



# Full wwPDB X-ray Structure Validation Report ⓘ

May 25, 2020 – 04:19 am BST

PDB ID : 3X02  
Title : Crystal structure of PIP4KIIBETA 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 : 2.45 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](mailto: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.

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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

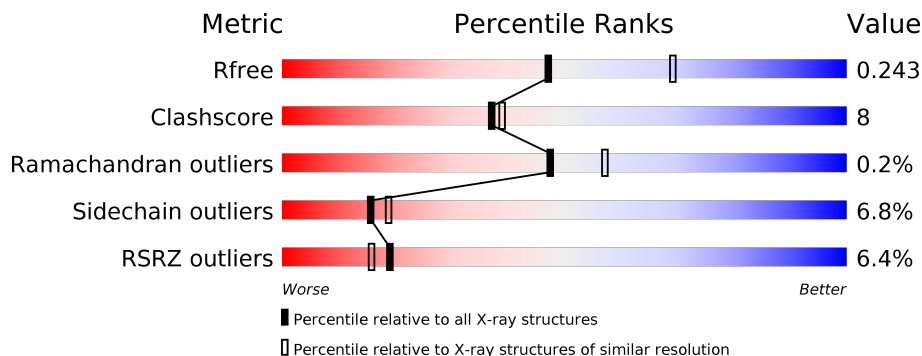
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.45 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	1544 (2.48-2.44)
Clashscore	141614	1613 (2.48-2.44)
Ramachandran outliers	138981	1598 (2.48-2.44)
Sidechain outliers	138945	1598 (2.48-2.44)
RSRZ outliers	127900	1523 (2.48-2.44)

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  $\geq 3$ , 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	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 67%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: grey;"></div> </div> <p style="font-size: small; margin-top: 5px;">3%      67%      11%      •      19%</p>
1	B	393	<div style="display: flex; align-items: center;"> <div style="width: 7%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 60%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 14%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 23%; height: 10px; background-color: grey;"></div> </div> <p style="font-size: small; margin-top: 5px;">7%      60%      14%      •      23%</p>

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 5273 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.

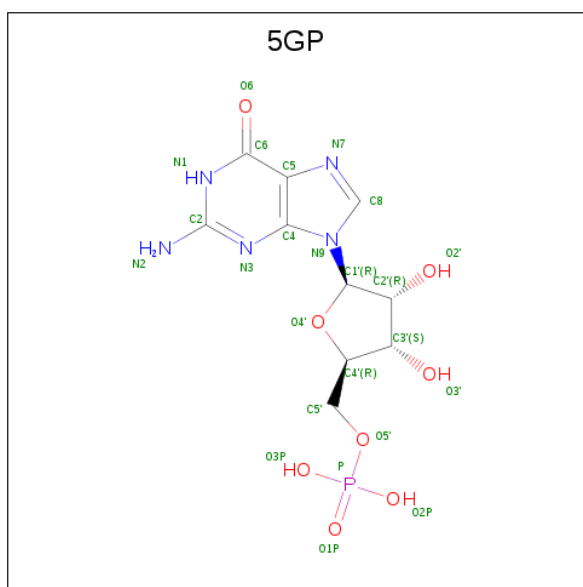
- Molecule 1 is a protein called Phosphatidylinositol 5-phosphate 4-kinase type-2 beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	317	2612	1663	445	490	14	0	0	0
1	B	304	2499	1601	424	461	13	0	0	0

There are 14 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
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

- Molecule 2 is GUANOSINE-5'-MONOPHOSPHATE (three-letter code: 5GP) (formula: C<sub>10</sub>H<sub>14</sub>N<sub>5</sub>O<sub>8</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			24	10	5	8	1		
2	A	1	Total	C	N	O	P	0	0
			24	10	5	8	1		
2	A	1	Total	C	N	O	P	0	0
			24	10	5	8	1		
2	A	1	Total	C	N	O	P	0	0
			24	10	5	8	1		
2	B	1	Total	C	N	O	P	0	0
			24	10	5	8	1		

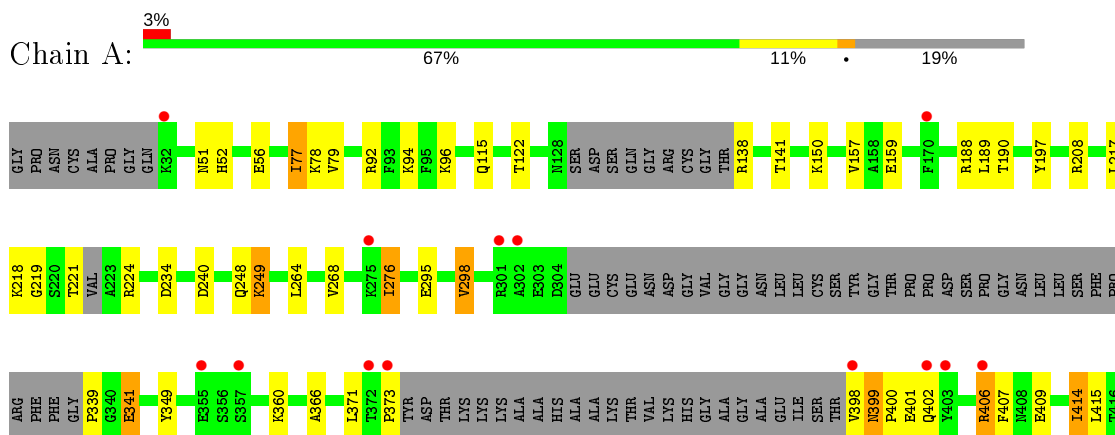
- Molecule 3 is water.

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

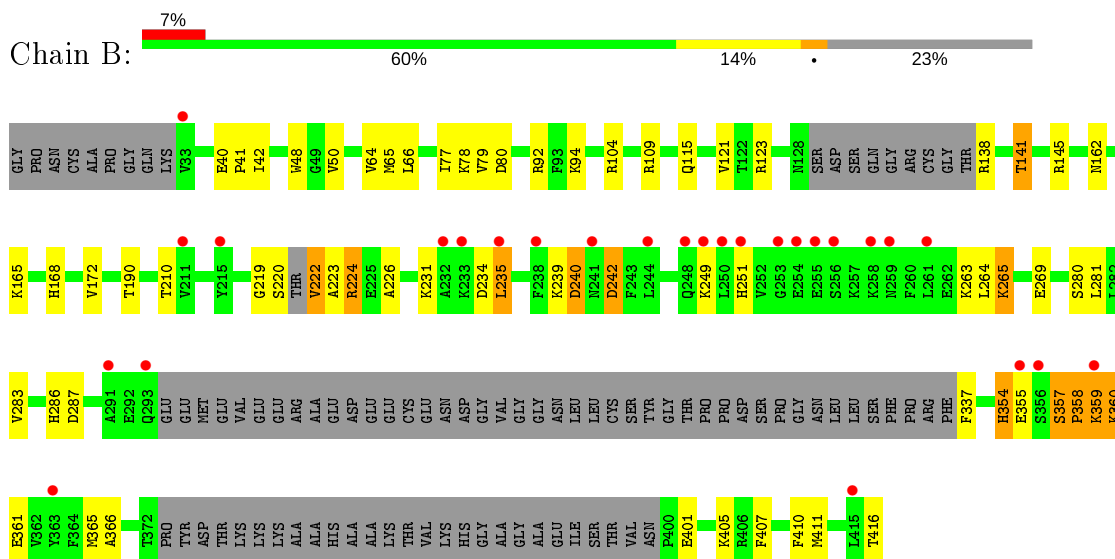
### 3 Residue-property plots [i](#)

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



## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	108.75Å 183.19Å 106.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.76 – 2.45 93.52 – 2.45	Depositor EDS
% Data completeness (in resolution range)	99.2 (46.76-2.45) 99.2 (93.52-2.45)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.45 (at 2.45Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE: 1.7.3_928)	Depositor
R, $R_{free}$	0.224 , 0.255 0.211 , 0.243	Depositor DCC
$R_{free}$ test set	1963 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	59.8	Xtrriage
Anisotropy	0.170	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 60.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.009 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.021 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	5273	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	76.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.53% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>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	0.46	0/2665	0.59	0/3583
1	B	0.45	0/2552	0.57	0/3431
All	All	0.46	0/5217	0.58	0/7014

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	2612	0	2584	43	0
1	B	2499	0	2480	41	0
2	A	96	0	48	1	0
2	B	24	0	12	0	0
3	A	21	0	0	0	0
3	B	21	0	0	0	0
All	All	5273	0	5124	81	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 (81) 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:287:ASP:CG	1:B:359:LYS:HE2	1.90	0.92
1:A:398:VAL:O	1:A:398:VAL:HG12	1.71	0.91
1:A:339:PRO:N	1:A:341:GLU:HG3	1.87	0.90
1:B:287:ASP:OD2	1:B:359:LYS:HE2	1.73	0.88
1:A:406:ARG:HG2	1:A:407:PHE:H	1.44	0.82
1:A:406:ARG:HG2	1:A:407:PHE:N	1.95	0.81
1:B:354:HIS:ND1	1:B:355:GLU:N	2.34	0.74
1:B:251:HIS:CB	1:B:357:SER:HB2	2.20	0.71
1:A:406:ARG:CG	1:A:407:PHE:N	2.53	0.70
1:A:399:ASN:HB2	1:A:400:PRO:HD2	1.73	0.69
1:B:251:HIS:CD2	1:B:358:PRO:HD2	2.28	0.69
1:B:287:ASP:OD2	1:B:359:LYS:CE	2.43	0.67
1:B:94:LYS:HB2	1:B:190:THR:HB	1.78	0.66
1:A:218:LYS:HB2	1:A:224:ARG:HH11	1.62	0.65
1:B:235:LEU:H	1:B:235:LEU:HD12	1.61	0.64
1:A:399:ASN:N	1:A:399:ASN:HD22	1.96	0.63
1:A:94:LYS:HB2	1:A:190:THR:HB	1.80	0.62
1:A:402:GLN:HE21	1:A:406:ARG:NH2	1.98	0.61
1:B:265:LYS:NZ	1:B:269:GLU:OE2	2.32	0.61
1:A:399:ASN:HB2	1:A:400:PRO:CD	2.30	0.61
1:A:219:GLY:O	1:A:406:ARG:HD3	2.01	0.60
1:A:399:ASN:H	1:A:399:ASN:HD22	1.49	0.60
1:A:398:VAL:O	1:A:398:VAL:CG1	2.44	0.60
1:B:224:ARG:HB2	1:B:239:LYS:HD3	1.84	0.59
1:B:242:ASP:N	1:B:242:ASP:OD1	2.34	0.59
1:A:218:LYS:HB2	1:A:224:ARG:NH1	2.18	0.57
1:A:221:THR:HG23	1:A:406:ARG:HH12	1.70	0.57
1:B:251:HIS:HB2	1:B:357:SER:HB2	1.87	0.57
1:A:224:ARG:NH1	1:A:240:ASP:OD1	2.38	0.56
1:B:287:ASP:OD1	1:B:359:LYS:HE2	2.06	0.56
1:A:217:LEU:HD13	1:A:414:ILE:HD11	1.88	0.55
1:B:357:SER:OG	1:B:358:PRO:N	2.38	0.55
1:A:56:GLU:OE2	1:B:48:TRP:NE1	2.41	0.53
1:B:219:GLY:HA2	1:B:410:PHE:CG	2.44	0.53
1:B:226:ALA:O	1:B:231:LYS:NZ	2.42	0.52
1:B:79:VAL:O	1:B:92:ARG:HA	2.08	0.52
1:B:141:THR:HG22	1:B:145:ARG:HA	1.92	0.51
1:B:109:ARG:CZ	1:B:172:VAL:HG22	2.40	0.51
1:A:399:ASN:ND2	1:A:399:ASN:N	2.59	0.50
1:A:77:ILE:HD12	1:B:79:VAL:HG22	1.92	0.50
1:B:401:GLU:OE1	1:B:405:LYS:NZ	2.45	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:52:HIS:NE2	1:A:77:ILE:HD13	2.28	0.49
1:B:283:VAL:HG22	1:B:365:MET:HG2	1.94	0.48
1:B:210:THR:O	1:B:286:HIS:ND1	2.35	0.48
1:A:264:LEU:O	1:A:268:VAL:HG22	2.14	0.47
1:A:402:GLN:HE21	1:A:406:ARG:HH21	1.62	0.47
1:A:406:ARG:O	1:A:407:PHE:C	2.54	0.47
1:B:222:VAL:HG12	1:B:223:ALA:H	1.80	0.46
1:A:157:VAL:HG21	1:A:197:TYR:CD2	2.49	0.46
1:A:248:GLN:O	1:A:249:LYS:HD2	2.16	0.46
1:B:249:LYS:HD3	1:B:416:THR:HG21	1.97	0.45
1:B:281:LEU:HD12	1:B:366:ALA:O	2.17	0.45
1:A:78:LYS:HB3	1:B:78:LYS:HB3	1.98	0.45
1:A:159:GLU:HG2	1:A:371:LEU:O	2.17	0.45
1:A:295:GLU:O	1:A:298:VAL:HG12	2.17	0.44
1:A:218:LYS:CB	1:A:224:ARG:NH1	2.80	0.44
1:A:51:ASN:HB2	1:A:122:THR:HG21	1.99	0.44
1:A:77:ILE:HG12	1:B:77:ILE:HD11	1.98	0.44
1:B:64:VAL:HG23	1:B:65:MET:HG2	1.99	0.43
1:B:240:ASP:N	1:B:240:ASP:OD1	2.51	0.43
1:A:349:TYR:CD1	1:A:366:ALA:HB2	2.53	0.43
1:A:221:THR:HG23	1:A:406:ARG:NH1	2.34	0.43
1:B:251:HIS:NE2	1:B:358:PRO:HD2	2.34	0.42
1:B:50:VAL:HG21	1:B:121:VAL:HG11	2.02	0.42
1:A:339:PRO:N	1:A:341:GLU:CG	2.71	0.42
1:A:96:LYS:HB3	1:A:188:ARG:HB3	2.01	0.42
1:A:276:ILE:HG23	1:A:373:PRO:HG2	2.02	0.42
1:A:399:ASN:H	1:A:399:ASN:ND2	2.14	0.42
1:B:165:LYS:HB2	1:B:165:LYS:HE2	1.95	0.42
1:B:66:LEU:HD12	1:B:168:HIS:CE1	2.55	0.41
1:B:360:LYS:C	1:B:361:GLU:HG3	2.41	0.41
1:B:264:LEU:HD21	1:B:411:MET:HB2	2.02	0.41
1:A:150:LYS:HE2	1:A:150:LYS:HB3	1.86	0.41
1:B:42:ILE:HG13	1:B:42:ILE:H	1.70	0.41
1:A:189:LEU:N	1:A:189:LEU:HD12	2.36	0.41
1:B:141:THR:CG2	1:B:145:ARG:HA	2.51	0.41
1:B:40:GLU:HG3	1:B:41:PRO:HD2	2.02	0.41
1:B:407:PHE:O	1:B:411:MET:HG2	2.21	0.40
1:A:371:LEU:HA	1:A:371:LEU:HD23	1.83	0.40
2:A:502:5GP:O5'	2:A:502:5GP:H8	2.21	0.40
1:A:79:VAL:O	1:A:92:ARG: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	307/393 (78%)	299 (97%)	8 (3%)	0	100	100
1	B	294/393 (75%)	286 (97%)	7 (2%)	1 (0%)	41	49
All	All	601/786 (76%)	585 (97%)	15 (2%)	1 (0%)	47	57

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	358	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	295/352 (84%)	278 (94%)	17 (6%)	20	25
1	B	281/352 (80%)	259 (92%)	22 (8%)	12	15
All	All	576/704 (82%)	537 (93%)	39 (7%)	16	19

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	77	ILE
1	A	115	GLN
1	A	138	ARG
1	A	141	THR
1	A	208	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	234	ASP
1	A	249	LYS
1	A	276	ILE
1	A	298	VAL
1	A	341	GLU
1	A	360	LYS
1	A	399	ASN
1	A	401	GLU
1	A	406	ARG
1	A	409	GLU
1	A	414	ILE
1	A	415	LEU
1	B	80	ASP
1	B	104	ARG
1	B	115	GLN
1	B	123	ARG
1	B	138	ARG
1	B	141	THR
1	B	162	ASN
1	B	220	SER
1	B	222	VAL
1	B	224	ARG
1	B	234	ASP
1	B	235	LEU
1	B	240	ASP
1	B	242	ASP
1	B	263	LYS
1	B	265	LYS
1	B	280	SER
1	B	337	PHE
1	B	354	HIS
1	B	357	SER
1	B	359	LYS
1	B	360	LYS

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

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	399	ASN
1	A	402	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 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	504	-	22,26,26	0.82	0	27,40,40	2.02	8 (29%)
2	5GP	A	503	-	22,26,26	0.70	0	27,40,40	1.85	7 (25%)
2	5GP	A	502	-	22,26,26	0.77	0	27,40,40	1.87	6 (22%)
2	5GP	A	501	-	22,26,26	0.61	0	27,40,40	1.81	6 (22%)
2	5GP	B	501	-	22,26,26	0.59	0	27,40,40	1.74	5 (18%)

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	504	-	-	3/6/26/26	0/3/3/3
2	5GP	A	503	-	-	3/6/26/26	0/3/3/3
2	5GP	A	502	-	-	3/6/26/26	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	5GP	A	501	-	-	5/6/26/26	0/3/3/3
2	5GP	B	501	-	-	3/6/26/26	0/3/3/3

There are no bond length outliers.

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	504	5GP	N3-C2-N1	-5.26	120.20	127.22
2	A	504	5GP	C2-N3-C4	4.77	120.81	115.36
2	A	501	5GP	C2-N3-C4	4.64	120.66	115.36
2	A	502	5GP	N3-C2-N1	-4.59	121.09	127.22
2	B	501	5GP	N3-C2-N1	-4.58	121.11	127.22
2	A	503	5GP	C2-N3-C4	4.56	120.56	115.36
2	A	501	5GP	N3-C2-N1	-4.52	121.19	127.22
2	A	503	5GP	N3-C2-N1	-4.37	121.40	127.22
2	B	501	5GP	C2-N3-C4	4.10	120.04	115.36
2	A	502	5GP	C2-N3-C4	4.03	119.95	115.36
2	A	502	5GP	C5-C6-N1	-3.49	118.65	123.43
2	A	504	5GP	N2-C2-N1	3.37	122.49	117.25
2	A	502	5GP	C6-N1-C2	3.35	121.25	115.93
2	A	503	5GP	C5-C6-N1	-3.21	119.04	123.43
2	B	501	5GP	C6-N1-C2	3.03	120.74	115.93
2	A	503	5GP	C6-N1-C2	3.01	120.72	115.93
2	A	504	5GP	C6-N1-C2	2.97	120.65	115.93
2	A	504	5GP	C5-C6-N1	-2.89	119.48	123.43
2	A	501	5GP	O3P-P-O5'	-2.86	99.13	106.73
2	A	502	5GP	O3P-P-O5'	-2.75	99.42	106.73
2	A	503	5GP	O3P-P-O5'	-2.74	99.44	106.73
2	A	501	5GP	C4-C5-N7	-2.71	106.57	109.40
2	A	501	5GP	C6-N1-C2	2.70	120.22	115.93
2	A	501	5GP	C5-C6-N1	-2.68	119.77	123.43
2	B	501	5GP	C5-C6-N1	-2.65	119.81	123.43
2	B	501	5GP	O3P-P-O5'	-2.61	99.80	106.73
2	A	504	5GP	O3P-P-O5'	-2.60	99.82	106.73
2	A	502	5GP	C4-C5-N7	-2.51	106.78	109.40
2	A	503	5GP	C4-C5-N7	-2.35	106.95	109.40
2	A	504	5GP	C6-C5-C4	-2.22	118.67	120.80
2	A	504	5GP	C4-C5-N7	-2.21	107.10	109.40
2	A	503	5GP	O2P-P-O1P	2.08	118.83	110.68

There are no chirality outliers.

All (17) torsion outliers are listed below:

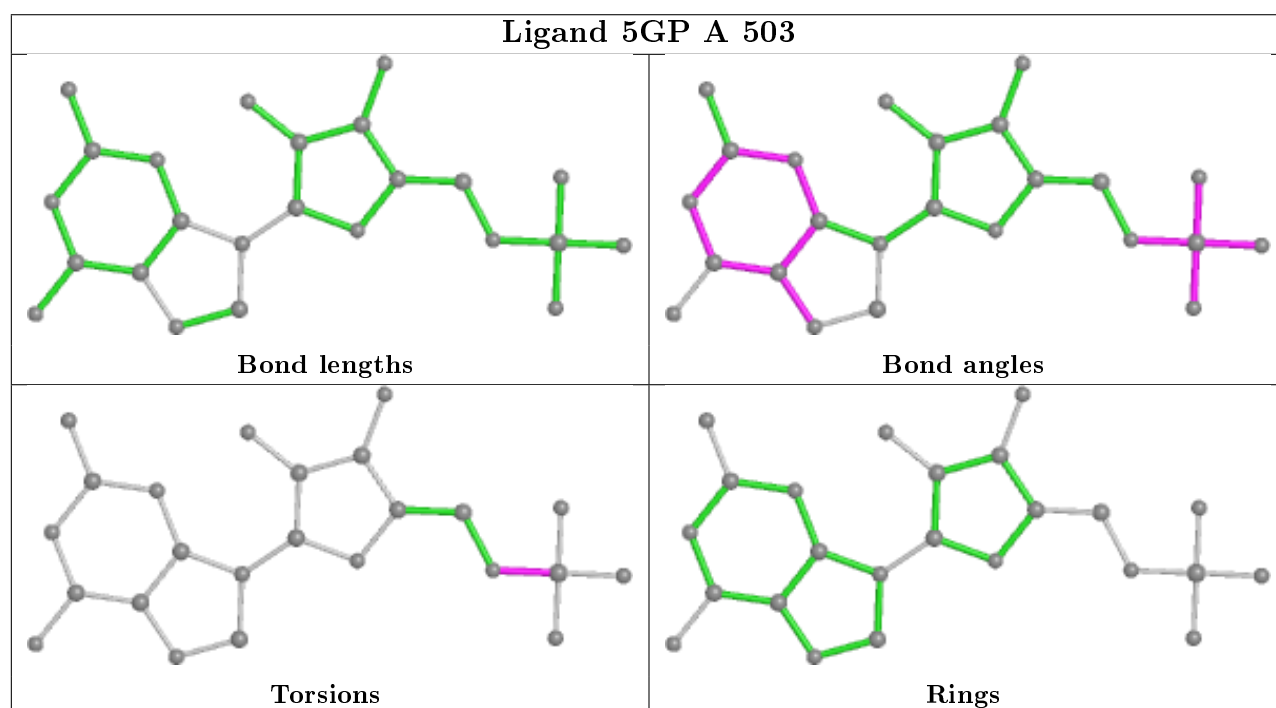
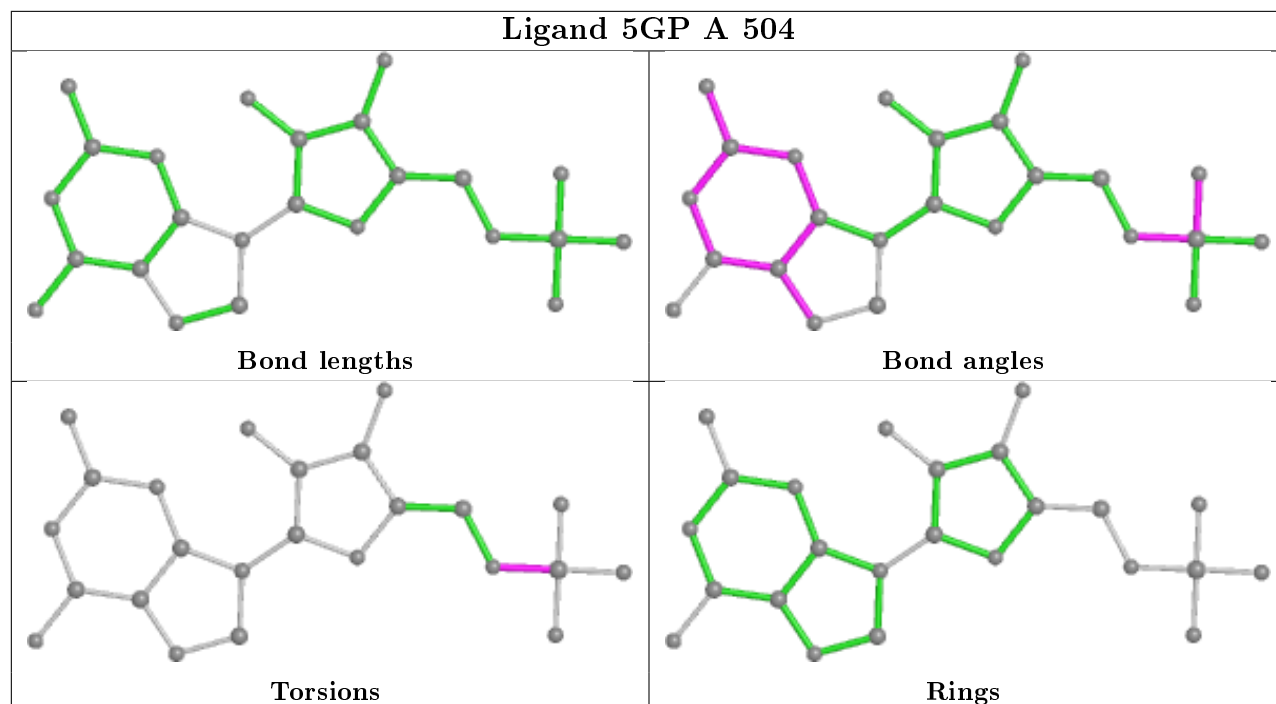
Mol	Chain	Res	Type	Atoms
2	A	504	5GP	C5'-O5'-P-O1P
2	A	504	5GP	C5'-O5'-P-O2P
2	A	504	5GP	C5'-O5'-P-O3P
2	A	503	5GP	C5'-O5'-P-O2P
2	A	503	5GP	C5'-O5'-P-O3P
2	A	502	5GP	C5'-O5'-P-O2P
2	A	502	5GP	C5'-O5'-P-O3P
2	A	501	5GP	C5'-O5'-P-O1P
2	A	501	5GP	C5'-O5'-P-O2P
2	A	501	5GP	C5'-O5'-P-O3P
2	B	501	5GP	C5'-O5'-P-O1P
2	B	501	5GP	C5'-O5'-P-O2P
2	B	501	5GP	C5'-O5'-P-O3P
2	A	501	5GP	O4'-C4'-C5'-O5'
2	A	502	5GP	C5'-O5'-P-O1P
2	A	501	5GP	C3'-C4'-C5'-O5'
2	A	503	5GP	C5'-O5'-P-O1P

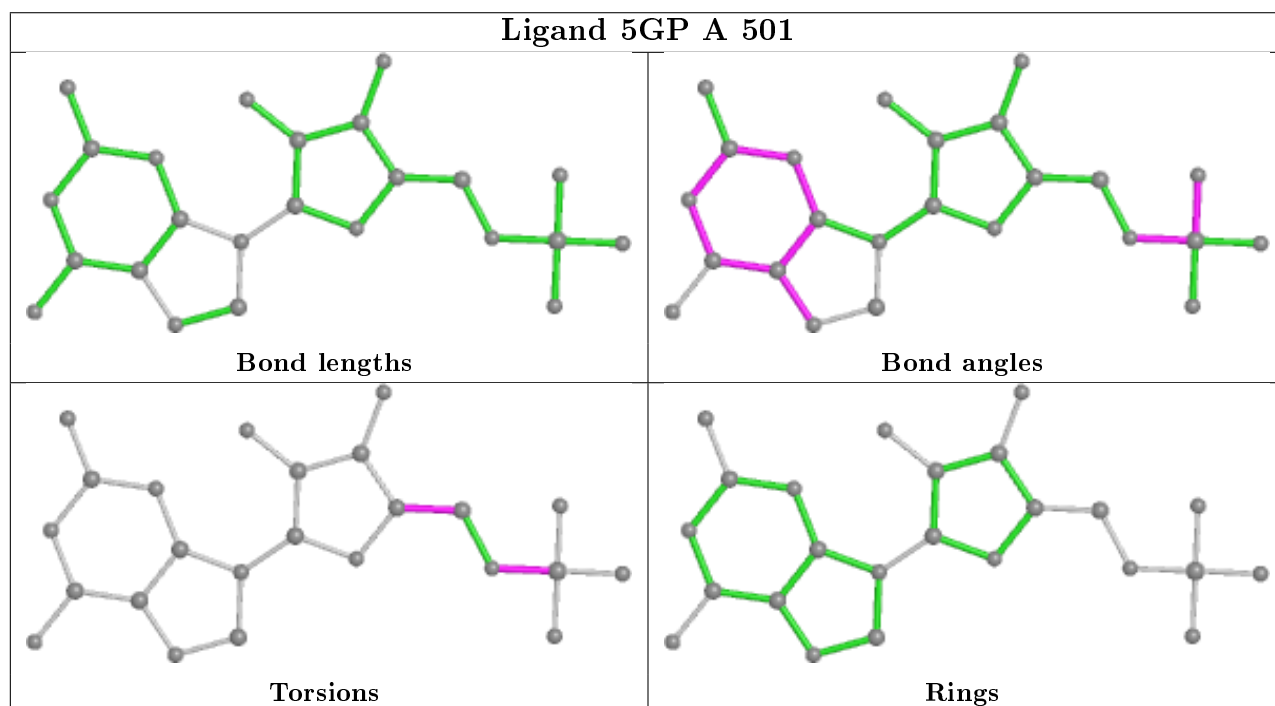
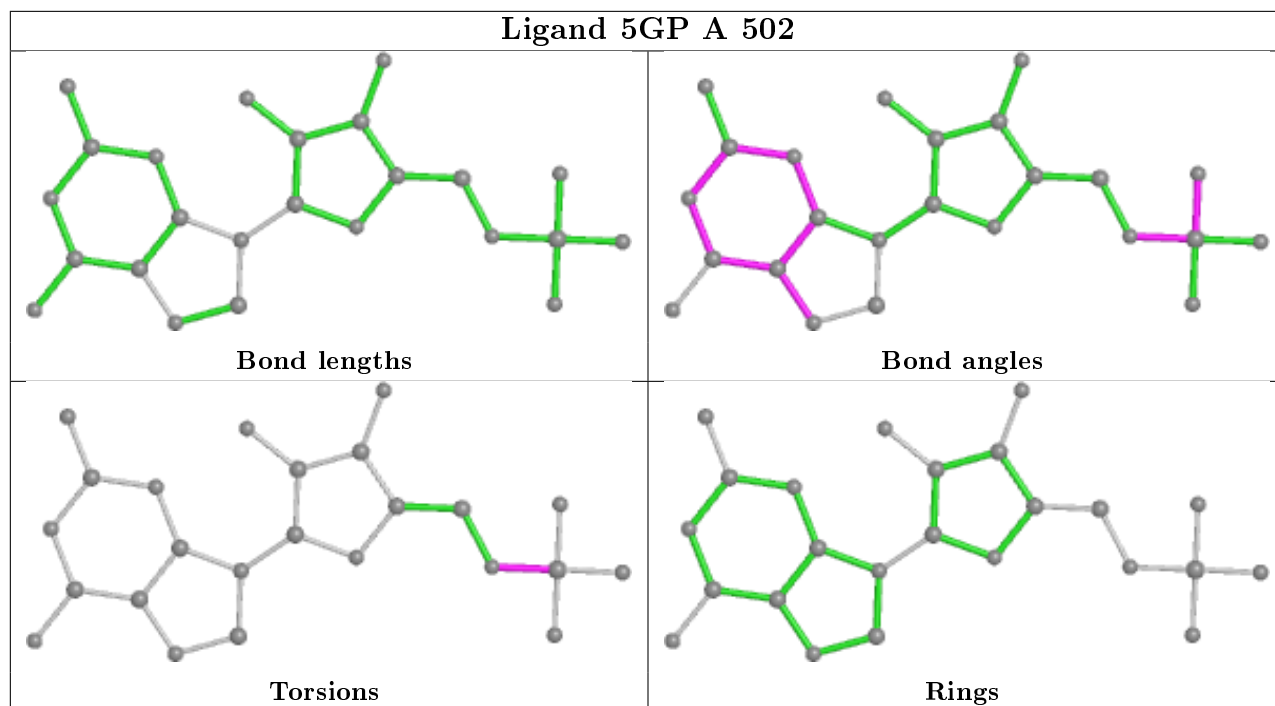
There are no ring outliers.

1 monomer is involved in 1 short contact:

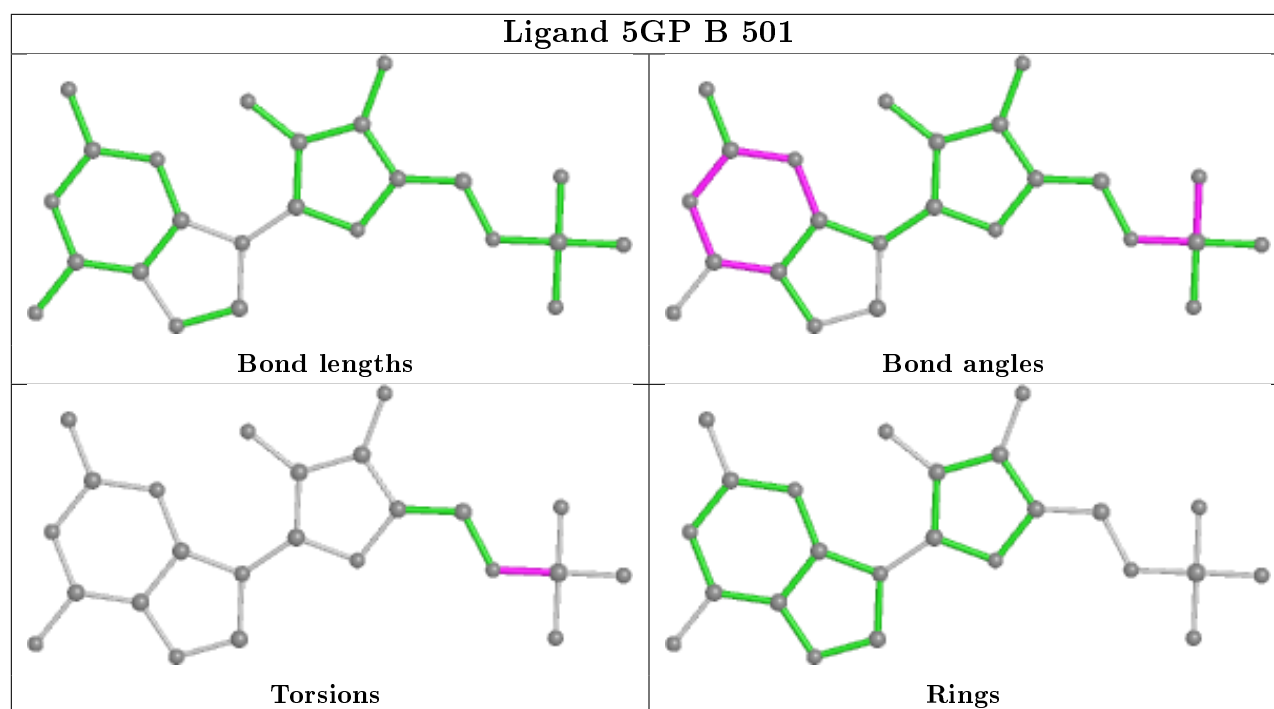
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	502	5GP	1	0

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	317/393 (80%)	0.62	13 (4%) 37 34	26, 68, 117, 145	0
1	B	304/393 (77%)	0.79	27 (8%) 9 6	33, 72, 152, 170	0
All	All	621/786 (79%)	0.71	40 (6%) 19 16	26, 69, 138, 170	0

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	215	TYR	4.9
1	A	402	GLN	4.6
1	B	250	LEU	4.6
1	B	256	SER	4.5
1	B	233	LYS	4.2
1	A	406	ARG	4.2
1	B	241	ASN	3.9
1	B	253	GLY	3.9
1	B	238	PHE	3.8
1	B	356	SER	3.6
1	A	398	VAL	3.4
1	A	403	TYR	3.3
1	B	261	LEU	3.2
1	B	249	LYS	3.1
1	B	232	ALA	3.1
1	A	373	PRO	3.0
1	B	251	HIS	3.0
1	B	259	ASN	2.9
1	A	302	ALA	2.8
1	B	211	VAL	2.8
1	A	372	THR	2.8
1	A	301	ARG	2.7
1	B	248	GLN	2.7
1	B	291	ALA	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	275	LYS	2.6
1	B	33	VAL	2.5
1	B	355	GLU	2.5
1	A	170	PHE	2.4
1	A	32	LYS	2.4
1	B	415	LEU	2.4
1	B	254	GLU	2.3
1	A	355	GLU	2.3
1	B	255	GLU	2.2
1	B	363	TYR	2.2
1	B	359	LYS	2.2
1	B	258	LYS	2.1
1	B	293	GLN	2.1
1	B	235	LEU	2.1
1	B	244	LEU	2.1
1	A	357	SER	2.1

## 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.

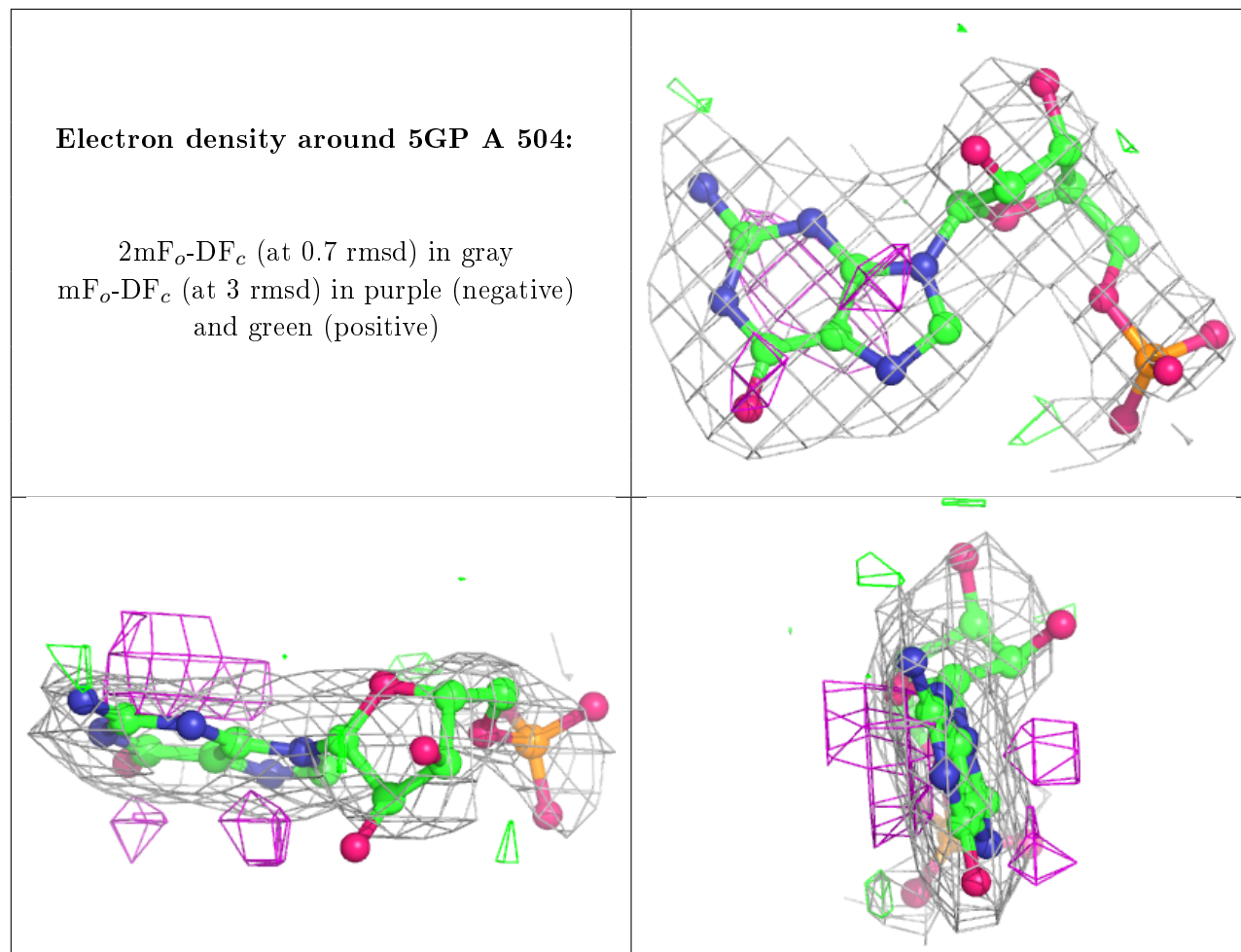
## 6.4 Ligands [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
2	5GP	A	504	24/24	0.84	0.27	50,95,203,203	0
2	5GP	B	501	24/24	0.90	0.25	58,103,141,142	24
2	5GP	A	501	24/24	0.94	0.16	33,63,113,114	24
2	5GP	A	502	24/24	0.95	0.19	45,57,65,76	0
2	5GP	A	503	24/24	0.97	0.18	41,47,50,57	0

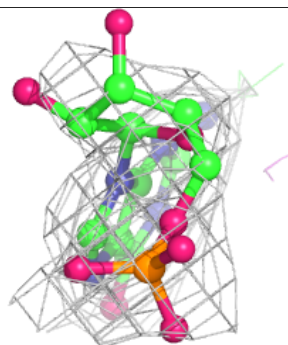
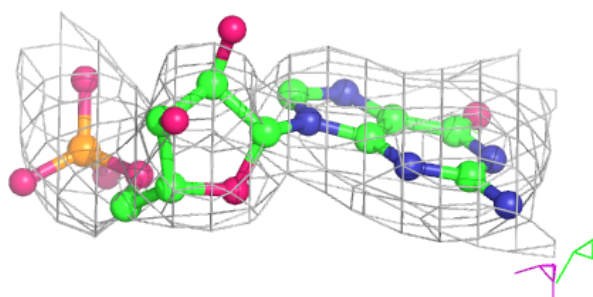
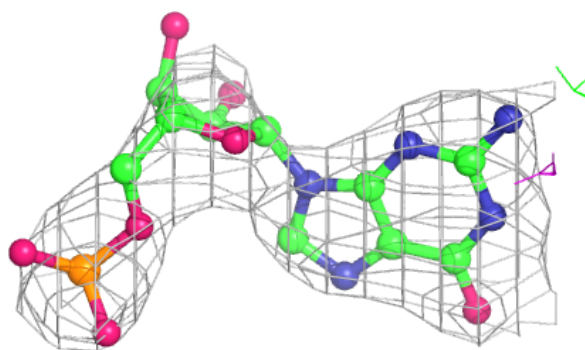
The following is a graphical depiction of the model fit to experimental electron density of all

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.

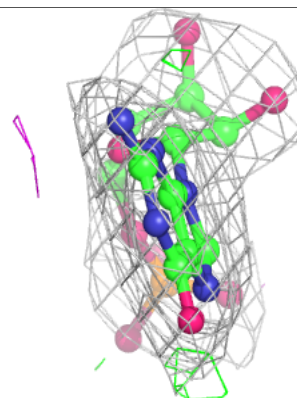
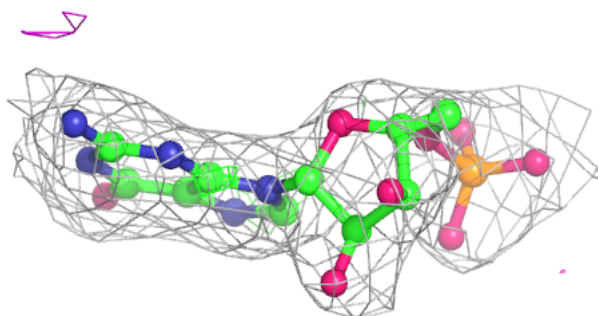
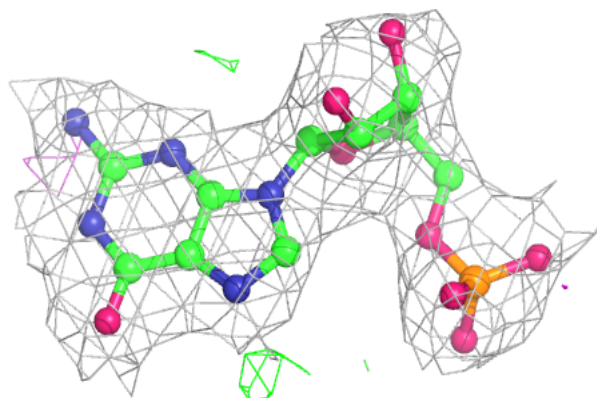


**Electron density around 5GP B 501:**

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

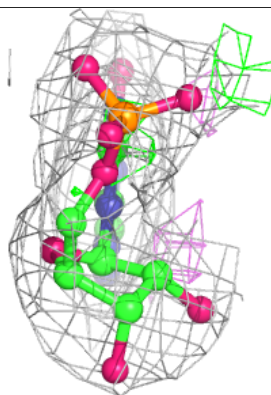
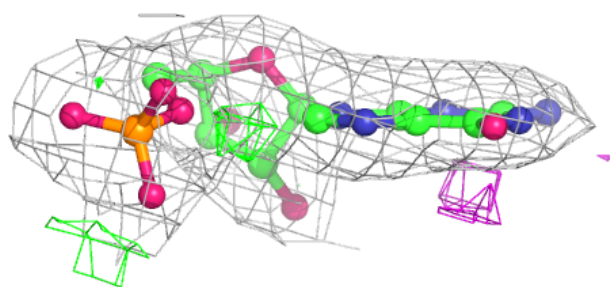
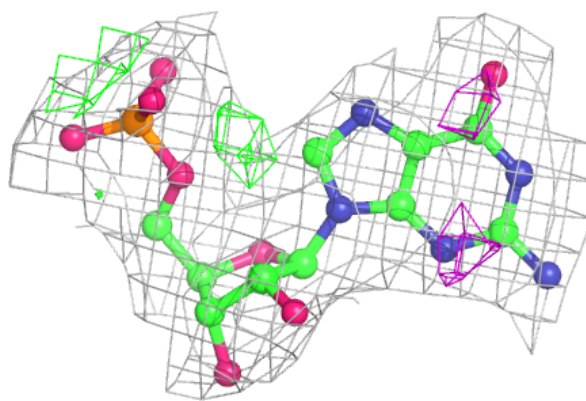
**Electron density around 5GP A 501:**

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

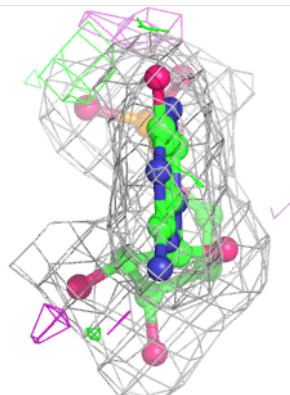
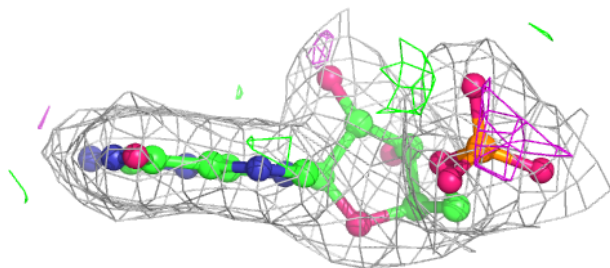
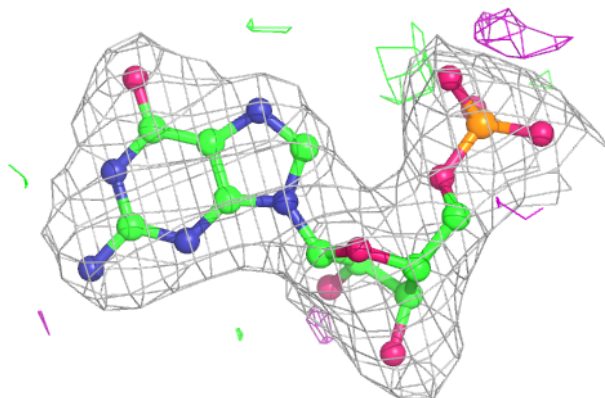


**Electron density around 5GP A 502:**

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

**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)



## 6.5 Other polymers

There are no such residues in this entry.