



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:04 PM UTC

PDB ID : 8OG2 / pdb_00008og2
Title : Crystal structure of CREBBP histone acetyltransferase domain in complex with Coenzyme A
Authors : Mechaly, A.E.; Zhang, W.; Haouz, A.; Green, M.; Rodrigues-Lima, F.
Deposited on : 2023-03-17
Resolution : 2.47 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

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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

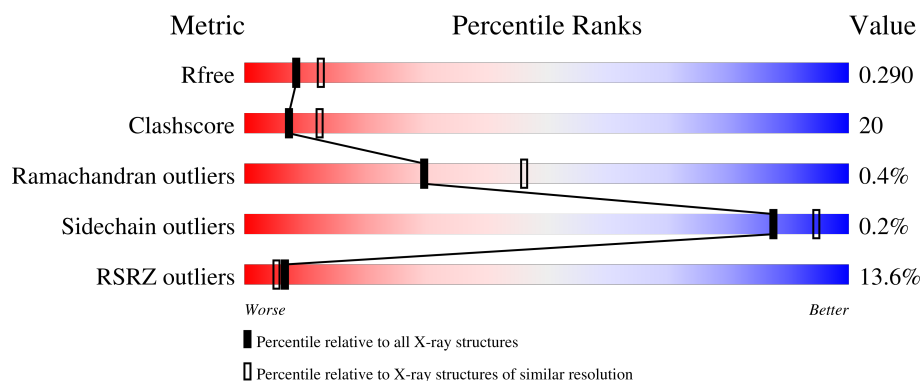
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.47 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}	180053	7589 (2.50-2.46)
Clashscore	190562	8295 (2.50-2.46)
Ramachandran outliers	187476	8164 (2.50-2.46)
Sidechain outliers	187428	8166 (2.50-2.46)
RSRZ outliers	180081	7593 (2.50-2.46)

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 ≥ 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	11% 52% 29% • 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
2	SO4	A	1801	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 4489 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
1	A	531	Total	C	N	O	S	0	1	0
			4414	2827	759	794	34			

There are 31 discrepancies between the modelled and reference sequences:

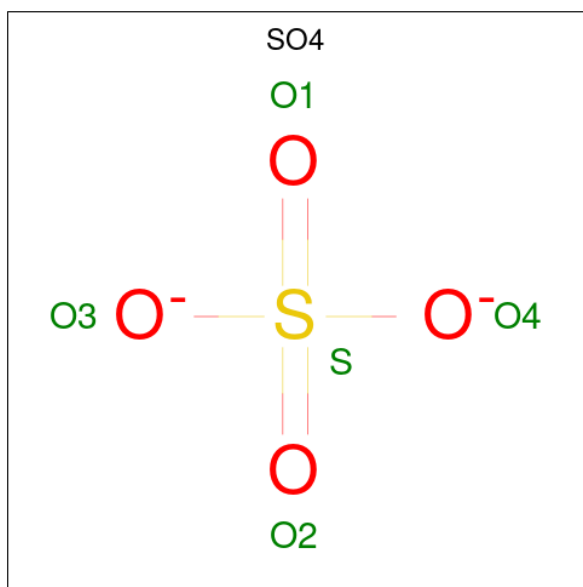
Chain	Residue	Modelled	Actual	Comment	Reference
A	1054	HIS	-	expression tag	UNP F8VPR5
A	1055	HIS	-	expression tag	UNP F8VPR5
A	1056	HIS	-	expression tag	UNP F8VPR5
A	1057	HIS	-	expression tag	UNP F8VPR5
A	1058	HIS	-	expression tag	UNP F8VPR5
A	1059	HIS	-	expression tag	UNP F8VPR5
A	1060	ASP	-	expression 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	1503	PHE	TYR	conflict	UNP F8VPR5
A	1613	SER	-	linker	UNP F8VPR5
A	1614	GLY	-	linker	UNP F8VPR5

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1615	GLY	-	linker	UNP F8VPR5
A	1616	SER	-	linker	UNP F8VPR5
A	1617	GLY	-	linker	UNP F8VPR5
A	1618	SER	-	linker	UNP F8VPR5

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).

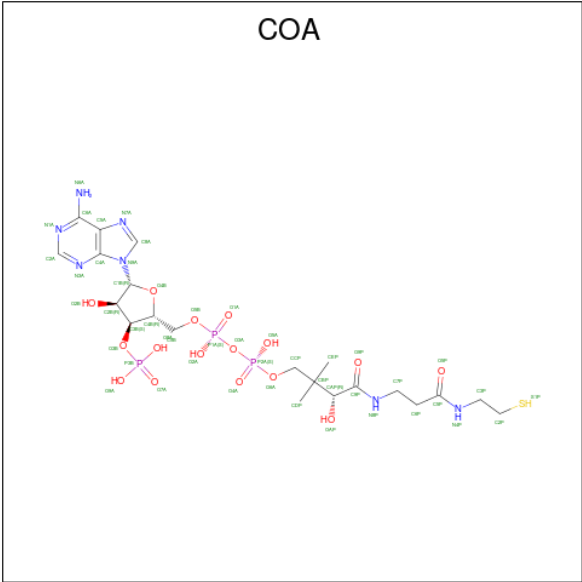


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	4	Total	Zn	0	0
			4	4		

- Molecule 4 is COENZYME A (CCD ID: COA) (formula: C₂₁H₃₆N₇O₁₆P₃S) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Na	0	0
			1	1		

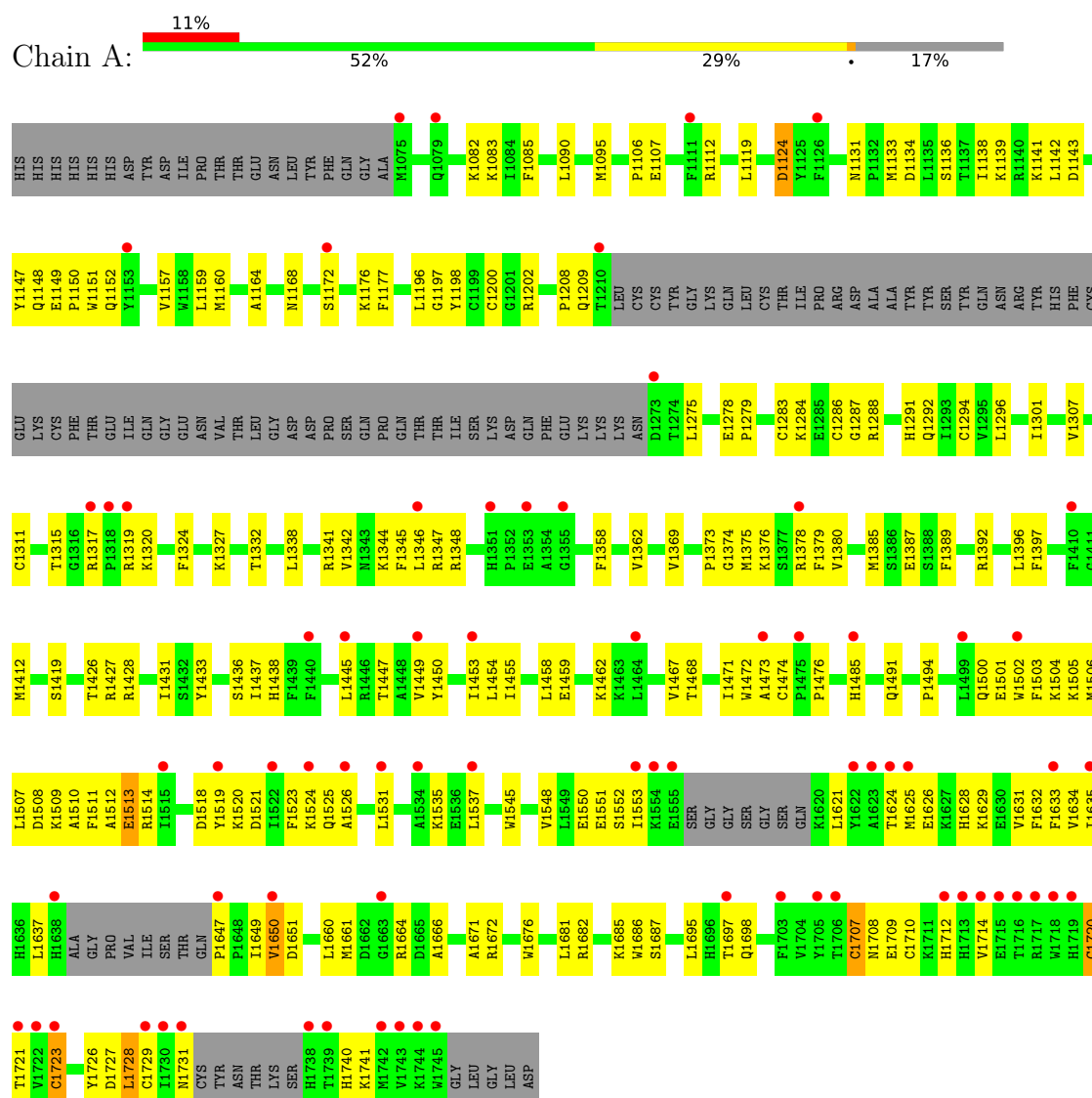
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	17	Total	O	0	0
			17	17		

3 Residue-property plots

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

- Molecule 1: histone acetyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	86.77Å 145.69Å 155.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	77.66 – 2.47 77.66 – 2.47	Depositor EDS
% Data completeness (in resolution range)	55.0 (77.66-2.47) 55.2 (77.66-2.47)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 2.45Å)	Xtriage
Refinement program	PHENIX 1.17.1 _3660	Depositor
R, R_{free}	0.236 , 0.289 0.237 , 0.290	Depositor DCC
R_{free} test set	1006 reflections (2.80%)	wwPDB-VP
Wilson B-factor (Å ²)	70.7	Xtriage
Anisotropy	0.094	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 62.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	4489	wwPDB-VP
Average B, all atoms (Å ²)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.98% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: NA, COA, SO4, ZN

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	0.51	0/4540	0.80	7/6135 (0.1%)

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	2

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	1707	CYS	CA-CB-SG	9.34	135.87	114.40
1	A	1378	ARG	CA-CB-CG	-8.36	97.38	114.10
1	A	1720	CYS	CA-CB-SG	7.13	130.80	114.40
1	A	1650	VAL	CA-C-N	-5.51	114.46	121.74
1	A	1650	VAL	C-N-CA	-5.51	114.46	121.74
1	A	1728	LEU	CA-CB-CG	-5.46	97.19	116.30
1	A	1723	CYS	CA-CB-SG	5.37	126.74	114.40

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1124	ASP	Peptide
1	A	1551	GLU	Peptide

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	4414	0	4282	177	0
2	A	5	0	0	0	6
3	A	4	0	0	0	0
4	A	48	0	32	9	0
5	A	1	0	0	0	0
6	A	17	0	0	6	0
All	All	4489	0	4314	179	6

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 20.

All (179) 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:HE1	1:A:1625:MET:HE2	1.23	0.98
1:A:1523:PHE:CE1	1:A:1625:MET:HE2	2.05	0.90
1:A:1523:PHE:CE2	1:A:1626:GLU:HA	2.07	0.90
1:A:1344:LYS:HA	1:A:1347:ARG:HE	1.38	0.88
1:A:1485:HIS:CE1	1:A:1672:ARG:HG3	2.10	0.87
1:A:1301:ILE:HD13	1:A:1324:PHE:HD1	1.40	0.86
1:A:1520:LYS:HE2	1:A:1524:LYS:HD3	1.63	0.81
1:A:1508:ASP:O	6:A:1901:HOH:O	1.99	0.80
1:A:1467:VAL:HG23	1:A:1468:THR:HG23	1.64	0.79
1:A:1462:LYS:HB2	1:A:1637:LEU:HD23	1.64	0.79
1:A:1139:LYS:NZ	1:A:1143:ASP:OD2	2.18	0.76
1:A:1709:GLU:HB3	1:A:1728:LEU:HD11	1.72	0.72
1:A:1438:HIS:CD2	1:A:1491:GLN:HB2	2.24	0.71
1:A:1307:VAL:H	1:A:1319:ARG:HH22	1.39	0.70
1:A:1728:LEU:HG	1:A:1729:CYS:N	2.05	0.70
1:A:1431:ILE:HD12	1:A:1471:ILE:HG12	1.76	0.68
1:A:1728:LEU:HG	1:A:1729:CYS:H	1.59	0.67
4:A:1806:COA:O5P	4:A:1806:COA:N8P	2.26	0.67
1:A:1518:ASP:CG	1:A:1519:TYR:H	2.02	0.67
1:A:1375:MET:HE3	1:A:1379:PHE:CE1	2.32	0.65
1:A:1341:ARG:NH1	1:A:1459:GLU:OE1	2.30	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1707:CYS:SG	1:A:1729:CYS:N	2.69	0.64
1:A:1501:GLU:HA	1:A:1504:LYS:HD2	1.79	0.64
1:A:1374:GLY:HA3	1:A:1553:ILE:HG12	1.79	0.63
1:A:1485:HIS:HE1	1:A:1672:ARG:HG3	1.61	0.63
1:A:1476:PRO:HG3	4:A:1806:COA:H61	1.81	0.63
1:A:1501:GLU:O	1:A:1505:LYS:HG3	1.99	0.62
1:A:1284:LYS:HB2	1:A:1307:VAL:HG22	1.81	0.62
1:A:1708:ASN:HD21	1:A:1726:TYR:HA	1.64	0.62
1:A:1436:SER:HB3	4:A:1806:COA:O9P	1.98	0.62
1:A:1455:ILE:HD13	1:A:1510:ALA:HB2	1.81	0.62
1:A:1519:TYR:O	1:A:1520:LYS:HD2	2.00	0.62
1:A:1197:GLY:O	1:A:1288:ARG:HD3	1.99	0.62
1:A:1525:GLN:HG2	1:A:1634:VAL:HG21	1.81	0.62
1:A:1621:LEU:HA	1:A:1624:THR:HG22	1.80	0.62
1:A:1291:HIS:HB2	1:A:1294:CYS:HB2	1.82	0.61
1:A:1723:CYS:SG	1:A:1740:HIS:CE1	2.94	0.61
1:A:1380:VAL:HG23	1:A:1385:MET:O	2.00	0.61
1:A:1373:PRO:HA	1:A:1376:LYS:CB	2.30	0.61
1:A:1523:PHE:CD2	1:A:1629:LYS:HB2	2.36	0.60
1:A:1315:THR:HG22	1:A:1317:ARG:HG3	1.83	0.60
1:A:1198:TYR:CE1	1:A:1288:ARG:HB2	2.37	0.60
1:A:1710:CYS:HB3	1:A:1712:HIS:ND1	2.17	0.60
1:A:1697:THR:OG1	1:A:1698:GLN:HG3	2.01	0.59
1:A:1149:GLU:HG2	1:A:1151:TRP:H	1.68	0.59
1:A:1661:MET:HE2	1:A:1695:LEU:HD21	1.85	0.59
1:A:1710:CYS:C	1:A:1712:HIS:H	2.11	0.58
1:A:1315:THR:CG2	1:A:1317:ARG:HG3	2.34	0.58
1:A:1344:LYS:CA	1:A:1347:ARG:HE	2.13	0.57
1:A:1301:ILE:HD13	1:A:1324:PHE:CD1	2.31	0.57
1:A:1375:MET:HE3	1:A:1379:PHE:CD1	2.39	0.57
1:A:1373:PRO:HA	1:A:1376:LYS:HB2	1.86	0.57
1:A:1346:LEU:HD23	1:A:1445:LEU:HD13	1.85	0.56
1:A:1095:MET:HE2	1:A:1142:LEU:HD23	1.86	0.56
1:A:1138:ILE:HD13	1:A:1157:VAL:HG12	1.87	0.56
1:A:1278:GLU:OE2	1:A:1682:ARG:NH1	2.32	0.56
1:A:1454:LEU:O	1:A:1458:LEU:HD12	2.06	0.56
1:A:1345:PHE:O	1:A:1348:ARG:HB3	2.06	0.56
1:A:1380:VAL:HG21	1:A:1387:GLU:HG2	1.88	0.55
1:A:1447:THR:OG1	4:A:1806:COA:O4A	2.20	0.55
1:A:1473:ALA:O	1:A:1631:VAL:HG23	2.07	0.55
1:A:1438:HIS:HD2	1:A:1491:GLN:HB2	1.69	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1208:PRO:HG3	1:A:1275:LEU:HD21	1.89	0.54
1:A:1550:GLU:O	1:A:1553:ILE:HG13	2.07	0.54
1:A:1085:PHE:HB3	1:A:1090:LEU:HG	1.89	0.53
1:A:1476:PRO:HD3	4:A:1806:COA:H61	1.89	0.53
1:A:1545:TRP:HA	1:A:1548:VAL:HG12	1.89	0.53
4:A:1806:COA:O7A	6:A:1902:HOH:O	2.19	0.53
1:A:1426:THR:HG22	1:A:1427:ARG:HG3	1.89	0.53
1:A:1436:SER:O	1:A:1437:ILE:HD13	2.09	0.53
1:A:1286:CYS:HB3	1:A:1288:ARG:HG2	1.91	0.52
1:A:1374:GLY:H	1:A:1550:GLU:CD	2.17	0.52
1:A:1149:GLU:HG3	1:A:1150:PRO:HD2	1.92	0.52
1:A:1455:ILE:CD1	1:A:1510:ALA:HB2	2.40	0.52
1:A:1708:ASN:HD21	1:A:1727:ASP:N	2.07	0.52
1:A:1710:CYS:C	1:A:1712:HIS:N	2.68	0.51
1:A:1385:MET:HE3	1:A:1535:LYS:HB2	1.92	0.51
1:A:1107:GLU:HA	1:A:1177:PHE:CD2	2.46	0.51
1:A:1511:PHE:HB3	6:A:1901:HOH:O	2.10	0.51
1:A:1507:LEU:HD11	1:A:1633:PHE:HD2	1.76	0.51
1:A:1379:PHE:HB3	1:A:1385:MET:HG2	1.94	0.50
1:A:1374:GLY:CA	1:A:1553:ILE:HG12	2.42	0.50
1:A:1509:LYS:HG2	1:A:1513:GLU:HG2	1.94	0.50
1:A:1447:THR:HG23	1:A:1502:TRP:HE1	1.75	0.50
1:A:1455:ILE:CD1	1:A:1506:MET:HE2	2.42	0.49
1:A:1150:PRO:CG	1:A:1196:LEU:HD23	2.42	0.49
1:A:1083:LYS:HG2	1:A:1288:ARG:NH2	2.27	0.49
1:A:1369:VAL:CG1	1:A:1389:PHE:HB2	2.42	0.49
1:A:1112:ARG:O	1:A:1136:SER:HB3	2.12	0.49
1:A:1107:GLU:HA	1:A:1177:PHE:CG	2.48	0.49
1:A:1709:GLU:CB	1:A:1728:LEU:HD11	2.42	0.49
1:A:1472:TRP:NE1	1:A:1474:CYS:HB2	2.27	0.49
1:A:1552:SER:OG	1:A:1621:LEU:HD11	2.13	0.48
1:A:1476:PRO:CD	4:A:1806:COA:H61	2.42	0.48
1:A:1485:HIS:HB2	1:A:1671:ALA:HB3	1.95	0.48
1:A:1661:MET:CE	1:A:1695:LEU:HD21	2.43	0.48
1:A:1419:SER:OG	1:A:1649:ILE:HG13	2.14	0.48
1:A:1512:ALA:C	1:A:1514:ARG:H	2.21	0.47
1:A:1283:CYS:HB3	1:A:1286:CYS:HB2	1.96	0.47
1:A:1134:ASP:HA	1:A:1160:MET:SD	2.55	0.47
1:A:1649:ILE:O	6:A:1903:HOH:O	2.19	0.47
1:A:1523:PHE:C	1:A:1525:GLN:N	2.71	0.47
1:A:1526:ALA:O	1:A:1531:LEU:HG	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1296:LEU:HD23	1:A:1686:TRP:HE3	1.78	0.46
1:A:1503:PHE:HB3	1:A:1633:PHE:CE2	2.51	0.46
1:A:1521:ASP:CG	1:A:1629:LYS:HZ3	2.23	0.46
1:A:1720:CYS:SG	1:A:1726:TYR:HB3	2.56	0.46
1:A:1082:LYS:HD2	1:A:1287:GLY:HA3	1.97	0.46
1:A:1447:THR:CG2	1:A:1502:TRP:HE1	2.29	0.46
1:A:1494:PRO:HA	4:A:1806:COA:N7A	2.31	0.46
1:A:1708:ASN:HD21	1:A:1727:ASP:H	1.62	0.46
1:A:1311:CYS:O	1:A:1315:THR:OG1	2.19	0.46
1:A:1525:GLN:CG	1:A:1634:VAL:HG21	2.45	0.45
1:A:1373:PRO:O	1:A:1376:LYS:HB3	2.16	0.45
1:A:1455:ILE:HD13	1:A:1506:MET:HE2	1.98	0.45
1:A:1708:ASN:HD21	1:A:1726:TYR:CA	2.27	0.45
1:A:1176:LYS:O	1:A:1177:PHE:C	2.59	0.45
1:A:1476:PRO:CG	4:A:1806:COA:H61	2.45	0.45
1:A:1523:PHE:C	1:A:1525:GLN:H	2.24	0.45
1:A:1090:LEU:HD23	1:A:1090:LEU:HA	1.82	0.45
1:A:1720:CYS:SG	1:A:1726:TYR:CD1	3.10	0.45
1:A:1545:TRP:HA	1:A:1548:VAL:CG1	2.47	0.44
1:A:1723:CYS:HB2	1:A:1726:TYR:HB3	1.99	0.44
1:A:1396:LEU:HD11	1:A:1412:MET:HE3	1.98	0.44
1:A:1707:CYS:HB2	1:A:1714:VAL:HG11	1.98	0.44
1:A:1327:LYS:HB2	1:A:1358:PHE:CE1	2.52	0.44
1:A:1373:PRO:HA	1:A:1376:LYS:HB3	1.98	0.44
1:A:1450:TYR:O	1:A:1454:LEU:HD12	2.17	0.44
1:A:1200:CYS:HB2	1:A:1202:ARG:HG2	2.00	0.44
1:A:1338:LEU:HD23	1:A:1453:ILE:HG23	1.99	0.44
1:A:1286:CYS:CB	1:A:1288:ARG:HG2	2.47	0.44
1:A:1332:THR:N	6:A:1907:HOH:O	2.50	0.44
1:A:1729:CYS:SG	1:A:1731:ASN:HB2	2.57	0.44
1:A:1374:GLY:N	1:A:1550:GLU:OE1	2.50	0.44
1:A:1095:MET:CE	1:A:1142:LEU:HD23	2.48	0.43
1:A:1433:TYR:CD2	1:A:1664:ARG:HD2	2.53	0.43
1:A:1133:MET:O	1:A:1160:MET:HG3	2.18	0.43
1:A:1520:LYS:NZ	1:A:1524:LYS:HE2	2.33	0.43
1:A:1344:LYS:HB2	1:A:1347:ARG:HH21	1.83	0.43
1:A:1392:ARG:NH1	1:A:1651:ASP:HB3	2.34	0.43
1:A:1164:ALA:O	1:A:1168:ASN:ND2	2.35	0.43
1:A:1279:PRO:HG2	1:A:1292:GLN:HB3	1.99	0.43
1:A:1500:GLN:HB3	1:A:1504:LYS:HE3	2.00	0.43
1:A:1438:HIS:HD2	1:A:1491:GLN:CB	2.30	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1168:ASN:HB3	1:A:1172:SER:OG	2.19	0.43
1:A:1472:TRP:CD1	1:A:1631:VAL:HG22	2.53	0.43
1:A:1721:THR:OG1	1:A:1741:LYS:HB3	2.19	0.42
1:A:1148:GLN:N	1:A:1152:GLN:OE1	2.47	0.42
1:A:1628:HIS:HB3	1:A:1631:VAL:CG1	2.49	0.42
1:A:1681:LEU:HG	1:A:1685:LYS:HE3	2.00	0.42
1:A:1106:PRO:HG2	1:A:1177:PHE:CZ	2.54	0.42
1:A:1631:VAL:HG13	1:A:1632:PHE:CD2	2.55	0.42
1:A:1523:PHE:CE2	1:A:1629:LYS:HB2	2.55	0.42
1:A:1315:THR:C	1:A:1317:ARG:H	2.26	0.42
1:A:1427:ARG:NH2	1:A:1647:PRO:O	2.53	0.42
1:A:1141:LYS:HD3	1:A:1147:TYR:CZ	2.55	0.42
1:A:1397:PHE:HE1	1:A:1661:MET:HG2	1.83	0.42
1:A:1676:TRP:HB3	1:A:1687:SER:CB	2.50	0.42
1:A:1649:ILE:O	1:A:1649:ILE:HD12	2.20	0.42
1:A:1119:LEU:HD23	1:A:1119:LEU:HA	1.85	0.42
1:A:1676:TRP:HB3	1:A:1687:SER:HB2	2.02	0.42
1:A:1709:GLU:H	1:A:1728:LEU:HD11	1.83	0.41
1:A:1445:LEU:O	1:A:1449:VAL:HG23	2.20	0.41
1:A:1525:GLN:HG2	1:A:1634:VAL:CG2	2.50	0.41
1:A:1650:VAL:HA	6:A:1903:HOH:O	2.19	0.41
1:A:1338:LEU:O	1:A:1342:VAL:HG13	2.20	0.41
1:A:1362:VAL:HG21	1:A:1661:MET:HG2	2.02	0.41
1:A:1507:LEU:HD21	1:A:1635:ILE:HD13	2.02	0.41
1:A:1200:CYS:SG	1:A:1291:HIS:CE1	3.13	0.41
1:A:1320:LYS:HD2	1:A:1320:LYS:HA	1.78	0.41
1:A:1660:LEU:O	1:A:1666:ALA:HB3	2.21	0.41
1:A:1083:LYS:HG2	1:A:1288:ARG:HH21	1.86	0.41
1:A:1428:ARG:HA	1:A:1468:THR:O	2.21	0.41
1:A:1518:ASP:CG	1:A:1519:TYR:N	2.75	0.41
1:A:1681:LEU:HA	1:A:1681:LEU:HD12	1.73	0.41
1:A:1131:ASN:O	1:A:1159:LEU:HD11	2.22	0.40
1:A:1142:LEU:HD12	1:A:1142:LEU:HA	1.88	0.40
1:A:1537:LEU:HD23	1:A:1537:LEU:HA	1.81	0.40
1:A:1525:GLN:CB	1:A:1634:VAL:HG21	2.52	0.40

All (6) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1801:SO4:O2	2:A:1801:SO4:O4[4_565]	0.11	2.09

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1801:SO4:O1	2:A:1801:SO4:O3[4_565]	0.12	2.08
2:A:1801:SO4:S	2:A:1801:SO4:O3[4_565]	1.46	0.74
2:A:1801:SO4:S	2:A:1801:SO4:O4[4_565]	1.46	0.74
2:A:1801:SO4:S	2:A:1801:SO4:O2[4_565]	1.46	0.74
2:A:1801:SO4:S	2:A:1801:SO4:O1[4_565]	1.46	0.74

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	522/640 (82%)	488 (94%)	32 (6%)	2 (0%)	30 46

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1124	ASP
1	A	1513	GLU

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	491/586 (84%)	490 (100%)	1 (0%)	87 94

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1209	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1343	ASN
1	A	1438	HIS
1	A	1500	GLN
1	A	1527	ASN
1	A	1698	GLN
1	A	1708	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 5 are monoatomic - leaving 2 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
4	COA	A	1806	1	47,50,50	0.80	2 (4%)	69,75,75	0.60	1 (1%)
2	SO4	A	1801	-	4,4,4	0.24	0	6,6,6	1.15	1 (16%)

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
4	COA	A	1806	1	-	16/48/64/64	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1806	COA	P3B-O3B	4.12	1.66	1.59
4	A	1806	COA	P2A-O6A	2.27	1.68	1.59

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1806	COA	P3B-O3B-C3B	2.30	129.59	123.43
2	A	1801	SO4	O4-S-O1	-2.10	98.57	109.56

There are no chirality outliers.

All (16) torsion outliers are listed below:

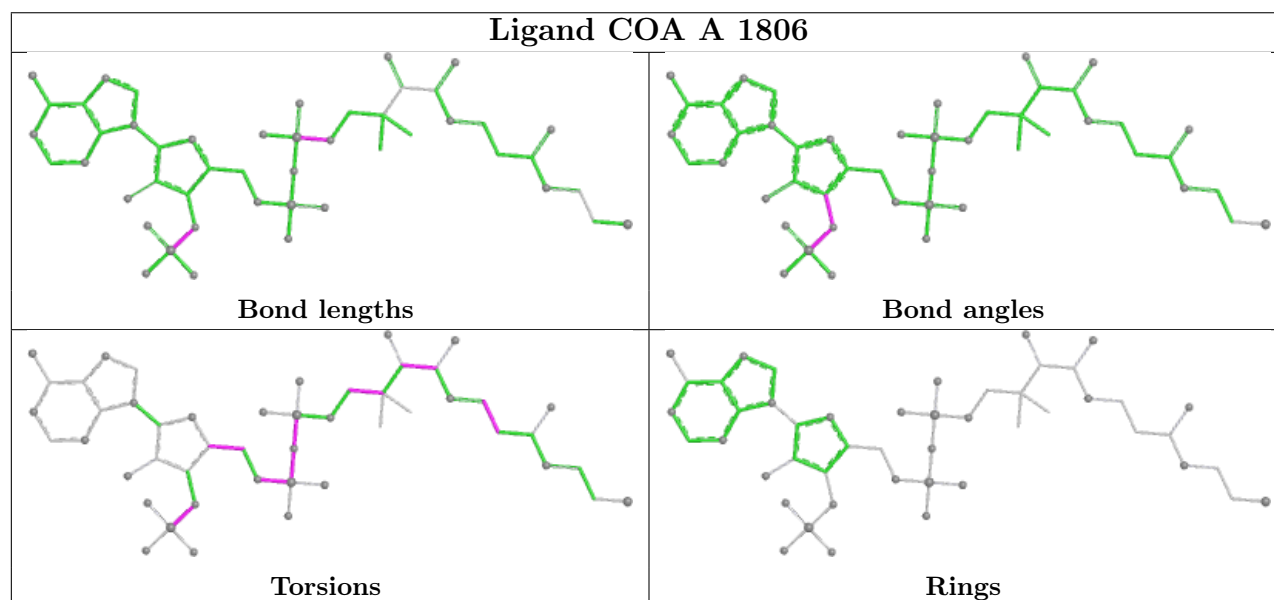
Mol	Chain	Res	Type	Atoms
4	A	1806	COA	CEP-CBP-CCP-O6A
4	A	1806	COA	CAP-CBP-CCP-O6A
4	A	1806	COA	N8P-C9P-CAP-OAP
4	A	1806	COA	C5P-C6P-C7P-N8P
4	A	1806	COA	O9P-C9P-CAP-OAP
4	A	1806	COA	P1A-O3A-P2A-O6A
4	A	1806	COA	CDP-CBP-CCP-O6A
4	A	1806	COA	C5B-O5B-P1A-O1A
4	A	1806	COA	C5B-O5B-P1A-O2A
4	A	1806	COA	C5B-O5B-P1A-O3A
4	A	1806	COA	C3B-O3B-P3B-O8A
4	A	1806	COA	P2A-O3A-P1A-O2A
4	A	1806	COA	P1A-O3A-P2A-O4A
4	A	1806	COA	O4B-C4B-C5B-O5B
4	A	1806	COA	P2A-O3A-P1A-O1A
4	A	1806	COA	O9P-C9P-CAP-CBP

There are no ring outliers.

2 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1806	COA	9	0
2	A	1801	SO4	0	6

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, 95th 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 ²)	Q<0.9
1	A	531/640 (82%)	0.74	72 (13%) 7 5	34, 71, 129, 215	1 (0%)

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1716	THR	6.1
1	A	1714	VAL	5.9
1	A	1705	TYR	4.6
1	A	1722	VAL	4.5
1	A	1713	HIS	4.5
1	A	1703	PHE	4.4
1	A	1743	VAL	4.3
1	A	1555	GLU	4.3
1	A	1744	LYS	3.9
1	A	1730	ILE	3.8
1	A	1273	ASP	3.7
1	A	1719	HIS	3.6
1	A	1624	THR	3.5
1	A	1742	MET	3.4
1	A	1731	ASN	3.3
1	A	1717	ARG	3.3
1	A	1553	ILE	3.2
1	A	1738	HIS	3.1
1	A	1153	TYR	3.1
1	A	1449	VAL	3.1
1	A	1622	TYR	3.1
1	A	1524	LYS	3.1
1	A	1075	MET	3.0
1	A	1475	PRO	3.0
1	A	1729	CYS	2.9
1	A	1623	ALA	2.9
1	A	1745	TRP	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	1353	GLU	2.9
1	A	1647	PRO	2.9
1	A	1440	PHE	2.8
1	A	1453	ILE	2.8
1	A	1718	TRP	2.8
1	A	1464	LEU	2.7
1	A	1633	PHE	2.7
1	A	1650	VAL	2.7
1	A	1721	THR	2.7
1	A	1663	GLY	2.7
1	A	1410	PHE	2.7
1	A	1111	PHE	2.6
1	A	1346	LEU	2.6
1	A	1079	GLN	2.5
1	A	1351	HIS	2.4
1	A	1172	SER	2.4
1	A	1712	HIS	2.3
1	A	1706	THR	2.3
1	A	1522	ILE	2.3
1	A	1739	THR	2.3
1	A	1317	ARG	2.3
1	A	1485	HIS	2.3
1	A	1635	ILE	2.3
1	A	1638	HIS	2.2
1	A	1499	LEU	2.2
1	A	1537	LEU	2.2
1	A	1554	LYS	2.2
1	A	1502	TRP	2.2
1	A	1519	TYR	2.2
1	A	1318	PRO	2.2
1	A	1534	ALA	2.2
1	A	1445	LEU	2.2
1	A	1126	PHE	2.2
1	A	1210	THR	2.2
1	A	1515	ILE	2.1
1	A	1355	GLY	2.1
1	A	1531	LEU	2.1
1	A	1715	GLU	2.1
1	A	1473	ALA	2.1
1	A	1697	THR	2.1
1	A	1378	ARG	2.1
1	A	1723	CYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	1319	ARG	2.0
1	A	1526	ALA	2.0
1	A	1625	MET	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

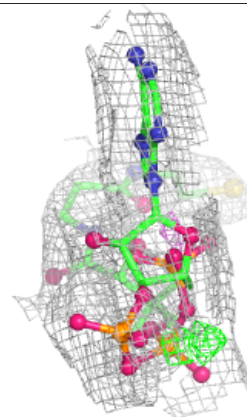
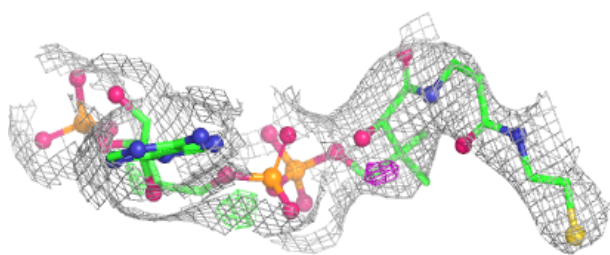
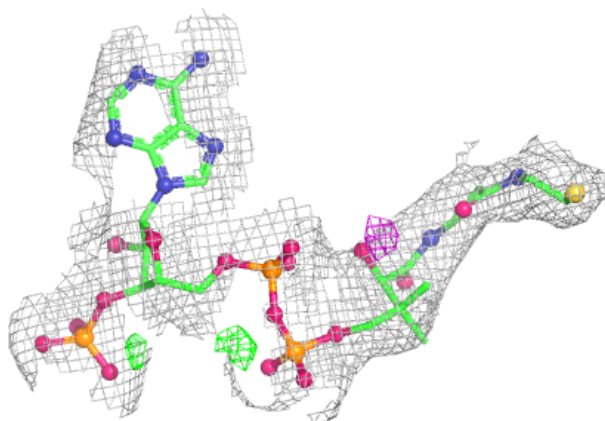
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
2	SO4	A	1801	5/5	0.62	0.14	180,181,181,181	0
3	ZN	A	1805	1/1	0.70	0.13	301,301,301,301	0
3	ZN	A	1804	1/1	0.78	0.10	177,177,177,177	0
4	COA	A	1806	48/48	0.92	0.11	40,67,86,90	0
5	NA	A	1807	1/1	0.93	0.21	41,41,41,41	0
3	ZN	A	1803	1/1	0.98	0.07	70,70,70,70	0
3	ZN	A	1802	1/1	0.99	0.03	50,50,50,50	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 A 1806:

$2mF_o-DF_c$ (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.