



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 17, 2021 – 10:17 PM JST

PDB ID : 7D4O  
Title : cyclic trinucleotide synthase CdnD in complex with ATP and ADP  
Authors : Yang, C.-S.; Hou, M.-H.; Tsai, C.-L.; Wang, Y.-C.; Ko, T.-P.; Chen, Y.  
Deposited on : 2020-09-24  
Resolution : 1.87 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 : 2.18  
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) : 2.18

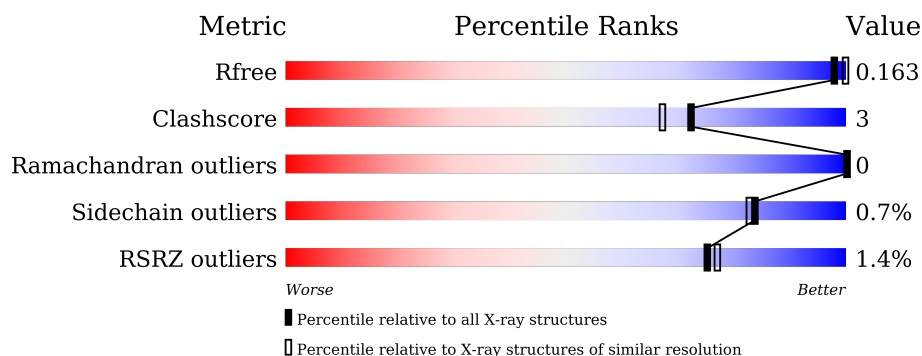
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.87 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	9470 (1.90-1.86)
Clashscore	141614	10282 (1.90-1.86)
Ramachandran outliers	138981	10152 (1.90-1.86)
Sidechain outliers	138945	10152 (1.90-1.86)
RSRZ outliers	127900	9303 (1.90-1.86)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	389	<div> <div></div> <div>83% 6% 11%</div> </div>
1	B	389	<div> <div></div> <div>83% 6% 11%</div> </div>

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 6724 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.

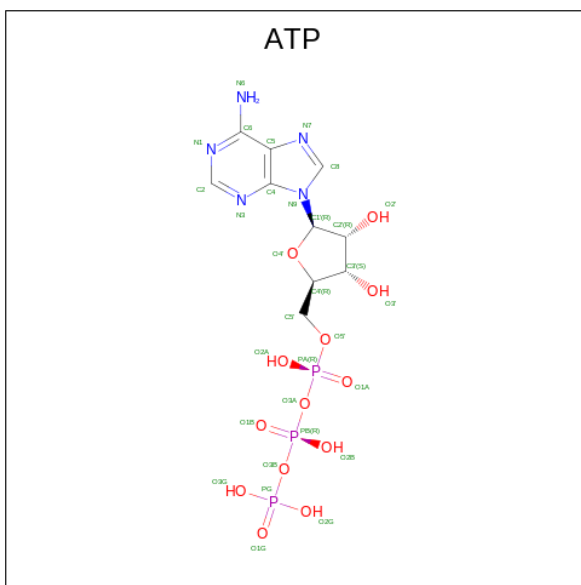
- Molecule 1 is a protein called Cyclic AMP-AMP-GMP synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	346	Total	C	N	O	S	0	7	0
			2809	1778	490	532	9			
1	B	347	Total	C	N	O	S	0	6	0
			2810	1779	490	532	9			

There are 16 discrepancies between the modelled and reference sequences:

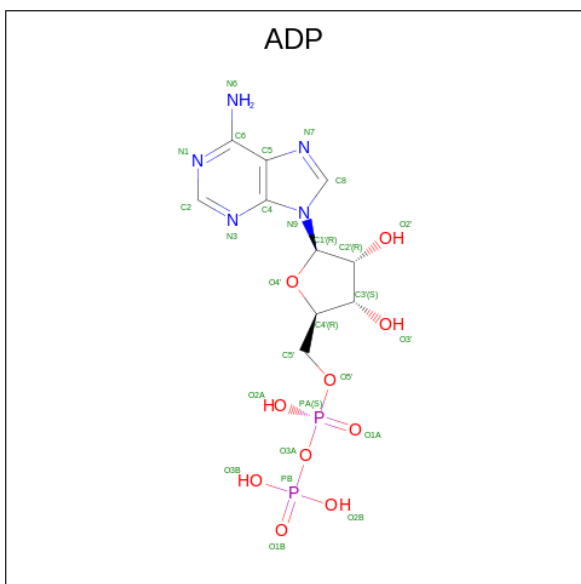
Chain	Residue	Modelled	Actual	Comment	Reference
A	382	LEU	-	expression tag	UNP P0DSP4
A	383	GLU	-	expression tag	UNP P0DSP4
A	384	HIS	-	expression tag	UNP P0DSP4
A	385	HIS	-	expression tag	UNP P0DSP4
A	386	HIS	-	expression tag	UNP P0DSP4
A	387	HIS	-	expression tag	UNP P0DSP4
A	388	HIS	-	expression tag	UNP P0DSP4
A	389	HIS	-	expression tag	UNP P0DSP4
B	382	LEU	-	expression tag	UNP P0DSP4
B	383	GLU	-	expression tag	UNP P0DSP4
B	384	HIS	-	expression tag	UNP P0DSP4
B	385	HIS	-	expression tag	UNP P0DSP4
B	386	HIS	-	expression tag	UNP P0DSP4
B	387	HIS	-	expression tag	UNP P0DSP4
B	388	HIS	-	expression tag	UNP P0DSP4
B	389	HIS	-	expression tag	UNP P0DSP4

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula:  $C_{10}H_{16}N_5O_{13}P_3$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 31	C 10	N 5	O 13	P 3	0	0
2	B	1	Total 31	C 10	N 5	O 13	P 3	0	0

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula:  $\text{C}_{10}\text{H}_{15}\text{N}_5\text{O}_{10}\text{P}_2$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

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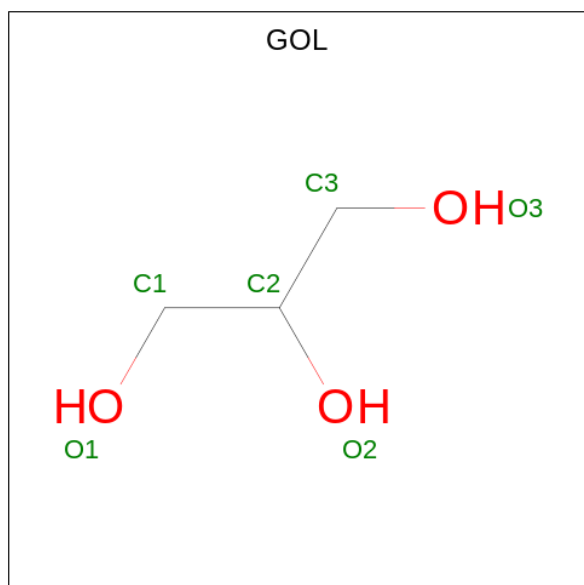
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	3	Total	Mg	0	0
			3	3		
4	B	3	Total	Mg	0	0
			3	3		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		

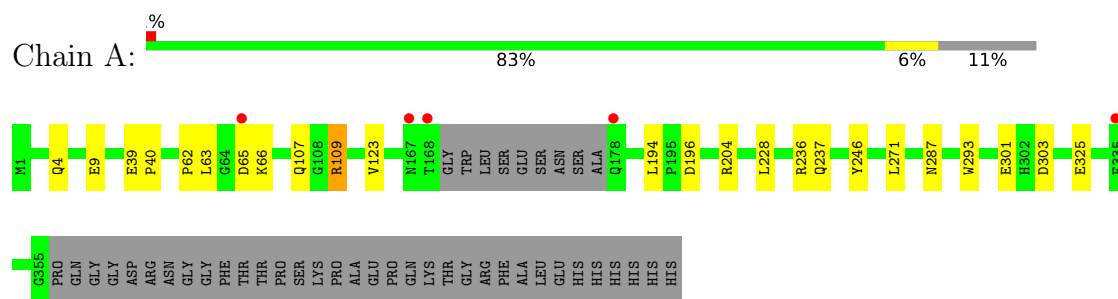
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	475	Total	O	0	0
			475	475		
6	B	460	Total	O	0	0
			460	460		

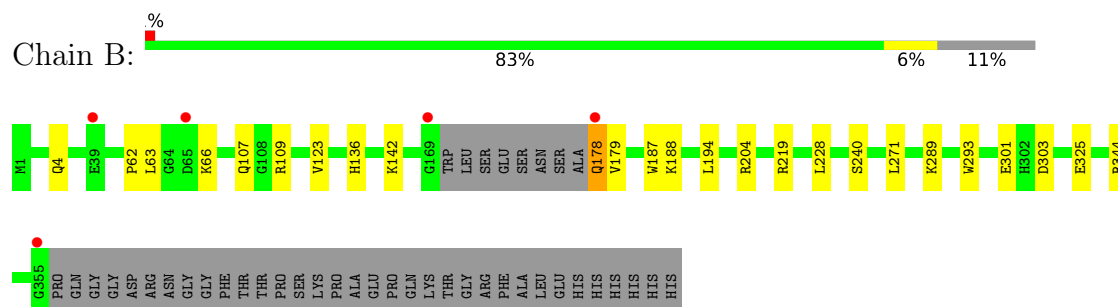
### 3 Residue-property plots

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

#### • Molecule 1: Cyclic AMP-AMP-GMP synthase



#### • Molecule 1: Cyclic AMP-AMP-GMP synthase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	65.77Å 107.18Å 65.88Å 90.00° 118.29° 90.00°	Depositor
Resolution (Å)	29.00 – 1.87 29.00 – 1.87	Depositor EDS
% Data completeness (in resolution range)	99.7 (29.00-1.87) 98.1 (29.00-1.87)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.03 (at 1.87Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, $R_{free}$	0.136 , 0.163 0.136 , 0.163	Depositor DCC
$R_{free}$ test set	2022 reflections (3.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.2	Xtriage
Anisotropy	0.004	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 54.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.001 for -h-l,k,h 0.001 for l,k,-h-l 0.018 for h,-k,-h-l 0.159 for -h-l,-k,l 0.016 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	6724	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.27% 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: ADP, MG, GOL, ATP

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	0.57	0/2918	0.63	0/3965
1	B	0.58	0/2914	0.64	0/3959
All	All	0.57	0/5832	0.63	0/7924

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	2809	0	2749	18	0
1	B	2810	0	2750	20	0
2	A	31	0	12	0	0
2	B	31	0	12	0	0
3	A	27	0	12	0	0
3	B	27	0	12	0	0
4	A	3	0	0	0	0
4	B	3	0	0	0	0
5	A	30	0	39	6	0
5	B	18	0	24	2	0
6	A	475	0	0	10	2

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	460	0	0	6	1
All	All	6724	0	5610	39	2

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 3.

All (39) 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:287[A]:ASN:ND2	6:A:501:HOH:O	2.00	0.93
1:B:107:GLN:OE1	6:B:501:HOH:O	1.98	0.82
1:B:219:ARG:NH2	6:B:502:HOH:O	2.13	0.80
1:A:287[A]:ASN:ND2	6:A:505:HOH:O	2.18	0.76
5:A:408:GOL:O3	6:A:502:HOH:O	2.04	0.76
1:A:107:GLN:OE1	6:A:503:HOH:O	2.06	0.72
1:B:178:GLN:HE21	1:B:178:GLN:HA	1.57	0.70
1:B:178:GLN:HG3	1:B:179:VAL:HG13	1.78	0.64
1:B:204:ARG:NH2	1:B:301:GLU:OE2	2.32	0.61
1:A:196:ASP:O	5:A:406:GOL:H11	2.01	0.60
5:A:408:GOL:H31	6:A:896:HOH:O	2.04	0.57
1:A:123[A]:VAL:HG21	1:A:194:LEU:HD12	1.88	0.56
1:A:246:TYR:OH	6:A:504:HOH:O	2.17	0.55
1:B:123[A]:VAL:HG21	1:B:194:LEU:HD12	1.88	0.55
1:A:4:GLN:HG3	6:A:731:HOH:O	2.06	0.54
1:B:325:GLU:OE1	6:B:503:HOH:O	2.19	0.52
1:B:142:LYS:NZ	5:B:406:GOL:H31	2.27	0.49
1:B:240:SER:OG	6:B:504:HOH:O	2.20	0.49
1:A:62:PRO:HB3	1:A:66:LYS:HE3	1.94	0.48
1:B:178:GLN:HE21	1:B:178:GLN:CA	2.25	0.48
1:B:228:LEU:CD2	1:B:271:LEU:HG	2.43	0.48
1:B:62:PRO:HB3	1:B:66:LYS:HE3	1.96	0.47
1:B:289:LYS:HD3	1:B:289:LYS:HA	1.60	0.46
1:B:136:HIS:HD2	6:B:907:HOH:O	1.98	0.46
1:A:325:GLU:HG2	6:A:750:HOH:O	2.15	0.46
1:A:63:LEU:CD1	5:A:410:GOL:H2	2.46	0.45
1:A:65:ASP:OD2	1:B:344:ARG:NH2	2.50	0.45
1:A:237:GLN:NE2	6:A:507:HOH:O	2.26	0.44
1:A:293:TRP:CE2	1:A:303:ASP:HB2	2.53	0.44
1:A:204:ARG:NH1	1:A:301:GLU:OE2	2.50	0.43
1:A:9:GLU:OE2	6:A:506:HOH:O	2.22	0.43
1:A:39:GLU:HB3	1:A:40:PRO:HD3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:109:ARG:HA	5:A:406:GOL:H12	2.00	0.43
1:A:228:LEU:CD2	1:A:271:LEU:HG	2.49	0.42
1:B:4:GLN:HG3	6:B:742:HOH:O	2.19	0.42
1:B:142:LYS:HZ1	5:B:406:GOL:H31	1.84	0.42
1:B:293:TRP:CE2	1:B:303:ASP:HB2	2.54	0.42
5:A:410:GOL:H32	1:B:63:LEU:CD1	2.51	0.41
1:B:187:TRP:CE3	1:B:188:LYS:HA	2.56	0.41

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:741:HOH:O	6:B:802:HOH:O[2_546]	2.17	0.03
6:A:768:HOH:O	6:A:825:HOH:O[2_555]	2.18	0.02

## 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	349/389 (90%)	343 (98%)	6 (2%)	0	100	100
1	B	349/389 (90%)	342 (98%)	7 (2%)	0	100	100
All	All	698/778 (90%)	685 (98%)	13 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	310/337 (92%)	308 (99%)	2 (1%)	86	86
1	B	309/337 (92%)	307 (99%)	2 (1%)	86	86
All	All	619/674 (92%)	615 (99%)	4 (1%)	84	86

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	109	ARG
1	A	236	ARG
1	B	109	ARG
1	B	178	GLN

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

Mol	Chain	Res	Type
1	B	178	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 6 are monoatomic - leaving 12 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The

Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	B	407	-	5,5,5	0.88	0	5,5,5	1.06	0
5	GOL	A	410	-	5,5,5	0.90	0	5,5,5	0.69	0
5	GOL	B	406	-	5,5,5	1.06	0	5,5,5	1.03	0
3	ADP	A	402	-	24,29,29	1.00	1 (4%)	29,45,45	1.20	4 (13%)
3	ADP	B	402	-	24,29,29	1.03	2 (8%)	29,45,45	1.24	3 (10%)
5	GOL	A	407	-	5,5,5	0.81	0	5,5,5	0.88	0
5	GOL	A	408	-	5,5,5	1.10	0	5,5,5	1.10	0
2	ATP	B	401	4	26,33,33	0.99	2 (7%)	31,52,52	1.33	6 (19%)
2	ATP	A	401	4	26,33,33	0.86	1 (3%)	31,52,52	1.43	5 (16%)
5	GOL	B	408	-	5,5,5	0.96	0	5,5,5	0.79	0
5	GOL	A	409	-	5,5,5	0.73	0	5,5,5	1.26	1 (20%)
5	GOL	A	406	-	5,5,5	0.83	0	5,5,5	1.40	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	B	407	-	-	1/4/4/4	-
5	GOL	A	410	-	-	4/4/4/4	-
5	GOL	B	406	-	-	2/4/4/4	-
3	ADP	A	402	-	-	3/12/32/32	0/3/3/3
3	ADP	B	402	-	-	3/12/32/32	0/3/3/3
5	GOL	A	407	-	-	2/4/4/4	-
5	GOL	A	408	-	-	0/4/4/4	-
2	ATP	B	401	4	-	5/18/38/38	0/3/3/3
2	ATP	A	401	4	-	5/18/38/38	0/3/3/3
5	GOL	B	408	-	-	1/4/4/4	-
5	GOL	A	409	-	-	2/4/4/4	-
5	GOL	A	406	-	-	4/4/4/4	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	402	ADP	C2-N3	2.82	1.36	1.32
2	B	401	ATP	C2-N3	2.58	1.36	1.32
3	A	402	ADP	C2-N3	2.31	1.35	1.32
2	B	401	ATP	C5-C4	2.03	1.46	1.40
2	A	401	ATP	C2-N3	2.02	1.35	1.32
3	B	402	ADP	C5-C4	2.02	1.46	1.40

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	ATP	N3-C2-N1	-4.22	122.08	128.68
2	B	401	ATP	N3-C2-N1	-3.60	123.05	128.68
3	B	402	ADP	N3-C2-N1	-3.42	123.34	128.68
3	A	402	ADP	N3-C2-N1	-3.38	123.39	128.68
2	B	401	ATP	O3G-PG-O2G	2.56	117.42	107.64
3	A	402	ADP	O2'-C2'-C1'	-2.50	101.61	110.85
2	A	401	ATP	C1'-N9-C4	-2.49	122.27	126.64
2	A	401	ATP	C4-C5-N7	-2.40	106.89	109.40
2	B	401	ATP	C1'-N9-C4	-2.37	122.48	126.64
3	B	402	ADP	O2'-C2'-C1'	-2.25	102.53	110.85
3	A	402	ADP	C4-C5-N7	-2.25	107.06	109.40
3	A	402	ADP	O3B-PB-O2B	2.25	116.23	107.64
5	A	409	GOL	C3-C2-C1	-2.24	102.98	111.70
2	B	401	ATP	PB-O3B-PG	-2.22	125.22	132.83
2	A	401	ATP	C2-N1-C6	2.21	122.54	118.75
2	B	401	ATP	C2-N1-C6	2.19	122.50	118.75
2	A	401	ATP	PB-O3B-PG	-2.16	125.41	132.83
3	B	402	ADP	N6-C6-N1	2.16	123.05	118.57
2	B	401	ATP	O3B-PG-O1G	-2.01	100.05	111.19

There are no chirality outliers.

All (32) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	402	ADP	PB-O3A-PA-O5'
5	A	406	GOL	C1-C2-C3-O3
5	A	409	GOL	C1-C2-C3-O3
5	A	410	GOL	C1-C2-C3-O3
5	B	406	GOL	C1-C2-C3-O3
5	B	406	GOL	O2-C2-C3-O3
5	A	406	GOL	O2-C2-C3-O3
5	A	406	GOL	O1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
5	A	407	GOL	O1-C1-C2-C3
5	A	410	GOL	O1-C1-C2-C3
5	B	407	GOL	O1-C1-C2-C3
5	A	410	GOL	O1-C1-C2-O2
5	A	410	GOL	O2-C2-C3-O3
5	A	409	GOL	O2-C2-C3-O3
2	A	401	ATP	PB-O3B-PG-O1G
2	B	401	ATP	PB-O3B-PG-O1G
3	B	402	ADP	PA-O3A-PB-O1B
2	A	401	ATP	PA-O3A-PB-O1B
2	B	401	ATP	PA-O3A-PB-O1B
2	B	401	ATP	PB-O3A-PA-O1A
3	B	402	ADP	PB-O3A-PA-O5'
3	A	402	ADP	PA-O3A-PB-O2B
3	B	402	ADP	PA-O3A-PB-O2B
2	A	401	ATP	PB-O3A-PA-O1A
2	A	401	ATP	PA-O3A-PB-O2B
5	B	408	GOL	O1-C1-C2-C3
5	A	406	GOL	O1-C1-C2-O2
3	A	402	ADP	PA-O3A-PB-O3B
5	A	407	GOL	O1-C1-C2-O2
2	A	401	ATP	PB-O3A-PA-O2A
2	B	401	ATP	PA-O3A-PB-O2B
2	B	401	ATP	PB-O3A-PA-O2A

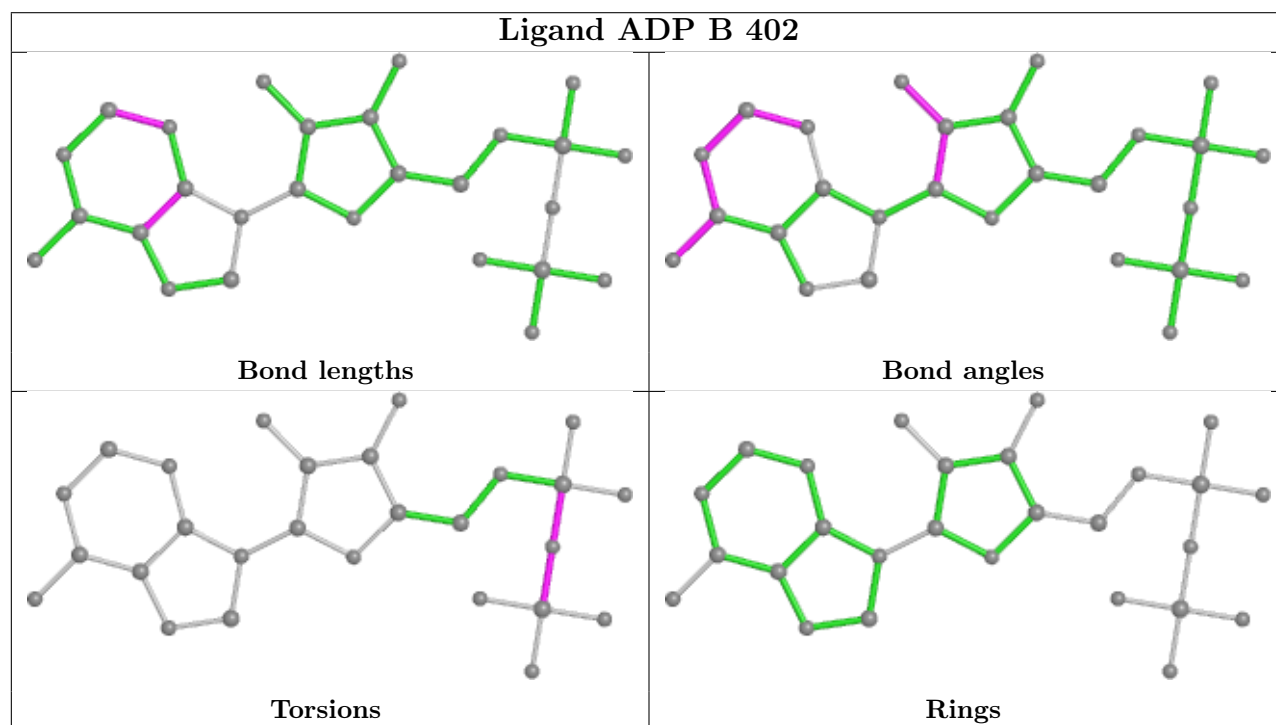
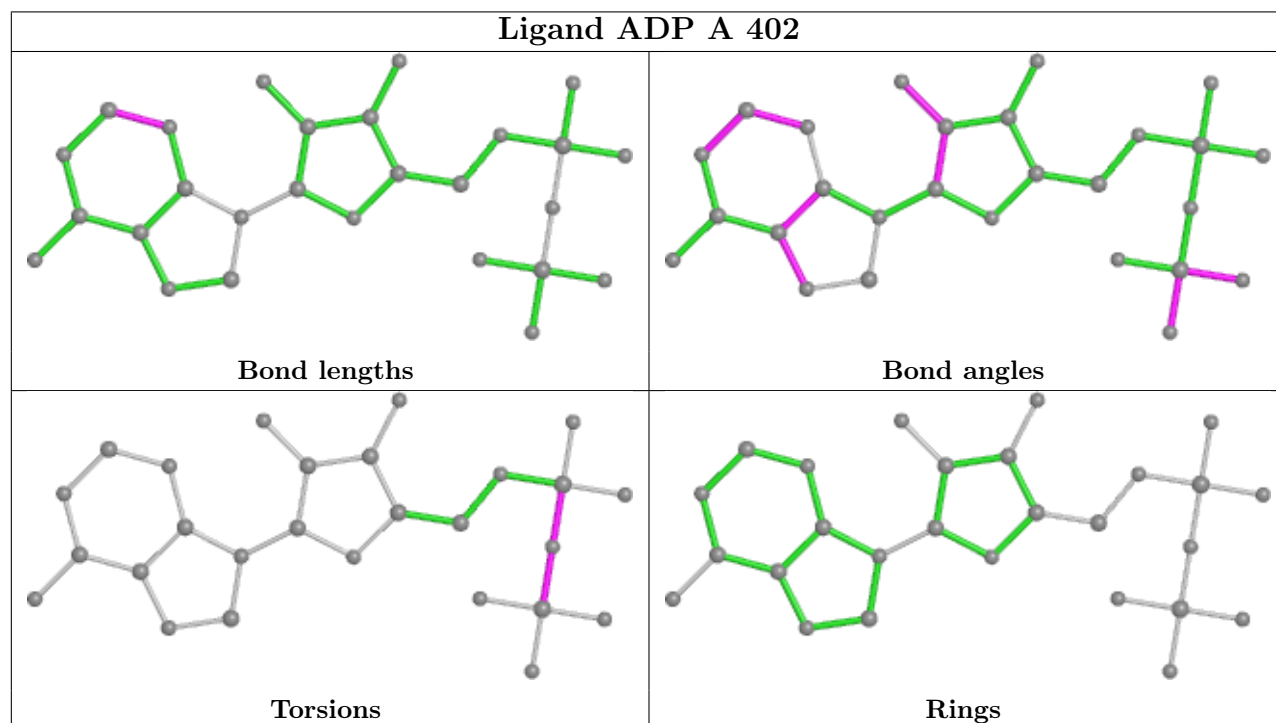
There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	410	GOL	2	0
5	B	406	GOL	2	0
5	A	408	GOL	2	0
5	A	406	GOL	2	0

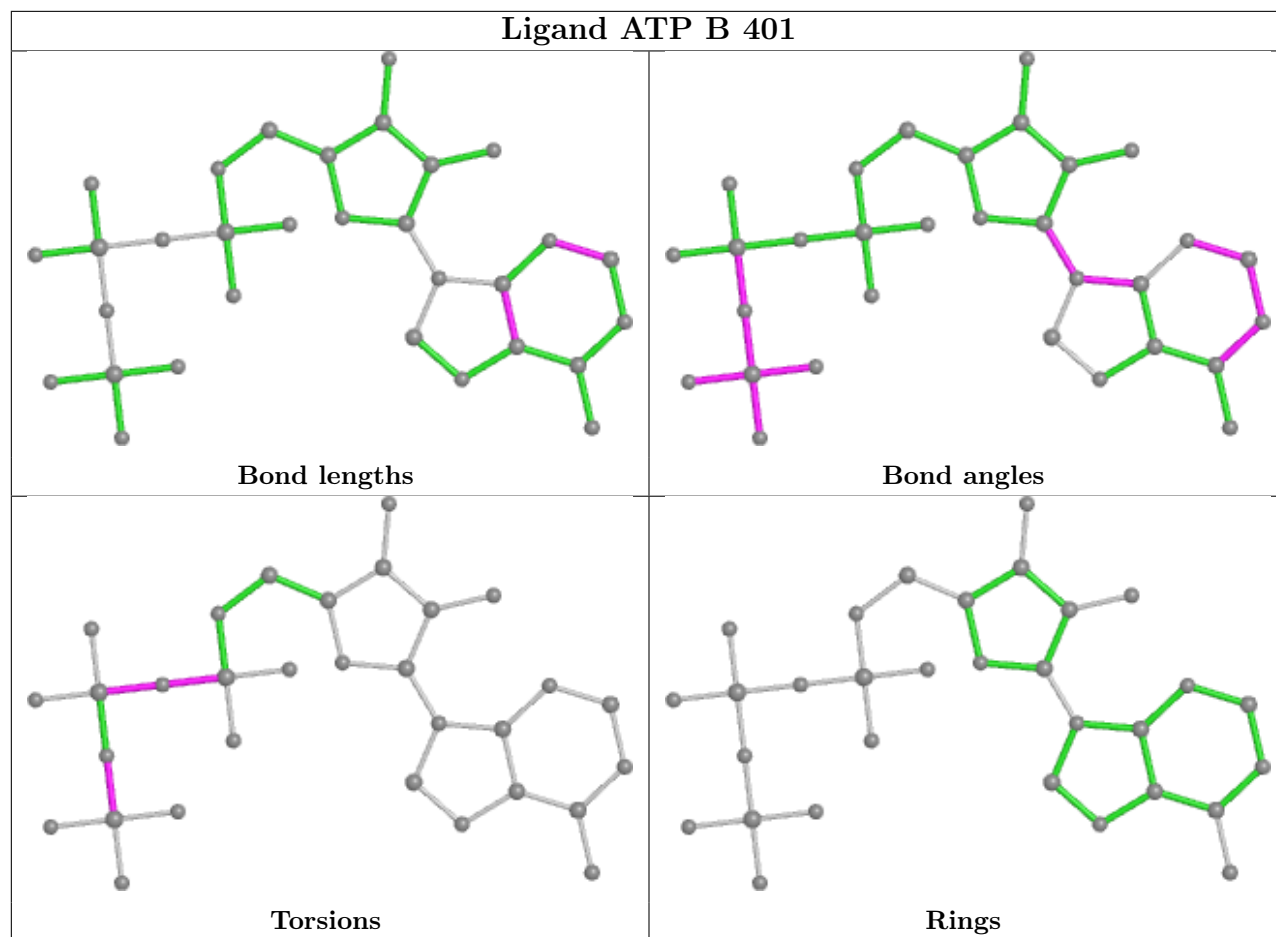
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the

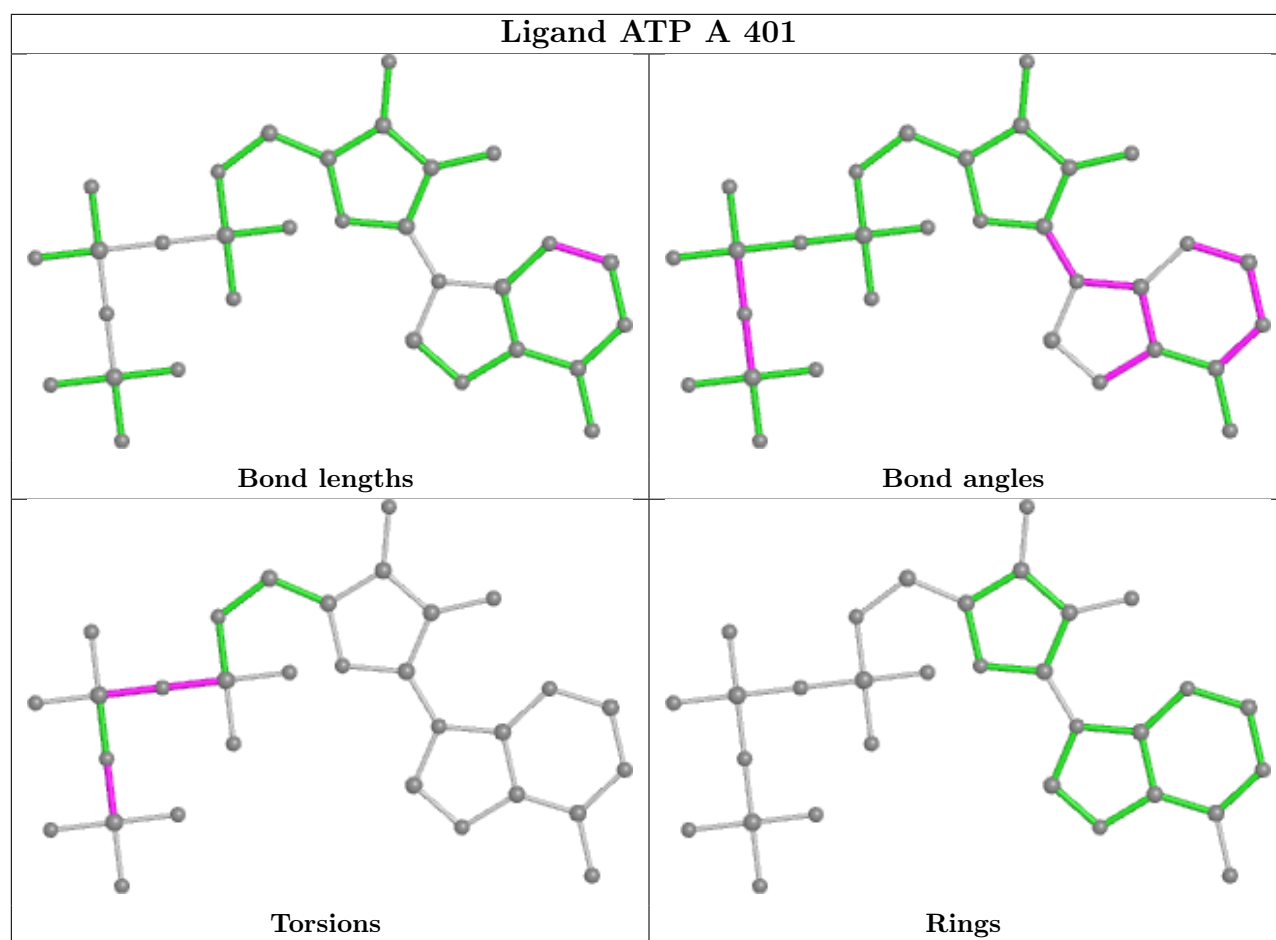
average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





## Ligand ATP B 401





## 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	346/389 (88%)	-0.35	5 (1%) 75 77	11, 18, 37, 79	0
1	B	347/389 (89%)	-0.35	5 (1%) 75 77	11, 18, 36, 72	0
All	All	693/778 (89%)	-0.35	10 (1%) 75 77	11, 18, 38, 79	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	65	ASP	4.5
1	B	178	GLN	4.1
1	A	178	GLN	3.8
1	B	355	GLY	3.4
1	A	65	ASP	3.4
1	B	169	GLY	2.8
1	A	168	THR	2.8
1	B	39	GLU	2.6
1	A	167	ASN	2.1
1	A	335	GLU	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 monosaccharides in this entry.

## 6.4 Ligands ⓘ

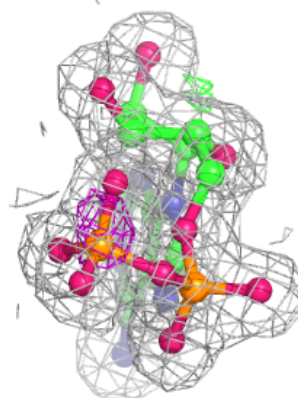
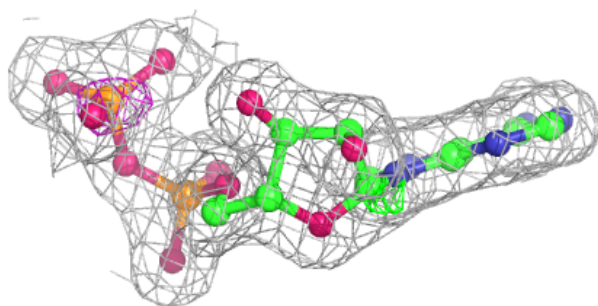
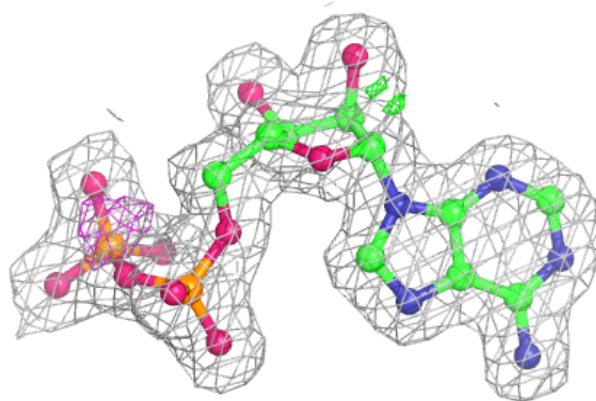
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
5	GOL	A	410	6/6	0.58	0.29	57,59,61,64	0
5	GOL	B	406	6/6	0.73	0.33	46,53,55,55	0
5	GOL	A	408	6/6	0.86	0.17	44,46,48,49	0
5	GOL	A	409	6/6	0.86	0.13	39,39,42,44	0
5	GOL	B	407	6/6	0.88	0.12	32,36,42,43	0
5	GOL	B	408	6/6	0.92	0.13	30,42,45,46	0
5	GOL	A	407	6/6	0.93	0.14	30,43,45,45	0
5	GOL	A	406	6/6	0.94	0.10	26,30,32,32	0
3	ADP	A	402	27/27	0.98	0.07	11,12,18,20	0
3	ADP	B	402	27/27	0.98	0.07	11,13,18,21	0
2	ATP	B	401	31/31	0.99	0.06	10,13,18,18	0
4	MG	A	403	1/1	0.99	0.03	13,13,13,13	0
4	MG	A	404	1/1	0.99	0.06	18,18,18,18	0
4	MG	A	405	1/1	0.99	0.07	16,16,16,16	0
4	MG	B	404	1/1	0.99	0.07	19,19,19,19	0
4	MG	B	405	1/1	0.99	0.07	15,15,15,15	0
2	ATP	A	401	31/31	0.99	0.06	11,13,17,19	0
4	MG	B	403	1/1	1.00	0.04	13,13,13,13	0

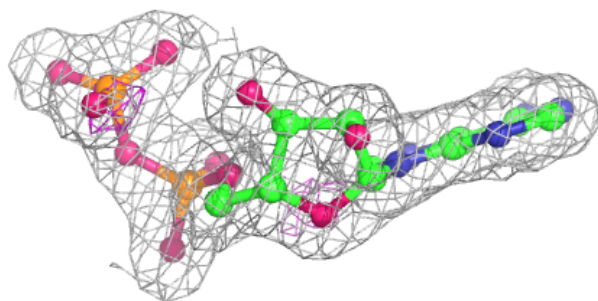
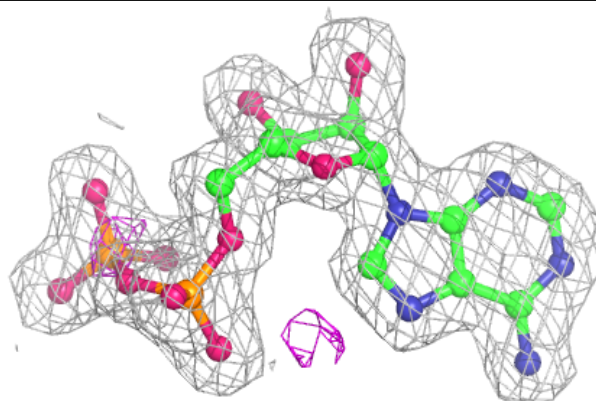
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around ADP A 402:**

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

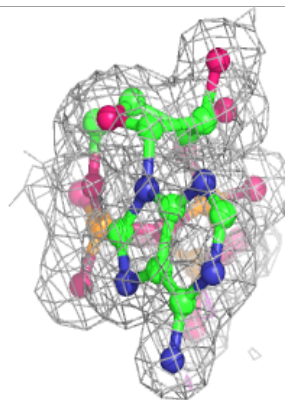
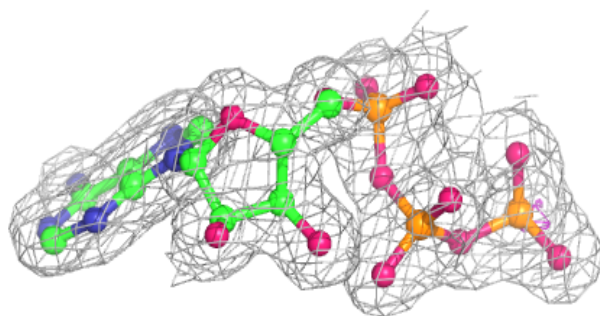
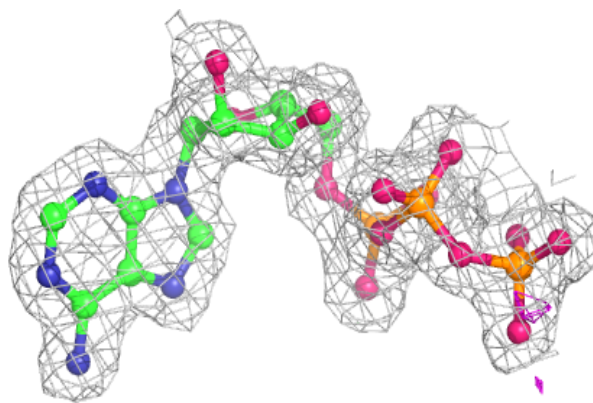
**Electron density around ADP B 402:**

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



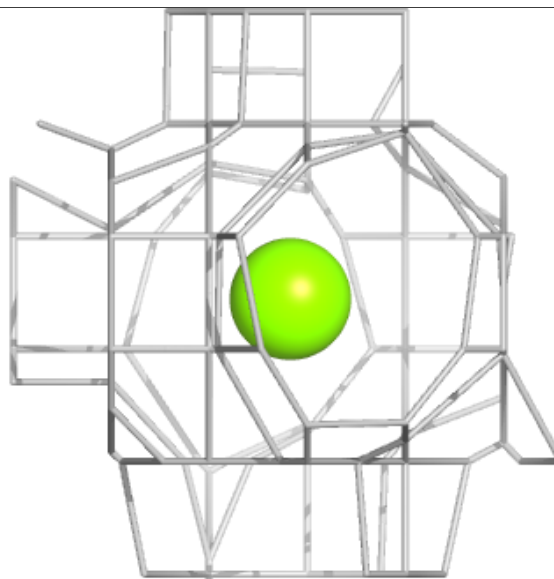
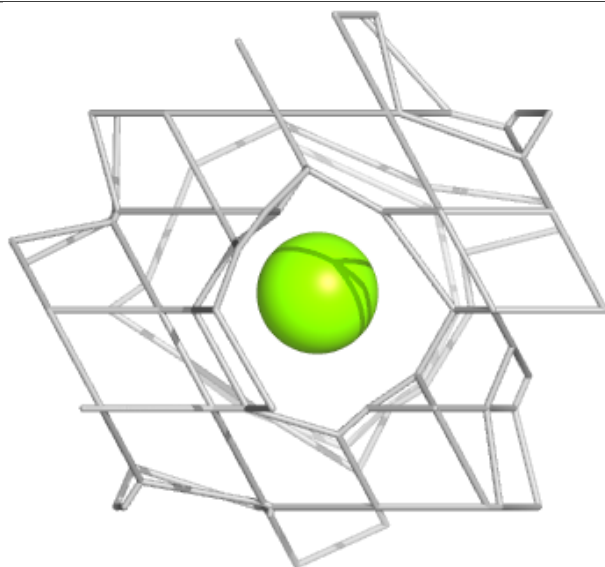
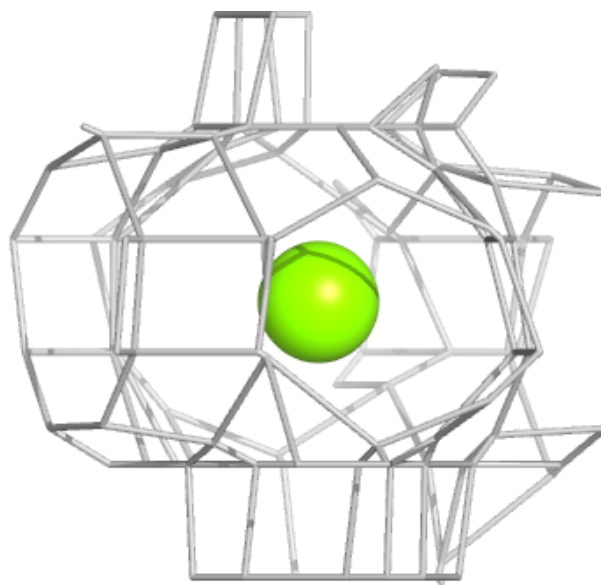
**Electron density around ATP B 401:**

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



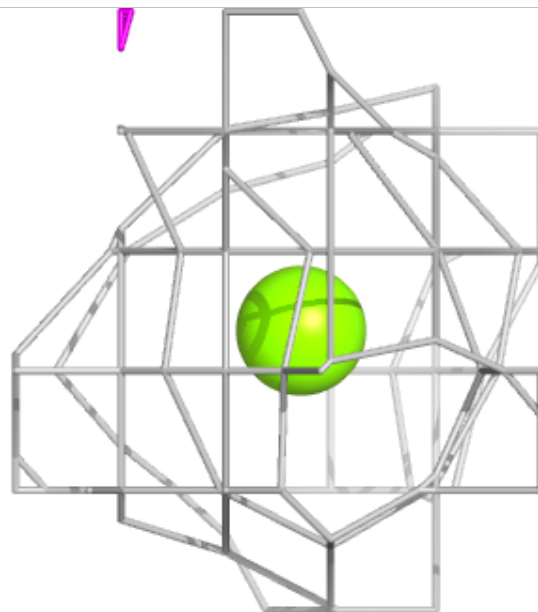
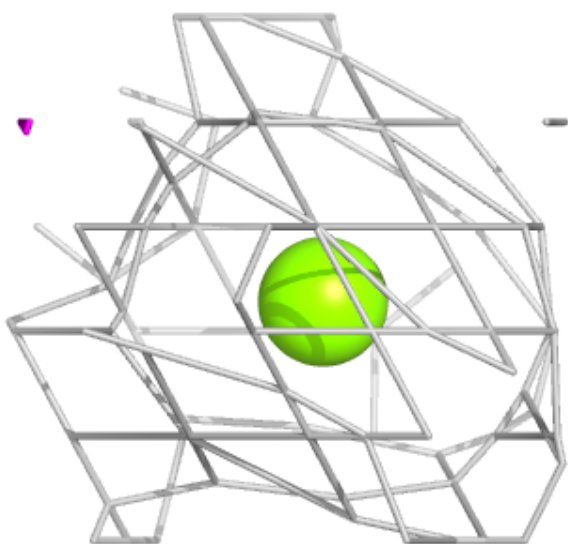
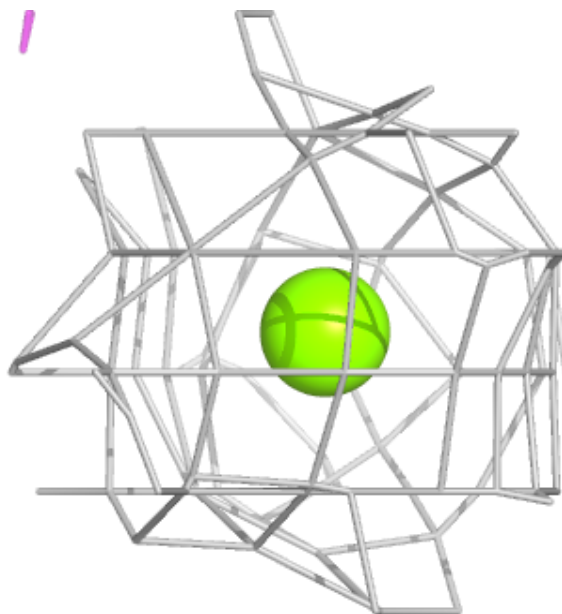
**Electron density around MG A 403:**

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



**Electron density around MG A 404:**

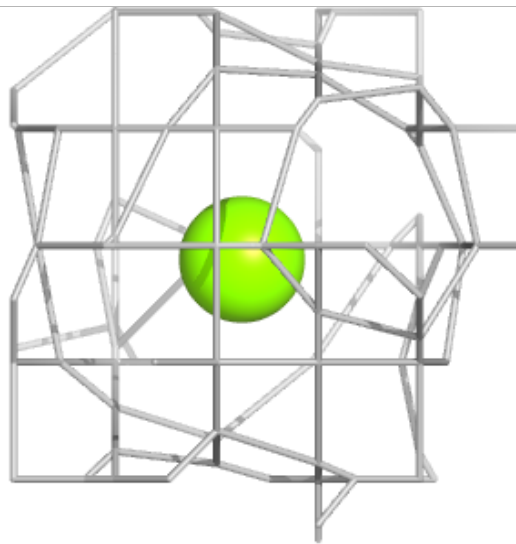
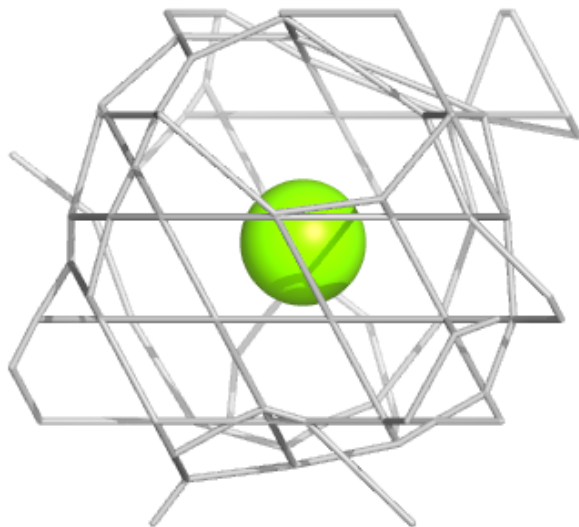
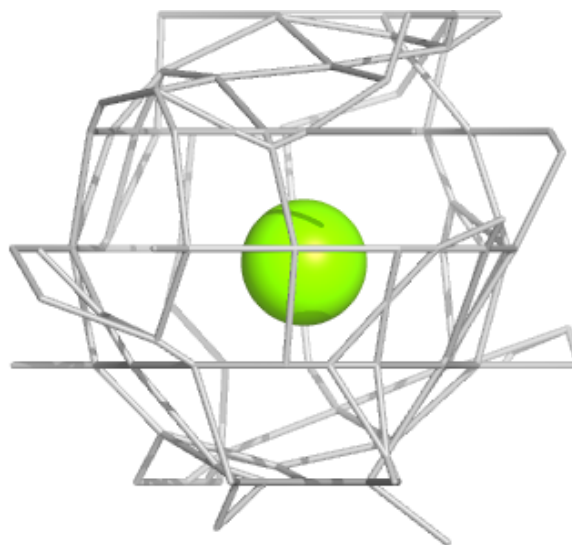
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





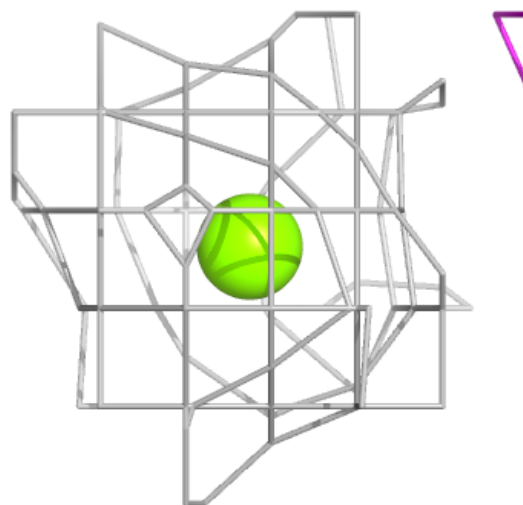
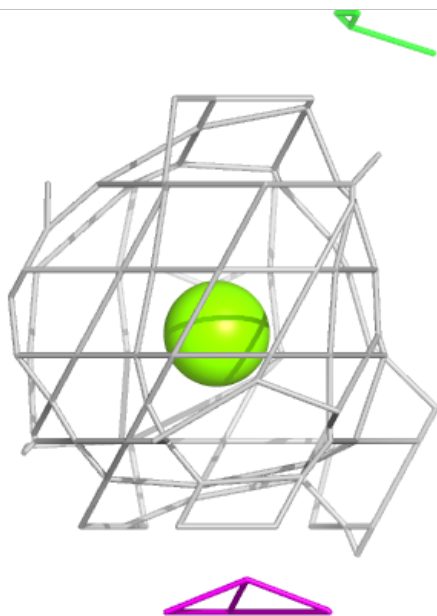
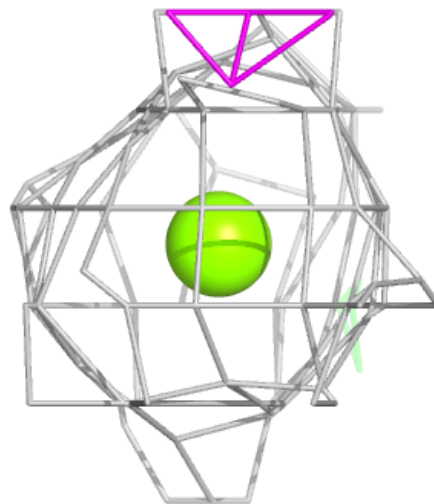
**Electron density around MG A 405:**

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and green (positive)



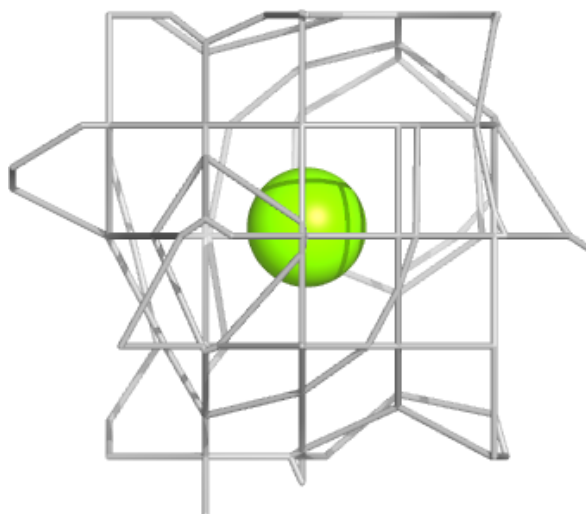
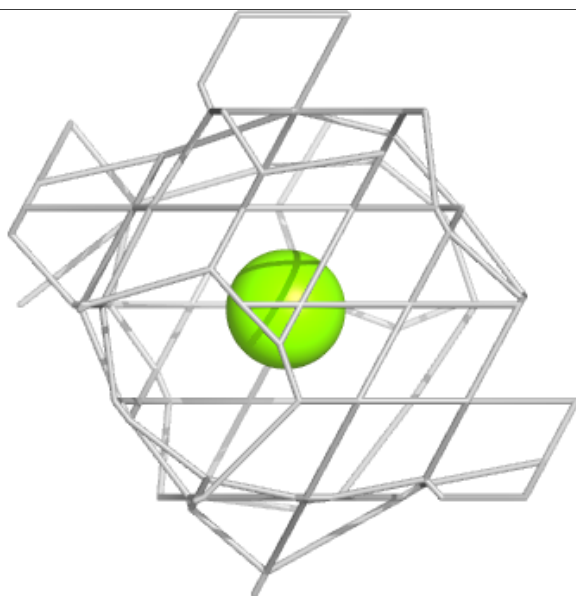
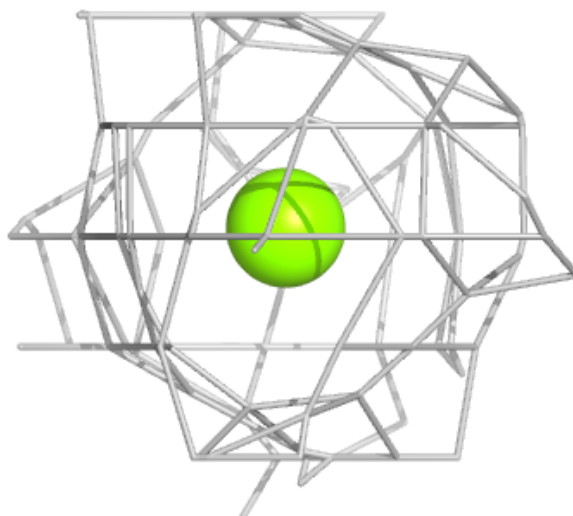
**Electron density around MG B 404:**

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



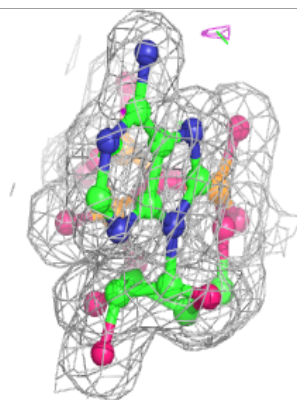
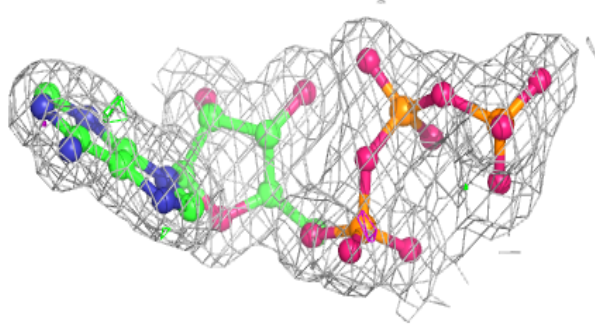
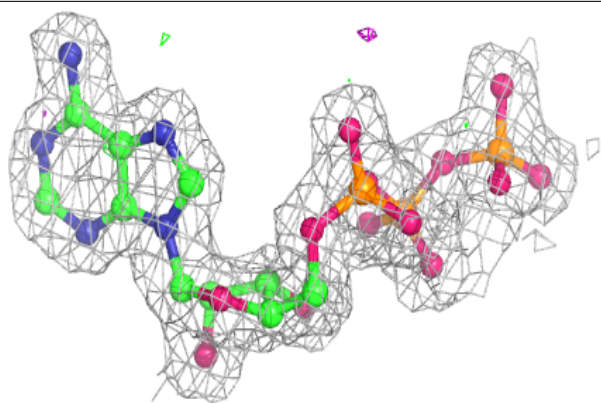
**Electron density around MG B 405:**

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and green (positive)



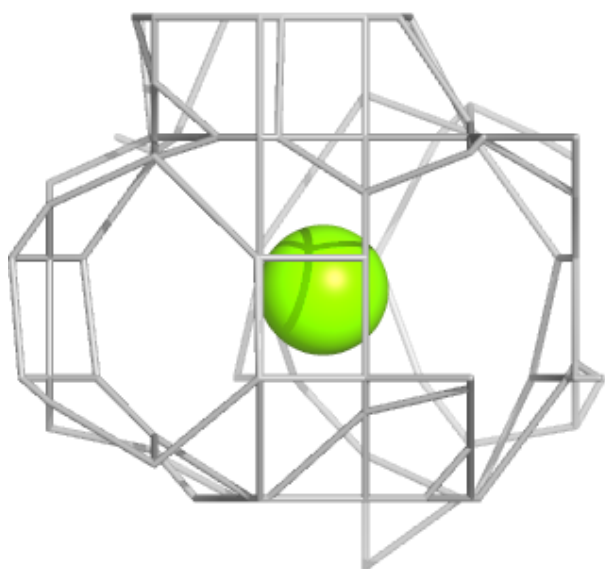
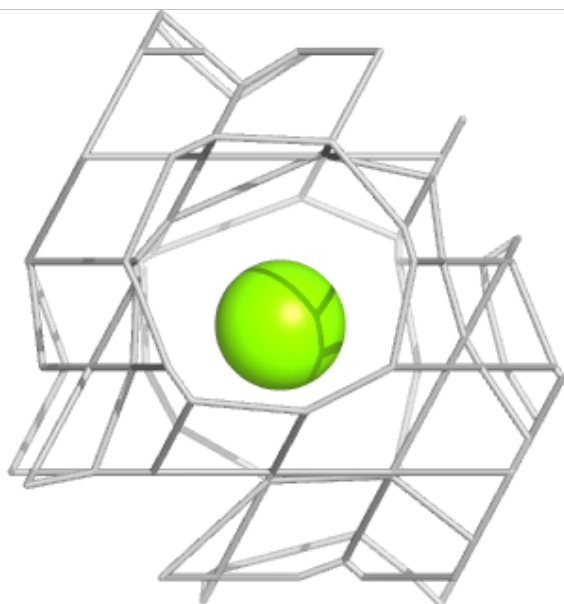
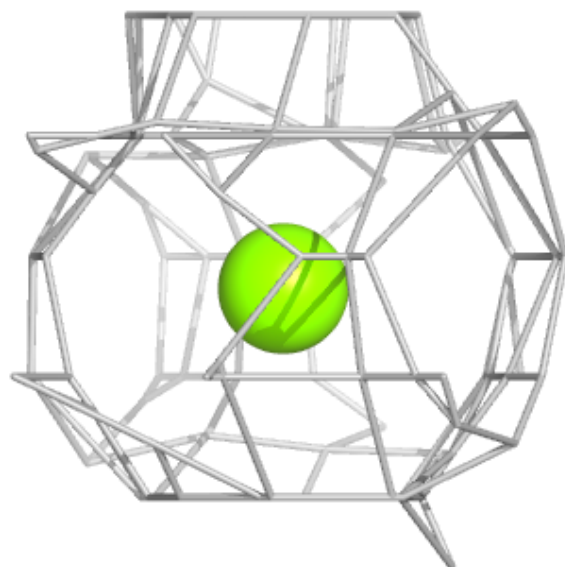
**Electron density around ATP A 401:**

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



**Electron density around MG B 403:**

$2mF_o-DF_c$  (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.