



# Full wwPDB X-ray Structure Validation Report ⓘ

May 14, 2020 – 02:11 pm BST

PDB ID : 4U9W  
Title : Crystal Structure of NatD bound to H4/H2A peptide and CoA  
Authors : Magin, R.S.; Liszczak, G.P.; Marmorstein, R.  
Deposited on : 2014-08-06  
Resolution : 2.49 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

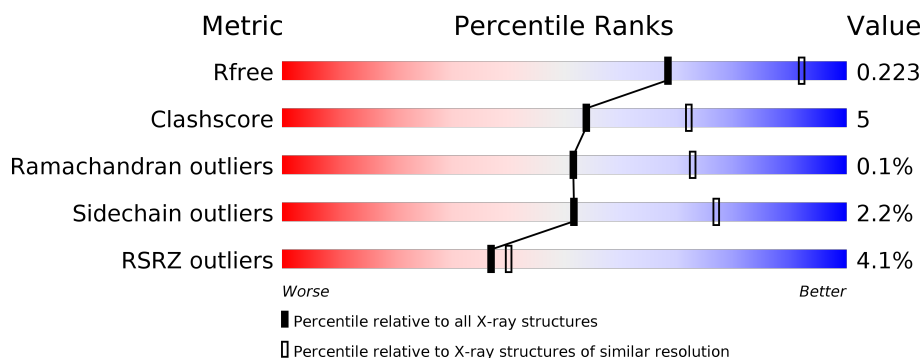
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.49 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.



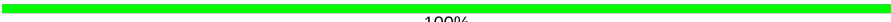
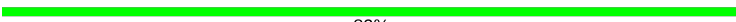
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	207	<div> <div>0%</div> <div>87% 7% 5%</div> </div>
1	B	207	<div> <div>2%</div> <div>84% 12% .</div> </div>
1	C	207	<div> <div>10%</div> <div>78% 15% 6%</div> </div>
1	D	207	<div> <div>2%</div> <div>78% 14% 7%</div> </div>
2	E	6	<div> <div></div> <div>67% 33%</div> </div>
2	F	6	<div> <div></div> <div>83% 17%</div> </div>

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Mol	Chain	Length	Quality of chain
2	G	6	 100%
2	H	6	 83% 17%

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
4	NA	C	302	-	-	-	X
4	NA	H	101	-	-	-	X

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 7122 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 N-alpha-acetyltransferase 40.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	197	Total	C	N	O	S	0	0	0
			1606	1020	274	300	12			
1	B	200	Total	C	N	O	S	0	0	0
			1628	1030	278	307	13			
1	C	195	Total	C	N	O	S	0	0	0
			1561	995	265	290	11			
1	D	192	Total	C	N	O	S	0	0	0
			1553	990	262	289	12			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	14	GLY	-	expression tag	UNP Q86UY6
A	15	SER	-	expression tag	UNP Q86UY6
A	16	MET	-	expression tag	UNP Q86UY6
B	14	GLY	-	expression tag	UNP Q86UY6
B	15	SER	-	expression tag	UNP Q86UY6
B	16	MET	-	expression tag	UNP Q86UY6
C	14	GLY	-	expression tag	UNP Q86UY6
C	15	SER	-	expression tag	UNP Q86UY6
C	16	MET	-	expression tag	UNP Q86UY6
D	14	GLY	-	expression tag	UNP Q86UY6
D	15	SER	-	expression tag	UNP Q86UY6
D	16	MET	-	expression tag	UNP Q86UY6

- Molecule 2 is a protein called Histone H4/H2A N-terminus.

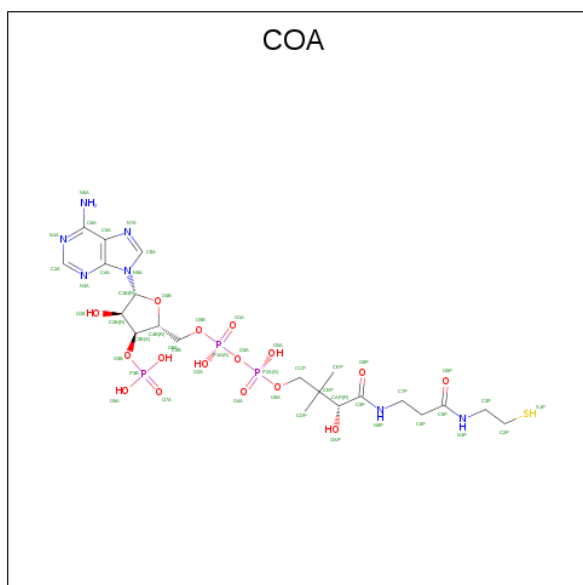
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	6	Total	C	N	O	0	0	1
			31	16	9	6			
2	F	6	Total	C	N	O	0	0	1
			31	16	9	6			

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	G	6	Total	C	N	O	0	0	1
			31	16	9	6			
2	H	6	Total	C	N	O	0	0	1
			32	17	9	6			

- Molecule 3 is COENZYME A (three-letter code: COA) (formula:  $C_{21}H_{36}N_7O_{16}P_3S$ ).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		
3	B	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		
3	C	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		
3	D	1	Total	C	N	O	P	S	0	0
			48	21	7	16	3	1		

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

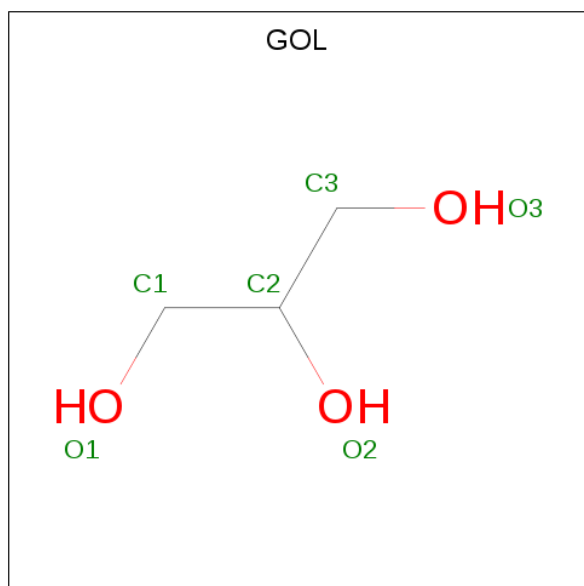
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	H	1	Total	Na	0	0
			1	1		
4	A	1	Total	Na	0	0
			1	1		
4	C	1	Total	Na	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	1	Total	Na	0	0
			1	1		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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	C	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	145	Total	O	0	0
			145	145		
6	B	117	Total	O	0	0
			117	117		
6	C	80	Total	O	0	0
			80	80		
6	D	78	Total	O	0	0
			78	78		

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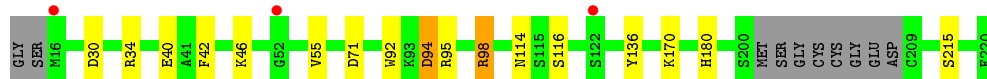
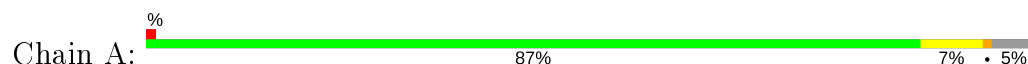
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	E	4	Total 4	O 4	0	0
6	F	2	Total 2	O 2	0	0
6	G	2	Total 2	O 2	0	0
6	H	1	Total 1	O 1	0	0

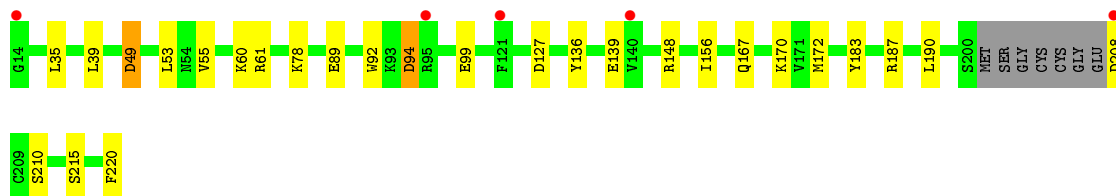
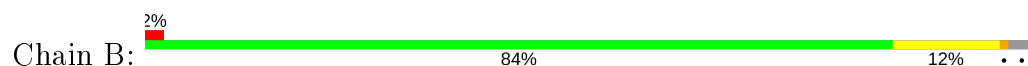
### 3 Residue-property plots [i](#)

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

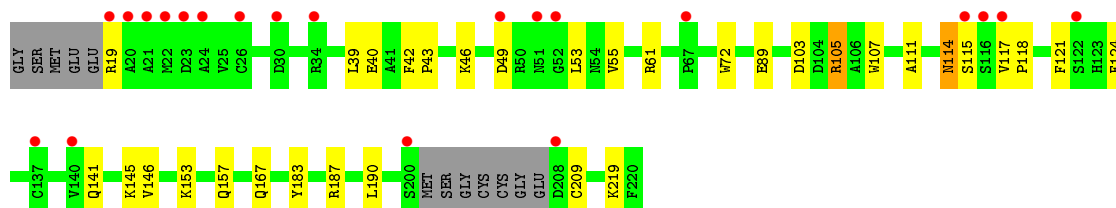
- Molecule 1: N-alpha-acetyltransferase 40



- Molecule 1: N-alpha-acetyltransferase 40



- Molecule 1: N-alpha-acetyltransferase 40



- Molecule 1: N-alpha-acetyltransferase 40






- Molecule 2: Histone H4/H2A N-terminus

Chain E:  67% 33%



- Molecule 2: Histone H4/H2A N-terminus

Chain F:  83% 17%




- Molecule 2: Histone H4/H2A N-terminus

Chain G:  100%

There are no outlier residues recorded for this chain.

- Molecule 2: Histone H4/H2A N-terminus

Chain H:  83% 17%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	52.90 Å 93.29 Å 100.33 Å 90.00° 96.69° 90.00°	Depositor
Resolution (Å)	26.24 – 2.49 26.24 – 2.49	Depositor EDS
% Data completeness (in resolution range)	97.8 (26.24-2.49) 86.5 (26.24-2.49)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.74 (at 2.50 Å)	Xtriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.176 , 0.223 0.175 , 0.223	Depositor DCC
$R_{free}$ test set	1673 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.7	Xtriage
Anisotropy	0.398	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 45.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	7122	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.70% 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: COA, GOL, NH2, NA

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	0.53	0/1641	0.62	0/2209
1	B	0.51	0/1663	0.60	0/2237
1	C	0.48	0/1596	0.57	0/2156
1	D	0.49	0/1588	0.56	0/2141
2	E	0.69	0/29	0.88	0/36
2	F	0.79	0/29	1.01	0/36
2	G	0.48	0/29	0.77	0/36
2	H	0.50	0/30	0.64	0/37
All	All	0.51	0/6605	0.59	0/8888

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	1606	0	1542	9	0
1	B	1628	0	1567	17	0
1	C	1561	0	1479	21	0
1	D	1553	0	1494	27	0
2	E	31	0	28	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	31	0	28	1	0
2	G	31	0	28	0	0
2	H	32	0	30	2	0
3	A	48	0	31	0	0
3	B	48	0	30	0	0
3	C	48	0	32	0	0
3	D	48	0	31	0	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
4	E	1	0	0	0	0
4	H	1	0	0	0	0
5	A	12	0	16	0	0
5	C	6	0	8	0	0
5	D	6	0	8	2	0
6	A	145	0	0	1	0
6	B	117	0	0	2	0
6	C	80	0	0	2	0
6	D	78	0	0	0	0
6	E	4	0	0	0	0
6	F	2	0	0	0	0
6	G	2	0	0	0	0
6	H	1	0	0	0	0
All	All	7122	0	6352	69	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 5.

All (69) 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:92:TRP:NE1	1:A:94:ASP:OD1	2.12	0.81
1:D:160:GLN:HG3	1:D:216:ARG:HH21	1.45	0.79
1:C:19:ARG:N	6:C:468:HOH:O	2.19	0.76
1:D:160:GLN:HG3	1:D:216:ARG:NH2	2.05	0.72
1:D:153:LYS:HG3	1:D:190:LEU:HD21	1.72	0.71
1:D:129:GLU:HG2	2:H:3:ARG:HH11	1.60	0.67
1:B:183:TYR:CZ	1:B:187:ARG:HG3	2.30	0.66
1:C:183:TYR:CZ	1:C:187:ARG:HG3	2.32	0.65
1:C:153:LYS:HG3	1:C:190:LEU:HD21	1.78	0.65
1:B:208:ASP:N	6:B:517:HOH:O	2.29	0.65
1:D:25:VAL:HG13	1:D:133:GLU:HG3	1.79	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:71:ASP:OD1	1:A:98:ARG:NH2	2.31	0.63
1:A:40:GLU:OE1	1:A:46:LYS:NZ	2.33	0.60
1:D:129:GLU:HG2	2:H:3:ARG:NH1	2.14	0.60
1:A:136:TYR:CE1	2:F:3:ARG:HD3	2.36	0.60
1:C:219:LYS:HD3	1:D:157:GLN:HG2	1.83	0.59
1:D:134:VAL:HG11	1:D:172:MET:HE1	1.85	0.58
1:D:134:VAL:HG11	1:D:172:MET:CE	2.34	0.57
1:C:39:LEU:HD13	1:C:46:LYS:HG2	1.87	0.57
1:C:157:GLN:HG3	1:D:220:PHE:HA	1.87	0.56
1:B:49:ASP:HA	1:B:53:LEU:O	2.07	0.54
1:C:219:LYS:HG2	6:C:474:HOH:O	2.09	0.52
1:D:49:ASP:HA	1:D:53:LEU:O	2.09	0.52
1:C:40:GLU:O	1:C:43:PRO:HD3	2.09	0.51
1:B:127:ASP:OD2	2:E:3:ARG:NH2	2.36	0.51
1:B:139:GLU:OE2	2:E:1:SER:OG	2.21	0.51
1:A:98:ARG:NH1	6:A:403:HOH:O	2.43	0.51
1:C:103:ASP:OD1	1:C:105:ARG:HG2	2.11	0.51
1:D:35:LEU:O	1:D:61:ARG:NH1	2.44	0.51
1:B:78:LYS:NZ	1:B:94:ASP:OD1	2.41	0.50
1:C:145:LYS:HG3	1:C:146:VAL:HG13	1.94	0.50
1:D:167:GLN:HA	1:D:220:PHE:CE2	2.47	0.50
1:D:92:TRP:NE1	1:D:94:ASP:OD1	2.31	0.49
1:C:49:ASP:HA	1:C:53:LEU:O	2.12	0.49
1:C:55:VAL:HG11	1:C:111:ALA:HB1	1.94	0.49
1:B:156:ILE:HG21	1:B:190:LEU:HD23	1.96	0.47
1:D:170:LYS:HE3	1:D:172:MET:CE	2.45	0.47
1:A:114:ASN:C	1:A:116:SER:H	2.18	0.47
1:B:89:GLU:OE2	1:B:210:SER:N	2.43	0.47
1:C:157:GLN:HG3	1:D:220:PHE:CA	2.44	0.46
1:C:167:GLN:HG2	1:D:44:VAL:HB	1.97	0.46
1:D:89:GLU:OE1	1:D:210:SER:OG	2.21	0.46
1:B:167:GLN:HA	1:B:220:PHE:CE1	2.51	0.45
1:B:136:TYR:CE1	2:E:3:ARG:HD3	2.51	0.45
1:D:25:VAL:HG12	1:D:128:VAL:HG22	1.98	0.45
1:C:114:ASN:HA	1:C:115:SER:HA	1.69	0.45
1:B:136:TYR:CD1	1:B:172:MET:HG3	2.51	0.45
1:B:35:LEU:O	1:B:61:ARG:NH1	2.51	0.44
1:D:194:ILE:HD12	5:D:302:GOL:H32	2.00	0.44
1:C:61:ARG:HH12	1:C:105:ARG:HA	1.81	0.44
1:A:30:ASP:O	1:A:34:ARG:HG3	2.18	0.43
1:B:170:LYS:HD3	1:B:215:SER:HB2	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:72:TRP:CH2	1:C:118:PRO:HB2	2.54	0.43
1:D:109:LEU:HD23	1:D:155:LEU:HD22	2.01	0.43
1:C:117:VAL:HA	1:C:118:PRO:HD2	1.83	0.43
1:D:49:ASP:HB3	1:D:54:ASN:OD1	2.19	0.43
1:A:180:HIS:NE2	1:D:212:GLU:OE1	2.27	0.43
1:A:170:LYS:HD3	1:A:215:SER:HB2	2.00	0.42
1:D:160:GLN:HG3	1:D:216:ARG:CZ	2.49	0.42
1:B:61:ARG:HG2	6:B:501:HOH:O	2.19	0.42
1:B:39:LEU:HD23	1:B:39:LEU:HA	1.87	0.42
1:C:107:TRP:HB2	1:C:124:PHE:O	2.19	0.42
1:B:92:TRP:NE1	1:B:94:ASP:OD1	2.37	0.41
1:D:194:ILE:HD13	5:D:302:GOL:H12	2.02	0.41
1:C:121:PHE:CE2	1:C:141:GLN:HB2	2.56	0.41
1:B:148:ARG:HD2	1:B:148:ARG:HA	1.95	0.41
1:D:39:LEU:HA	1:D:39:LEU:HD23	1.87	0.40
1:D:82:GLN:HG3	1:D:92:TRP:CG	2.57	0.40
1:C:89:GLU:OE2	1:C:209:CYS:HA	2.22	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	193/207 (93%)	191 (99%)	2 (1%)	0	100	100
1	B	196/207 (95%)	193 (98%)	3 (2%)	0	100	100
1	C	191/207 (92%)	189 (99%)	1 (0%)	1 (0%)	29	48
1	D	188/207 (91%)	186 (99%)	2 (1%)	0	100	100
2	E	4/6 (67%)	4 (100%)	0	0	100	100
2	F	4/6 (67%)	4 (100%)	0	0	100	100
2	G	4/6 (67%)	4 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	4/6 (67%)	4 (100%)	0	0	100	100
All	All	784/852 (92%)	775 (99%)	8 (1%)	1 (0%)	51	73

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	114	ASN

### 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	169/181 (93%)	164 (97%)	5 (3%)	41	68
1	B	174/181 (96%)	169 (97%)	5 (3%)	42	69
1	C	161/181 (89%)	159 (99%)	2 (1%)	71	88
1	D	166/181 (92%)	163 (98%)	3 (2%)	59	81
2	E	2/3 (67%)	2 (100%)	0	100	100
2	F	2/3 (67%)	2 (100%)	0	100	100
2	G	2/3 (67%)	2 (100%)	0	100	100
2	H	2/3 (67%)	2 (100%)	0	100	100
All	All	678/736 (92%)	663 (98%)	15 (2%)	52	77

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	PHE
1	A	55	VAL
1	A	94	ASP
1	A	95	ARG
1	A	98	ARG
1	B	49	ASP
1	B	55	VAL

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Mol	Chain	Res	Type
1	B	60	LYS
1	B	94	ASP
1	B	99	GLU
1	C	42	PHE
1	C	105	ARG
1	D	94	ASP
1	D	133	GLU
1	D	161	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 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	$\# Z  > 2$
3	COA	A	301	-	41,50,50	1.93	7 (17%)	52,75,75	1.56	10 (19%)
3	COA	C	301	-	41,50,50	1.90	10 (24%)	52,75,75	1.60	10 (19%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	C	303	-	5,5,5	0.30	0	5,5,5	0.54	0
5	GOL	A	303	-	5,5,5	0.29	0	5,5,5	0.26	0
3	COA	B	301	-	41,50,50	1.96	9 (21%)	52,75,75	1.56	9 (17%)
5	GOL	A	304	-	5,5,5	0.33	0	5,5,5	0.41	0
3	COA	D	301	-	41,50,50	1.89	8 (19%)	52,75,75	1.47	9 (17%)
5	GOL	D	302	-	5,5,5	0.33	0	5,5,5	0.35	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
3	COA	A	301	-	-	9/44/64/64	0/3/3/3
3	COA	C	301	-	-	9/44/64/64	0/3/3/3
5	GOL	C	303	-	-	3/4/4/4	-
5	GOL	A	303	-	-	2/4/4/4	-
3	COA	B	301	-	-	5/44/64/64	0/3/3/3
5	GOL	A	304	-	-	4/4/4/4	-
3	COA	D	301	-	-	7/44/64/64	0/3/3/3
5	GOL	D	302	-	-	2/4/4/4	-

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	301	COA	C9P-N8P	7.21	1.49	1.33
3	B	301	COA	C9P-N8P	7.20	1.49	1.33
3	A	301	COA	C9P-N8P	7.12	1.49	1.33
3	C	301	COA	C9P-N8P	6.77	1.48	1.33
3	B	301	COA	C5P-N4P	4.70	1.44	1.33
3	C	301	COA	C5P-N4P	4.68	1.44	1.33
3	A	301	COA	C5P-N4P	4.61	1.43	1.33
3	A	301	COA	O4B-C1B	4.22	1.47	1.41
3	D	301	COA	C5P-N4P	4.17	1.42	1.33
3	B	301	COA	O4B-C1B	4.03	1.46	1.41
3	D	301	COA	O4B-C1B	3.80	1.46	1.41
3	C	301	COA	O4B-C1B	3.51	1.46	1.41
3	A	301	COA	C2B-C1B	-3.42	1.48	1.53
3	D	301	COA	C2A-N3A	3.35	1.37	1.32
3	B	301	COA	C2A-N3A	3.00	1.36	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	301	COA	C2A-N3A	2.95	1.36	1.32
3	A	301	COA	C2A-N3A	2.95	1.36	1.32
3	C	301	COA	C2B-C3B	-2.75	1.46	1.52
3	B	301	COA	C2B-C1B	-2.71	1.49	1.53
3	B	301	COA	C2B-C3B	-2.59	1.47	1.52
3	D	301	COA	C2B-C3B	-2.55	1.47	1.52
3	C	301	COA	C2B-C1B	-2.54	1.49	1.53
3	C	301	COA	C3B-C4B	-2.51	1.46	1.52
3	C	301	COA	P3B-O3B	-2.47	1.54	1.59
3	B	301	COA	C8A-N7A	2.44	1.39	1.34
3	B	301	COA	P3B-O3B	-2.38	1.54	1.59
3	A	301	COA	C2B-C3B	-2.33	1.47	1.52
3	C	301	COA	C8A-N7A	2.19	1.38	1.34
3	C	301	COA	OAP-CAP	-2.18	1.38	1.42
3	D	301	COA	C2B-C1B	-2.14	1.50	1.53
3	B	301	COA	C3B-C4B	-2.08	1.47	1.52
3	D	301	COA	OAP-CAP	-2.08	1.38	1.42
3	D	301	COA	C3B-C4B	-2.08	1.47	1.52
3	A	301	COA	C3B-C4B	-2.01	1.47	1.52

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	301	COA	N3A-C2A-N1A	-4.88	121.05	128.68
3	C	301	COA	C7P-C6P-C5P	4.85	120.44	112.36
3	B	301	COA	C7P-C6P-C5P	4.62	120.06	112.36
3	C	301	COA	N3A-C2A-N1A	-4.58	121.51	128.68
3	B	301	COA	N3A-C2A-N1A	-4.46	121.71	128.68
3	D	301	COA	N3A-C2A-N1A	-4.02	122.40	128.68
3	D	301	COA	C7P-C6P-C5P	3.95	118.94	112.36
3	A	301	COA	CAP-C9P-N8P	3.25	123.04	116.58
3	A	301	COA	C2A-N1A-C6A	3.08	124.02	118.75
3	C	301	COA	O6A-CCP-CBP	-3.05	105.64	110.55
3	A	301	COA	C6P-C5P-N4P	2.96	121.41	116.42
3	A	301	COA	C3P-N4P-C5P	-2.77	117.70	122.84
3	C	301	COA	C2A-N1A-C6A	2.74	123.44	118.75
3	C	301	COA	P2A-O3A-P1A	-2.72	123.50	132.83
3	B	301	COA	C2P-C3P-N4P	-2.65	106.26	112.31
3	B	301	COA	C2A-N1A-C6A	2.61	123.21	118.75
3	D	301	COA	CAP-C9P-N8P	2.59	121.73	116.58
3	D	301	COA	C4A-C5A-N7A	-2.44	106.85	109.40
3	D	301	COA	C2P-C3P-N4P	-2.42	106.77	112.31

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	301	COA	O6A-CCP-CBP	-2.34	106.79	110.55
3	B	301	COA	CAP-C9P-N8P	2.31	121.18	116.58
3	B	301	COA	P2A-O3A-P1A	-2.28	125.00	132.83
3	D	301	COA	C2A-N1A-C6A	2.28	122.65	118.75
3	A	301	COA	C7P-C6P-C5P	2.22	116.05	112.36
3	B	301	COA	C4A-C5A-N7A	-2.21	107.10	109.40
3	C	301	COA	O2A-P1A-O1A	-2.20	101.38	112.24
3	C	301	COA	C3B-C2B-C1B	2.18	104.71	99.89
3	D	301	COA	O8A-P3B-O7A	-2.18	102.16	110.68
3	C	301	COA	N6A-C6A-N1A	2.16	123.06	118.57
3	D	301	COA	O5A-P2A-O4A	-2.14	101.65	112.24
3	A	301	COA	O9A-P3B-O3B	2.14	115.58	105.99
3	B	301	COA	O8A-P3B-O7A	-2.11	102.40	110.68
3	C	301	COA	CAP-C9P-N8P	2.11	120.78	116.58
3	A	301	COA	O6A-CCP-CBP	-2.11	107.16	110.55
3	C	301	COA	CEP-CBP-CAP	2.08	112.43	108.82
3	A	301	COA	C4A-C5A-N7A	-2.04	107.28	109.40
3	D	301	COA	P2A-O3A-P1A	-2.03	125.84	132.83
3	A	301	COA	O5P-C5P-N4P	-2.01	119.22	123.01

There are no chirality outliers.

All (41) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	301	COA	C3B-O3B-P3B-O8A
3	A	301	COA	C5B-O5B-P1A-O2A
3	A	301	COA	C5B-O5B-P1A-O3A
3	A	301	COA	N8P-C9P-CAP-OAP
3	A	301	COA	S1P-C2P-C3P-N4P
3	C	301	COA	C5B-O5B-P1A-O2A
3	C	301	COA	C5B-O5B-P1A-O3A
3	C	301	COA	CCP-O6A-P2A-O3A
3	C	301	COA	O9P-C9P-CAP-OAP
3	C	301	COA	N8P-C9P-CAP-OAP
3	C	301	COA	C5P-C6P-C7P-N8P
5	C	303	GOL	O1-C1-C2-C3
5	D	302	GOL	O1-C1-C2-C3
3	B	301	COA	C3B-O3B-P3B-O7A
3	B	301	COA	C5B-O5B-P1A-O3A
3	D	301	COA	C5B-O5B-P1A-O1A
3	D	301	COA	C5B-O5B-P1A-O2A
5	C	303	GOL	O1-C1-C2-O2

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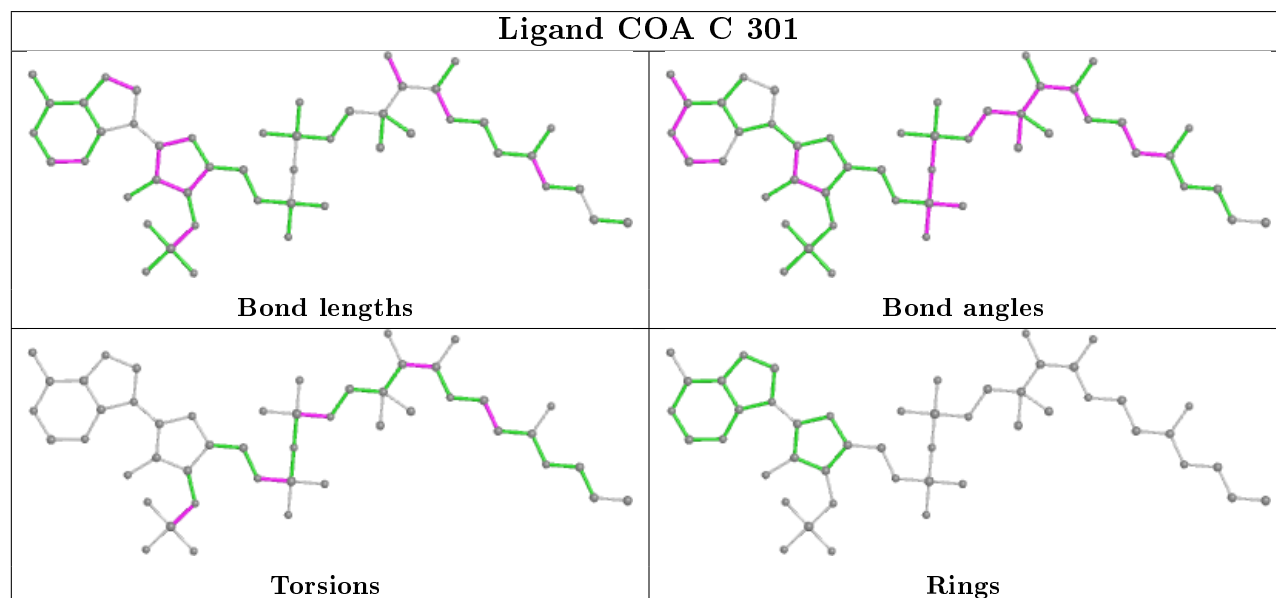
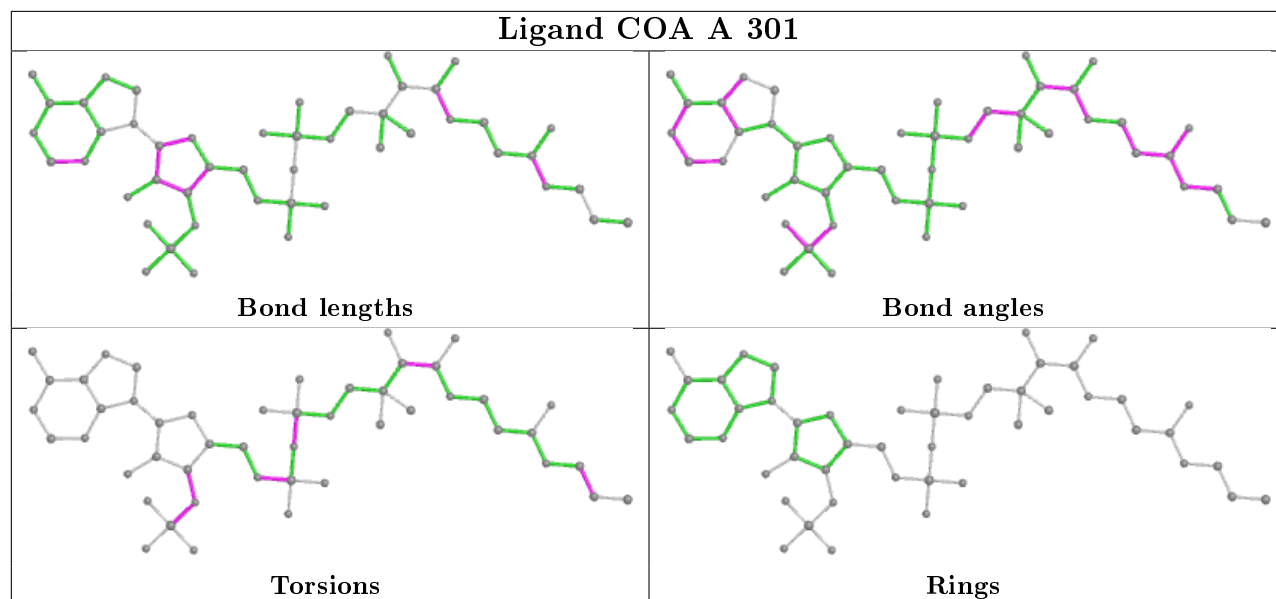
Mol	Chain	Res	Type	Atoms
5	D	302	GOL	O1-C1-C2-O2
3	B	301	COA	C5P-C6P-C7P-N8P
3	A	301	COA	O9P-C9P-CAP-OAP
5	A	304	GOL	O2-C2-C3-O3
3	C	301	COA	C3B-O3B-P3B-O8A
5	A	304	GOL	O1-C1-C2-O2
3	D	301	COA	C3B-O3B-P3B-O8A
3	B	301	COA	P1A-O3A-P2A-O4A
3	A	301	COA	C5B-O5B-P1A-O1A
3	C	301	COA	C5B-O5B-P1A-O1A
3	C	301	COA	CCP-O6A-P2A-O5A
3	B	301	COA	C5B-O5B-P1A-O1A
3	D	301	COA	C6P-C7P-N8P-C9P
3	D	301	COA	CDP-CBP-CCP-O6A
3	A	301	COA	P1A-O3A-P2A-O4A
5	C	303	GOL	O2-C2-C3-O3
5	A	303	GOL	C1-C2-C3-O3
5	A	304	GOL	O1-C1-C2-C3
5	A	303	GOL	O2-C2-C3-O3
3	D	301	COA	CEP-CBP-CCP-O6A
3	A	301	COA	C2B-C3B-O3B-P3B
3	D	301	COA	C5B-O5B-P1A-O3A
5	A	304	GOL	C1-C2-C3-O3

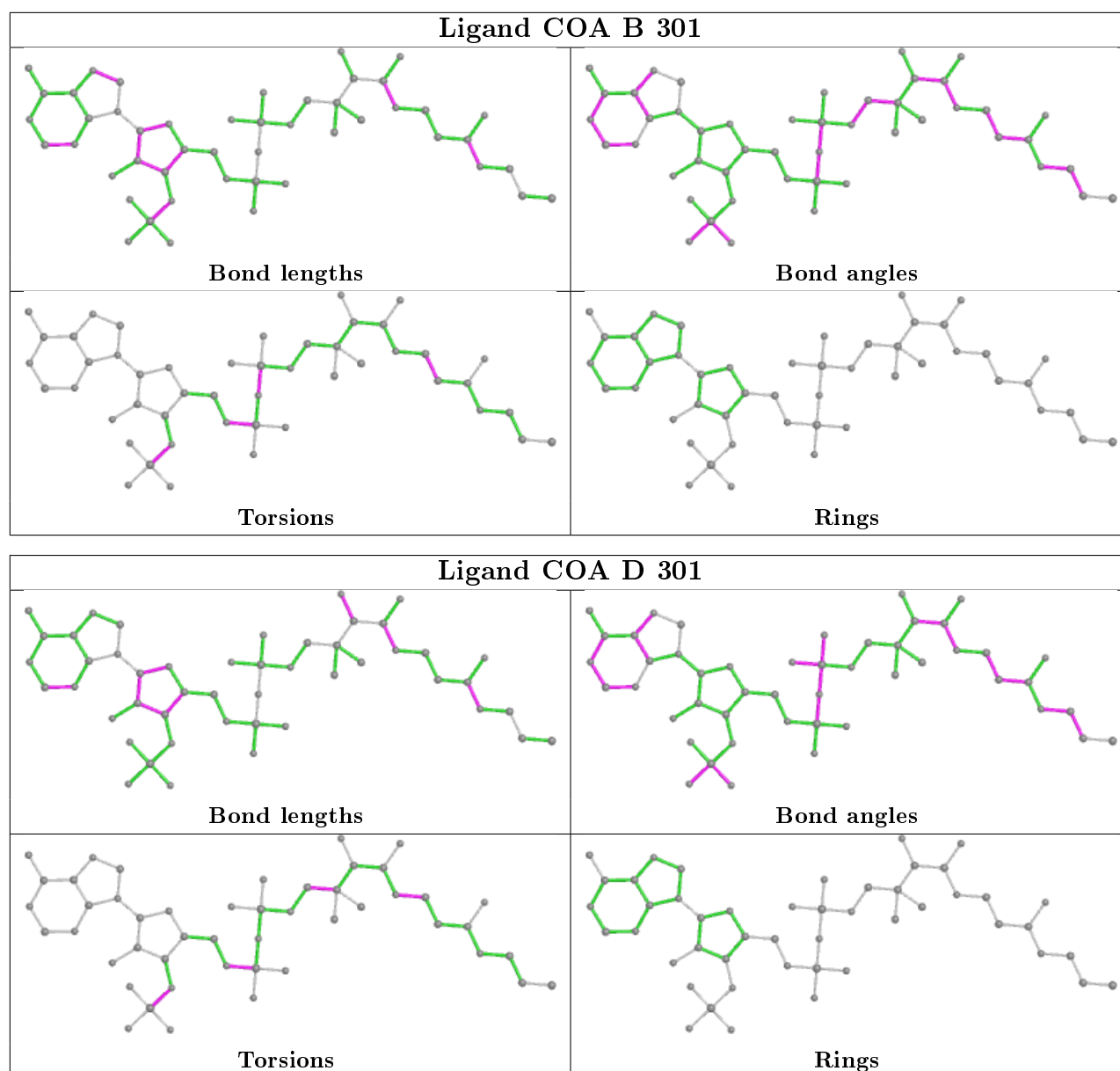
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	302	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.





## 5.7 Other polymers ⓘ

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	197/207 (95%)	-0.21	3 (1%) 73 75	8, 20, 36, 49	0
1	B	200/207 (96%)	-0.12	5 (2%) 57 61	10, 21, 37, 54	0
1	C	195/207 (94%)	0.29	21 (10%) 5 5	19, 32, 54, 69	0
1	D	192/207 (92%)	0.11	4 (2%) 63 66	18, 30, 45, 53	0
2	E	5/6 (83%)	0.01	0 100 100	20, 21, 23, 31	0
2	F	5/6 (83%)	0.07	0 100 100	18, 19, 20, 25	0
2	G	5/6 (83%)	-0.21	0 100 100	25, 25, 27, 35	0
2	H	5/6 (83%)	0.42	0 100 100	29, 29, 34, 39	0
All	All	804/852 (94%)	0.02	33 (4%) 37 40	8, 26, 44, 69	0

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	20	ALA	5.8
1	C	21	ALA	4.0
1	C	116	SER	3.9
1	C	24	ALA	3.7
1	C	140	VAL	3.1
1	C	115	SER	3.0
1	C	122	SER	3.0
1	C	67	PRO	3.0
1	D	137	CYS	3.0
1	C	34	ARG	3.0
1	A	16	MET	3.0
1	D	122	SER	2.8
1	B	140	VAL	2.7
1	C	49	ASP	2.7
1	C	51	ASN	2.7
1	C	26	CYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	95	ARG	2.5
1	D	140	VAL	2.5
1	D	121	PHE	2.5
1	C	52	GLY	2.5
1	B	14	GLY	2.4
1	C	19	ARG	2.4
1	A	122	SER	2.3
1	C	23	ASP	2.3
1	C	117	VAL	2.3
1	C	200	SER	2.3
1	A	52	GLY	2.3
1	B	208	ASP	2.1
1	C	137	CYS	2.1
1	C	208	ASP	2.0
1	C	22	MET	2.0
1	B	121	PHE	2.0
1	C	30	ASP	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates 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
4	NA	C	302	1/1	0.71	0.51	36,36,36,36	0
4	NA	H	101	1/1	0.79	0.56	36,36,36,36	0
4	NA	A	302	1/1	0.86	0.20	24,24,24,24	0
5	GOL	D	302	6/6	0.88	0.26	30,34,37,37	0
4	NA	E	101	1/1	0.91	0.48	34,34,34,34	0
5	GOL	C	303	6/6	0.91	0.14	29,31,32,32	0

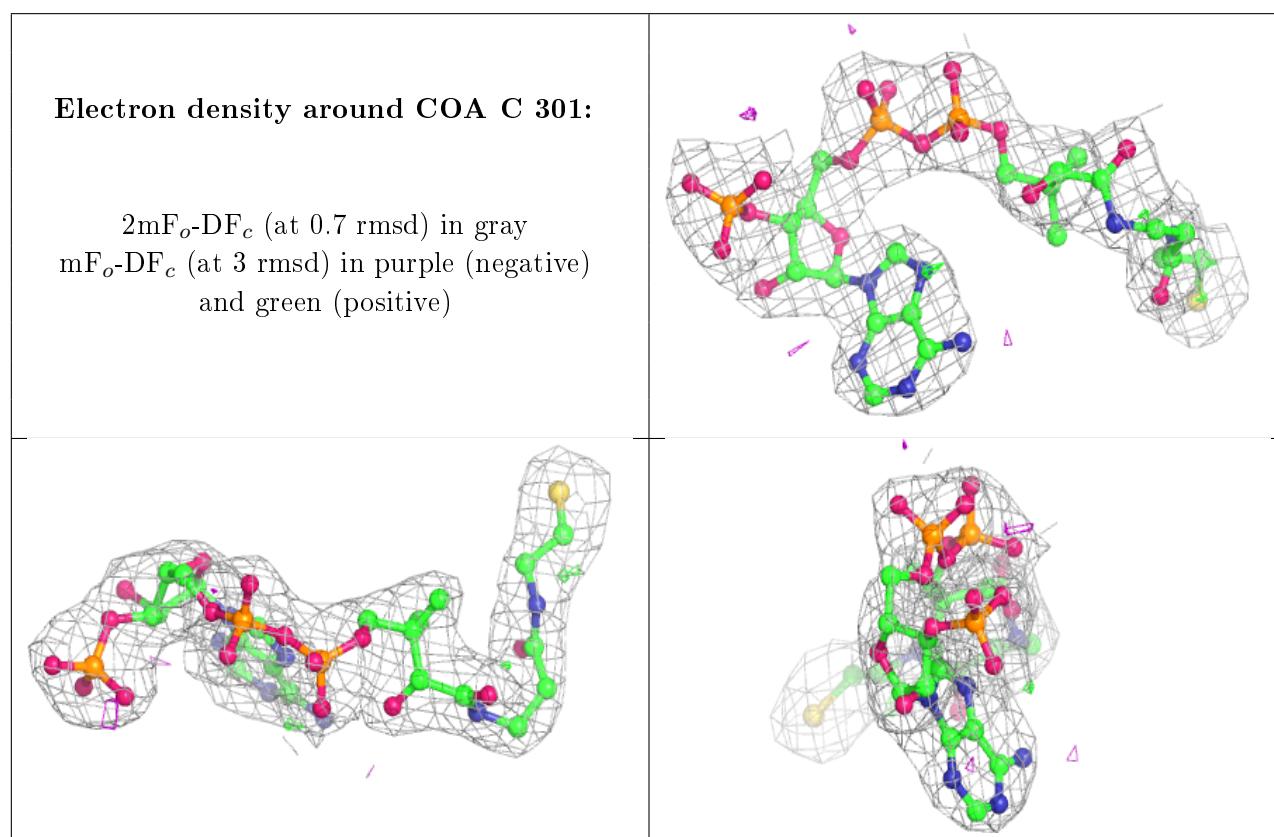
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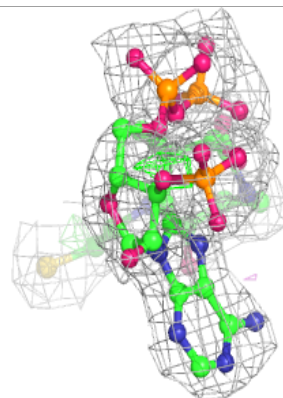
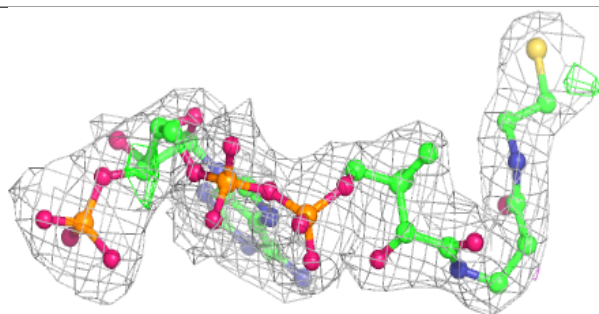
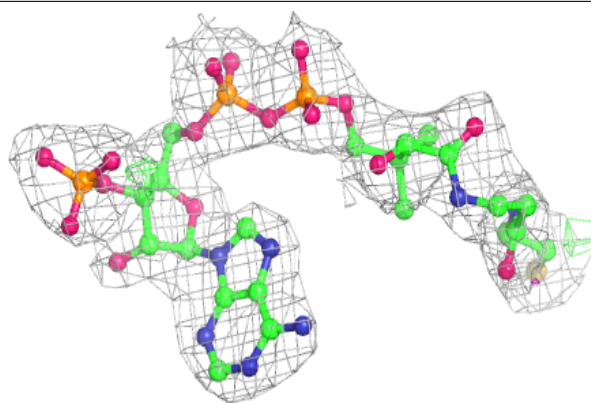
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	GOL	A	303	6/6	0.92	0.18	20,23,28,30	0
3	COA	C	301	48/48	0.92	0.15	24,27,37,39	0
5	GOL	A	304	6/6	0.93	0.14	20,26,32,36	0
3	COA	D	301	48/48	0.93	0.15	20,27,35,42	0
3	COA	A	301	48/48	0.95	0.12	12,20,26,29	0
3	COA	B	301	48/48	0.95	0.14	13,20,28,38	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.

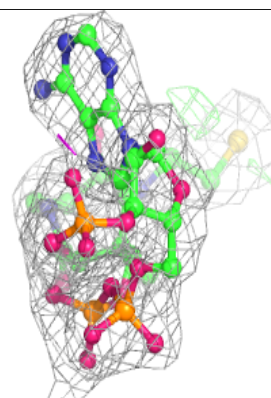
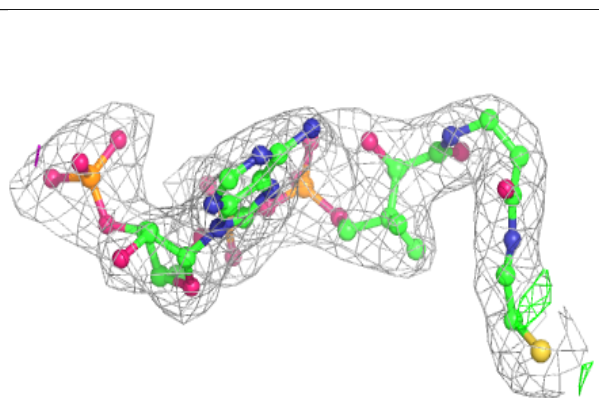
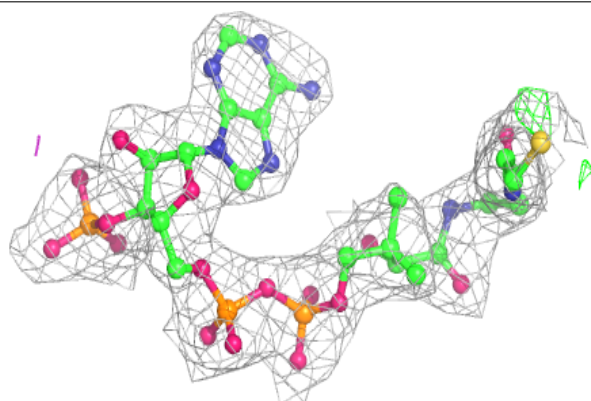


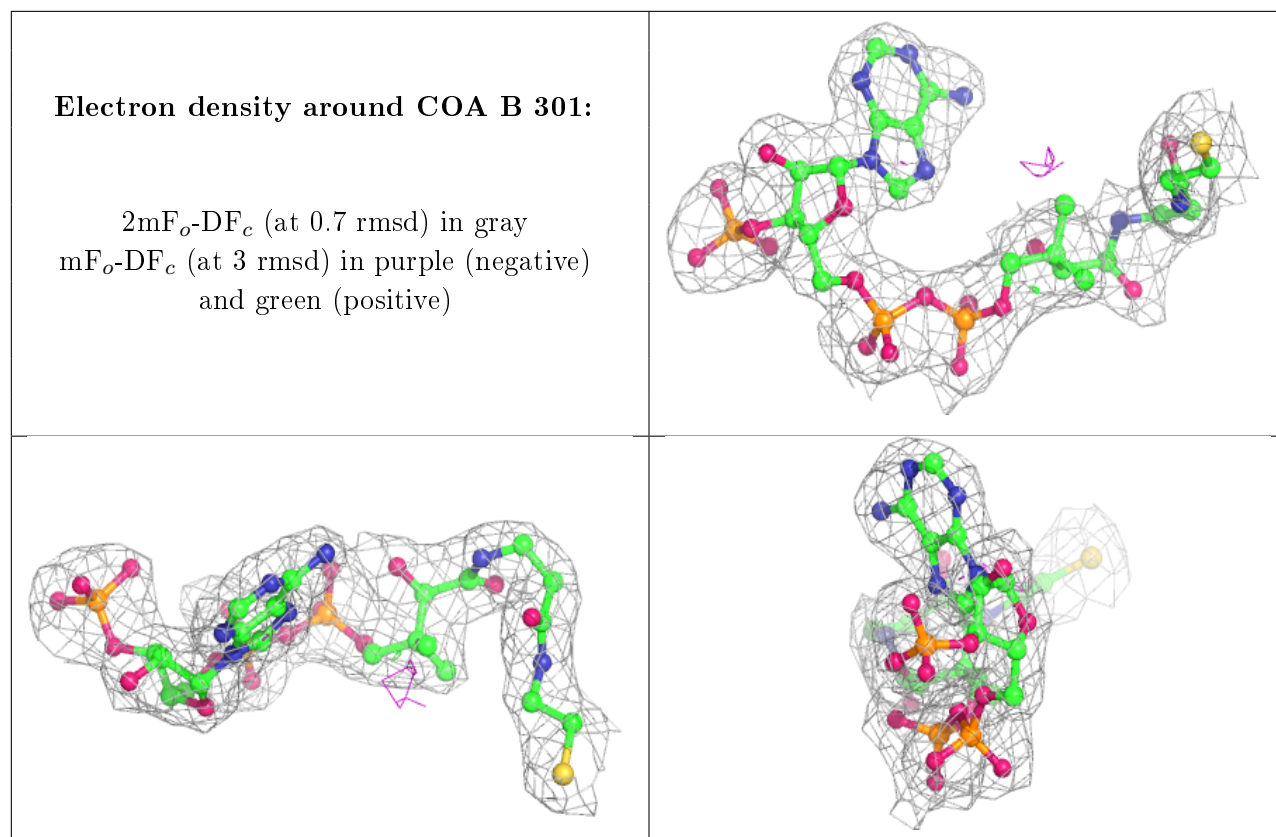
**Electron density around COA D 301:**

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

**Electron density around COA 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.