



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 22, 2024 – 06:27 AM EDT

PDB ID : 4I3Z  
Title : Structure of pCDK2/CyclinA bound to ADP and 2 Magnesium ions  
Authors : Jacobsen, D.M.; Bao, Z.-Q.; O'Brien, P.J.; Brooks, C.L.; Young, M.A.  
Deposited on : 2012-11-27  
Resolution : 2.05 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

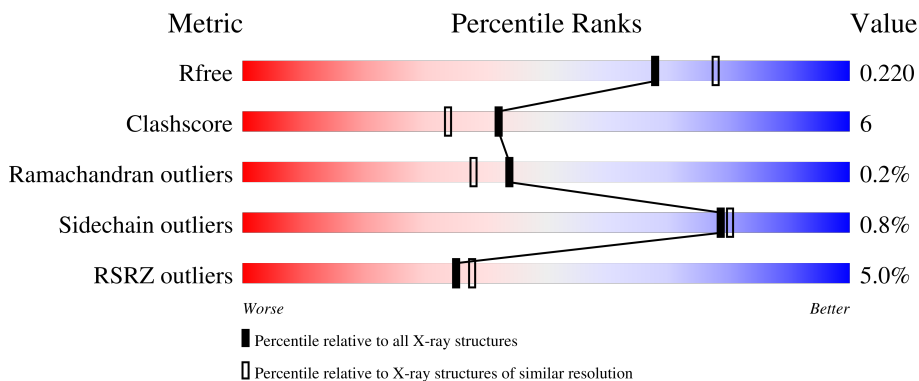
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


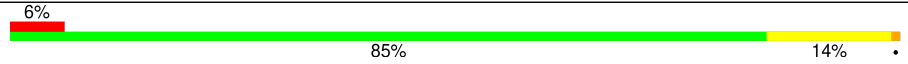
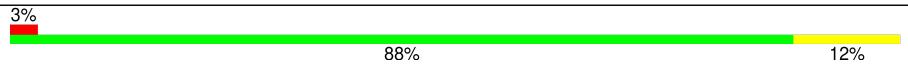

The reported resolution of this entry is 2.05 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	2096 (2.04-2.04)
Clashscore	180529	2229 (2.04-2.04)
Ramachandran outliers	177936	2217 (2.04-2.04)
Sidechain outliers	177891	2217 (2.04-2.04)
RSRZ outliers	164620	2096 (2.04-2.04)

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	296	 7% 83% 16%
1	C	296	 6% 85% 14%
2	B	257	 3% 88% 12%
2	D	257	 3% 88% 12%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	CL	A	307	-	-	X	-

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 9537 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.

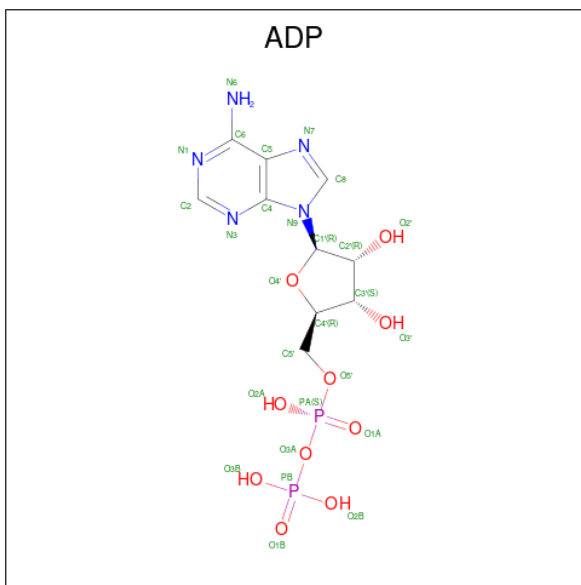
- Molecule 1 is a protein called Cyclin-dependent kinase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	N	O	P				S
1	A	296	Total	C	N	O	P	S	0	0	0
			2382	1547	403	423	1	8			
1	C	296	Total	C	N	O	P	S	0	0	0
			2382	1547	403	423	1	8			

- Molecule 2 is a protein called Cyclin-A2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	257	Total	C	N	O	S	0	0	0
			2069	1340	336	383	10			
2	D	257	Total	C	N	O	S	0	0	0
			2069	1340	336	383	10			

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula:  $C_{10}H_{15}N_5O_{10}P_2$ ).

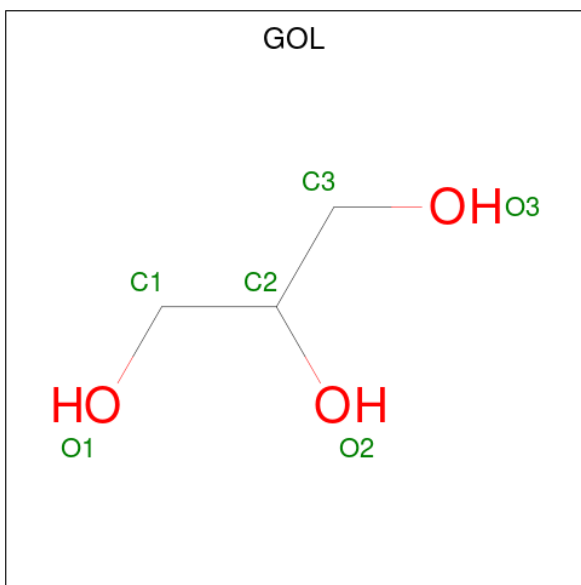


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
3	A	1	27	10	5	10	2	0	0
3	C	1	27	10	5	10	2	0	0

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
4	A	2	2	2	0	0
4	C	2	2	2	0	0

- 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
			Total	C	O		
5	A	1	6	3	3	0	0
5	A	1	6	3	3	0	0
5	A	1	6	3	3	0	0
5	B	1	6	3	3	0	0
5	B	1	6	3	3	0	0
5	C	1	6	3	3	0	0

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

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Cl	0	0
			1	1		
6	C	1	Total	Cl	0	0
			1	1		

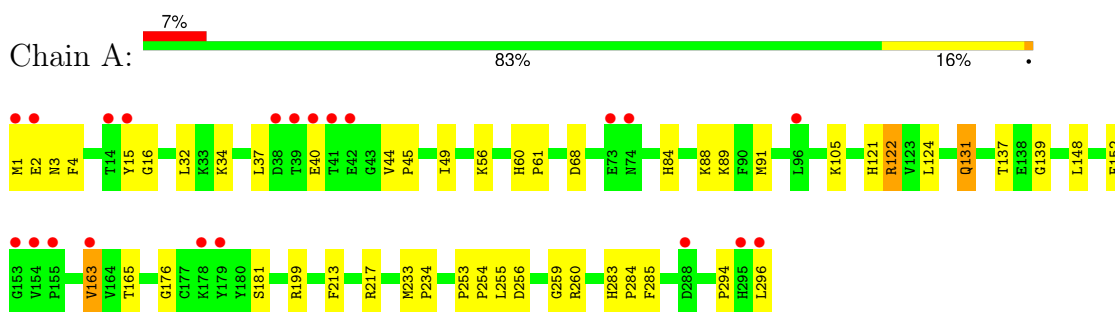
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	134	Total	O	0	0
			134	134		
7	B	110	Total	O	0	0
			110	110		
7	C	124	Total	O	0	0
			124	124		
7	D	153	Total	O	0	0
			153	153		

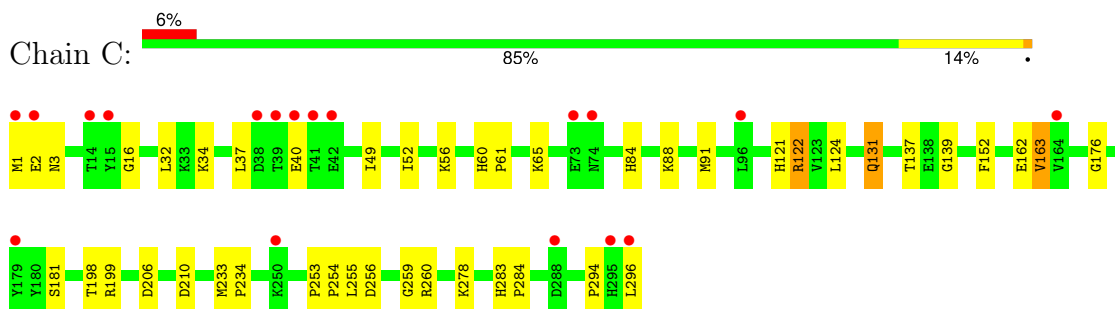
### 3 Residue-property plots [i](#)

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

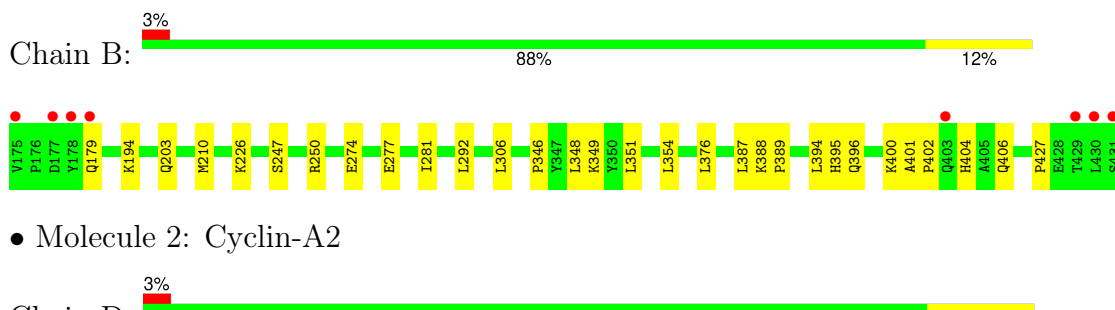
- Molecule 1: Cyclin-dependent kinase 2



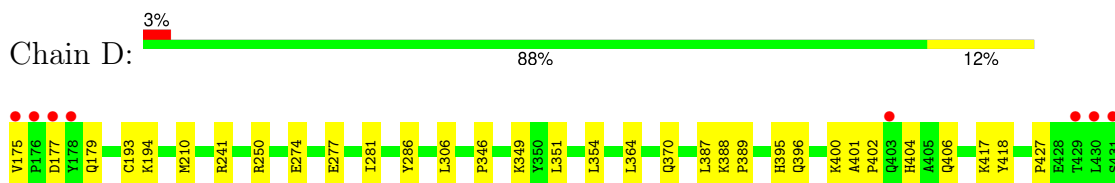
- Molecule 1: Cyclin-dependent kinase 2



- Molecule 2: Cyclin-A2



- Molecule 2: Cyclin-A2



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	70.77Å 164.13Å 73.28Å 90.00° 107.07° 90.00°	Depositor
Resolution (Å)	42.79 – 2.05 42.79 – 2.05	Depositor EDS
% Data completeness (in resolution range)	98.5 (42.79-2.05) 98.5 (42.79-2.05)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.84 (at 2.05Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7_650)	Depositor
R, $R_{free}$	0.197 , 0.228 0.191 , 0.220	Depositor DCC
$R_{free}$ test set	4895 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.0	Xtrriage
Anisotropy	0.495	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 55.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.028 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	9537	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	38.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.63% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, TPO, GOL, CL, 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	0.31	0/2432	0.44	0/3300
1	C	0.30	0/2432	0.44	0/3300
2	B	0.46	0/2119	0.46	0/2880
2	D	0.48	2/2119 (0.1%)	0.45	0/2880
All	All	0.39	2/9102 (0.0%)	0.45	0/12360

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	286	TYR	CD2-CE2	-5.81	1.30	1.39
2	D	286	TYR	CD1-CE1	-5.37	1.31	1.39

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	2382	0	2425	35	0
1	C	2382	0	2425	29	0
2	B	2069	0	2084	28	0
2	D	2069	0	2084	25	0
3	A	27	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	27	0	12	0	0
4	A	2	0	0	0	0
4	C	2	0	0	0	0
5	A	18	0	24	4	0
5	B	12	0	16	3	0
5	C	6	0	8	0	0
5	D	18	0	24	0	0
6	A	1	0	0	2	0
6	C	1	0	0	1	0
7	A	134	0	0	5	0
7	B	110	0	0	1	0
7	C	124	0	0	2	0
7	D	153	0	0	3	0
All	All	9537	0	9114	113	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (113) 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)
2:D:404:HIS:HD2	2:D:406:GLN:H	1.08	1.00
2:B:404:HIS:HD2	2:B:406:GLN:H	1.06	0.99
2:D:364:LEU:HD21	7:D:647:HOH:O	1.85	0.75
1:C:84:HIS:CD2	1:C:296:LEU:HD13	2.23	0.74
1:A:84:HIS:CD2	1:A:296:LEU:HD13	2.23	0.73
1:C:253:PRO:HB2	1:C:254:PRO:HD3	1.71	0.73
2:B:346:PRO:O	2:B:349:LYS:HG2	1.89	0.73
2:B:404:HIS:CD2	2:B:406:GLN:H	1.99	0.70
2:B:346:PRO:HB2	2:B:349:LYS:HE2	1.75	0.68
1:A:253:PRO:HB2	1:A:254:PRO:HD3	1.76	0.67
2:D:404:HIS:CD2	2:D:406:GLN:H	2.01	0.67
1:A:15:TYR:HB2	7:A:531:HOH:O	1.95	0.66
2:D:346:PRO:HB2	2:D:349:LYS:HE2	1.78	0.65
2:D:388:LYS:HB3	2:D:389:PRO:HD3	1.82	0.61
1:A:68:ASP:HB2	5:A:305:GOL:H11	1.83	0.60
1:C:137:THR:HG22	1:C:296:LEU:HD12	1.84	0.60
2:B:210:MET:HE1	2:B:250:ARG:CB	2.32	0.60
1:C:37:LEU:O	1:C:40:GLU:HB2	2.00	0.60
2:B:210:MET:CE	2:B:250:ARG:HB2	2.32	0.60
1:A:37:LEU:O	1:A:40:GLU:HB2	2.01	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:88:LYS:HA	1:A:91:MET:HE2	1.84	0.59
2:D:346:PRO:O	2:D:349:LYS:HG2	2.02	0.59
2:B:388:LYS:HB3	2:B:389:PRO:HD3	1.84	0.59
2:D:210:MET:HE1	2:D:250:ARG:CB	2.34	0.58
1:A:137:THR:HG22	1:A:296:LEU:HD12	1.84	0.58
2:B:203:GLN:NE2	5:B:502:GOL:H12	2.21	0.56
1:C:253:PRO:CB	1:C:254:PRO:HD3	2.35	0.56
1:A:139:GLY:HA2	1:A:294:PRO:HD3	1.87	0.56
1:A:16:GLY:HA3	1:A:34:LYS:O	2.06	0.56
1:C:131:GLN:HB3	6:C:305:CL:CL	2.43	0.56
2:D:210:MET:CE	2:D:250:ARG:HB2	2.37	0.55
1:C:139:GLY:HA2	1:C:294:PRO:HD3	1.87	0.55
2:D:194:LYS:HD3	2:D:351:LEU:HD23	1.88	0.55
2:B:194:LYS:HD3	2:B:351:LEU:HD23	1.89	0.54
1:C:255:LEU:HG	1:C:259:GLY:HA3	1.90	0.54
2:B:404:HIS:HD2	2:B:406:GLN:N	1.91	0.54
1:C:88:LYS:HA	1:C:91:MET:HE2	1.90	0.54
1:A:165:THR:HG22	7:A:532:HOH:O	2.08	0.53
2:B:395:HIS:HE1	2:B:427:PRO:O	1.92	0.52
2:D:210:MET:HE1	2:D:250:ARG:HB3	1.92	0.52
2:B:226:LYS:HE3	1:C:206:ASP:OD2	2.10	0.52
2:D:396:GLN:HE21	2:D:400:LYS:HE3	1.75	0.52
1:A:1:MET:HE1	1:A:32:LEU:HD21	1.92	0.52
2:D:370:GLN:HB3	7:D:647:HOH:O	2.07	0.52
1:A:60:HIS:CG	1:A:61:PRO:HD2	2.45	0.52
2:B:210:MET:HE1	2:B:250:ARG:HB3	1.93	0.52
1:C:65:LYS:HG2	7:C:469:HOH:O	2.09	0.51
2:B:247:SER:N	5:B:502:GOL:H11	2.25	0.51
1:A:89:LYS:NZ	5:A:306:GOL:H2	2.25	0.51
1:C:16:GLY:HA3	1:C:34:LYS:O	2.10	0.51
1:A:255:LEU:HG	1:A:259:GLY:HA3	1.93	0.50
1:A:253:PRO:CB	1:A:254:PRO:HD3	2.40	0.49
2:D:395:HIS:HE1	2:D:427:PRO:O	1.94	0.49
1:A:1:MET:CE	1:A:32:LEU:HD21	2.42	0.49
1:C:60:HIS:CG	1:C:61:PRO:HD2	2.48	0.49
1:C:1:MET:HE1	1:C:32:LEU:HD21	1.94	0.48
1:C:181:SER:HB3	7:C:505:HOH:O	2.13	0.48
1:A:121:HIS:C	1:A:122:ARG:HG3	2.35	0.47
1:A:256:ASP:O	1:A:260:ARG:HG3	2.15	0.47
2:B:354:LEU:HD12	2:B:387:LEU:HD23	1.97	0.47
1:C:1:MET:CE	1:C:32:LEU:HD21	2.44	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:49:ILE:HG23	2:D:306:LEU:HD12	1.98	0.46
1:C:176:GLY:O	1:C:234:PRO:HG2	2.16	0.46
1:A:49:ILE:HG23	2:B:306:LEU:HD12	1.97	0.46
2:D:175:VAL:N	7:D:734:HOH:O	2.49	0.46
2:D:274:GLU:HG2	2:D:277:GLU:HG3	1.97	0.45
2:B:210:MET:HE1	2:B:250:ARG:HB2	1.96	0.45
1:A:121:HIS:O	1:A:122:ARG:HG3	2.16	0.45
1:A:131:GLN:HB3	6:A:307:CL:CL	2.54	0.45
2:B:274:GLU:HG2	2:B:277:GLU:HG3	1.98	0.45
1:C:2:GLU:HG3	1:C:3:ASN:N	2.33	0.45
1:C:56:LYS:HB3	1:C:56:LYS:HE2	1.80	0.44
1:A:181:SER:HB3	7:A:470:HOH:O	2.17	0.44
1:C:121:HIS:C	1:C:122:ARG:HG3	2.37	0.44
1:C:256:ASP:O	1:C:260:ARG:HG3	2.16	0.44
1:A:4:PHE:HZ	5:A:305:GOL:H32	1.82	0.43
1:A:2:GLU:HG3	1:A:3:ASN:N	2.34	0.43
2:B:401:ALA:N	2:B:402:PRO:CD	2.81	0.43
5:B:501:GOL:H31	1:C:210:ASP:HA	2.00	0.43
2:D:274:GLU:CG	2:D:277:GLU:HG3	2.49	0.43
1:A:199:ARG:HG2	7:A:498:HOH:O	2.17	0.43
1:A:213:PHE:O	1:A:217:ARG:HG3	2.19	0.43
1:C:198:THR:O	1:C:199:ARG:HB2	2.19	0.42
2:D:281:ILE:HD12	2:D:281:ILE:HA	1.91	0.42
1:A:124:LEU:HG	1:A:152:PHE:CD2	2.55	0.42
1:A:44:VAL:HA	1:A:45:PRO:HD3	1.92	0.42
1:A:283:HIS:CG	1:A:284:PRO:HD2	2.54	0.42
2:B:210:MET:HE3	2:B:250:ARG:HB2	2.02	0.42
2:B:396:GLN:HE21	2:B:400:LYS:HE3	1.84	0.42
1:C:124:LEU:HG	1:C:152:PHE:CD2	2.55	0.42
1:A:105:LYS:HE2	1:A:285:PHE:CZ	2.54	0.42
1:A:176:GLY:O	1:A:234:PRO:HG2	2.20	0.42
2:D:210:MET:HE3	2:D:250:ARG:HB2	2.01	0.42
2:D:179:GLN:HA	2:D:179:GLN:OE1	2.19	0.41
1:A:56:LYS:HE2	1:A:56:LYS:HB3	1.83	0.41
1:C:278:LYS:HD2	2:D:177:ASP:OD2	2.20	0.41
1:A:131:GLN:NE2	6:A:307:CL:CL	2.90	0.41
2:B:394:LEU:HD12	2:B:394:LEU:HA	1.90	0.41
2:B:179:GLN:HA	2:B:179:GLN:OE1	2.20	0.41
2:B:376:LEU:HD23	2:B:376:LEU:HA	1.93	0.41
2:D:193:CYS:O	2:D:241:ARG:HD2	2.21	0.41
1:A:88:LYS:HD3	5:A:306:GOL:O3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:148:LEU:HD13	7:A:408:HOH:O	2.21	0.41
2:D:354:LEU:HD12	2:D:387:LEU:HD23	2.03	0.41
2:D:401:ALA:N	2:D:402:PRO:CD	2.84	0.41
1:C:52:ILE:O	1:C:56:LYS:HG3	2.22	0.40
2:B:274:GLU:HA	7:B:684:HOH:O	2.22	0.40
2:B:281:ILE:HD12	2:B:281:ILE:HA	1.91	0.40
2:B:348:LEU:HD23	2:B:348:LEU:HA	1.97	0.40
1:C:162:GLU:CD	1:C:162:GLU:H	2.25	0.40
2:D:417:LYS:HE2	2:D:418:TYR:CE2	2.56	0.40
2:B:292:LEU:HD23	2:B:292:LEU:HA	1.90	0.40
1:C:283:HIS:CG	1:C:284:PRO:HD2	2.56	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	293/296 (99%)	286 (98%)	6 (2%)	1 (0%)	37	30
1	C	293/296 (99%)	287 (98%)	5 (2%)	1 (0%)	37	30
2	B	255/257 (99%)	255 (100%)	0	0	100	100
2	D	255/257 (99%)	255 (100%)	0	0	100	100
All	All	1096/1106 (99%)	1083 (99%)	11 (1%)	2 (0%)	44	38

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	163	VAL
1	C	163	VAL

### 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	260/260 (100%)	256 (98%)	4 (2%)	60	60
1	C	260/260 (100%)	256 (98%)	4 (2%)	60	60
2	B	230/230 (100%)	230 (100%)	0	100	100
2	D	230/230 (100%)	230 (100%)	0	100	100
All	All	980/980 (100%)	972 (99%)	8 (1%)	79	80

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	ARG
1	A	131	GLN
1	A	163	VAL
1	A	233	MET
1	C	122	ARG
1	C	131	GLN
1	C	163	VAL
1	C	233	MET

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

Mol	Chain	Res	Type
1	A	84	HIS
1	A	113	GLN
1	A	131	GLN
1	A	287	GLN
2	B	254	GLN
2	B	312	ASN
2	B	379	GLN
2	B	395	HIS
2	B	396	GLN
2	B	404	HIS
1	C	84	HIS

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Mol	Chain	Res	Type
1	C	113	GLN
1	C	131	GLN
1	C	287	GLN
2	D	254	GLN
2	D	312	ASN
2	D	379	GLN
2	D	395	HIS
2	D	396	GLN
2	D	404	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\# Z  > 2$
1	TPO	C	160	1	8,10,11	1.16	0	10,14,16	0.97	0
1	TPO	A	160	1	8,10,11	1.12	0	10,14,16	0.98	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
1	TPO	C	160	1	-	0/9/11/13	-
1	TPO	A	160	1	-	0/9/11/13	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 17 ligands modelled in this entry, 6 are monoatomic - leaving 11 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	502	-	5,5,5	0.39	0	5,5,5	0.37	0
5	GOL	A	306	-	5,5,5	0.39	0	5,5,5	0.23	0
5	GOL	D	503	-	5,5,5	0.36	0	5,5,5	0.36	0
5	GOL	A	305	-	5,5,5	0.36	0	5,5,5	0.41	0
3	ADP	C	301	4	24,29,29	1.03	1 (4%)	29,45,45	1.07	2 (6%)
5	GOL	C	304	-	5,5,5	0.32	0	5,5,5	0.49	0
5	GOL	B	501	-	5,5,5	0.36	0	5,5,5	0.37	0
5	GOL	D	501	-	5,5,5	0.42	0	5,5,5	0.24	0
3	ADP	A	301	4	24,29,29	0.99	2 (8%)	29,45,45	1.06	2 (6%)
5	GOL	D	502	-	5,5,5	0.36	0	5,5,5	0.51	0
5	GOL	A	304	-	5,5,5	0.37	0	5,5,5	0.34	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	502	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	A	306	-	-	3/4/4/4	-
5	GOL	D	503	-	-	2/4/4/4	-
5	GOL	A	305	-	-	2/4/4/4	-
3	ADP	C	301	4	-	1/12/32/32	0/3/3/3
5	GOL	C	304	-	-	2/4/4/4	-
5	GOL	B	501	-	-	2/4/4/4	-
5	GOL	D	501	-	-	3/4/4/4	-
3	ADP	A	301	4	-	3/12/32/32	0/3/3/3
5	GOL	D	502	-	-	0/4/4/4	-
5	GOL	A	304	-	-	2/4/4/4	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	301	ADP	PA-O3A	3.12	1.62	1.59
3	A	301	ADP	PA-O3A	2.71	1.62	1.59
3	A	301	ADP	C2-N3	2.02	1.35	1.32

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	301	ADP	N3-C2-N1	-3.71	123.63	128.67
3	A	301	ADP	N3-C2-N1	-3.50	123.92	128.67
3	A	301	ADP	C4-C5-N7	-2.19	107.02	109.34
3	C	301	ADP	C4-C5-N7	-2.11	107.11	109.34

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	304	GOL	O1-C1-C2-C3
5	A	305	GOL	O1-C1-C2-C3
5	A	306	GOL	O1-C1-C2-C3
5	B	501	GOL	O1-C1-C2-C3
5	C	304	GOL	O1-C1-C2-C3
5	D	503	GOL	O1-C1-C2-C3
5	A	304	GOL	O1-C1-C2-O2
5	A	305	GOL	O1-C1-C2-O2
5	C	304	GOL	O1-C1-C2-O2

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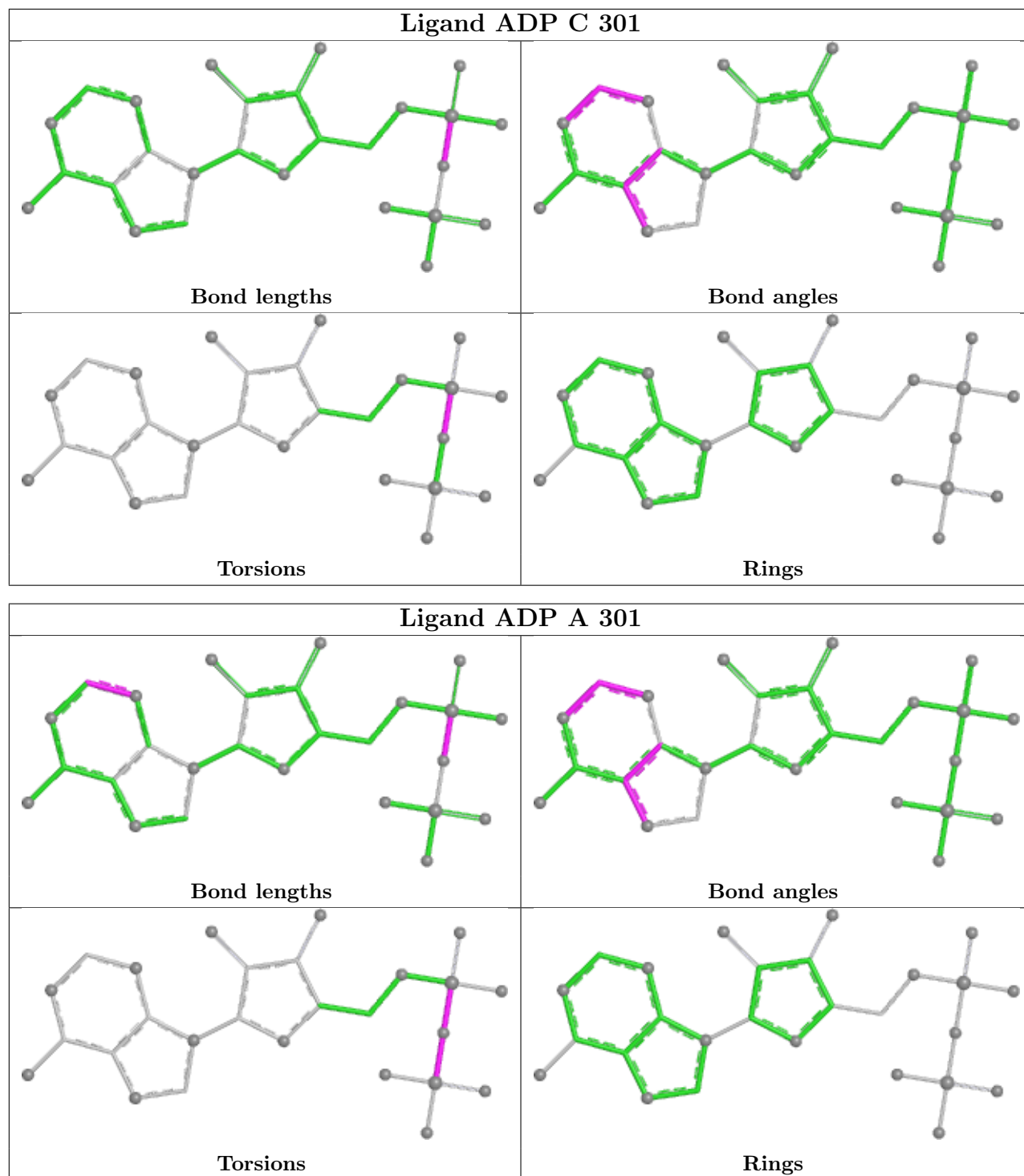
Mol	Chain	Res	Type	Atoms
5	D	501	GOL	O1-C1-C2-C3
5	D	501	GOL	C1-C2-C3-O3
5	A	306	GOL	O1-C1-C2-O2
5	D	503	GOL	O1-C1-C2-O2
3	A	301	ADP	PA-O3A-PB-O1B
3	A	301	ADP	PB-O3A-PA-O1A
5	A	306	GOL	O2-C2-C3-O3
5	B	501	GOL	O1-C1-C2-O2
5	D	501	GOL	O2-C2-C3-O3
3	A	301	ADP	PB-O3A-PA-O2A
3	C	301	ADP	PB-O3A-PA-O2A

There are no ring outliers.

4 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	502	GOL	2	0
5	A	306	GOL	2	0
5	A	305	GOL	2	0
5	B	501	GOL	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

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	295/296 (99%)	0.11	21 (7%) 23 25	20, 34, 75, 123	0
1	C	295/296 (99%)	0.09	18 (6%) 28 29	20, 35, 75, 123	0
2	B	257/257 (100%)	-0.15	8 (3%) 51 53	19, 34, 59, 107	0
2	D	257/257 (100%)	-0.10	8 (3%) 51 53	17, 32, 59, 107	0
All	All	1104/1106 (99%)	-0.00	55 (4%) 35 38	17, 34, 68, 123	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	175	VAL	8.6
2	B	175	VAL	7.4
1	C	15	TYR	4.9
1	A	295	HIS	4.5
1	A	15	TYR	4.4
1	C	295	HIS	4.3
1	A	39	THR	4.3
1	C	96	LEU	4.0
1	C	39	THR	4.0
1	A	38	ASP	3.7
2	B	431	SER	3.6
1	C	14	THR	3.6
2	D	431	SER	3.6
1	A	2	GLU	3.5
1	C	41	THR	3.4
1	C	74	ASN	3.3
1	A	14	THR	3.3
1	C	296	LEU	3.3
1	A	41	THR	3.2
1	A	74	ASN	3.2
1	A	96	LEU	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	296	LEU	3.0
1	C	38	ASP	3.0
2	B	429	THR	3.0
2	B	403	GLN	3.0
1	C	2	GLU	3.0
1	A	163	VAL	3.0
1	A	179	TYR	2.9
1	C	250	LYS	2.9
2	B	179	GLN	2.8
2	D	178	TYR	2.8
1	C	73	GLU	2.8
1	A	73	GLU	2.8
2	D	429	THR	2.7
2	B	430	LEU	2.7
1	A	153	GLY	2.5
1	A	42	GLU	2.5
1	A	288	ASP	2.5
1	A	1	MET	2.5
2	B	178	TYR	2.4
1	C	288	ASP	2.4
2	D	430	LEU	2.3
1	C	1	MET	2.3
1	A	154	VAL	2.3
1	C	179	TYR	2.3
1	C	40	GLU	2.2
2	D	176	PRO	2.2
1	A	40	GLU	2.1
1	A	178	LYS	2.1
2	B	177	ASP	2.1
2	D	177	ASP	2.1
1	C	42	GLU	2.0
1	C	164	VAL	2.0
2	D	403	GLN	2.0
1	A	155	PRO	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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
1	TPO	A	160	11/12	0.95	0.14	25,38,45,47	0
1	TPO	C	160	11/12	0.96	0.12	29,38,43,44	0

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

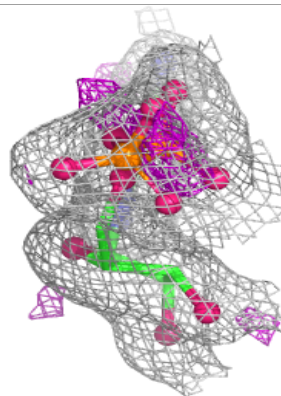
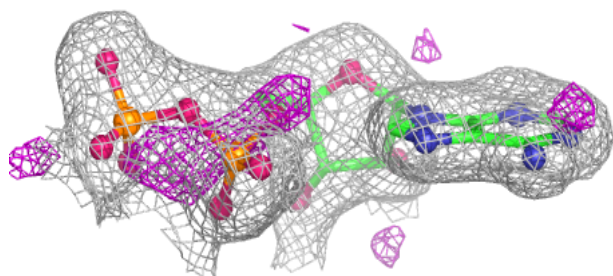
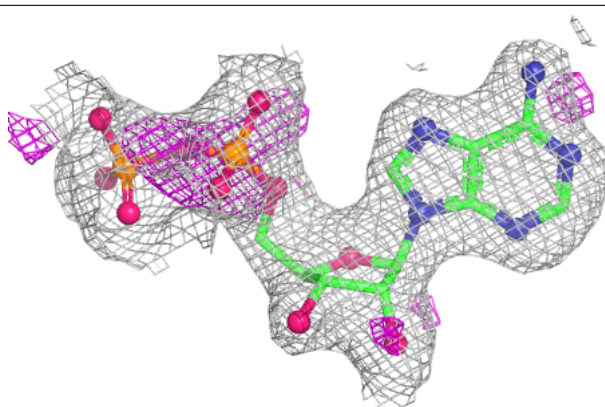
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
5	GOL	D	501	6/6	0.67	0.33	80,95,102,107	0
5	GOL	A	306	6/6	0.79	0.18	61,71,76,77	0
5	GOL	D	502	6/6	0.86	0.22	66,71,72,79	0
5	GOL	B	502	6/6	0.87	0.16	61,64,66,73	0
5	GOL	B	501	6/6	0.88	0.21	67,68,77,85	0
5	GOL	A	304	6/6	0.89	0.16	55,57,63,65	0
4	MG	C	303	1/1	0.89	0.09	57,57,57,57	0
5	GOL	C	304	6/6	0.90	0.12	31,44,50,52	0
4	MG	A	303	1/1	0.91	0.07	52,52,52,52	0
5	GOL	D	503	6/6	0.91	0.13	58,60,66,66	0
5	GOL	A	305	6/6	0.93	0.10	37,51,55,60	0
3	ADP	C	301	27/27	0.96	0.07	29,41,49,53	0
3	ADP	A	301	27/27	0.96	0.07	30,37,43,52	0
6	CL	C	305	1/1	0.96	0.06	46,46,46,46	0
6	CL	A	307	1/1	0.98	0.07	41,41,41,41	0
4	MG	A	302	1/1	0.99	0.06	34,34,34,34	0
4	MG	C	302	1/1	0.99	0.05	33,33,33,33	0

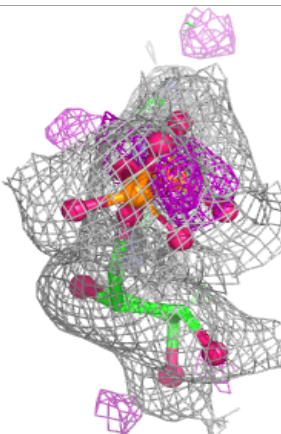
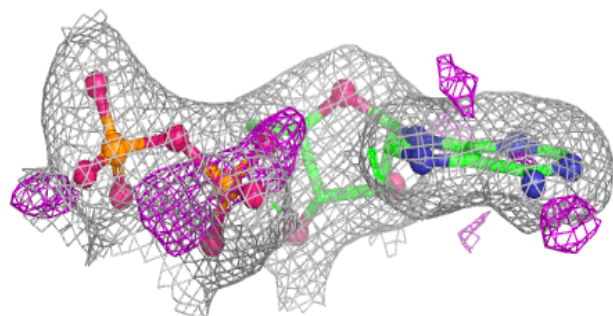
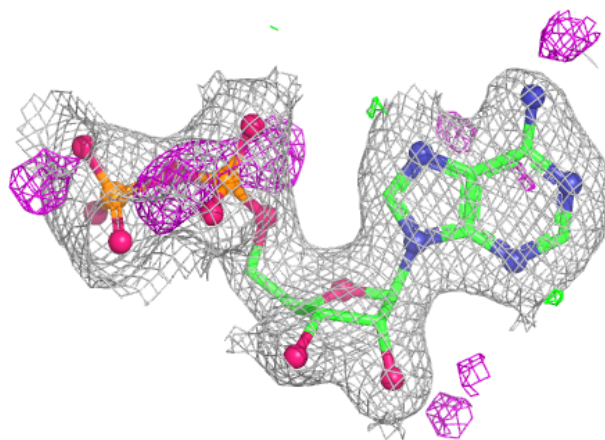
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around ADP C 301:**

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

**Electron density around ADP A 301:**

$2mF_o-DF_c$  (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.