



# Full wwPDB X-ray Structure Validation Report ⓘ

May 18, 2020 – 12:29 pm BST

PDB ID : 1WC5  
Title : Soluble adenylyl cyclase CyaC from *S. platensis* in complex with alpha, beta-methylene-ATP in presence of bicarbonate  
Authors : Steegborn, C.; Litvin, T.N.; Levin, L.R.; Buck, J.; Wu, H.  
Deposited on : 2004-11-08  
Resolution : 2.30 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.

---

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

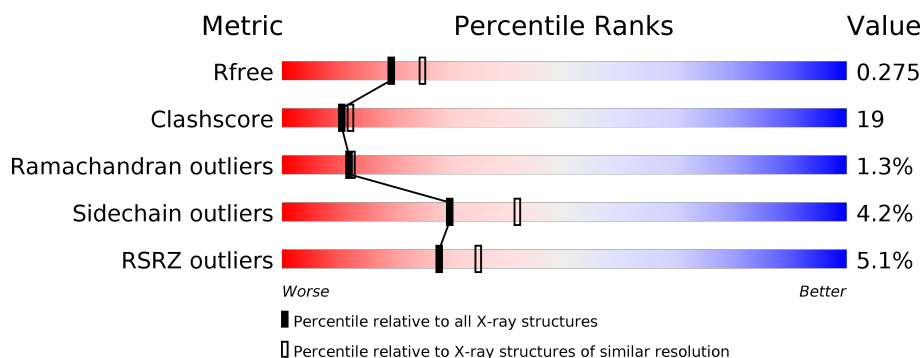
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	219	 4% 55% 30% • • 12%
1	B	219	 4% 60% 26% • 11%
1	C	219	 4% 64% 23% • 10%
1	D	219	 7% 54% 32% • 12%

## 2 Entry composition [i](#)

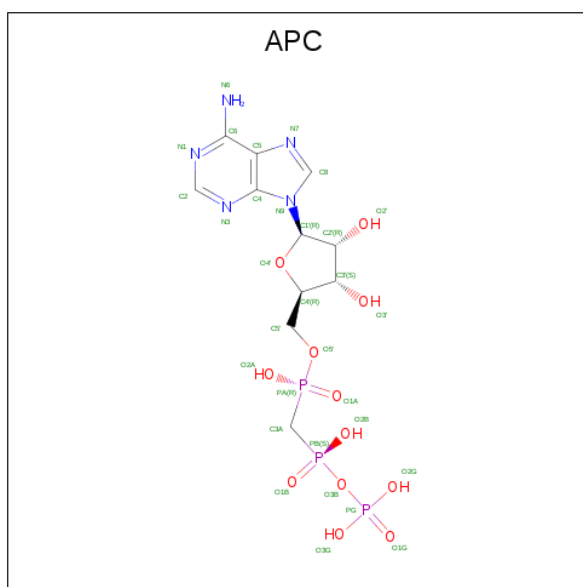
There are 5 unique types of molecules in this entry. The entry contains 6226 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ADENYLATE CYCLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	193	Total	C	N	O	S	0	0	0
			1487	935	261	279	12			
1	B	194	Total	C	N	O	S	0	0	0
			1495	940	262	280	13			
1	C	198	Total	C	N	O	S	0	0	0
			1528	958	269	288	13			
1	D	193	Total	C	N	O	S	4	0	0
			1485	934	258	281	12			

- Molecule 2 is DIPHOSPHOMETHYLPHOSPHONIC ACID ADENOSYL ESTER (three-letter code: APC) (formula:  $C_{11}H_{18}N_5O_{12}P_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			31	11	5	12	3		
2	B	1	Total	C	N	O	P	0	0
			31	11	5	12	3		

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			31	11	5	12	3		
2	D	1	Total	C	N	O	P	0	0
			31	11	5	12	3		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

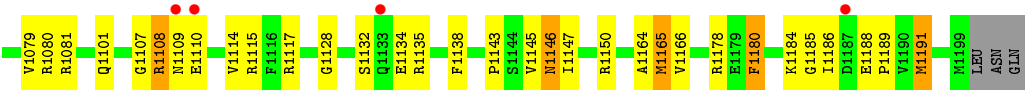
- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Ca	0	0
			1	1		
4	A	1	Total	Ca	0	0
			1	1		
4	D	1	Total	Ca	0	0
			1	1		
4	C	1	Total	Ca	0	0
			1	1		

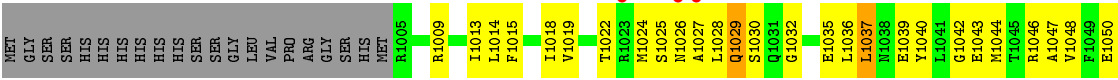
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	21	Total	O	0	0
			21	21		
5	B	36	Total	O	0	0
			36	36		
5	C	29	Total	O	0	0
			29	29		
5	D	13	Total	O	0	0
			13	13		





● Molecule 1: ADENYLATE CYCLASE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	53.30 Å 71.19 Å 106.73 Å 90.00° 95.81° 90.00°	Depositor
Resolution (Å)	14.99 – 2.30 19.79 – 2.29	Depositor EDS
% Data completeness (in resolution range)	75.7 (14.99-2.30) 88.5 (19.79-2.29)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.50 (at 2.28 Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.202 , 0.262 0.216 , 0.275	Depositor DCC
$R_{free}$ test set	2030 reflections (5.98%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	31.3	Xtriage
Anisotropy	0.481	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 40.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	6226	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.25% 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: APC, CA, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.36	0/1510	0.62	1/2041 (0.0%)
1	B	0.38	0/1518	0.62	0/2051
1	C	0.40	0/1553	0.61	1/2100 (0.0%)
1	D	0.33	0/1508	0.55	0/2039
All	All	0.37	0/6089	0.60	2/8231 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1107	GLY	N-CA-C	8.69	134.81	113.10
1	C	1017	ASP	N-CA-CB	-5.37	100.94	110.60

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	1487	0	1498	76	0
1	B	1495	0	1507	60	0
1	C	1528	0	1532	47	0
1	D	1485	0	1491	58	0
2	A	31	0	14	3	0

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	31	0	14	0	0
2	C	31	0	14	0	0
2	D	31	0	14	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	21	0	0	2	0
5	B	36	0	0	2	0
5	C	29	0	0	2	0
5	D	13	0	0	1	0
All	All	6226	0	6084	226	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 19.

All (226) 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:A:1184:LYS:H	1:A:1184:LYS:HD3	1.07	1.18
1:A:1184:LYS:H	1:A:1184:LYS:CD	1.80	0.94
1:B:1134:GLU:HG3	1:B:1135:ARG:H	1.32	0.93
1:B:1005:ARG:HD2	1:B:1006:PRO:HD2	1.51	0.93
1:A:1031:GLN:NE2	1:A:1031:GLN:H	1.73	0.87
1:D:1018:ILE:HD12	1:D:1061:ASP:HB2	1.55	0.86
1:A:1150:ARG:NH1	1:A:1185:GLY:HA3	1.90	0.85
1:A:1184:LYS:N	1:A:1184:LYS:HD3	1.90	0.85
1:A:1154:ALA:HB2	1:A:1184:LYS:HE3	1.59	0.84
1:A:1008:PRO:O	1:A:1009:ARG:HG3	1.78	0.82
1:A:1101:GLN:OE1	1:A:1107:GLY:HA3	1.80	0.81
1:B:1150:ARG:HD3	1:B:1184:LYS:O	1.84	0.77
1:A:1005:ARG:HH12	1:A:1007:GLU:HB3	1.50	0.76
1:A:1150:ARG:HH11	1:A:1185:GLY:HA3	1.50	0.76
1:C:1134:GLU:HG2	1:C:1135:ARG:H	1.50	0.75
1:B:1042:GLY:HA2	1:C:1132:SER:HB3	1.69	0.75
1:A:1146:ASN:ND2	1:A:1150:ARG:HG2	2.03	0.73
1:D:1019:VAL:HG12	1:D:1115:ARG:O	1.87	0.73

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1031:GLN:HE21	1:A:1031:GLN:H	1.38	0.72
1:B:1080:ARG:HG2	1:B:1080:ARG:HH11	1.55	0.72
1:A:1042:GLY:HA2	1:D:1132:SER:HB3	1.72	0.71
1:A:1044:MET:HA	5:A:2004:HOH:O	1.90	0.71
1:D:1052:GLN:HB2	1:D:1081:ARG:HD3	1.73	0.70
1:B:1132:SER:HB3	1:C:1042:GLY:HA2	1.72	0.70
1:A:1132:SER:OG	1:D:1042:GLY:HA2	1.93	0.69
1:A:1037:LEU:HD12	1:D:1130:PHE:HD2	1.55	0.69
1:B:1134:GLU:HG3	1:B:1135:ARG:N	2.07	0.68
1:C:1014:LEU:C	1:C:1014:LEU:HD23	2.14	0.68
1:B:1019:VAL:HG11	1:B:1115:ARG:HB2	1.76	0.67
1:C:1180:PHE:CE1	1:C:1191:MET:HG2	2.30	0.67
1:C:1134:GLU:HG2	1:C:1135:ARG:N	2.10	0.66
1:B:1022:THR:HG23	1:C:1143:PRO:HG3	1.78	0.65
1:A:1005:ARG:NH1	1:A:1007:GLU:HB3	2.11	0.65
1:A:1141:ILE:HD13	1:D:1037:LEU:HD12	1.78	0.64
1:A:1085:THR:O	1:A:1089:MET:HG3	1.98	0.64
1:A:1087:ARG:O	1:A:1091:VAL:HG23	1.98	0.64
1:A:1146:ASN:HD21	1:A:1150:ARG:HG2	1.62	0.63
1:D:1093:LEU:HD21	1:D:1115:ARG:HA	1.81	0.63
1:D:1117:ARG:HB2	1:D:1152:GLN:HE21	1.63	0.63
1:D:1047:ALA:HA	1:D:1088:GLN:NE2	2.14	0.63
1:C:1165:MET:HB3	5:C:2025:HOH:O	1.98	0.63
1:A:1081:ARG:HH12	1:A:1084:ALA:HB3	1.63	0.62
1:B:1115:ARG:HB3	1:B:1158:ASN:ND2	2.13	0.62
1:D:1014:LEU:HD23	1:D:1014:LEU:C	2.20	0.62
1:D:1085:THR:O	1:D:1089:MET:HG3	1.99	0.61
1:A:1081:ARG:HA	1:A:1081:ARG:NH1	2.16	0.61
1:A:1183:LEU:O	1:A:1185:GLY:N	2.34	0.61
1:A:1019:VAL:HG12	1:A:1115:ARG:O	2.01	0.61
1:B:1117:ARG:HD3	1:B:1155:THR:O	2.00	0.60
1:A:1177:LYS:HE3	1:A:1179:GLU:OE1	2.01	0.60
1:B:1165:MET:O	1:B:1168:GLN:HG2	2.01	0.60
1:B:1087:ARG:HG2	1:B:1197:PRO:O	2.01	0.60
1:A:1117:ARG:HB2	1:A:1152:GLN:HE21	1.66	0.60
1:B:1099:GLY:O	1:B:1103:ARG:HB2	2.02	0.60
1:B:1085:THR:O	1:B:1089:MET:HG3	2.02	0.59
1:B:1116:PHE:H	1:B:1158:ASN:ND2	2.00	0.59
1:A:1035:GLU:O	1:A:1039:GLU:HG3	2.03	0.59
1:A:1037:LEU:HD12	1:D:1130:PHE:CD2	2.36	0.59
1:B:1005:ARG:HD2	1:B:1006:PRO:CD	2.31	0.59

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:1018:ILE:HB	1:D:1061:ASP:OD2	2.02	0.59
1:D:1143:PRO:HD2	5:D:2007:HOH:O	2.03	0.58
1:A:1019:VAL:HG11	1:A:1115:ARG:HB2	1.86	0.58
1:B:1019:VAL:HG12	1:B:1115:ARG:O	2.03	0.58
1:D:1097:ASN:O	1:D:1101:GLN:HB2	2.02	0.58
1:C:1165:MET:SD	1:C:1165:MET:N	2.76	0.58
1:B:1010:LEU:CD2	1:B:1075:PRO:HG3	2.33	0.58
1:C:1035:GLU:O	1:C:1039:GLU:HG3	2.04	0.58
1:A:1041:LEU:HD22	1:A:1058:PHE:CE2	2.40	0.57
1:A:1040:TYR:O	1:A:1044:MET:HG2	2.05	0.57
1:D:1106:VAL:HG11	1:D:1113:PRO:HA	1.85	0.57
1:C:1052:GLN:HG3	1:C:1081:ARG:NE	2.20	0.57
1:C:1184:LYS:HG2	1:C:1185:GLY:N	2.18	0.57
1:C:1180:PHE:CD1	1:C:1191:MET:HG2	2.40	0.56
1:A:1007:GLU:HB2	1:A:1008:PRO:HD2	1.86	0.56
1:B:1150:ARG:HD2	5:B:2032:HOH:O	2.04	0.56
1:A:1031:GLN:HE21	1:A:1031:GLN:N	2.02	0.56
1:A:1143:PRO:HG3	1:D:1022:THR:HG23	1.87	0.56
1:B:1019:VAL:CG1	1:B:1115:ARG:HB2	2.35	0.56
1:D:1043:GLU:O	1:D:1046:ARG:HB3	2.06	0.56
1:B:1080:ARG:NH1	1:B:1080:ARG:HG2	2.21	0.55
1:B:1022:THR:CG2	1:C:1143:PRO:HG3	2.35	0.55
1:C:1134:GLU:N	1:C:1134:GLU:OE1	2.38	0.55
1:A:1081:ARG:HH12	1:A:1084:ALA:CB	2.20	0.55
1:B:1014:LEU:HD23	1:B:1014:LEU:C	2.27	0.54
1:A:1101:GLN:HE22	1:A:1108:ARG:N	2.05	0.54
1:A:1117:ARG:HD3	1:A:1155:THR:O	2.07	0.54
1:B:1030:SER:HB3	1:C:1008:PRO:HG3	1.90	0.54
1:C:1023:ARG:HH11	1:C:1023:ARG:HG3	1.73	0.54
1:A:1115:ARG:HH11	1:A:1115:ARG:HG3	1.73	0.54
1:D:1164:ALA:HB2	1:D:1191:MET:HG2	1.90	0.54
1:A:1019:VAL:CG1	1:A:1115:ARG:HB2	2.38	0.54
1:A:1028:LEU:O	1:A:1032:GLY:HA3	2.07	0.53
1:C:1052:GLN:HG3	1:C:1081:ARG:CZ	2.38	0.53
1:D:1026:ASN:O	1:D:1027:ALA:HB3	2.08	0.53
1:A:1004:MET:N	1:A:1129:LEU:HD12	2.24	0.53
1:B:1120:ILE:HB	1:B:1162:VAL:HG12	1.90	0.53
1:B:1017:ASP:O	1:B:1116:PHE:HB2	2.09	0.53
1:A:1150:ARG:HD2	1:A:1184:LYS:O	2.10	0.52
1:A:1051:ASN:OD1	1:A:1081:ARG:NH1	2.43	0.52
1:A:1184:LYS:N	1:A:1184:LYS:CD	2.57	0.52

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:1128:GLY:HA2	1:C:1138:PHE:CE1	2.45	0.52
1:A:1141:ILE:HD13	1:D:1037:LEU:CD1	2.39	0.51
1:D:1040:TYR:O	1:D:1044:MET:HG2	2.10	0.51
1:B:1028:LEU:O	1:B:1029:GLN:HB2	2.11	0.51
1:C:1080:ARG:HG2	1:C:1080:ARG:HH11	1.75	0.51
1:D:1079:VAL:HG13	1:D:1166:VAL:HG13	1.91	0.51
1:A:1045:THR:HG21	1:A:1058:PHE:HZ	1.75	0.51
1:A:1081:ARG:NH1	1:A:1084:ALA:HB3	2.25	0.51
1:C:1013:ILE:HD13	1:C:1145:VAL:HA	1.92	0.51
1:D:1014:LEU:HD23	1:D:1015:PHE:N	2.25	0.51
1:B:1115:ARG:HA	1:B:1158:ASN:HD21	1.76	0.51
1:A:1017:ASP:OD1	1:A:1062:ALA:HB2	2.12	0.50
1:B:1005:ARG:HG3	1:B:1005:ARG:HH11	1.77	0.50
1:A:1071:GLU:OE2	1:A:1071:GLU:HA	2.12	0.50
1:A:1046:ARG:HD3	1:A:1050:GLU:OE2	2.12	0.50
1:B:1179:GLU:N	1:B:1191:MET:HE1	2.26	0.50
1:C:1010:LEU:CD2	1:C:1075:PRO:HG3	2.42	0.50
1:D:1035:GLU:O	1:D:1039:GLU:HG3	2.12	0.49
1:D:1036:LEU:HD23	1:D:1036:LEU:C	2.32	0.49
1:B:1051:ASN:C	1:B:1052:GLN:HG2	2.33	0.49
1:A:1098:GLN:O	1:A:1101:GLN:HB3	2.13	0.49
1:B:1079:VAL:HG21	1:B:1169:TYR:HD1	1.78	0.49
1:C:1147:ILE:HG12	1:C:1186:ILE:HD13	1.95	0.49
1:C:1164:ALA:HB2	1:C:1191:MET:HB3	1.95	0.49
1:C:1101:GLN:HE21	1:C:1107:GLY:HA3	1.78	0.49
1:A:1120:ILE:HB	1:A:1162:VAL:HG12	1.95	0.48
1:D:1151:LEU:HD22	1:D:1161:MET:HG2	1.95	0.48
1:B:1191:MET:HE2	1:B:1192:THR:O	2.13	0.48
1:B:1191:MET:HA	1:B:1191:MET:HE3	1.96	0.48
1:B:1088:GLN:HB2	5:B:2014:HOH:O	2.14	0.48
1:C:1178:ARG:NH1	1:C:1178:ARG:HG2	2.28	0.48
1:B:1150:ARG:CD	1:B:1184:LYS:O	2.59	0.48
1:A:1130:PHE:CZ	1:A:1141:ILE:HD12	2.49	0.47
1:D:1046:ARG:HG3	1:D:1050:GLU:OE2	2.14	0.47
1:B:1016:SER:HA	1:B:1117:ARG:O	2.15	0.47
1:B:1196:ASN:HD22	1:B:1197:PRO:HD2	1.78	0.47
1:A:1146:ASN:HD21	1:A:1150:ARG:CG	2.28	0.47
1:A:1176:ILE:CD1	1:A:1196:ASN:HA	2.45	0.47
1:D:1107:GLY:O	1:D:1110:GLU:N	2.47	0.47
1:A:1176:ILE:HD11	1:A:1196:ASN:HA	1.98	0.46
1:C:1146:ASN:HD21	1:C:1150:ARG:NH1	2.13	0.46

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:1180:PHE:HE1	1:C:1191:MET:HG2	1.79	0.46
1:A:1150:ARG:HD3	1:A:1150:ARG:HA	1.79	0.46
1:B:1017:ASP:OD1	1:B:1061:ASP:OD2	2.34	0.46
1:A:1022:THR:HG22	2:A:1500:APC:O1B	2.15	0.46
1:D:1116:PHE:CD1	1:D:1116:PHE:C	2.89	0.46
1:B:1023:ARG:HH21	1:B:1023:ARG:HG3	1.80	0.46
1:C:1029:GLN:O	1:C:1032:GLY:N	2.42	0.46
1:D:1196:ASN:OD1	1:D:1197:PRO:HD2	2.16	0.45
1:D:1176:ILE:HD11	1:D:1196:ASN:HA	1.98	0.45
1:A:1084:ALA:O	1:A:1088:GLN:HG3	2.16	0.45
1:D:1018:ILE:HD11	1:D:1040:TYR:CD2	2.51	0.45
1:A:1044:MET:HE2	5:A:2004:HOH:O	2.15	0.45
1:C:1041:LEU:O	1:C:1045:THR:HG23	2.16	0.45
1:D:1009:ARG:NH2	1:D:1072:GLU:OE1	2.50	0.45
1:D:1028:LEU:C	1:D:1029:GLN:HG2	2.37	0.45
1:D:1115:ARG:HH11	1:D:1115:ARG:HG3	1.81	0.45
1:A:1014:LEU:C	1:A:1014:LEU:HD23	2.37	0.45
1:A:1179:GLU:OE2	1:A:1181:LEU:HD21	2.17	0.45
1:C:1010:LEU:HD23	1:C:1075:PRO:HG3	1.98	0.45
1:D:1164:ALA:HB3	1:D:1165:MET:CE	2.46	0.45
1:B:1019:VAL:O	1:B:1019:VAL:HG13	2.16	0.45
1:A:1130:PHE:CE2	1:A:1141:ILE:HD12	2.52	0.44
1:B:1100:TRP:CD1	1:B:1105:LEU:HD12	2.52	0.44
1:B:1177:LYS:O	1:B:1193:CYS:HA	2.17	0.44
1:B:1176:ILE:CD1	1:B:1196:ASN:HA	2.47	0.44
1:B:1115:ARG:CA	1:B:1158:ASN:HD21	2.31	0.44
1:B:1146:ASN:O	1:B:1150:ARG:HG2	2.17	0.44
1:D:1152:GLN:O	1:D:1155:THR:HG22	2.18	0.44
1:C:1040:TYR:O	1:C:1044:MET:HG2	2.17	0.44
1:D:1044:MET:O	1:D:1048:VAL:HG23	2.18	0.44
2:A:1500:APC:H3A2	1:D:1146:ASN:ND2	2.33	0.44
1:D:1181:LEU:HD12	1:D:1192:THR:HG21	1.99	0.44
1:D:1051:ASN:ND2	1:D:1085:THR:HA	2.33	0.44
1:C:1080:ARG:HG2	1:C:1080:ARG:NH1	2.33	0.44
1:A:1005:ARG:HH11	1:A:1005:ARG:HG2	1.83	0.43
1:A:1013:ILE:O	1:A:1120:ILE:HA	2.18	0.43
1:C:1178:ARG:HH11	1:C:1178:ARG:HG2	1.84	0.43
1:D:1022:THR:O	1:D:1025:SER:HB3	2.17	0.43
1:A:1072:GLU:HA	1:A:1072:GLU:OE1	2.17	0.43
1:B:1191:MET:HE2	1:B:1192:THR:N	2.34	0.43
1:B:1008:PRO:HG3	1:C:1030:SER:HB2	2.01	0.43

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:1016:SER:HA	1:C:1117:ARG:O	2.18	0.43
1:D:1112:PRO:HB2	1:D:1113:PRO:HD2	2.01	0.43
1:C:1007:GLU:HB3	5:C:2002:HOH:O	2.19	0.42
1:A:1077:GLU:OE2	1:A:1080:ARG:HD2	2.19	0.42
1:D:1080:ARG:HG2	1:D:1080:ARG:HH11	1.84	0.42
1:A:1100:TRP:HB3	1:A:1106:VAL:HG22	2.02	0.42
1:B:1171:PRO:HB2	1:B:1174:GLU:HG3	2.02	0.42
1:C:1029:GLN:O	1:C:1030:SER:C	2.58	0.42
1:A:1037:LEU:O	1:A:1041:LEU:HG	2.19	0.42
1:D:1056:ASP:OD2	1:D:1139:THR:HA	2.19	0.42
1:B:1132:SER:O	1:B:1134:GLU:N	2.52	0.42
1:C:1014:LEU:C	1:C:1014:LEU:CD2	2.85	0.42
1:C:1108:ARG:HG3	1:C:1109:ASN:N	2.35	0.42
1:C:1051:ASN:C	1:C:1052:GLN:HG2	2.40	0.42
1:C:1188:GLU:HA	1:C:1189:PRO:HD3	1.95	0.42
1:D:1028:LEU:O	1:D:1032:GLY:HA3	2.20	0.42
1:D:1101:GLN:NE2	1:D:1106:VAL:O	2.52	0.42
1:B:1143:PRO:O	1:B:1147:ILE:HG13	2.20	0.42
1:C:1017:ASP:C	1:C:1017:ASP:OD2	2.57	0.42
1:D:1024:MET:O	1:D:1028:LEU:HB2	2.20	0.41
1:A:1069:ALA:HA	1:A:1070:PRO:C	2.40	0.41
2:A:1500:APC:HN61	1:D:1141:ILE:HD13	1.85	0.41
1:B:1116:PHE:H	1:B:1158:ASN:HD22	1.68	0.41
1:A:1097:ASN:O	1:A:1101:GLN:HB2	2.20	0.41
1:B:1143:PRO:HB3	1:C:1022:THR:HG23	2.02	0.41
1:B:1171:PRO:HD2	1:B:1174:GLU:OE1	2.20	0.41
1:D:1100:TRP:HB3	1:D:1106:VAL:HG23	2.02	0.41
1:A:1051:ASN:C	1:A:1052:GLN:HG2	2.41	0.41
1:B:1013:ILE:N	1:B:1013:ILE:HD12	2.36	0.41
1:B:1008:PRO:HG3	1:C:1030:SER:CB	2.50	0.41
1:C:1114:VAL:HG12	1:C:1115:ARG:N	2.36	0.41
1:D:1071:GLU:OE2	1:D:1071:GLU:HA	2.21	0.41
1:A:1036:LEU:HD23	1:A:1036:LEU:C	2.41	0.41
1:D:1176:ILE:CD1	1:D:1196:ASN:HA	2.51	0.41
1:A:1173:GLU:HG2	1:A:1174:GLU:N	2.35	0.41
1:B:1044:MET:CB	1:B:1063:ILE:CD1	2.98	0.41
1:A:1005:ARG:HG2	1:A:1005:ARG:NH1	2.36	0.40
1:D:1162:VAL:HB	1:D:1166:VAL:HB	2.03	0.40
1:C:1079:VAL:HG13	1:C:1166:VAL:HG13	2.03	0.40
1:D:1013:ILE:HD12	1:D:1013:ILE:N	2.35	0.40
1:B:1044:MET:HB3	1:B:1063:ILE:CD1	2.51	0.40

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:1106:VAL:HG13	1:D:1112:PRO:O	2.22	0.40
1:D:1172:ASP:OD1	1:D:1178:ARG:NH2	2.54	0.40
1:B:1037:LEU:HD22	1:B:1041:LEU:CD1	2.51	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	189/219 (86%)	177 (94%)	9 (5%)	3 (2%)	9	9
1	B	190/219 (87%)	179 (94%)	7 (4%)	4 (2%)	7	5
1	C	196/219 (90%)	189 (96%)	6 (3%)	1 (0%)	29	35
1	D	189/219 (86%)	173 (92%)	14 (7%)	2 (1%)	14	15
All	All	764/876 (87%)	718 (94%)	36 (5%)	10 (1%)	12	12

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1184	LYS
1	B	1134	GLU
1	C	1030	SER
1	D	1029	GLN
1	A	1107	GLY
1	D	1030	SER
1	B	1103	ARG
1	B	1198	ASN
1	B	1133	GLN
1	A	1106	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	160/183 (87%)	153 (96%)	7 (4%)	28	39
1	B	161/183 (88%)	156 (97%)	5 (3%)	40	55
1	C	165/183 (90%)	155 (94%)	10 (6%)	18	25
1	D	160/183 (87%)	155 (97%)	5 (3%)	40	55
All	All	646/732 (88%)	619 (96%)	27 (4%)	30	42

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1031	GLN
1	A	1035	GLU
1	A	1052	GLN
1	A	1081	ARG
1	A	1098	GLN
1	A	1180	PHE
1	A	1184	LYS
1	B	1005	ARG
1	B	1037	LEU
1	B	1061	ASP
1	B	1080	ARG
1	B	1150	ARG
1	C	1005	ARG
1	C	1031	GLN
1	C	1037	LEU
1	C	1072	GLU
1	C	1108	ARG
1	C	1110	GLU
1	C	1146	ASN
1	C	1165	MET
1	C	1180	PHE
1	C	1191	MET
1	D	1037	LEU
1	D	1072	GLU

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type
1	D	1165	MET
1	D	1179	GLU
1	D	1191	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1031	GLN
1	A	1052	GLN
1	A	1122	GLN
1	A	1146	ASN
1	A	1152	GLN
1	A	1158	ASN
1	B	1052	GLN
1	B	1122	GLN
1	B	1152	GLN
1	B	1158	ASN
1	B	1196	ASN
1	C	1098	GLN
1	C	1101	GLN
1	C	1146	ASN
1	C	1152	GLN
1	C	1158	ASN
1	D	1088	GLN
1	D	1101	GLN
1	D	1152	GLN
1	D	1158	ASN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry

Of 12 ligands modelled in this entry, 8 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
2	APC	D	1500	3,4	27,33,33	1.39	6 (22%)	31,52,52	1.05	2 (6%)
2	APC	B	1500	3,4	27,33,33	1.58	5 (18%)	31,52,52	1.02	2 (6%)
2	APC	C	1500	3,4	27,33,33	1.45	5 (18%)	31,52,52	1.06	3 (9%)
2	APC	A	1500	3,4	27,33,33	1.46	5 (18%)	31,52,52	1.06	2 (6%)

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	APC	D	1500	3,4	-	3/15/38/38	0/3/3/3
2	APC	B	1500	3,4	-	1/15/38/38	0/3/3/3
2	APC	C	1500	3,4	-	1/15/38/38	0/3/3/3
2	APC	A	1500	3,4	-	2/15/38/38	0/3/3/3

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1500	APC	O4'-C1'	4.66	1.47	1.41
2	B	1500	APC	PA-O5'	4.51	1.64	1.57
2	B	1500	APC	O4'-C1'	3.71	1.46	1.41
2	D	1500	APC	O4'-C1'	3.70	1.46	1.41
2	A	1500	APC	PA-O5'	3.56	1.62	1.57
2	A	1500	APC	PB-O3B	3.31	1.62	1.58
2	A	1500	APC	O4'-C1'	3.13	1.45	1.41
2	D	1500	APC	PB-O3B	2.85	1.61	1.58
2	B	1500	APC	PB-O3B	2.72	1.61	1.58
2	C	1500	APC	PA-O5'	2.71	1.61	1.57
2	D	1500	APC	PA-O5'	2.63	1.61	1.57

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	1500	APC	C2-N1	2.59	1.38	1.33
2	B	1500	APC	C8-N7	-2.41	1.30	1.34
2	B	1500	APC	C2-N1	2.40	1.38	1.33
2	A	1500	APC	C8-N7	-2.36	1.30	1.34
2	A	1500	APC	C2-N1	2.28	1.38	1.33
2	D	1500	APC	C8-N7	-2.26	1.30	1.34
2	C	1500	APC	C2-N3	2.26	1.35	1.32
2	C	1500	APC	C2-N1	2.22	1.38	1.33
2	C	1500	APC	C8-N7	-2.20	1.30	1.34
2	D	1500	APC	C2-N3	2.09	1.35	1.32

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1500	APC	PG-O3B-PB	-2.82	122.68	132.62
2	D	1500	APC	PG-O3B-PB	-2.73	122.99	132.62
2	C	1500	APC	PG-O3B-PB	-2.68	123.17	132.62
2	B	1500	APC	PG-O3B-PB	-2.43	124.06	132.62
2	C	1500	APC	C4-C5-N7	2.31	111.81	109.40
2	B	1500	APC	C4-C5-N7	2.31	111.80	109.40
2	C	1500	APC	C3'-C2'-C1'	2.26	104.38	100.98
2	A	1500	APC	C4-C5-N7	2.20	111.69	109.40
2	D	1500	APC	C4-C5-N7	2.08	111.57	109.40

There are no chirality outliers.

All (7) torsion outliers are listed below:

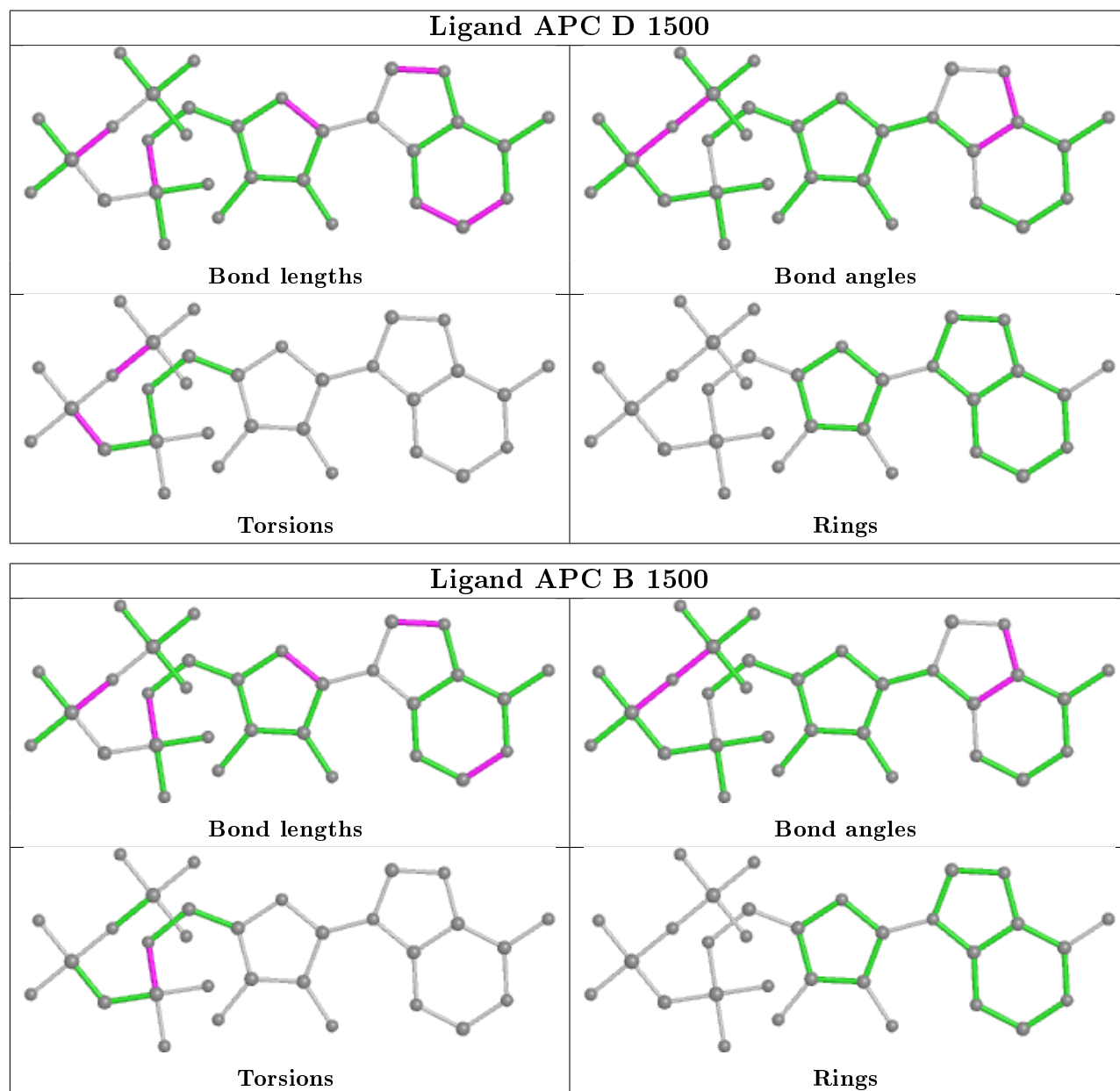
Mol	Chain	Res	Type	Atoms
2	D	1500	APC	PB-O3B-PG-O3G
2	A	1500	APC	C5'-O5'-PA-O1A
2	B	1500	APC	C5'-O5'-PA-O1A
2	D	1500	APC	PA-C3A-PB-O1B
2	A	1500	APC	PB-C3A-PA-O1A
2	D	1500	APC	PB-O3B-PG-O2G
2	C	1500	APC	PB-O3B-PG-O3G

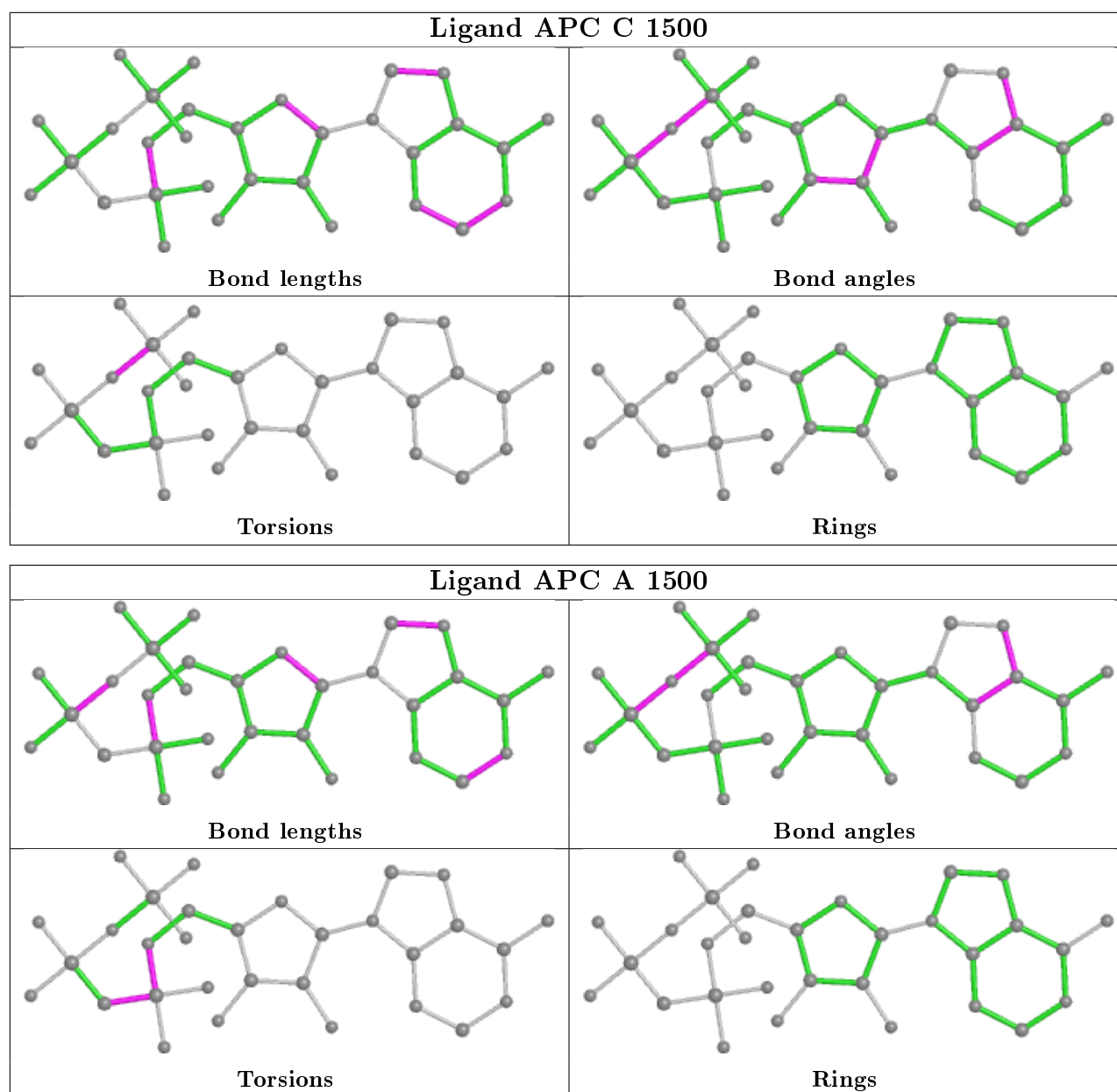
There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1500	APC	3	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	193/219 (88%)	0.35	9 (4%)	31 38	23, 39, 65, 92	0
1	B	194/219 (88%)	0.03	8 (4%)	37 44	13, 29, 60, 77	0
1	C	198/219 (90%)	0.11	8 (4%)	38 45	14, 31, 62, 67	0
1	D	193/219 (88%)	0.41	15 (7%)	13 17	20, 43, 81, 89	1 (0%)
All	All	778/876 (88%)	0.22	40 (5%)	28 35	13, 35, 67, 92	1 (0%)

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1004	MET	5.4
1	B	1004	MET	5.3
1	A	1108	ARG	5.2
1	B	1133	GLN	4.3
1	B	1108	ARG	4.1
1	D	1111	VAL	3.9
1	A	1133	GLN	3.9
1	B	1199	MET	3.7
1	C	1133	GLN	3.5
1	D	1105	LEU	3.5
1	D	1027	ALA	3.5
1	D	1098	GLN	3.5
1	A	1198	ASN	3.5
1	C	1187	ASP	3.4
1	A	1107	GLY	3.3
1	A	1005	ARG	3.1
1	D	1110	GLU	3.1
1	D	1023	ARG	3.1
1	D	1133	GLN	3.0
1	D	1104	GLY	3.0
1	C	1110	GLU	3.0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	D	1188	GLU	2.8
1	B	1131	GLY	2.7
1	C	1109	ASN	2.6
1	D	1199	MET	2.6
1	D	1102	GLU	2.5
1	A	1173	GLU	2.5
1	B	1134	GLU	2.4
1	A	1026	ASN	2.4
1	C	1002	SER	2.3
1	C	1023	ARG	2.2
1	C	1031	GLN	2.2
1	B	1005	ARG	2.2
1	C	1003	HIS	2.2
1	D	1026	ASN	2.1
1	D	1134	GLU	2.1
1	D	1099	GLY	2.1
1	D	1198	ASN	2.1
1	A	1184	LYS	2.1
1	B	1023	ARG	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no 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.

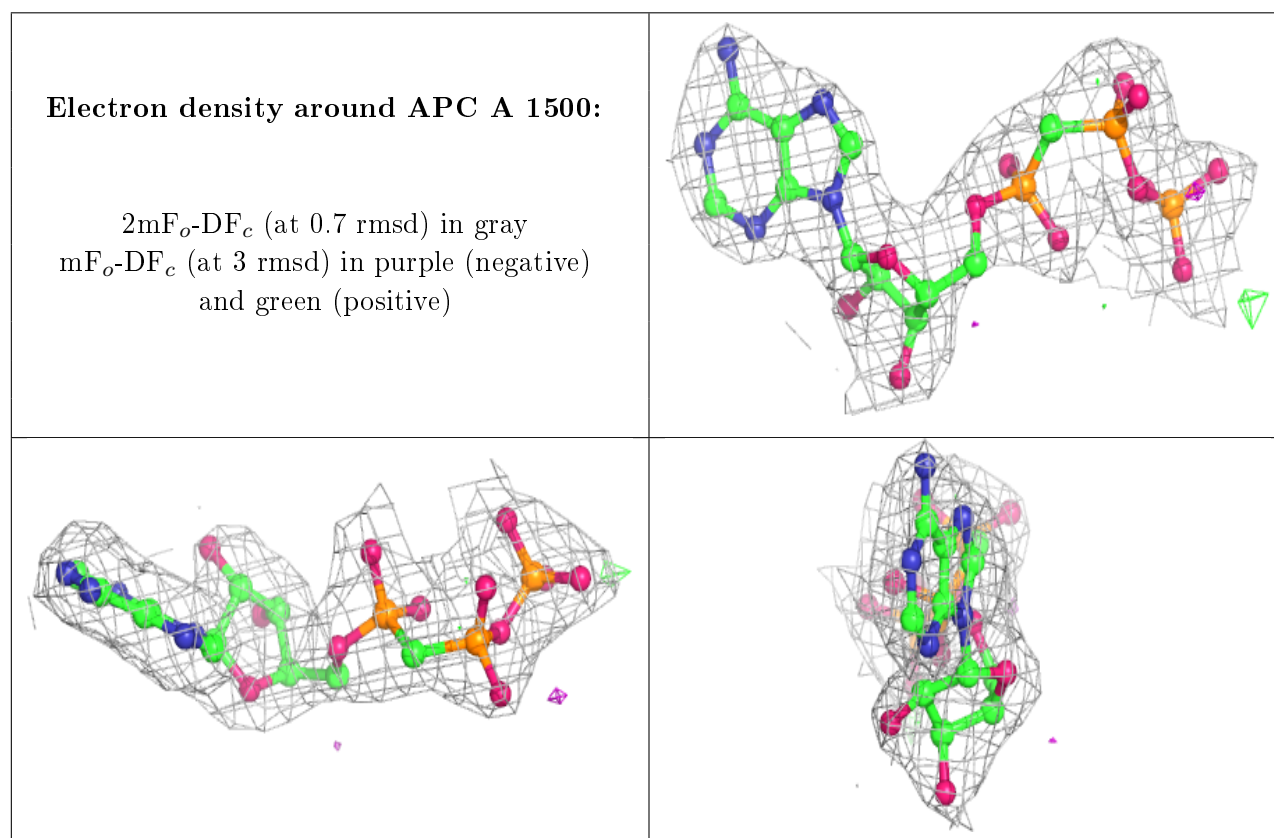
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	MG	B	2000	1/1	0.88	0.09	27,27,27,27	0
3	MG	D	2000	1/1	0.92	0.07	40,40,40,40	0
3	MG	A	2000	1/1	0.92	0.08	42,42,42,42	0
3	MG	C	2000	1/1	0.95	0.08	18,18,18,18	0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	APC	A	1500	31/31	0.95	0.13	39,41,44,46	0
2	APC	D	1500	31/31	0.95	0.11	34,38,43,47	0
4	CA	B	2100	1/1	0.96	0.05	29,29,29,29	0
2	APC	B	1500	31/31	0.96	0.10	20,25,34,35	0
4	CA	C	2100	1/1	0.98	0.06	24,24,24,24	0
4	CA	A	2100	1/1	0.98	0.03	32,32,32,32	0
2	APC	C	1500	31/31	0.98	0.09	16,25,30,31	0
4	CA	D	2100	1/1	0.99	0.02	32,32,32,32	0

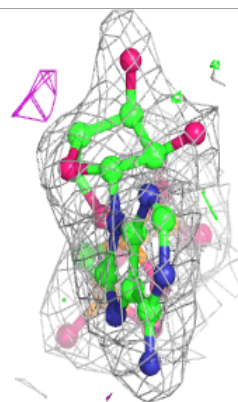
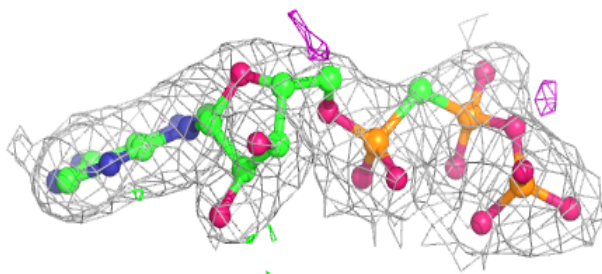
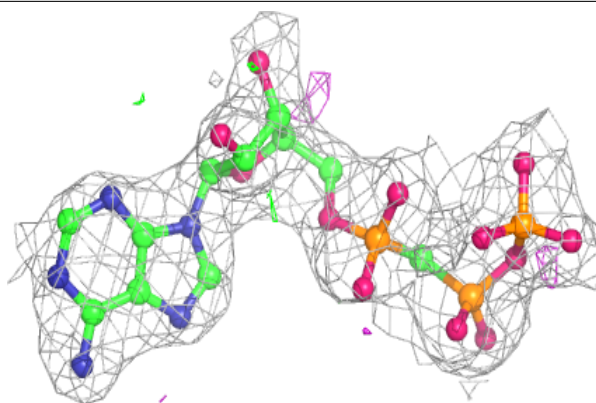
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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



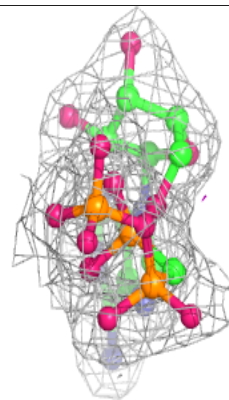
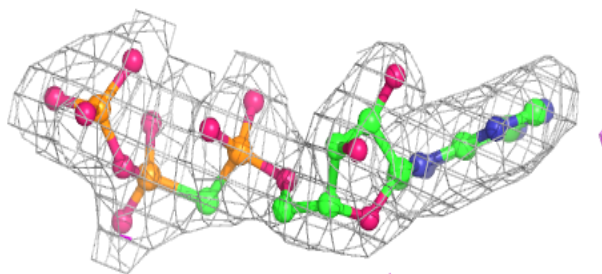
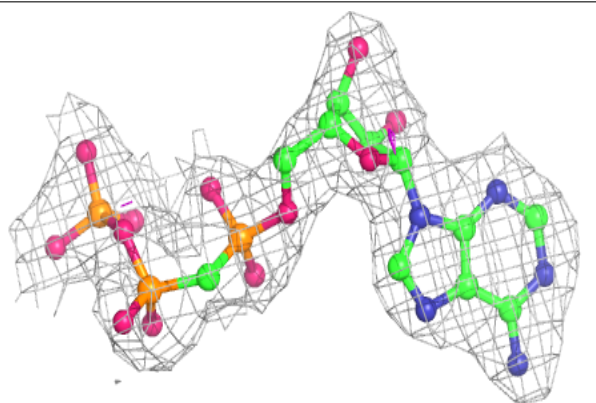


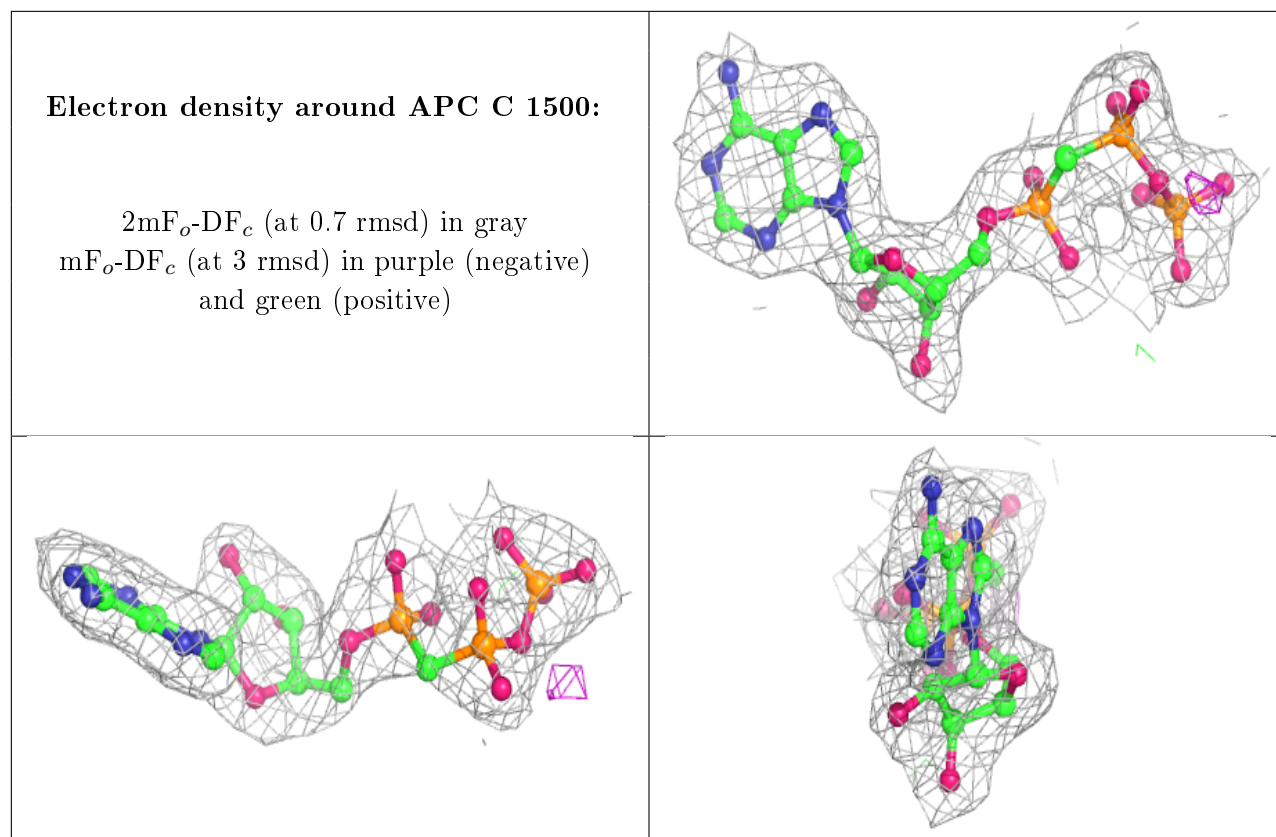
**Electron density around APC D 1500:**

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

**Electron density around APC B 1500:**

$2mF_o-DF_c$  (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.