



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 29, 2024 – 06:15 pm GMT

PDB ID : 8CN0  
Title : Crystal structure of CREBBP-Y1482N histone acetyltransferase domain in complex with Coenzyme A  
Authors : Mechaly, A.E.; Zhang, W.; Haouz, A.; Green, M.; Rodrigues-Lima, F.  
Deposited on : 2023-02-21  
Resolution : 2.44 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 : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

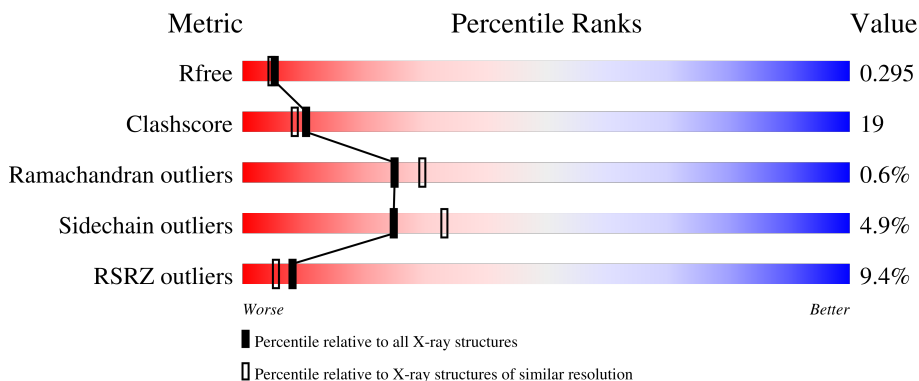
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.44 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	1564 (2.46-2.42)
Clashscore	141614	1631 (2.46-2.42)
Ramachandran outliers	138981	1617 (2.46-2.42)
Sidechain outliers	138945	1617 (2.46-2.42)
RSRZ outliers	127900	1547 (2.46-2.42)

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	640	

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
2	ZN	A	1804	-	-	-	X

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4503 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 histone acetyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	534	4426	2830	763	798	35	0	1	0

There are 37 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1054	HIS	-	expression tag	UNP F8VPR5
A	1055	HIS	-	expression tag	UNP F8VPR5
A	1056	HIS	-	expression tag	UNP F8VPR5
A	1057	HIS	-	expression tag	UNP F8VPR5
A	1058	HIS	-	expression tag	UNP F8VPR5
A	1059	HIS	-	expression tag	UNP F8VPR5
A	1060	ASP	-	expression tag	UNP F8VPR5
A	1061	TYR	-	expression tag	UNP F8VPR5
A	1062	ASP	-	expression tag	UNP F8VPR5
A	1063	ILE	-	expression tag	UNP F8VPR5
A	1064	PRO	-	expression tag	UNP F8VPR5
A	1065	THR	-	expression tag	UNP F8VPR5
A	1066	THR	-	expression tag	UNP F8VPR5
A	1067	GLU	-	expression tag	UNP F8VPR5
A	1068	ASN	-	expression tag	UNP F8VPR5
A	1069	LEU	-	expression tag	UNP F8VPR5
A	1070	TYR	-	expression tag	UNP F8VPR5
A	1071	PHE	-	expression tag	UNP F8VPR5
A	1072	GLN	-	expression tag	UNP F8VPR5
A	1073	GLY	-	expression tag	UNP F8VPR5
A	1074	ALA	-	expression tag	UNP F8VPR5
A	1075	MET	-	expression tag	UNP F8VPR5
A	1076	GLY	-	expression tag	UNP F8VPR5
A	1077	SER	-	expression tag	UNP F8VPR5
A	1078	SER	-	expression tag	UNP F8VPR5
A	1079	GLN	-	expression tag	UNP F8VPR5
A	1080	PRO	-	expression tag	UNP F8VPR5

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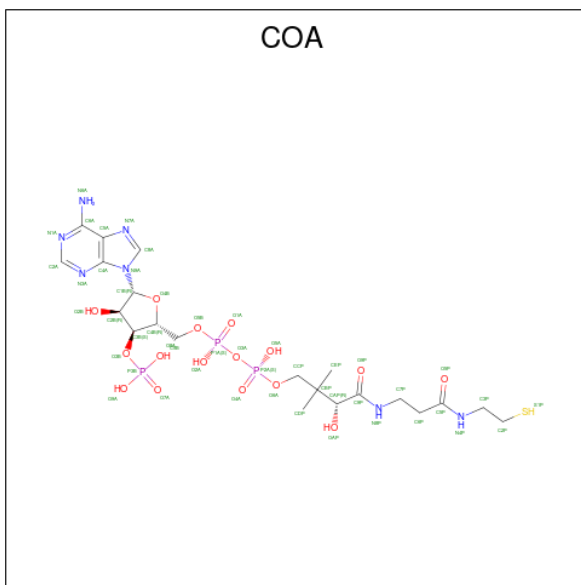
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Chain	Residue	Modelled	Actual	Comment	Reference
A	1081	ARG	-	expression tag	UNP F8VPR5
A	1082	LYS	-	expression tag	UNP F8VPR5
A	1083	LYS	-	expression tag	UNP F8VPR5
A	1084	ILE	-	expression tag	UNP F8VPR5
A	1482	ASN	TYR	engineered mutation	UNP F8VPR5
A	1613	SER	-	linker	UNP F8VPR5
A	1614	GLY	-	linker	UNP F8VPR5
A	1615	GLY	-	linker	UNP F8VPR5
A	1616	SER	-	linker	UNP F8VPR5
A	1617	GLY	-	linker	UNP F8VPR5

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	5	Total Zn 5 5	0	0

- Molecule 3 is COENZYME A (three-letter code: COA) (formula: C<sub>21</sub>H<sub>36</sub>N<sub>7</sub>O<sub>16</sub>P<sub>3</sub>S) (labeled as "Ligand of Interest" by depositor).



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

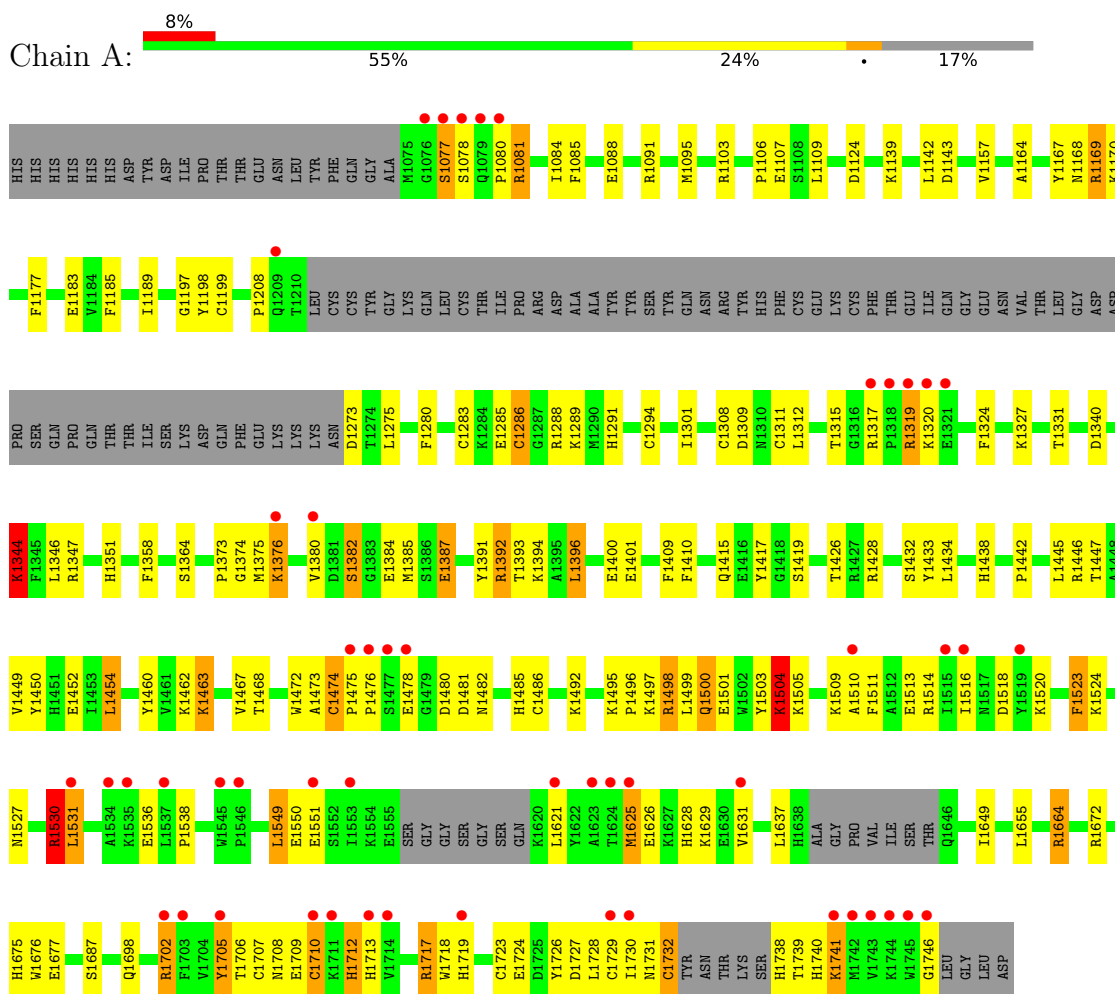
- Molecule 4 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
4	A	24	Total 24	O 24	0	0

### 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: histone acetyltransferase



## 4 Data and refinement statistics i

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	87.01Å 148.59Å 155.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	75.89 – 2.44 107.30 – 2.44	Depositor EDS
% Data completeness (in resolution range)	61.8 (75.89-2.44) 61.8 (107.30-2.44)	Depositor EDS
$R_{merge}$	0.17	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.59 (at 2.45Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.258 , 0.304 0.253 , 0.295	Depositor DCC
$R_{free}$ test set	1193 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	55.6	Xtrriage
Anisotropy	0.121	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 35.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.006 for -h,-l,-k	Xtrriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	4503	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	59.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.90% 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: ZN, COA

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	0.68	1/4551 (0.0%)	1.06	23/6151 (0.4%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1286	CYS	CB-SG	-6.10	1.71	1.82

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1392	ARG	NE-CZ-NH1	-9.75	115.42	120.30
1	A	1376	LYS	CA-CB-CG	9.47	134.24	113.40
1	A	1531	LEU	CA-CB-CG	9.29	136.66	115.30
1	A	1705	TYR	CB-CG-CD2	-8.09	116.14	121.00
1	A	1504	LYS	CA-CB-CG	7.04	128.89	113.40
1	A	1729	CYS	CA-CB-SG	7.04	126.66	114.00
1	A	1698	GLN	CA-CB-CG	-6.87	98.29	113.40
1	A	1710	CYS	CA-CB-SG	6.66	125.98	114.00
1	A	1344	LYS	CA-CB-CG	6.53	127.77	113.40
1	A	1392	ARG	NE-CZ-NH2	5.72	123.16	120.30
1	A	1518	ASP	N-CA-CB	5.64	120.75	110.60
1	A	1664	ARG	CG-CD-NE	5.56	123.47	111.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1500	GLN	CA-CB-CG	5.50	125.50	113.40
1	A	1698	GLN	N-CA-CB	5.35	120.23	110.60
1	A	1712	HIS	CB-CA-C	5.24	120.88	110.40
1	A	1705	TYR	CB-CG-CD1	5.23	124.14	121.00
1	A	1741	LYS	CB-CG-CD	5.18	125.08	111.60
1	A	1078	SER	N-CA-CB	5.16	118.25	110.50
1	A	1530	ARG	N-CA-C	5.11	124.80	111.00
1	A	1549	LEU	CA-CB-CG	-5.06	103.67	115.30
1	A	1396	LEU	CB-CG-CD2	-5.04	102.44	111.00
1	A	1169	ARG	CA-CB-CG	-5.03	102.33	113.40
1	A	1523	PHE	CB-CG-CD1	-5.02	117.28	120.80

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1625	MET	Mainchain

## 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	4426	0	4293	163	2
2	A	5	0	0	0	0
3	A	48	0	32	11	0
4	A	24	0	0	14	0
All	All	4503	0	4325	164	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 19.

All (164) 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:1523:PHE:HD2	1:A:1629:LYS:HB3	1.37	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1481:ASP:OD1	4:A:1901:HOH:O	1.92	0.87
1:A:1373:PRO:O	1:A:1376:LYS:HB3	1.75	0.87
1:A:1447:THR:OG1	3:A:1806:COA:O4A	1.95	0.85
1:A:1387:GLU:O	1:A:1387:GLU:OE1	1.95	0.84
1:A:1467:VAL:HG23	1:A:1468:THR:HG23	1.61	0.81
1:A:1523:PHE:CD2	1:A:1629:LYS:HB3	2.16	0.80
1:A:1474:CYS:SG	4:A:1924:HOH:O	2.39	0.79
1:A:1497:LYS:HG3	4:A:1903:HOH:O	1.82	0.77
1:A:1531:LEU:HD13	1:A:1536:GLU:HB2	1.67	0.77
1:A:1485:HIS:O	1:A:1485:HIS:ND1	2.17	0.76
1:A:1080:PRO:HD2	1:A:1081:ARG:HH12	1.49	0.76
1:A:1375:MET:HE3	1:A:1385:MET:CE	2.16	0.76
1:A:1480:ASP:O	4:A:1902:HOH:O	2.05	0.75
1:A:1675:HIS:ND1	4:A:1907:HOH:O	2.20	0.75
1:A:1628:HIS:O	1:A:1631:VAL:HG12	1.87	0.75
1:A:1530:ARG:O	1:A:1531:LEU:HB2	1.86	0.73
1:A:1462:LYS:HB2	1:A:1637:LEU:HD23	1.70	0.72
1:A:1446:ARG:NH1	3:A:1806:COA:O5A	2.22	0.71
1:A:1344:LYS:HA	1:A:1347:ARG:HG2	1.73	0.69
1:A:1312:LEU:HA	1:A:1315:THR:HB	1.73	0.68
1:A:1485:HIS:O	1:A:1485:HIS:CG	2.47	0.67
1:A:1375:MET:HE2	1:A:1385:MET:HE1	1.76	0.67
1:A:1446:ARG:CZ	3:A:1806:COA:O5A	2.42	0.67
1:A:1375:MET:CE	1:A:1385:MET:CE	2.73	0.67
1:A:1433:TYR:CE1	1:A:1664:ARG:NH2	2.63	0.66
1:A:1717:ARG:HG3	1:A:1727:ASP:HB3	1.77	0.66
1:A:1473:ALA:O	1:A:1631:VAL:HG23	1.96	0.66
1:A:1497:LYS:O	4:A:1903:HOH:O	2.12	0.66
1:A:1428:ARG:NH1	1:A:1538:PRO:HG3	2.10	0.66
1:A:1419:SER:H	1:A:1649:ILE:HD11	1.59	0.66
1:A:1500:GLN:O	1:A:1504:LYS:HD3	1.96	0.65
1:A:1476:PRO:HG3	3:A:1806:COA:H61	1.77	0.65
1:A:1523:PHE:HD2	1:A:1629:LYS:HE3	1.61	0.64
1:A:1375:MET:CE	1:A:1385:MET:HE1	2.29	0.63
1:A:1433:TYR:CD1	1:A:1664:ARG:NH2	2.67	0.63
1:A:1197:GLY:HA3	1:A:1288:ARG:NH2	2.14	0.63
1:A:1344:LYS:HA	1:A:1347:ARG:HE	1.66	0.61
1:A:1375:MET:CE	1:A:1385:MET:SD	2.88	0.61
1:A:1208:PRO:HG3	1:A:1275:LEU:HD21	1.82	0.61
1:A:1169:ARG:NH1	4:A:1912:HOH:O	2.35	0.60
1:A:1351:HIS:CD2	1:A:1442:PRO:HG3	2.37	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1376:LYS:O	1:A:1380:VAL:HG12	2.01	0.60
1:A:1472:TRP:NE1	1:A:1474:CYS:HB3	2.17	0.59
1:A:1527:ASN:OD1	4:A:1904:HOH:O	2.16	0.58
1:A:1374:GLY:H	1:A:1550:GLU:CD	2.05	0.58
1:A:1709:GLU:HB3	1:A:1728:LEU:HD11	1.86	0.58
1:A:1095:MET:HE2	1:A:1139:LYS:HG3	1.86	0.57
1:A:1531:LEU:HD13	1:A:1536:GLU:CB	2.34	0.57
1:A:1375:MET:HE3	1:A:1385:MET:SD	2.45	0.57
1:A:1549:LEU:HD21	1:A:1621:LEU:HD21	1.86	0.56
1:A:1327:LYS:HB2	1:A:1358:PHE:CE1	2.41	0.56
1:A:1649:ILE:HD12	1:A:1649:ILE:O	2.05	0.56
1:A:1285:GLU:OE1	1:A:1311:CYS:HB3	2.06	0.55
1:A:1433:TYR:CE1	1:A:1664:ARG:CZ	2.89	0.55
1:A:1476:PRO:CG	3:A:1806:COA:H61	2.36	0.55
1:A:1157:VAL:HG11	1:A:1185:PHE:CZ	2.41	0.55
1:A:1080:PRO:HD2	1:A:1081:ARG:NH1	2.18	0.55
1:A:1523:PHE:CE2	1:A:1625:MET:O	2.61	0.54
1:A:1364:SER:HB3	1:A:1394:LYS:HG2	1.89	0.54
1:A:1707:CYS:SG	4:A:1923:HOH:O	2.58	0.54
1:A:1523:PHE:CD2	1:A:1626:GLU:HA	2.43	0.54
1:A:1485:HIS:O	1:A:1486:CYS:HB2	2.07	0.54
1:A:1717:ARG:NH1	1:A:1746:GLY:HA3	2.23	0.53
1:A:1124:ASP:OD2	1:A:1167:TYR:CE1	2.62	0.53
1:A:1549:LEU:CD2	1:A:1621:LEU:HD21	2.39	0.53
1:A:1198:TYR:CZ	1:A:1288:ARG:HG2	2.43	0.53
1:A:1551:GLU:HA	1:A:1551:GLU:OE1	2.10	0.52
1:A:1523:PHE:CE1	1:A:1625:MET:HB3	2.44	0.52
1:A:1492:LYS:HB3	3:A:1806:COA:C8A	2.40	0.51
3:A:1806:COA:O5P	3:A:1806:COA:N8P	2.42	0.51
1:A:1283:CYS:HB3	1:A:1286:CYS:HB2	1.91	0.51
1:A:1364:SER:HA	1:A:1393:THR:O	2.11	0.51
1:A:1344:LYS:HA	1:A:1347:ARG:CG	2.40	0.51
1:A:1676:TRP:HB3	1:A:1687:SER:HB3	1.92	0.51
1:A:1713:HIS:CE1	4:A:1916:HOH:O	2.63	0.51
1:A:1106:PRO:HA	1:A:1109:LEU:HD13	1.92	0.50
1:A:1510:ALA:HB3	1:A:1516:ILE:HD12	1.93	0.50
1:A:1710:CYS:O	1:A:1712:HIS:ND1	2.44	0.50
1:A:1492:LYS:HB2	3:A:1806:COA:H2B	1.92	0.50
1:A:1708:ASN:OD1	1:A:1726:TYR:HA	2.11	0.50
1:A:1373:PRO:HA	1:A:1376:LYS:CB	2.42	0.49
1:A:1503:TYR:HH	3:A:1806:COA:HS1	1.52	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1523:PHE:CD2	1:A:1629:LYS:CB	2.93	0.49
1:A:1164:ALA:O	1:A:1168:ASN:ND2	2.35	0.49
1:A:1291:HIS:HB2	1:A:1294:CYS:HB2	1.94	0.49
1:A:1410:PHE:HE1	1:A:1434:LEU:HD21	1.78	0.49
1:A:1415:GLN:HE21	1:A:1432:SER:HG	1.57	0.49
1:A:1107:GLU:HA	1:A:1177:PHE:CD2	2.48	0.48
1:A:1315:THR:HG22	1:A:1317:ARG:H	1.78	0.48
1:A:1732:CYS:SG	4:A:1923:HOH:O	2.61	0.48
1:A:1709:GLU:CB	1:A:1728:LEU:HD11	2.42	0.48
1:A:1374:GLY:N	1:A:1550:GLU:OE2	2.46	0.48
1:A:1183:GLU:HA	1:A:1183:GLU:OE1	2.14	0.48
1:A:1492:LYS:HB3	3:A:1806:COA:N7A	2.29	0.47
1:A:1719:HIS:HD1	1:A:1727:ASP:CG	2.18	0.47
1:A:1718:TRP:CD1	1:A:1730:ILE:HG22	2.50	0.46
1:A:1391:TYR:HB3	1:A:1417:TYR:CE2	2.49	0.46
1:A:1331:THR:OG1	1:A:1724:GLU:OE2	2.34	0.46
1:A:1485:HIS:CE1	1:A:1672:ARG:HG2	2.50	0.46
1:A:1309:ASP:OD2	1:A:1319:ARG:NH2	2.48	0.46
1:A:1702:ARG:O	1:A:1702:ARG:HG2	2.16	0.46
1:A:1728:LEU:HD12	1:A:1728:LEU:HA	1.34	0.46
1:A:1486:CYS:HB3	1:A:1677:GLU:HB3	1.97	0.46
1:A:1426:THR:O	1:A:1428:ARG:HG3	2.15	0.46
1:A:1509:LYS:O	1:A:1509:LYS:HD3	2.15	0.46
1:A:1462:LYS:HB2	1:A:1637:LEU:CD2	2.41	0.45
1:A:1676:TRP:HB3	1:A:1687:SER:CB	2.47	0.45
1:A:1707:CYS:SG	1:A:1710:CYS:HB3	2.57	0.45
1:A:1523:PHE:CZ	1:A:1625:MET:C	2.90	0.45
1:A:1730:ILE:O	1:A:1732:CYS:N	2.49	0.45
1:A:1415:GLN:NE2	1:A:1432:SER:OG	2.41	0.45
1:A:1505:LYS:HD3	1:A:1505:LYS:HA	1.75	0.45
1:A:1473:ALA:HB2	1:A:1503:TYR:CD2	2.52	0.44
1:A:1495:LYS:HG3	1:A:1498:ARG:H	1.81	0.44
1:A:1446:ARG:NH2	3:A:1806:COA:O5A	2.51	0.44
1:A:1095:MET:HE3	1:A:1142:LEU:HD23	2.00	0.44
1:A:1170:LYS:HB3	1:A:1170:LYS:HE2	1.84	0.44
1:A:1723:CYS:SG	1:A:1740:HIS:HE1	2.40	0.44
1:A:1199:CYS:HB2	4:A:1922:HOH:O	2.17	0.44
1:A:1392:ARG:CZ	1:A:1655:LEU:HD21	2.48	0.44
1:A:1706:THR:HG22	4:A:1916:HOH:O	2.18	0.44
1:A:1523:PHE:CD2	1:A:1629:LYS:HE3	2.47	0.44
1:A:1446:ARG:O	1:A:1449:VAL:HG22	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1460:TYR:O	1:A:1463:LYS:HG3	2.17	0.43
1:A:1475:PRO:HG3	1:A:1499:LEU:HD23	1.99	0.43
1:A:1169:ARG:HD3	1:A:1169:ARG:HA	1.63	0.43
1:A:1373:PRO:HA	1:A:1376:LYS:HB2	2.00	0.43
1:A:1382:SER:OG	1:A:1384:GLU:HG3	2.18	0.43
1:A:1523:PHE:CZ	1:A:1625:MET:O	2.72	0.43
1:A:1415:GLN:NE2	1:A:1432:SER:HG	2.16	0.43
1:A:1103:ARG:HH11	1:A:1103:ARG:HG3	1.82	0.43
1:A:1301:ILE:HG12	1:A:1324:PHE:CD2	2.54	0.43
1:A:1496:PRO:O	1:A:1500:GLN:HG3	2.18	0.43
1:A:1739:THR:O	1:A:1739:THR:HG22	2.19	0.43
1:A:1084:ILE:HG13	1:A:1085:PHE:N	2.34	0.42
1:A:1185:PHE:O	1:A:1189:ILE:HG22	2.19	0.42
1:A:1364:SER:CB	1:A:1394:LYS:HG2	2.49	0.42
1:A:1391:TYR:HB3	1:A:1417:TYR:CD2	2.54	0.42
1:A:1523:PHE:CE2	1:A:1626:GLU:HA	2.54	0.42
1:A:1273:ASP:N	1:A:1273:ASP:OD1	2.51	0.42
1:A:1509:LYS:NZ	1:A:1513:GLU:HB2	2.34	0.42
1:A:1726:TYR:CZ	1:A:1738:HIS:CE1	3.08	0.42
1:A:1719:HIS:ND1	1:A:1727:ASP:OD1	2.47	0.42
1:A:1088:GLU:OE1	1:A:1088:GLU:N	2.40	0.42
1:A:1124:ASP:OD2	1:A:1167:TYR:HE1	2.03	0.42
1:A:1286:CYS:CB	1:A:1288:ARG:H	2.33	0.41
1:A:1446:ARG:HG3	1:A:1447:THR:N	2.35	0.41
1:A:1346:LEU:HD23	1:A:1445:LEU:HD13	2.01	0.41
1:A:1501:GLU:HG2	4:A:1903:HOH:O	2.21	0.41
1:A:1124:ASP:OD2	1:A:1167:TYR:OH	2.27	0.41
1:A:1730:ILE:C	1:A:1732:CYS:H	2.23	0.41
1:A:1475:PRO:HG3	1:A:1499:LEU:CD2	2.51	0.41
1:A:1520:LYS:HB3	1:A:1524:LYS:HE3	2.03	0.41
1:A:1091:ARG:NE	1:A:1143:ASP:OD1	2.51	0.41
1:A:1320:LYS:HA	1:A:1320:LYS:HD2	1.61	0.41
1:A:1400:GLU:HB2	1:A:1409:PHE:CE2	2.56	0.41
1:A:1629:LYS:HB3	1:A:1629:LYS:HE3	1.67	0.41
1:A:1280:PHE:HB3	1:A:1289:LYS:HG3	2.02	0.41
1:A:1319:ARG:HE	1:A:1319:ARG:HB2	1.11	0.40
1:A:1344:LYS:HD3	1:A:1347:ARG:HH21	1.87	0.40
1:A:1450:TYR:O	1:A:1454:LEU:HD12	2.21	0.40
1:A:1492:LYS:HD3	1:A:1492:LYS:HA	1.77	0.40
1:A:1500:GLN:O	1:A:1504:LYS:CD	2.66	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1077:SER:O	1:A:1702:ARG:NH1[8_555]	1.87	0.33
1:A:1384:GLU:OE1	1:A:1705:TYR:OH[8_455]	2.05	0.15

## 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	525/640 (82%)	501 (95%)	21 (4%)	3 (1%)	25 29

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1478	GLU
1	A	1731	ASN
1	A	1530	ARG

### 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	492/586 (84%)	468 (95%)	24 (5%)	25 33

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1077	SER
1	A	1081	ARG
1	A	1308	CYS
1	A	1319	ARG
1	A	1340	ASP
1	A	1344	LYS
1	A	1382	SER
1	A	1387	GLU
1	A	1396	LEU
1	A	1401	GLU
1	A	1438	HIS
1	A	1452	GLU
1	A	1454	LEU
1	A	1463	LYS
1	A	1474	CYS
1	A	1482	ASN
1	A	1498	ARG
1	A	1504	LYS
1	A	1511	PHE
1	A	1514	ARG
1	A	1702	ARG
1	A	1717	ARG
1	A	1732	CYS
1	A	1741	LYS

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

Mol	Chain	Res	Type
1	A	1310	ASN
1	A	1351	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](#)

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 6 ligands modelled in this entry, 5 are monoatomic - leaving 1 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	1806	-	41,50,50	0.75	2 (4%)	52,75,75	0.94	3 (5%)

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	1806	-	-	16/44/64/64	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1806	COA	P3B-O3B	2.73	1.64	1.59
3	A	1806	COA	P3B-O7A	2.34	1.58	1.50

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1806	COA	C2P-C3P-N4P	3.50	120.31	112.31
3	A	1806	COA	C5A-C6A-N6A	2.55	124.22	120.35
3	A	1806	COA	O5B-P1A-O1A	2.09	117.25	109.07

There are no chirality outliers.

All (16) torsion outliers are listed below:



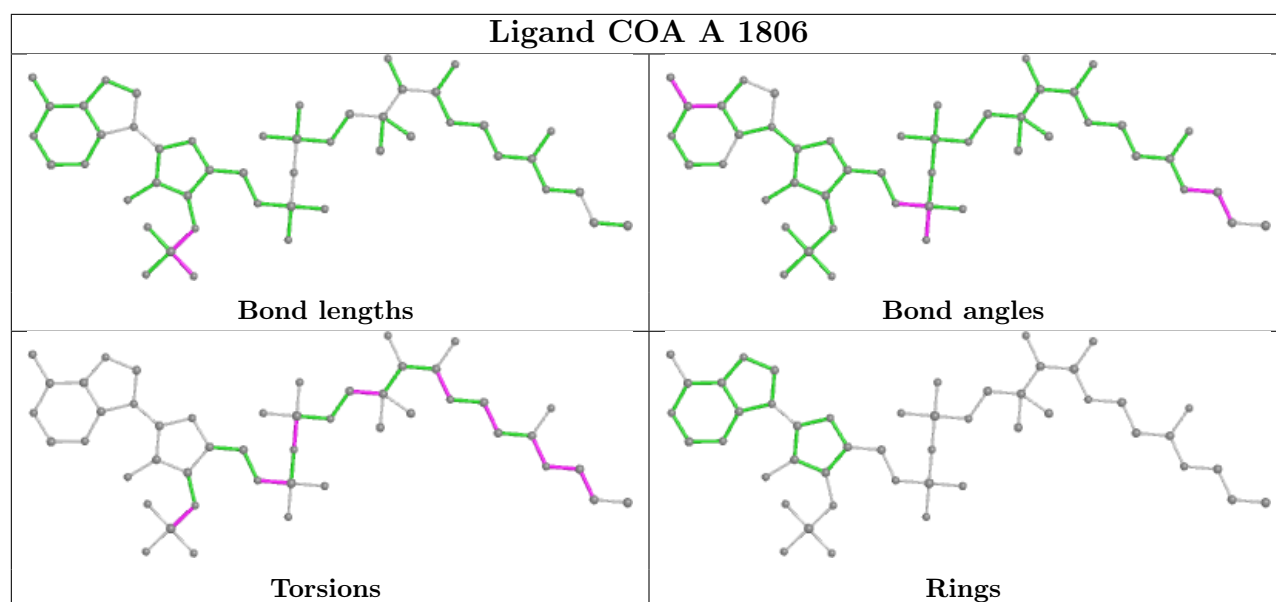
Mol	Chain	Res	Type	Atoms
3	A	1806	COA	C5B-O5B-P1A-O3A
3	A	1806	COA	CAP-CBP-CCP-O6A
3	A	1806	COA	CAP-C9P-N8P-C7P
3	A	1806	COA	C5P-C6P-C7P-N8P
3	A	1806	COA	C6P-C5P-N4P-C3P
3	A	1806	COA	O5P-C5P-N4P-C3P
3	A	1806	COA	S1P-C2P-C3P-N4P
3	A	1806	COA	CDP-CBP-CCP-O6A
3	A	1806	COA	CEP-CBP-CCP-O6A
3	A	1806	COA	P1A-O3A-P2A-O6A
3	A	1806	COA	P1A-O3A-P2A-O4A
3	A	1806	COA	C5B-O5B-P1A-O1A
3	A	1806	COA	C5B-O5B-P1A-O2A
3	A	1806	COA	O9P-C9P-N8P-C7P
3	A	1806	COA	C2P-C3P-N4P-C5P
3	A	1806	COA	C3B-O3B-P3B-O9A

There are no ring outliers.

1 monomer is involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1806	COA	11	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	534/640 (83%)	0.67	50 (9%) <b>8</b> <b>5</b>	26, 52, 110, 185	0

All (50) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1746	GLY	8.3
1	A	1703	PHE	8.1
1	A	1714	VAL	6.8
1	A	1478	GLU	6.5
1	A	1475	PRO	5.6
1	A	1625	MET	5.6
1	A	1741	LYS	5.6
1	A	1743	VAL	5.5
1	A	1621	LEU	5.5
1	A	1705	TYR	4.9
1	A	1713	HIS	4.9
1	A	1076	GLY	4.6
1	A	1730	ILE	4.3
1	A	1534	ALA	4.0
1	A	1510	ALA	4.0
1	A	1078	SER	3.8
1	A	1537	LEU	3.7
1	A	1551	GLU	3.5
1	A	1077	SER	3.4
1	A	1476	PRO	3.3
1	A	1624	THR	3.2
1	A	1515	ILE	3.2
1	A	1729	CYS	3.1
1	A	1080	PRO	3.1
1	A	1380	VAL	3.0
1	A	1745	TRP	2.8
1	A	1519	TYR	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	1516	ILE	2.8
1	A	1321	GLU	2.8
1	A	1702	ARG	2.7
1	A	1744	LYS	2.6
1	A	1719	HIS	2.6
1	A	1477	SER	2.6
1	A	1318	PRO	2.6
1	A	1623	ALA	2.6
1	A	1710	CYS	2.5
1	A	1317	ARG	2.4
1	A	1320	LYS	2.3
1	A	1742	MET	2.3
1	A	1209	GLN	2.3
1	A	1319	ARG	2.2
1	A	1553	ILE	2.2
1	A	1376	LYS	2.2
1	A	1545	TRP	2.2
1	A	1079	GLN	2.1
1	A	1711	LYS	2.1
1	A	1546	PRO	2.1
1	A	1531	LEU	2.0
1	A	1631	VAL	2.0
1	A	1535	LYS	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

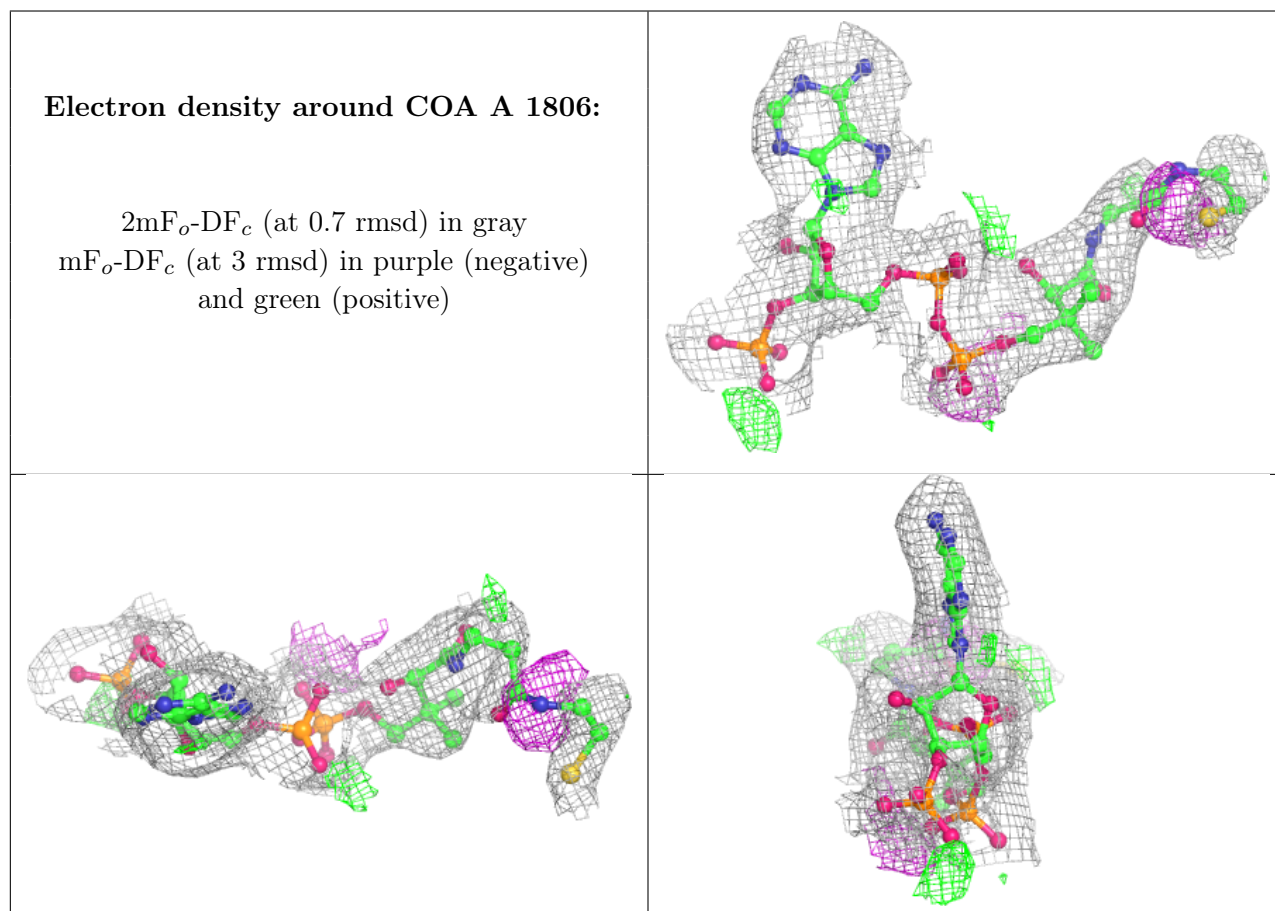
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	ZN	A	1805	1/1	0.28	0.10	193,193,193,193	0
2	ZN	A	1804	1/1	0.40	0.47	159,159,159,159	0
3	COA	A	1806	48/48	0.89	0.18	42,57,74,82	0
2	ZN	A	1801	1/1	0.90	0.07	75,75,75,75	1
2	ZN	A	1803	1/1	0.97	0.19	64,64,64,64	0
2	ZN	A	1802	1/1	0.99	0.28	52,52,52,52	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.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.