE1	1:B:249:LYS:HG2	2.28	0.68
1:B:243:PHE:CE2	1:B:414:ILE:HG23	2.28	0.68
1:B:243:PHE:HZ	1:B:414:ILE:CG2	2.05	0.68
1:B:249:LYS:HG3	1:B:249:LYS:O	1.93	0.68
1:B:40:GLU:HG2	1:B:42:ILE:HD13	1.74	0.68
1:B:227:SER:O	1:B:231:LYS:HG3	1.94	0.67
1:B:399:ASN:N	1:B:400:PRO:CD	2.57	0.67
1:A:411:MET:O	1:A:414:ILE:HB	1.95	0.67
1:B:78:LYS:HD2	1:B:94:LYS:NZ	2.10	0.67
1:B:40:GLU:CG	1:B:42:ILE:HD13	2.25	0.66
1:B:252:VAL:CG2	1:B:252:VAL:O	2.44	0.66
1:B:243:PHE:CE1	1:B:249:LYS:CG	2.80	0.65
1:B:283:VAL:HG22	1:B:365:MET:HG2	1.79	0.65
1:B:367:ILE:O	1:B:368:ILE:CG2	2.45	0.65
1:B:367:ILE:O	1:B:368:ILE:HG22	1.97	0.65
1:B:227:SER:OG	1:B:230:GLU:HB2	1.96	0.65
1:B:109:ARG:CZ	1:B:172:VAL:HG22	2.27	0.64
1:B:224:ARG:CZ	1:B:239:LYS:HG2	2.27	0.64
1:B:141:THR:HG23	1:B:142:THR:O	1.97	0.64
1:A:220:SER:HB3	1:A:222:VAL:HG23	1.78	0.64
1:A:225:GLU:HG2	1:A:241:ASN:HB2	1.80	0.64
1:A:94:LYS:HB2	1:A:190:THR:HB	1.79	0.64
1:A:241:ASN:O	1:A:245:ASN:HB2	1.98	0.63
1:B:224:ARG:HB3	1:B:239:LYS:HG2	1.79	0.63
1:A:415:LEU:HD23	1:A:415:LEU:N	2.13	0.63
1:B:220:SER:HA	1:B:406:ARG:NE	2.14	0.62
1:B:367:ILE:HG22	1:B:368:ILE:N	2.14	0.62
1:B:225:GLU:HG3	1:B:241:ASN:HB2	1.81	0.62
1:A:160:MET:HE1	1:A:164:LEU:HD13	1.82	0.62
1:B:250:LEU:HD22	1:B:363:TYR:CD2	2.35	0.61
1:B:235:LEU:H	1:B:235:LEU:HD12	1.65	0.61
1:A:56:GLU:OE2	1:B:48:TRP:NE1	2.31	0.60
1:B:224:ARG:HB3	1:B:239:LYS:CG	2.30	0.60
1:B:277:MET:O	1:B:278:ASP:HB2	2.02	0.60
2:A:502:5GP:H2'	2:A:503:5GP:N3	2.17	0.59
1:B:243:PHE:HE2	1:B:414:ILE:CG2	2.14	0.59
1:B:224:ARG:HB3	1:B:239:LYS:HD3	1.83	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:141:THR:HG23	1:A:145:ARG:HA	1.84	0.58
1:B:226:ALA:O	1:B:231:LYS:HE2	2.03	0.58
1:A:186:MET:HG3	1:A:199:VAL:HG22	1.86	0.58
1:A:371:LEU:C	1:A:372:THR:CG2	2.72	0.58
1:A:355:GLU:N	1:A:355:GLU:OE2	2.38	0.57
1:B:265:LYS:NZ	1:B:269:GLU:OE2	2.37	0.57
1:B:287:ASP:OD1	1:B:290:ARG:HB2	2.05	0.56
1:A:415:LEU:CD2	1:A:415:LEU:N	2.68	0.56
1:A:218:LYS:HD2	1:A:224:ARG:NE	2.20	0.56
1:B:217:LEU:HB2	1:B:411:MET:HE3	1.88	0.56
1:A:217:LEU:CD1	1:A:414:ILE:CD1	2.81	0.55
1:B:252:VAL:O	1:B:253:GLY:O	2.24	0.55
1:A:269:GLU:O	1:A:273:GLN:HG3	2.07	0.55
1:B:216:ASP:C	1:B:217:LEU:HD23	2.27	0.55
1:B:242:ASP:O	1:B:246:GLU:CD	2.45	0.55
1:B:243:PHE:HZ	1:B:414:ILE:HG22	1.71	0.55
1:B:152:VAL:HB	1:B:156:ASP:OD2	2.08	0.54
1:B:252:VAL:HG23	1:B:256:SER:HB2	1.88	0.54
1:B:369:ASP:OD2	2:B:501:5GP:O1P	2.26	0.54
1:A:264:LEU:O	1:A:268:VAL:HG22	2.07	0.54
1:B:279:TYR:HB3	1:B:370:ILE:HG22	1.90	0.53
1:A:202:ARG:HG3	1:A:203:ASN:N	2.24	0.53
1:B:252:VAL:O	1:B:252:VAL:HG23	2.07	0.53
1:B:217:LEU:HB2	1:B:411:MET:CE	2.39	0.53
1:B:141:THR:CG2	1:B:142:THR:O	2.56	0.53
1:A:371:LEU:O	1:A:372:THR:CG2	2.57	0.53
1:A:51:ASN:HB2	1:A:122:THR:HG21	1.91	0.53
1:B:42:ILE:N	1:B:42:ILE:HD12	2.06	0.53
1:B:367:ILE:C	1:B:368:ILE:HG23	2.28	0.53
1:B:238:PHE:HD2	1:B:242:ASP:HB3	1.74	0.53
1:B:250:LEU:HB2	1:B:414:ILE:O	2.09	0.53
1:A:204:VAL:HA	1:A:349:TYR:CD2	2.44	0.52
1:A:399:ASN:CB	1:A:400:PRO:CD	2.80	0.52
1:A:96:LYS:NZ	2:A:502:5GP:O2P	2.39	0.52
1:A:225:GLU:CG	1:A:241:ASN:HB2	2.40	0.52
1:B:236:PRO:HB2	1:B:238:PHE:CE1	2.45	0.52
1:B:46:LEU:HD21	1:B:149:ILE:HD13	1.92	0.52
1:B:254:GLU:HA	1:B:257:LYS:HB3	1.92	0.52
1:B:205:LEU:HD13	1:B:211:VAL:HG21	1.92	0.51
1:B:271:LEU:CD2	1:B:370:ILE:HD12	2.40	0.51
1:B:367:ILE:C	1:B:368:ILE:CG2	2.79	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:66:LEU:HD12	1:A:168:HIS:CE1	2.46	0.51
1:B:57:LEU:O	1:B:104:ARG:NH2	2.44	0.51
1:B:43:LEU:HD21	1:B:140:LEU:HD11	1.93	0.51
1:B:240:ASP:N	1:B:240:ASP:OD1	2.44	0.51
1:A:261:LEU:HD21	1:A:412:SER:HA	1.91	0.51
1:B:86:LYS:HE3	1:B:91:SER:OG	2.11	0.51
1:A:354:HIS:C	1:A:356:SER:H	2.14	0.50
1:A:141:THR:CG2	1:A:142:THR:O	2.58	0.50
1:A:248:GLN:O	1:A:249:LYS:HD2	2.11	0.50
1:B:49:GLY:HA3	1:B:95:PHE:CE1	2.47	0.50
1:B:399:ASN:O	1:B:402:GLN:HB2	2.10	0.50
1:A:43:LEU:HD21	1:A:140:LEU:HD11	1.94	0.49
1:B:243:PHE:CZ	1:B:249:LYS:HB3	2.47	0.49
1:A:206:SER:HB2	1:A:364:PHE:CE2	2.47	0.49
1:B:235:LEU:HD12	1:B:235:LEU:N	2.28	0.49
1:A:349:TYR:CD1	1:A:366:ALA:HB2	2.48	0.49
1:B:224:ARG:HB3	1:B:239:LYS:CD	2.42	0.49
1:B:159:GLU:HA	1:B:159:GLU:OE2	2.13	0.49
1:B:74:TYR:CD1	1:B:74:TYR:C	2.85	0.49
1:B:204:VAL:HG13	1:B:366:ALA:HB3	1.94	0.48
1:B:43:LEU:HD21	1:B:140:LEU:CD1	2.42	0.48
1:B:250:LEU:CD2	1:B:363:TYR:CE2	2.96	0.48
1:A:189:LEU:N	1:A:189:LEU:HD12	2.28	0.48
1:B:219:GLY:HA2	1:B:410:PHE:CG	2.49	0.48
1:A:141:THR:CG2	1:A:145:ARG:HA	2.44	0.48
1:B:250:LEU:HD21	1:B:285:ILE:HD11	1.96	0.48
1:A:249:LYS:O	1:A:250:LEU:HD23	2.14	0.48
1:B:281:LEU:HD12	1:B:366:ALA:C	2.34	0.48
1:B:370:ILE:O	1:B:370:ILE:HG13	2.14	0.48
1:A:354:HIS:ND1	1:A:356:SER:OG	2.45	0.48
1:A:43:LEU:HD21	1:A:140:LEU:CD1	2.44	0.48
1:B:250:LEU:HD21	1:B:285:ILE:CD1	2.44	0.47
1:B:285:ILE:HD13	1:B:363:TYR:HD2	1.79	0.47
1:B:160:MET:HG2	1:B:186:MET:SD	2.54	0.47
1:B:78:LYS:HD2	1:B:94:LYS:HZ2	1.78	0.47
1:A:207:HIS:CD2	1:A:208:ARG:HG2	2.49	0.47
1:B:206:SER:HB2	1:B:364:PHE:CE2	2.50	0.47
1:A:239:LYS:O	1:A:242:ASP:HB2	2.14	0.47
1:A:340:GLY:O	1:A:352:LYS:HE3	2.14	0.47
1:A:100:PRO:HD2	3:A:604:HOH:O	2.14	0.47
1:A:160:MET:CE	1:A:164:LEU:HD13	2.43	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:367:ILE:CG2	1:B:368:ILE:N	2.77	0.47
1:B:139:PHE:O	1:B:139:PHE:HD2	1.98	0.47
1:B:288:VAL:CG1	1:B:339:PRO:HB2	2.45	0.47
1:B:139:PHE:C	1:B:139:PHE:CD2	2.87	0.46
1:A:213:ARG:NH1	1:A:246:GLU:OE2	2.47	0.46
1:A:160:MET:HB3	1:A:160:MET:HE2	1.76	0.46
1:B:233:LYS:CG	1:B:234:ASP:H	2.28	0.46
1:B:276:ILE:CG2	1:B:277:MET:N	2.79	0.46
1:B:288:VAL:HG23	1:B:360:LYS:O	2.16	0.46
1:A:110:PHE:CE1	1:A:182:GLN:HB3	2.49	0.46
1:A:288:VAL:HG21	1:A:360:LYS:HG2	1.98	0.46
1:A:354:HIS:C	1:A:356:SER:N	2.68	0.46
1:B:353:SER:OG	1:B:361:GLU:O	2.21	0.46
1:B:139:PHE:O	1:B:139:PHE:CD2	2.69	0.46
1:B:224:ARG:NH2	1:B:239:LYS:HE3	2.31	0.45
1:A:254:GLU:H	1:A:254:GLU:HG2	1.45	0.45
1:B:141:THR:HG23	1:B:145:ARG:HA	1.98	0.45
1:A:160:MET:O	1:A:164:LEU:HB2	2.17	0.45
1:B:99:CYS:N	1:B:100:PRO:CD	2.80	0.45
1:B:250:LEU:HD22	1:B:363:TYR:CE2	2.52	0.45
1:B:226:ALA:HB3	1:B:231:LYS:NZ	2.32	0.45
1:B:399:ASN:N	1:B:400:PRO:HD3	2.30	0.45
1:B:104:ARG:HA	1:B:107:ARG:CZ	2.48	0.44
1:A:287:ASP:HB3	1:A:290:ARG:HB3	1.99	0.44
1:B:48:TRP:HB2	1:B:89:LEU:HD21	1.99	0.44
1:A:253:GLY:HA2	1:A:354:HIS:CD2	2.52	0.44
1:B:104:ARG:HA	1:B:107:ARG:NH1	2.33	0.44
1:A:224:ARG:NH1	1:A:240:ASP:OD1	2.51	0.44
1:A:154:SER:OG	2:A:502:5GP:H4'	2.18	0.44
1:B:252:VAL:O	1:B:253:GLY:C	2.56	0.44
1:A:354:HIS:CE1	1:A:356:SER:HG	2.34	0.43
1:A:414:ILE:HG22	1:A:415:LEU:HD22	2.00	0.43
1:A:168:HIS:O	1:A:172:VAL:HG23	2.18	0.43
1:A:354:HIS:O	1:A:356:SER:N	2.52	0.43
2:A:502:5GP:H2'	2:A:503:5GP:N2	2.34	0.43
1:B:354:HIS:ND1	1:B:355:GLU:N	2.67	0.43
1:B:264:LEU:O	1:B:268:VAL:HG22	2.19	0.43
1:B:49:GLY:HA3	1:B:95:PHE:CZ	2.54	0.43
1:A:270:PHE:O	1:A:273:GLN:HB2	2.19	0.43
1:A:150:LYS:O	1:A:198:MET:HA	2.19	0.42
1:A:250:LEU:HD12	1:A:414:ILE:CG2	2.49	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:180:LEU:HB3	1:B:181:PRO:HD2	2.00	0.42
1:B:233:LYS:HG2	1:B:234:ASP:H	1.84	0.42
1:B:243:PHE:HE1	1:B:249:LYS:HG3	1.83	0.42
1:A:295:GLU:O	1:A:298:VAL:HG12	2.19	0.42
1:B:235:LEU:HD13	1:B:235:LEU:O	2.19	0.42
1:B:254:GLU:O	1:B:257:LYS:N	2.52	0.42
1:A:48:TRP:HB2	1:A:89:LEU:HD21	2.02	0.42
2:A:502:5GP:O2'	2:A:503:5GP:H1'	2.19	0.42
1:A:97:GLU:HG3	1:A:187:TYR:CE2	2.55	0.42
1:B:119:ASN:O	1:B:123:ARG:HB2	2.20	0.42
1:B:215:TYR:HB3	1:B:217:LEU:HD21	2.02	0.42
1:A:94:LYS:HB2	1:A:190:THR:CB	2.46	0.42
1:B:225:GLU:HG3	1:B:241:ASN:CB	2.48	0.42
1:B:268:VAL:HG11	1:B:407:PHE:CD2	2.55	0.42
1:B:82:HIS:CE1	1:B:83:LEU:HG	2.54	0.41
1:A:282:LEU:O	1:A:365:MET:HA	2.21	0.41
1:A:371:LEU:C	1:A:372:THR:HG23	2.41	0.41
1:A:77:ILE:HD11	1:B:77:ILE:HG13	1.93	0.41
1:B:191:VAL:O	1:B:192:ASP:HB2	2.21	0.41
1:A:240:ASP:OD1	1:A:240:ASP:N	2.54	0.41
1:B:224:ARG:O	1:B:239:LYS:HB3	2.21	0.41
1:B:240:ASP:O	1:B:244:LEU:HB2	2.19	0.41
1:A:274:LEU:C	1:A:276:ILE:H	2.24	0.41
1:A:157:VAL:HG21	1:A:197:TYR:CD2	2.56	0.41
1:A:234:ASP:N	1:A:234:ASP:OD1	2.53	0.41
1:A:159:GLU:HG2	1:A:373:PRO:HD3	2.03	0.41
1:A:98:TYR:O	1:A:99:CYS:C	2.59	0.41
1:B:124:SER:HB3	1:B:143:TYR:CD2	2.56	0.41
1:B:358:PRO:HB2	1:B:359:LYS:H	1.70	0.41
1:B:276:ILE:HG22	1:B:277:MET:N	2.35	0.41
1:A:215:TYR:O	1:A:282:LEU:HD12	2.21	0.40
1:B:203:ASN:OD1	1:B:205:LEU:N	2.54	0.40
1:A:82:HIS:O	1:A:83:LEU:HB2	2.20	0.40
1:A:59:ASN:HB3	1:B:34:LYS:O	2.21	0.40
1:A:152:VAL:HB	1:A:156:ASP:OD2	2.21	0.40
1:A:160:MET:HG2	1:A:371:LEU:HD21	2.03	0.40
1:A:251:HIS:O	1:A:353:SER:HA	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	311/393 (79%)	292 (94%)	16 (5%)	3 (1%)	15	32
1	B	291/393 (74%)	276 (95%)	13 (4%)	2 (1%)	22	43
All	All	602/786 (77%)	568 (94%)	29 (5%)	5 (1%)	19	39

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	358	PRO
1	A	358	PRO
1	B	253	GLY
1	A	355	GLU
1	A	400	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	296/352 (84%)	275 (93%)	21 (7%)	14	29
1	B	281/352 (80%)	257 (92%)	24 (8%)	10	21
All	All	577/704 (82%)	532 (92%)	45 (8%)	12	25

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

Mol	Chain	Res	Type
1	A	91	SER

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Mol	Chain	Res	Type
1	A	115	GLN
1	A	123	ARG
1	A	138	ARG
1	A	141	THR
1	A	208	ARG
1	A	220	SER
1	A	222	VAL
1	A	234	ASP
1	A	240	ASP
1	A	249	LYS
1	A	254	GLU
1	A	256	SER
1	A	266	ARG
1	A	298	VAL
1	A	371	LEU
1	A	372	THR
1	A	401	GLU
1	A	409	GLU
1	A	414	ILE
1	A	415	LEU
1	B	76	LYS
1	B	80	ASP
1	B	87	GLU
1	B	104	ARG
1	B	115	GLN
1	B	120	SER
1	B	123	ARG
1	B	139	PHE
1	B	141	THR
1	B	155	GLU
1	B	208	ARG
1	B	230	GLU
1	B	235	LEU
1	B	240	ASP
1	B	244	LEU
1	B	252	VAL
1	B	276	ILE
1	B	277	MET
1	B	280	SER
1	B	287	ASP
1	B	361	GLU
1	B	370	ILE

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Mol	Chain	Res	Type
1	B	399	ASN
1	B	414	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	82	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

5 ligands are 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
2	5GP	A	503	-	17,21,26	1.40	2 (11%)	17,32,40	2.49	7 (41%)
2	5GP	B	501	-	22,26,26	0.99	1 (4%)	27,40,40	2.08	9 (33%)
2	5GP	B	502	-	22,26,26	1.85	8 (36%)	27,40,40	1.88	8 (29%)
2	5GP	A	501	-	22,26,26	1.19	2 (9%)	27,40,40	1.97	7 (25%)
2	5GP	A	502	-	22,26,26	1.22	2 (9%)	27,40,40	2.06	7 (25%)

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
2	5GP	A	503	-	-	0/0/20/26	0/3/3/3
2	5GP	B	501	-	-	0/6/26/26	0/3/3/3
2	5GP	B	502	-	-	0/6/26/26	0/3/3/3
2	5GP	A	501	-	-	3/6/26/26	0/3/3/3
2	5GP	A	502	-	-	3/6/26/26	0/3/3/3

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	502	5GP	C6-C5	4.19	1.48	1.41
2	B	502	5GP	P-O2P	-3.06	1.43	1.54
2	A	503	5GP	C2'-C1'	-3.05	1.49	1.53
2	B	502	5GP	C2'-C1'	-2.87	1.49	1.53
2	A	503	5GP	C4-N3	-2.71	1.31	1.35
2	B	502	5GP	P-O3P	-2.70	1.44	1.54
2	B	502	5GP	O4'-C4'	-2.57	1.39	1.45
2	B	501	5GP	C6-C5	2.49	1.45	1.41
2	B	502	5GP	C4-N3	-2.47	1.31	1.35
2	B	502	5GP	C2'-C3'	-2.43	1.46	1.53
2	A	502	5GP	C5-C4	2.40	1.47	1.40
2	A	501	5GP	C6-C5	2.29	1.45	1.41
2	B	502	5GP	P-O5'	-2.18	1.53	1.60
2	B	502	5GP	C2-N1	-2.18	1.31	1.35
2	A	501	5GP	C4-N3	-2.11	1.32	1.35

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	502	5GP	C2-N3-C4	5.00	121.07	115.36
2	A	503	5GP	C6-C5-C4	-4.85	116.17	120.80
2	B	502	5GP	C2-N3-C4	4.26	120.23	115.36
2	B	501	5GP	C2-N3-C4	4.15	120.10	115.36
2	A	501	5GP	C2-N3-C4	4.12	120.07	115.36
2	B	502	5GP	C5-C6-N1	-4.02	117.93	123.43
2	A	503	5GP	C5-C6-N1	-3.98	117.99	123.43
2	A	501	5GP	C5-C6-N1	-3.89	118.12	123.43
2	B	501	5GP	C5-C6-N1	-3.88	118.12	123.43
2	B	501	5GP	C6-C5-C4	-3.83	117.14	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	503	5GP	C6-N1-C2	3.83	122.01	115.93
2	A	502	5GP	C5-C6-N1	-3.82	118.21	123.43
2	A	502	5GP	C6-N1-C2	3.78	121.94	115.93
2	A	502	5GP	C6-C5-C4	-3.64	117.32	120.80
2	A	503	5GP	C1'-N9-C4	-3.62	120.27	126.64
2	B	501	5GP	C6-N1-C2	3.59	121.64	115.93
2	B	502	5GP	C6-N1-C2	3.53	121.54	115.93
2	A	501	5GP	C3'-C2'-C1'	3.49	106.23	100.98
2	A	502	5GP	C3'-C2'-C1'	3.47	106.21	100.98
2	B	502	5GP	C6-C5-C4	-3.40	117.55	120.80
2	B	501	5GP	C3'-C2'-C1'	3.34	106.00	100.98
2	A	501	5GP	C4-C5-N7	-3.27	105.99	109.40
2	A	502	5GP	N3-C2-N1	-3.18	122.98	127.22
2	A	503	5GP	O4'-C1'-C2'	-2.97	102.59	106.93
2	A	501	5GP	C6-N1-C2	2.90	120.54	115.93
2	A	502	5GP	C4-C5-N7	-2.82	106.46	109.40
2	A	501	5GP	C6-C5-C4	-2.80	118.12	120.80
2	A	503	5GP	C2-N3-C4	2.78	118.54	115.36
2	B	501	5GP	C4-C5-N7	-2.67	106.61	109.40
2	A	501	5GP	O3P-P-O2P	2.61	117.61	107.64
2	B	502	5GP	O2P-P-O1P	2.54	120.63	110.68
2	B	501	5GP	N3-C2-N1	-2.51	123.87	127.22
2	B	502	5GP	N3-C2-N1	-2.40	124.03	127.22
2	A	503	5GP	N3-C2-N1	-2.36	124.08	127.22
2	B	501	5GP	N2-C2-N1	2.35	120.91	117.25
2	B	502	5GP	C4-C5-N7	-2.33	106.97	109.40
2	B	502	5GP	O3P-P-O5'	-2.32	100.56	106.73
2	B	501	5GP	C2'-C3'-C4'	2.03	106.59	102.64

There are no chirality outliers.

All (6) torsion outliers are listed below:

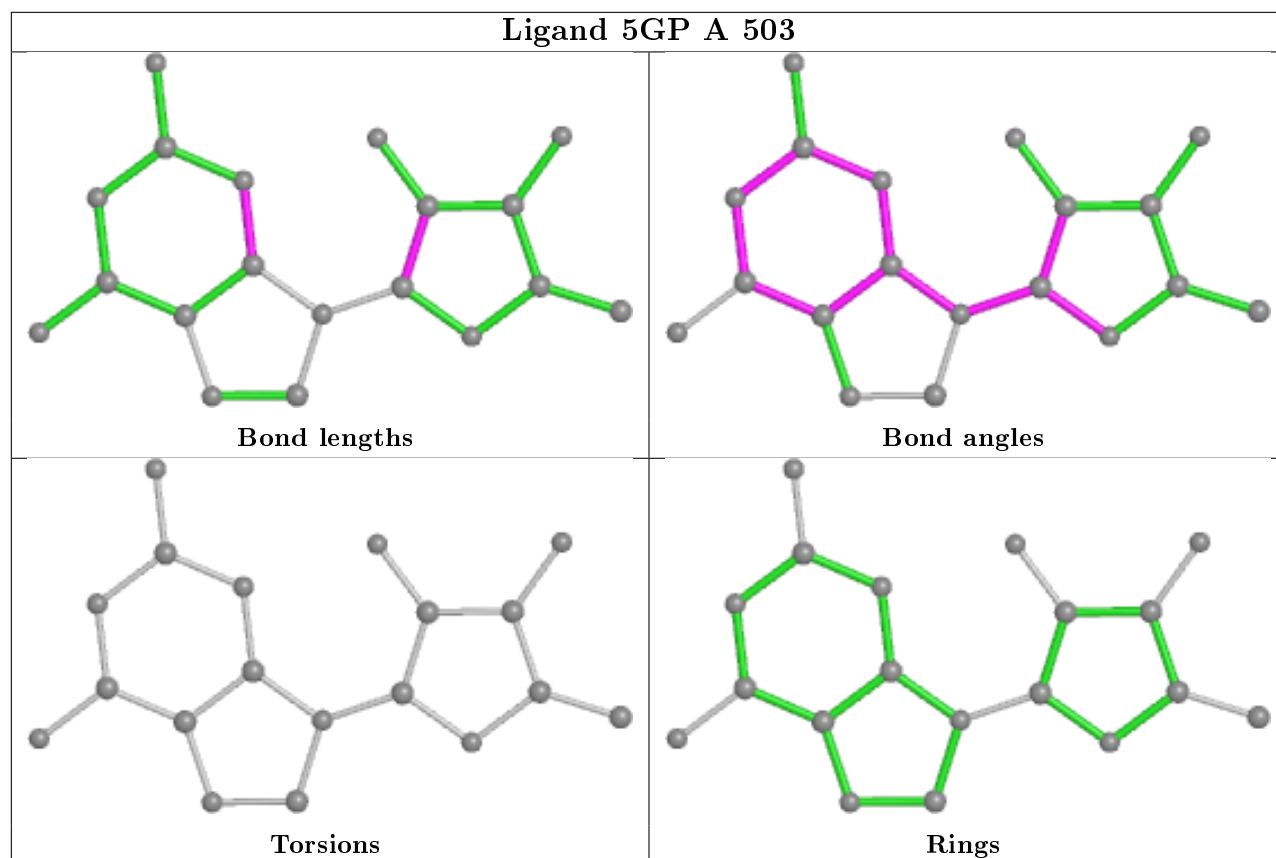
Mol	Chain	Res	Type	Atoms
2	A	501	5GP	C5'-O5'-P-O2P
2	A	501	5GP	C5'-O5'-P-O3P
2	A	502	5GP	C5'-O5'-P-O2P
2	A	502	5GP	C5'-O5'-P-O3P
2	A	501	5GP	C5'-O5'-P-O1P
2	A	502	5GP	C5'-O5'-P-O1P

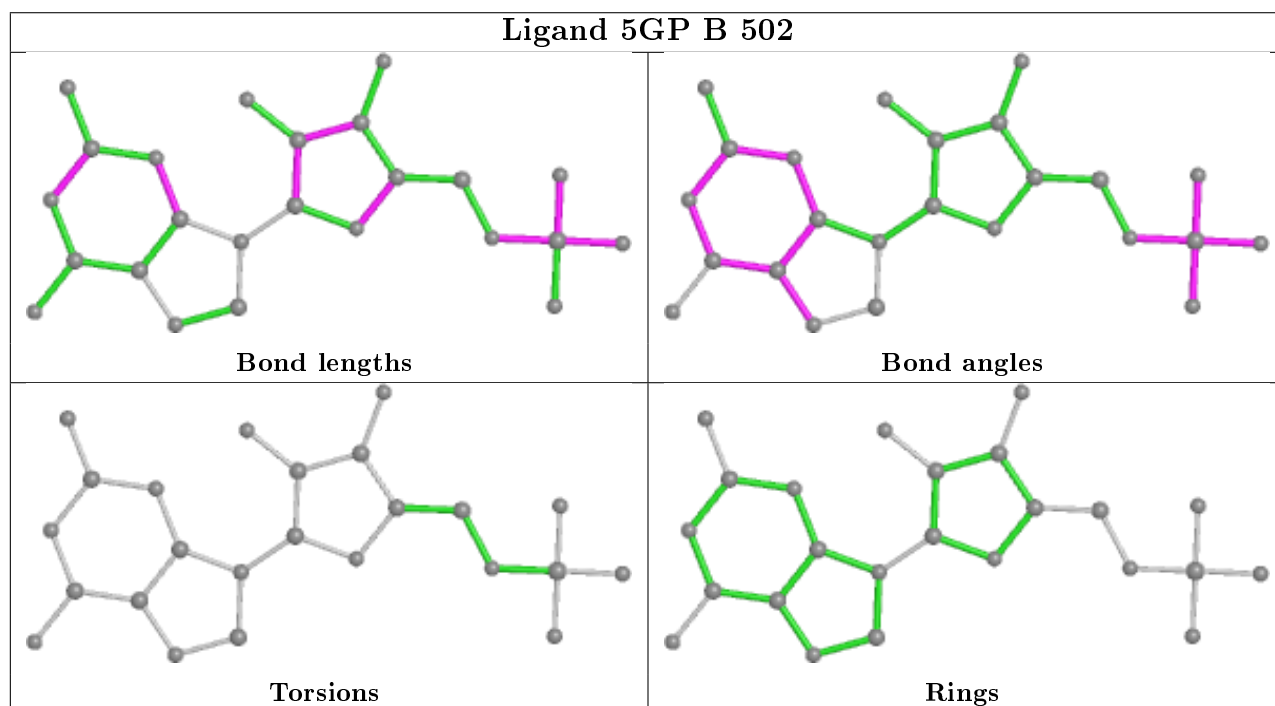
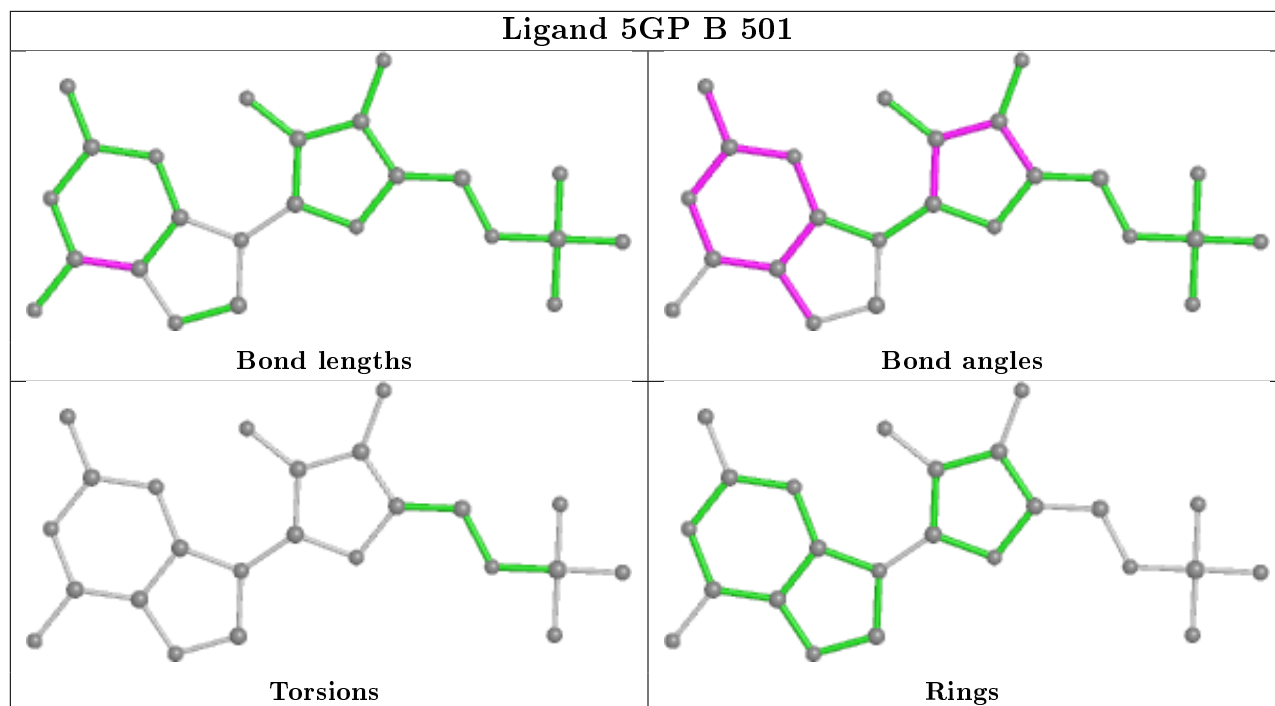
There are no ring outliers.

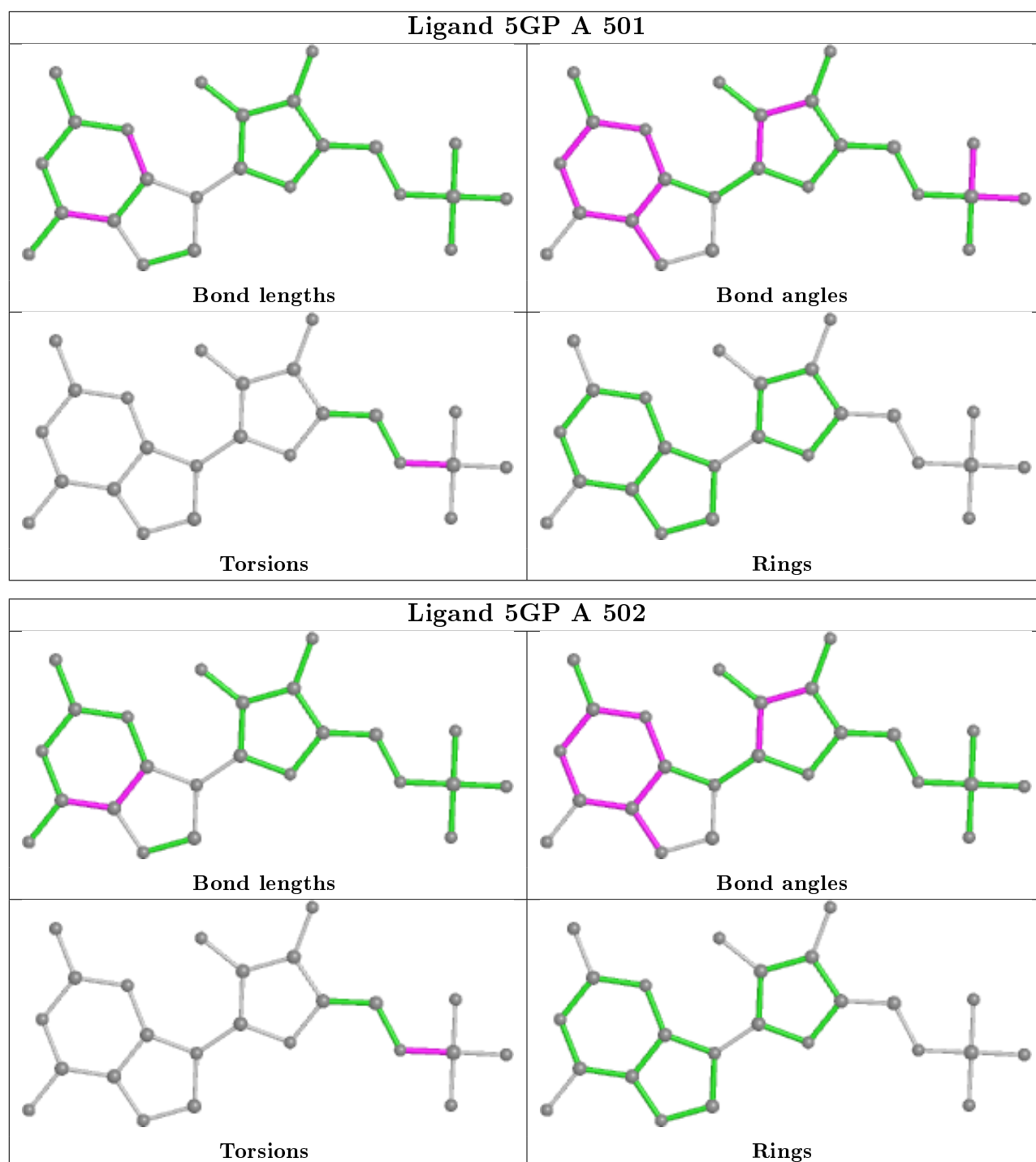
3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	503	5GP	3	0
2	B	501	5GP	1	0
2	A	502	5GP	5	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	319/393 (81%)	0.65	28 (8%) 10 7	25, 76, 130, 155	0
1	B	303/393 (77%)	1.13	53 (17%) 1 0	25, 76, 149, 164	0
All	All	622/786 (79%)	0.88	81 (13%) 3 2	25, 76, 140, 164	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	245	ASN	6.9
1	B	250	LEU	6.0
1	B	244	LEU	5.8
1	B	235	LEU	5.6
1	B	236	PRO	5.5
1	B	231	LYS	5.4
1	B	400	PRO	5.4
1	B	211	VAL	5.2
1	B	228	ASP	5.1
1	A	403	TYR	5.0
1	B	233	LYS	4.8
1	A	338	GLY	4.8
1	B	243	PHE	4.6
1	A	301	ARG	4.6
1	A	223	ALA	4.6
1	B	227	SER	4.6
1	B	226	ALA	4.5
1	B	215	TYR	4.4
1	A	228	ASP	4.4
1	B	224	ARG	4.3
1	B	238	PHE	4.2
1	B	415	LEU	4.1
1	A	226	ALA	4.0
1	B	241	ASN	4.0

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Mol	Chain	Res	Type	RSRZ
1	B	337	PHE	4.0
1	B	230	GLU	3.9
1	B	251	HIS	3.9
1	B	261	LEU	3.9
1	B	220	SER	3.8
1	B	232	ALA	3.8
1	B	219	GLY	3.8
1	A	373	PRO	3.7
1	B	242	ASP	3.7
1	B	246	GLU	3.6
1	B	359	LYS	3.6
1	A	231	LYS	3.6
1	A	229	LYS	3.6
1	A	222	VAL	3.6
1	B	407	PHE	3.5
1	B	272	ALA	3.2
1	B	254	GLU	3.2
1	B	223	ALA	3.1
1	B	255	GLU	3.1
1	A	225	GLU	3.1
1	B	240	ASP	3.0
1	B	229	LYS	3.0
1	B	252	VAL	3.0
1	A	372	THR	2.8
1	A	405	LYS	2.8
1	B	213	ARG	2.8
1	B	356	SER	2.7
1	B	416	THR	2.7
1	B	258	LYS	2.7
1	B	277	MET	2.7
1	B	404	SER	2.7
1	A	244	LEU	2.7
1	B	399	ASN	2.6
1	A	238	PHE	2.6
1	B	225	GLU	2.6
1	A	302	ALA	2.6
1	A	64	VAL	2.5
1	A	227	SER	2.5
1	B	410	PHE	2.3
1	A	241	ASN	2.3
1	A	232	ALA	2.3
1	B	403	TYR	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	230	GLU	2.2
1	A	233	LYS	2.2
1	B	234	ASP	2.2
1	A	399	ASN	2.2
1	B	253	GLY	2.2
1	A	346	VAL	2.2
1	B	217	LEU	2.2
1	A	224	ARG	2.2
1	B	413	ASN	2.1
1	A	246	GLU	2.1
1	B	218	LYS	2.1
1	B	237	THR	2.1
1	A	304	ASP	2.1
1	A	406	ARG	2.0
1	B	257	LYS	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 carbohydrates in this entry.

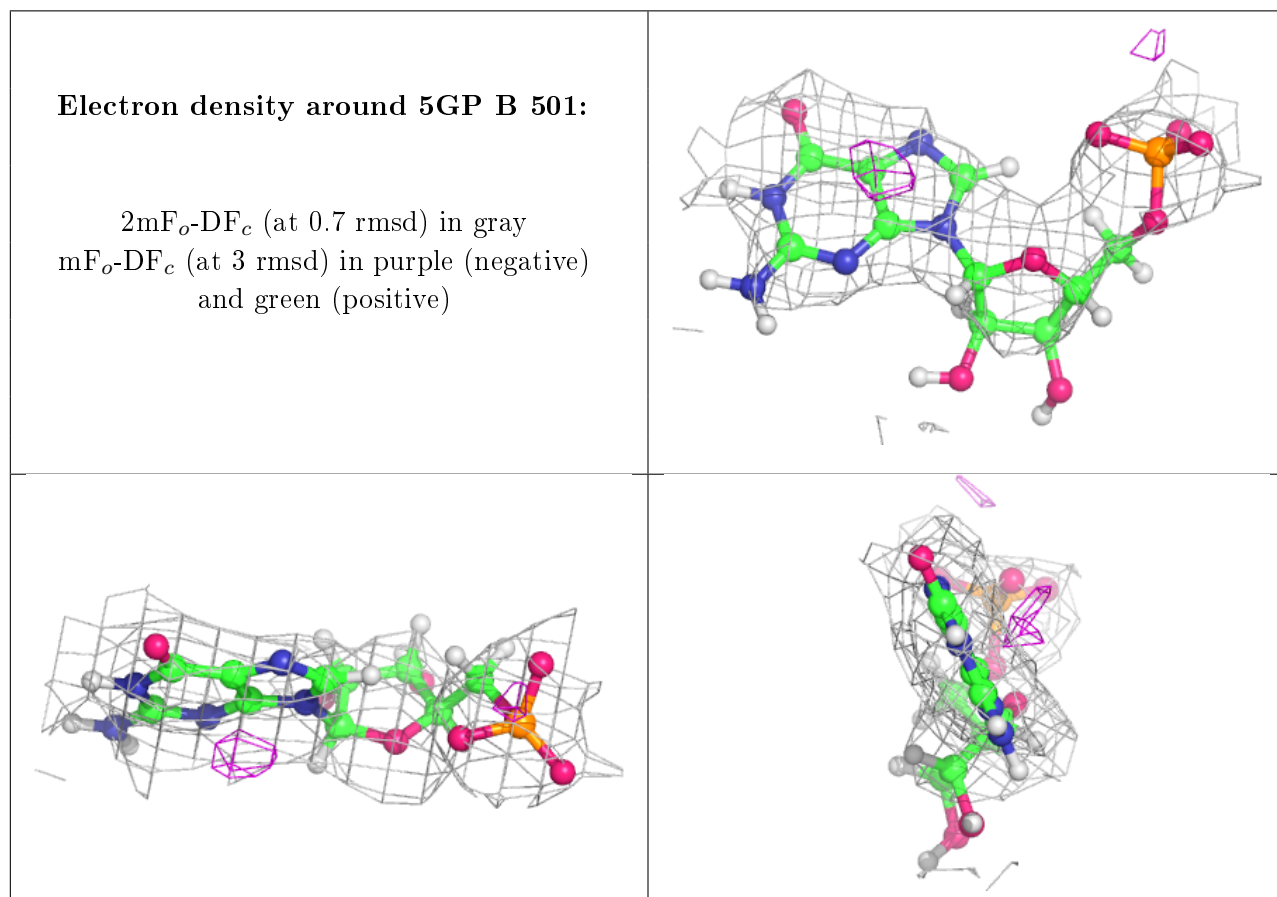
6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	5GP	B	501	24/24	0.71	0.31	107,155,198,198	0
2	5GP	A	503	19/24	0.85	0.24	45,98,156,169	0
2	5GP	A	501	24/24	0.86	0.19	54,124,158,162	0
2	5GP	A	502	24/24	0.91	0.22	37,69,89,93	0
2	5GP	B	502	24/24	0.95	0.16	48,58,71,83	0

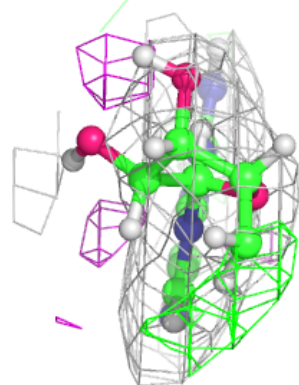
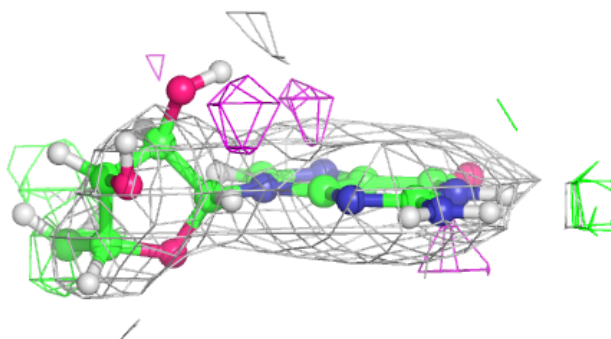
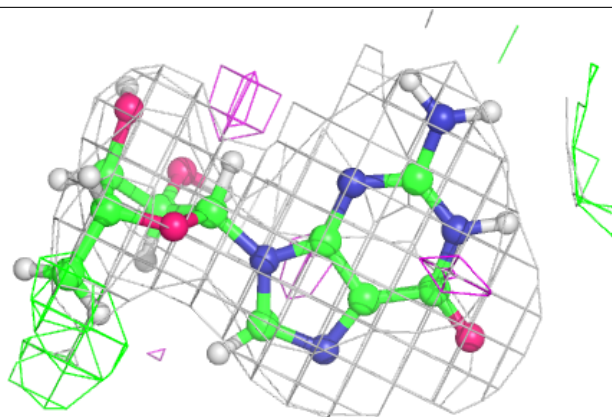
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers

as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

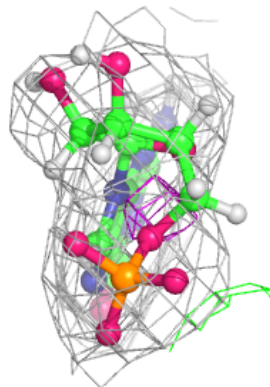
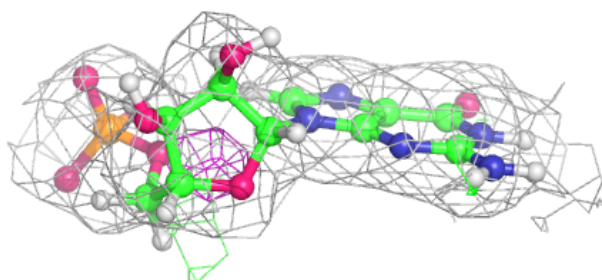
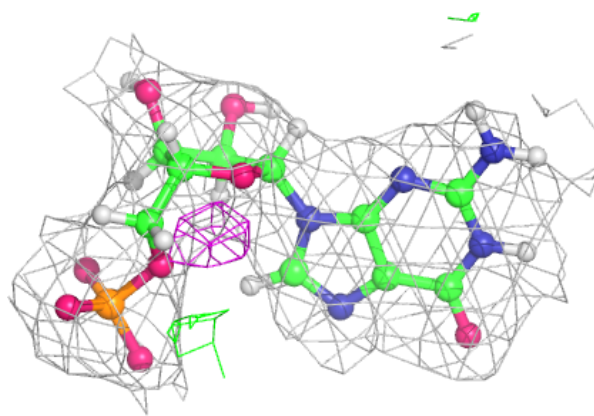


Electron density around 5GP A 503:

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

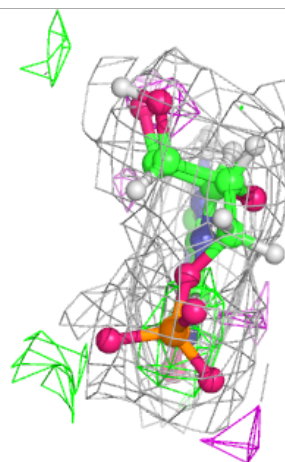
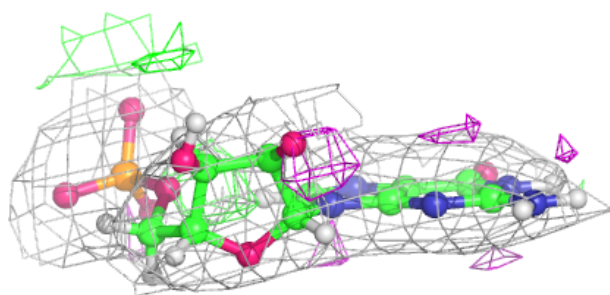
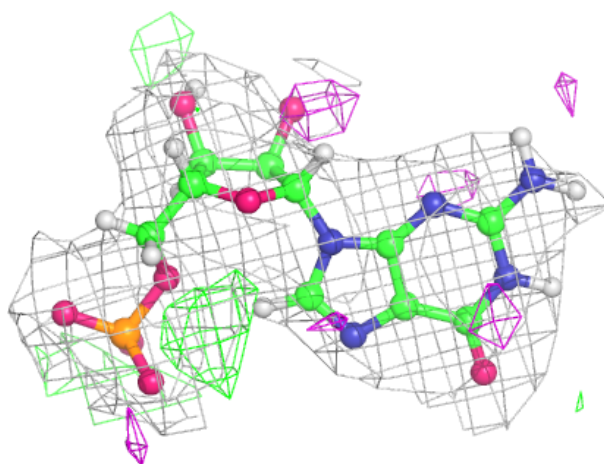
**Electron density around 5GP A 501:**

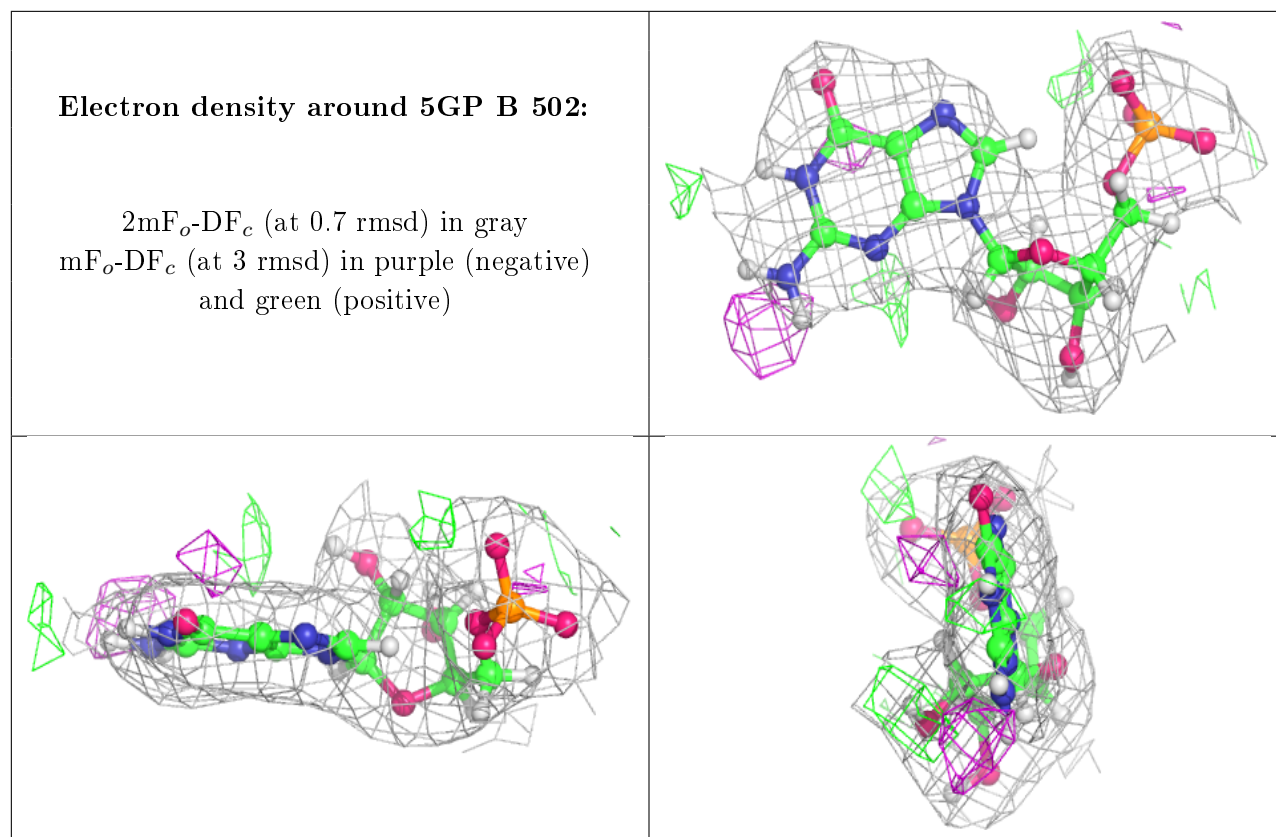
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around 5GP A 502:

$2mF_o-DF_c$ (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.