



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 11:08 AM UTC

PDB ID : 8CMZ / pdb_00008cmz
Title : Crystal structure of CREBBP-R1446C 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 : 2.25 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

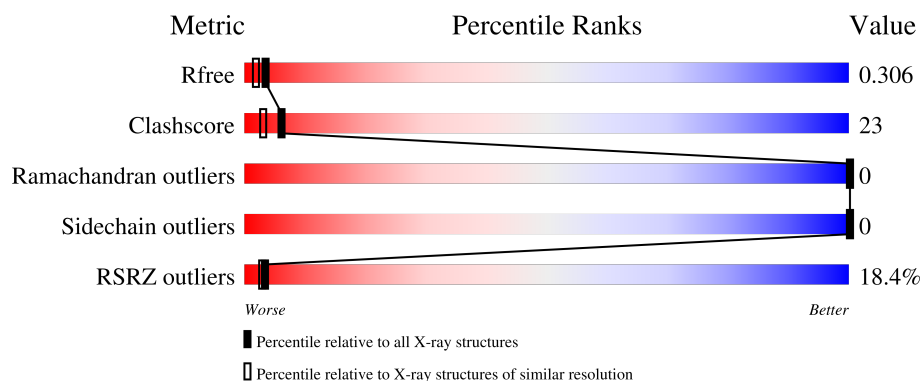
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	15% 52% 31% 17%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 4481 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	532	Total	C	N	O	S	0	1	0
			4415	2827	757	795	36			

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	1446	CYS	ARG	engineered mutation	UNP F8VPR5
A	1503	PHE	TYR	conflict	UNP F8VPR5
A	1613	SER	-	linker	UNP F8VPR5

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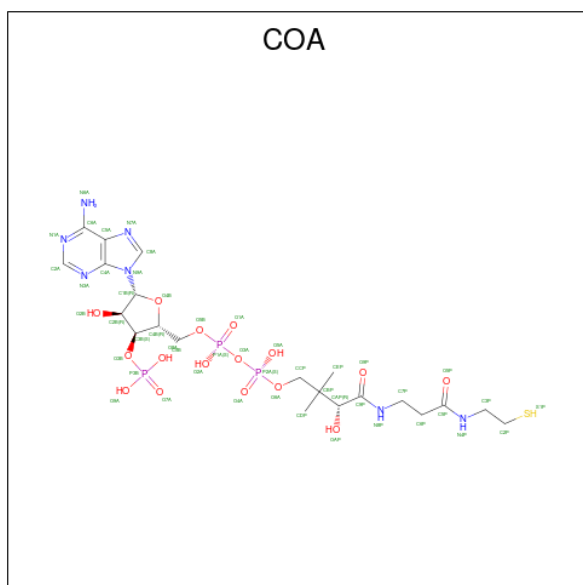
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Chain	Residue	Modelled	Actual	Comment	Reference
A	1614	GLY	-	linker	UNP F8VPR5
A	1615	GLY	-	linker	UNP F8VPR5
A	1616	SER	-	linker	UNP F8VPR5
A	1617	GLY	-	linker	UNP F8VPR5

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

- Molecule 3 is COENZYME A (CCD ID: COA) (formula: C₂₁H₃₆N₇O₁₆P₃S) (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.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	14	Total O 14 14	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	87.18Å 145.09Å 154.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	53.76 – 2.25 53.76 – 2.25	Depositor EDS
% Data completeness (in resolution range)	49.5 (53.76-2.25) 49.5 (53.76-2.25)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.01 (at 2.25Å)	Xtriage
Refinement program	autoBUSTER	Depositor
R, R_{free}	0.239 , 0.297 0.251 , 0.306	Depositor DCC
R_{free} test set	1183 reflections (2.53%)	wwPDB-VP
Wilson B-factor (Å ²)	58.3	Xtriage
Anisotropy	0.126	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 53.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	4481	wwPDB-VP
Average B, all atoms (Å ²)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.03% 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: COA, 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	0.49	0/4541	0.83	2/6137 (0.0%)

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 (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1316	GLY	CA-C-N	15.99	142.09	120.67
1	A	1316	GLY	C-N-CA	15.99	142.09	120.67

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1078	SER	Peptide
1	A	1477	SER	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	4415	0	4282	198	0
2	A	4	0	0	0	0
3	A	48	0	32	6	0
4	A	14	0	0	2	0
All	All	4481	0	4314	198	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 23.

All (198) 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:1728:LEU:CD1	1:A:1738:HIS:HB2	1.86	1.06
1:A:1531:LEU:O	1:A:1622:TYR:OH	1.88	0.91
1:A:1728:LEU:HD11	1:A:1738:HIS:HB2	1.51	0.90
1:A:1719:HIS:HA	1:A:1727:ASP:OD1	1.71	0.89
1:A:1718:TRP:HE1	1:A:1730:ILE:HG12	1.41	0.86
1:A:1475:PRO:HG2	1:A:1496:PRO:HA	1.56	0.85
1:A:1523:PHE:CE2	1:A:1626:GLU:HA	2.12	0.84
1:A:1516:ILE:HD12	1:A:1635:ILE:HG23	1.59	0.84
1:A:1523:PHE:CE2	1:A:1629:LYS:HB2	2.13	0.83
1:A:1726:TYR:CE1	1:A:1728:LEU:HG	2.14	0.81
1:A:1095:MET:HE1	1:A:1139:LYS:HG3	1.63	0.80
1:A:1320:LYS:HD2	1:A:1321:GLU:H	1.48	0.78
1:A:1726:TYR:HE1	1:A:1728:LEU:HG	1.48	0.75
1:A:1728:LEU:HD12	1:A:1738:HIS:HB2	1.67	0.74
1:A:1467:VAL:HG13	1:A:1468:THR:HG23	1.67	0.74
1:A:1520:LYS:HG2	1:A:1524:LYS:HD2	1.68	0.74
1:A:1720:CYS:SG	1:A:1726:TYR:HB3	2.27	0.74
1:A:1106:PRO:HA	1:A:1109:LEU:HD13	1.71	0.73
1:A:1675:HIS:ND1	4:A:1901:HOH:O	2.21	0.72
1:A:1436:SER:HB3	3:A:1805:COA:O9P	1.89	0.72
1:A:1722:VAL:HG13	1:A:1723:CYS:H	1.53	0.72
1:A:1426:THR:HG22	1:A:1427:ARG:HG3	1.72	0.72
1:A:1720:CYS:HB2	1:A:1722:VAL:HG12	1.71	0.71
1:A:1344:LYS:HA	1:A:1347:ARG:HB2	1.74	0.69
1:A:1462:LYS:HG3	1:A:1637:LEU:HB3	1.75	0.67
1:A:1139:LYS:NZ	1:A:1143:ASP:OD2	2.28	0.66
1:A:1346:LEU:HD23	1:A:1445:LEU:HD13	1.77	0.66
1:A:1516:ILE:CD1	1:A:1635:ILE:HG23	2.24	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1112:ARG:HB2	1:A:1113:GLN:NE2	2.11	0.65
1:A:1545:TRP:HA	1:A:1548:VAL:HG12	1.77	0.65
1:A:1344:LYS:HB3	1:A:1347:ARG:CZ	2.28	0.64
1:A:1374:GLY:HA3	1:A:1553:ILE:HD13	1.79	0.64
1:A:1722:VAL:HG13	1:A:1723:CYS:N	2.13	0.63
1:A:1719:HIS:HD1	1:A:1727:ASP:CG	2.06	0.62
1:A:1718:TRP:NE1	1:A:1730:ILE:HG12	2.14	0.62
1:A:1112:ARG:HB2	1:A:1113:GLN:HE21	1.65	0.61
1:A:1343:ASN:HA	1:A:1346:LEU:HD12	1.83	0.61
1:A:1728:LEU:HD12	1:A:1738:HIS:CB	2.30	0.61
1:A:1341:ARG:HH12	1:A:1455:ILE:HG13	1.64	0.61
1:A:1095:MET:HE3	1:A:1142:LEU:HD23	1.81	0.60
1:A:1533:SER:H	1:A:1536:GLU:CD	2.09	0.60
1:A:1149:GLU:HG2	1:A:1150:PRO:HD2	1.84	0.60
1:A:1552:SER:O	1:A:1552:SER:OG	2.17	0.60
1:A:1676:TRP:HB3	1:A:1687:SER:HB3	1.84	0.60
1:A:1438:HIS:CD2	1:A:1491:GLN:HB2	2.37	0.59
1:A:1494:PRO:HA	3:A:1805:COA:H62A	1.67	0.59
1:A:1169:ARG:HH11	1:A:1170:LYS:NZ	2.00	0.59
1:A:1475:PRO:HG2	1:A:1496:PRO:CA	2.30	0.59
1:A:1369:VAL:HB	1:A:1541:GLU:HG2	1.84	0.59
1:A:1531:LEU:HB3	1:A:1536:GLU:OE1	2.03	0.58
1:A:1728:LEU:CD1	1:A:1738:HIS:CB	2.72	0.58
1:A:1079:GLN:NE2	1:A:1082:LYS:HE3	2.19	0.58
1:A:1726:TYR:OH	1:A:1728:LEU:HD11	2.03	0.58
1:A:1462:LYS:HG3	1:A:1637:LEU:HD23	1.85	0.58
1:A:1083:LYS:HG2	1:A:1288:ARG:HH21	1.71	0.56
1:A:1523:PHE:CE1	1:A:1625:MET:HE2	2.40	0.56
1:A:1367:LYS:HE2	1:A:1393:THR:HG21	1.88	0.56
1:A:1516:ILE:HD11	1:A:1519:TYR:HB3	1.88	0.55
1:A:1500:GLN:O	1:A:1504:LYS:HG3	2.07	0.55
1:A:1472:TRP:NE1	1:A:1474:CYS:HB2	2.21	0.54
1:A:1286:CYS:CB	1:A:1288:ARG:HG2	2.38	0.54
1:A:1283:CYS:HB3	1:A:1286:CYS:HB2	1.90	0.54
1:A:1710:CYS:SG	1:A:1712:HIS:ND1	2.79	0.54
1:A:1555:GLU:OE1	1:A:1620:LYS:HG2	2.08	0.54
1:A:1739:THR:HB	1:A:1740:HIS:CD2	2.44	0.53
1:A:1341:ARG:HH22	1:A:1455:ILE:HG13	1.73	0.53
1:A:1385:MET:HE3	1:A:1535:LYS:HA	1.91	0.53
1:A:1396:LEU:HD11	1:A:1412:MET:HE2	1.91	0.53
1:A:1726:TYR:HH	1:A:1738:HIS:CE1	2.26	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1476:PRO:HG3	3:A:1805:COA:H61	1.91	0.52
1:A:1717:ARG:HD2	1:A:1727:ASP:CG	2.35	0.52
1:A:1523:PHE:HE2	1:A:1626:GLU:HA	1.71	0.52
1:A:1320:LYS:CD	1:A:1321:GLU:H	2.21	0.52
1:A:1311:CYS:HA	1:A:1314:LYS:HB2	1.91	0.52
1:A:1622:TYR:O	1:A:1626:GLU:HG2	2.09	0.51
1:A:1385:MET:CE	1:A:1535:LYS:HA	2.40	0.51
1:A:1368:THR:HG22	1:A:1390:PRO:HA	1.91	0.51
1:A:1391:TYR:OH	1:A:1541:GLU:HG3	2.10	0.51
1:A:1138:ILE:HD13	1:A:1157:VAL:HG12	1.93	0.51
1:A:1720:CYS:HB2	1:A:1722:VAL:CG1	2.41	0.51
1:A:1454:LEU:O	1:A:1458:LEU:HD12	2.10	0.51
1:A:1169:ARG:HH11	1:A:1170:LYS:HZ3	1.59	0.50
1:A:1344:LYS:HB3	1:A:1347:ARG:NE	2.26	0.50
1:A:1702:ARG:NE	1:A:1702:ARG:HA	2.27	0.50
1:A:1719:HIS:CA	1:A:1727:ASP:OD1	2.54	0.50
1:A:1523:PHE:CZ	1:A:1625:MET:C	2.90	0.50
1:A:1443:ARG:O	1:A:1446:CYS:HB3	2.12	0.50
1:A:1688:THR:HA	1:A:1691:MET:HE3	1.93	0.50
1:A:1521:ASP:HB2	1:A:1629:LYS:HG2	1.93	0.50
1:A:1545:TRP:HA	1:A:1548:VAL:CG1	2.41	0.50
1:A:1451:HIS:O	1:A:1455:ILE:HG12	2.12	0.49
1:A:1485:HIS:CE1	1:A:1672:ARG:HD3	2.47	0.49
1:A:1475:PRO:HD2	1:A:1496:PRO:HG3	1.93	0.49
1:A:1513:GLU:CG	1:A:1515:ILE:HG12	2.43	0.49
1:A:1719:HIS:N	1:A:1743:VAL:O	2.44	0.49
1:A:1622:TYR:O	1:A:1625:MET:HB2	2.13	0.49
1:A:1079:GLN:HA	1:A:1080:PRO:HD3	1.61	0.49
1:A:1523:PHE:CD2	1:A:1629:LYS:HB2	2.47	0.49
1:A:1529:ASP:HB2	1:A:1531:LEU:CD2	2.43	0.48
1:A:1462:LYS:HG2	1:A:1638:HIS:NE2	2.27	0.48
1:A:1476:PRO:CG	3:A:1805:COA:H61	2.44	0.48
1:A:1550:GLU:O	1:A:1553:ILE:HG12	2.14	0.48
1:A:1523:PHE:HE1	1:A:1625:MET:HE2	1.78	0.48
1:A:1717:ARG:HD2	1:A:1727:ASP:OD2	2.13	0.48
1:A:1729:CYS:SG	1:A:1732:CYS:N	2.87	0.48
1:A:1476:PRO:HD2	1:A:1493:ILE:HG23	1.96	0.47
1:A:1396:LEU:HD21	1:A:1412:MET:HE3	1.96	0.47
1:A:1521:ASP:CG	1:A:1629:LYS:HE3	2.39	0.47
1:A:1154:VAL:O	1:A:1158:TRP:HD1	1.97	0.47
1:A:1348:ARG:NH1	1:A:1348:ARG:HB3	2.28	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1446:CYS:O	1:A:1449:VAL:HG22	2.14	0.47
1:A:1462:LYS:CG	1:A:1637:LEU:HD23	2.44	0.47
1:A:1507:LEU:HD21	1:A:1635:ILE:HD13	1.96	0.47
1:A:1374:GLY:N	1:A:1550:GLU:OE1	2.38	0.47
1:A:1472:TRP:CD1	1:A:1631:VAL:HG22	2.50	0.47
1:A:1523:PHE:CE1	1:A:1625:MET:HB3	2.49	0.47
1:A:1198:TYR:CE1	1:A:1288:ARG:HB2	2.50	0.47
1:A:1284:LYS:HB2	1:A:1307:VAL:HG12	1.96	0.46
1:A:1728:LEU:HD11	1:A:1738:HIS:CB	2.34	0.46
1:A:1522:ILE:HD13	1:A:1632:PHE:HB2	1.97	0.46
1:A:1525:GLN:HG2	1:A:1634:VAL:HG11	1.98	0.46
1:A:1107:GLU:HA	1:A:1177:PHE:CD2	2.51	0.46
1:A:1434:LEU:HD11	1:A:1454:LEU:HD21	1.96	0.46
1:A:1475:PRO:CG	1:A:1496:PRO:HA	2.39	0.46
1:A:1723:CYS:HB2	1:A:1726:TYR:HB2	1.98	0.46
1:A:1157:VAL:HG21	1:A:1185:PHE:CZ	2.51	0.46
1:A:1506:MET:HE3	1:A:1507:LEU:HG	1.97	0.45
1:A:1314:LYS:HE2	1:A:1314:LYS:HB3	1.74	0.45
1:A:1705:TYR:CD1	1:A:1705:TYR:N	2.84	0.45
1:A:1149:GLU:HG2	1:A:1150:PRO:CD	2.46	0.45
1:A:1087:PRO:O	1:A:1091:ARG:HG3	2.16	0.45
1:A:1513:GLU:HG3	1:A:1513:GLU:O	2.17	0.45
1:A:1164:ALA:O	1:A:1168:ASN:ND2	2.38	0.45
1:A:1341:ARG:NH1	1:A:1455:ILE:HG13	2.30	0.45
1:A:1483:ILE:O	1:A:1668:LEU:HD21	2.17	0.45
1:A:1364:SER:HB3	1:A:1656:LEU:H	1.82	0.45
1:A:1098:LEU:HD12	1:A:1098:LEU:HA	1.82	0.44
1:A:1342:VAL:HG21	1:A:1449:VAL:HB	1.99	0.44
1:A:1380:VAL:HG11	1:A:1387:GLU:HG3	2.00	0.44
1:A:1523:PHE:CZ	1:A:1625:MET:HB3	2.52	0.44
1:A:1668:LEU:HD23	1:A:1668:LEU:HA	1.46	0.44
1:A:1374:GLY:H	1:A:1550:GLU:CD	2.22	0.44
1:A:1513:GLU:HG3	1:A:1515:ILE:HG12	1.98	0.44
1:A:1555:GLU:CD	1:A:1620:LYS:HE3	2.42	0.44
1:A:1691:MET:O	1:A:1695:LEU:HG	2.18	0.44
1:A:1149:GLU:OE1	1:A:1151:TRP:HB2	2.17	0.44
1:A:1371:VAL:HG23	1:A:1387:GLU:O	2.18	0.44
1:A:1085:PHE:HA	1:A:1089:GLU:OE1	2.18	0.43
1:A:1374:GLY:CA	1:A:1553:ILE:HD13	2.47	0.43
1:A:1523:PHE:HZ	1:A:1625:MET:C	2.25	0.43
1:A:1740:HIS:O	1:A:1742:MET:HG3	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1660:LEU:HD11	1:A:1667:PHE:HA	2.00	0.43
1:A:1079:GLN:HG2	1:A:1082:LYS:HG2	1.99	0.43
1:A:1428:ARG:HH11	1:A:1538:PRO:HG3	1.84	0.43
1:A:1478:GLU:C	1:A:1480:ASP:H	2.25	0.43
1:A:1095:MET:HE2	1:A:1098:LEU:HD23	2.01	0.43
1:A:1711:LYS:HG2	1:A:1711:LYS:O	2.19	0.43
1:A:1320:LYS:HD3	1:A:1320:LYS:HA	1.75	0.43
1:A:1090:LEU:HA	1:A:1090:LEU:HD23	1.71	0.43
1:A:1518:ASP:OD1	1:A:1519:TYR:N	2.51	0.43
1:A:1421:CYS:HA	1:A:1422:PRO:HD3	1.90	0.42
1:A:1141:LYS:HD3	1:A:1147:TYR:CE1	2.54	0.42
1:A:1284:LYS:NZ	1:A:1304:SER:O	2.34	0.42
1:A:1545:TRP:CE3	1:A:1548:VAL:HG11	2.55	0.42
1:A:1279:PRO:HG2	1:A:1292:GLN:HB3	2.01	0.42
1:A:1478:GLU:C	1:A:1480:ASP:N	2.72	0.42
1:A:1492:LYS:HZ3	3:A:1805:COA:C6A	2.33	0.42
1:A:1109:LEU:C	1:A:1111:PHE:H	2.28	0.42
1:A:1438:HIS:N	1:A:1491:GLN:OE1	2.52	0.42
1:A:1742:MET:HE3	1:A:1742:MET:HB2	1.82	0.42
1:A:1151:TRP:NE1	1:A:1198:TYR:CD1	2.87	0.42
1:A:1086:LYS:O	1:A:1087:PRO:C	2.63	0.42
1:A:1668:LEU:O	1:A:1672:ARG:HG2	2.19	0.42
1:A:1307:VAL:HG23	1:A:1312:LEU:HG	2.02	0.41
1:A:1472:TRP:HD1	1:A:1631:VAL:HG22	1.86	0.41
1:A:1545:TRP:HH2	1:A:1625:MET:HA	1.85	0.41
1:A:1291:HIS:HB2	1:A:1294:CYS:HB2	2.02	0.41
1:A:1525:GLN:HE21	1:A:1529:ASP:CG	2.26	0.41
1:A:1628:HIS:O	1:A:1631:VAL:HG12	2.20	0.41
1:A:1286:CYS:HB2	1:A:1288:ARG:HG2	2.02	0.41
1:A:1150:PRO:O	1:A:1153:TYR:HB3	2.21	0.41
1:A:1342:VAL:O	1:A:1345:PHE:HB3	2.21	0.41
1:A:1362:VAL:CG2	1:A:1661:MET:HG3	2.50	0.41
1:A:1523:PHE:HZ	1:A:1625:MET:O	2.04	0.41
1:A:1706:THR:N	4:A:1903:HOH:O	2.54	0.41
1:A:1738:HIS:NE2	1:A:1740:HIS:ND1	2.69	0.41
1:A:1437:ILE:HD12	1:A:1437:ILE:HG23	1.81	0.40
1:A:1447:THR:OG1	3:A:1805:COA:O4A	2.25	0.40
1:A:1516:ILE:CD1	1:A:1519:TYR:HB3	2.51	0.40
1:A:1707:CYS:HB2	1:A:1714:VAL:HG11	2.02	0.40
1:A:1333:ARG:HD3	1:A:1652:PRO:HB2	2.01	0.40
1:A:1333:ARG:HH11	1:A:1333:ARG:HD2	1.77	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1086:LYS:N	1:A:1089:GLU:OE1	2.46	0.40
1:A:1180:LYS:HA	1:A:1183:GLU:HG2	2.03	0.40
1:A:1095:MET:CE	1:A:1139:LYS:HG3	2.43	0.40
1:A:1283:CYS:SG	1:A:1286:CYS:N	2.85	0.40
1:A:1540:PHE:HB2	1:A:1543:ASP:HB2	2.02	0.40
1:A:1708:ASN:OD1	1:A:1727:ASP:N	2.50	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	523/640 (82%)	487 (93%)	36 (7%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	492/586 (84%)	492 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1079	GLN
1	A	1113	GLN
1	A	1310	ASN
1	A	1438	HIS
1	A	1517	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 4 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	1805	-	47,50,50	0.40	0	69,75,75	0.60	2 (2%)

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	1805	-	-	14/48/64/64	0/3/3/3

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1805	COA	P3B-O3B-C3B	2.31	129.61	123.43
3	A	1805	COA	O3B-C3B-C4B	-2.25	102.10	110.03

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1805	COA	C5B-O5B-P1A-O2A
3	A	1805	COA	CDP-CBP-CCP-O6A
3	A	1805	COA	CEP-CBP-CCP-O6A
3	A	1805	COA	CAP-CBP-CCP-O6A
3	A	1805	COA	C5P-C6P-C7P-N8P
3	A	1805	COA	O4B-C4B-C5B-O5B
3	A	1805	COA	C3B-C4B-C5B-O5B
3	A	1805	COA	P1A-O3A-P2A-O6A
3	A	1805	COA	S1P-C2P-C3P-N4P
3	A	1805	COA	C5B-O5B-P1A-O1A
3	A	1805	COA	C5B-O5B-P1A-O3A
3	A	1805	COA	C2P-C3P-N4P-C5P
3	A	1805	COA	P2A-O3A-P1A-O1A
3	A	1805	COA	P2A-O3A-P1A-O2A

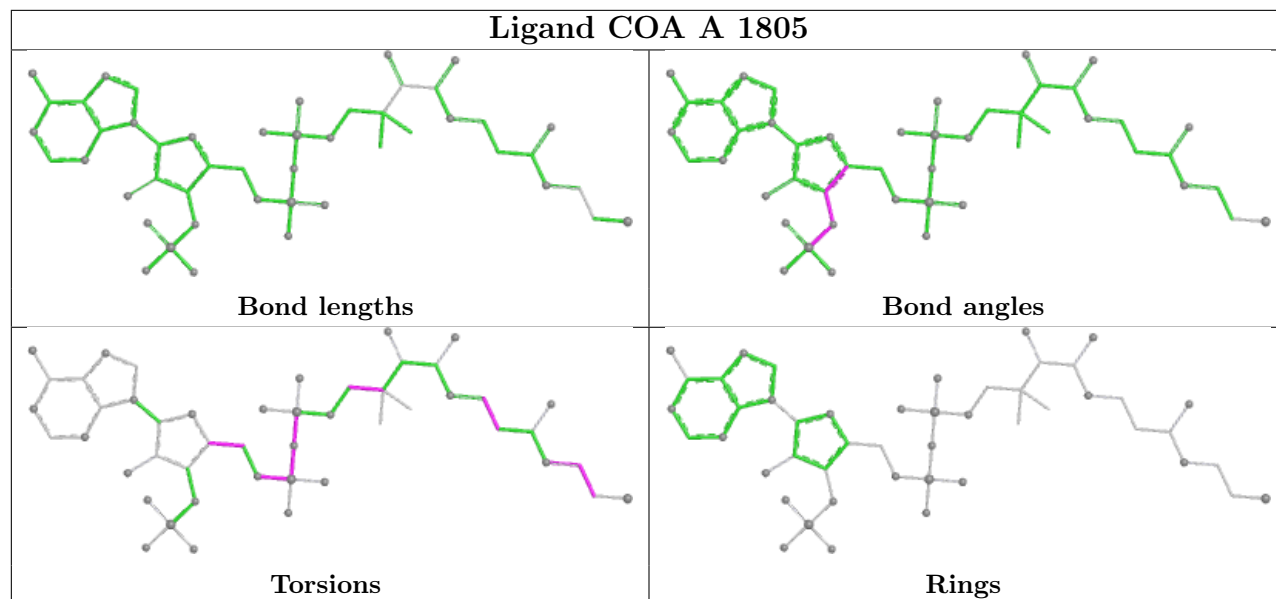
There are no ring outliers.

1 monomer is involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1805	COA	6	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, 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	532/640 (83%)	0.91	98 (18%) 3 3	29, 68, 140, 202	1 (0%)

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1716	THR	5.9
1	A	1714	VAL	5.7
1	A	1621	LEU	5.5
1	A	1730	ILE	5.3
1	A	1745	TRP	5.3
1	A	1700	GLN	4.8
1	A	1531	LEU	4.5
1	A	1477	SER	4.2
1	A	1712	HIS	4.1
1	A	1713	HIS	4.1
1	A	1743	VAL	4.0
1	A	1732	CYS	3.8
1	A	1075	MET	3.7
1	A	1318	PRO	3.7
1	A	1624	THR	3.7
1	A	1704	VAL	3.6
1	A	1731	ASN	3.5
1	A	1502	TRP	3.5
1	A	1711	LYS	3.4
1	A	1145	GLY	3.4
1	A	1721	THR	3.4
1	A	1622	TYR	3.3
1	A	1410	PHE	3.3
1	A	1537	LEU	3.2
1	A	1742	MET	3.2
1	A	1478	GLU	3.1
1	A	1722	VAL	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	1317	ARG	3.1
1	A	1475	PRO	3.0
1	A	1522	ILE	3.0
1	A	1705	TYR	3.0
1	A	1741	LYS	3.0
1	A	1633	PHE	3.0
1	A	1706	THR	3.0
1	A	1744	LYS	2.9
1	A	1505	LYS	2.9
1	A	1698	GLN	2.9
1	A	1527	ASN	2.9
1	A	1515	ILE	2.9
1	A	1553	ILE	2.9
1	A	1544	PHE	2.8
1	A	1647	PRO	2.8
1	A	1519	TYR	2.8
1	A	1728	LEU	2.8
1	A	1729	CYS	2.8
1	A	1111	PHE	2.8
1	A	1079	GLN	2.7
1	A	1472	TRP	2.7
1	A	1719	HIS	2.7
1	A	1708	ASN	2.7
1	A	1534	ALA	2.6
1	A	1378	ARG	2.6
1	A	1077	SER	2.6
1	A	1545	TRP	2.6
1	A	1517	ASN	2.6
1	A	1511	PHE	2.6
1	A	1080	PRO	2.5
1	A	1697	THR	2.5
1	A	1464	LEU	2.5
1	A	1474	CYS	2.5
1	A	1672	ARG	2.5
1	A	1082	LYS	2.5
1	A	1485	HIS	2.5
1	A	1516	ILE	2.4
1	A	1631	VAL	2.4
1	A	1720	CYS	2.4
1	A	1081	ARG	2.4
1	A	1273	ASP	2.4
1	A	1088	GLU	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	1701	ASP	2.3
1	A	1554	LYS	2.3
1	A	1625	MET	2.3
1	A	1479	GLY	2.3
1	A	1274	THR	2.3
1	A	1076	GLY	2.3
1	A	1555	GLU	2.3
1	A	1150	PRO	2.2
1	A	1476	PRO	2.2
1	A	1509	LYS	2.2
1	A	1524	LYS	2.2
1	A	1523	PHE	2.2
1	A	1548	VAL	2.2
1	A	1626	GLU	2.2
1	A	1699	GLY	2.2
1	A	1438	HIS	2.2
1	A	1512	ALA	2.2
1	A	1499	LEU	2.2
1	A	1349	GLN	2.1
1	A	1508	ASP	2.1
1	A	1740	HIS	2.1
1	A	1380	VAL	2.1
1	A	1319	ARG	2.1
1	A	1738	HIS	2.1
1	A	1084	ILE	2.1
1	A	1717	ARG	2.0
1	A	1724	GLU	2.0
1	A	1507	LEU	2.0
1	A	1453	ILE	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 ⓘ

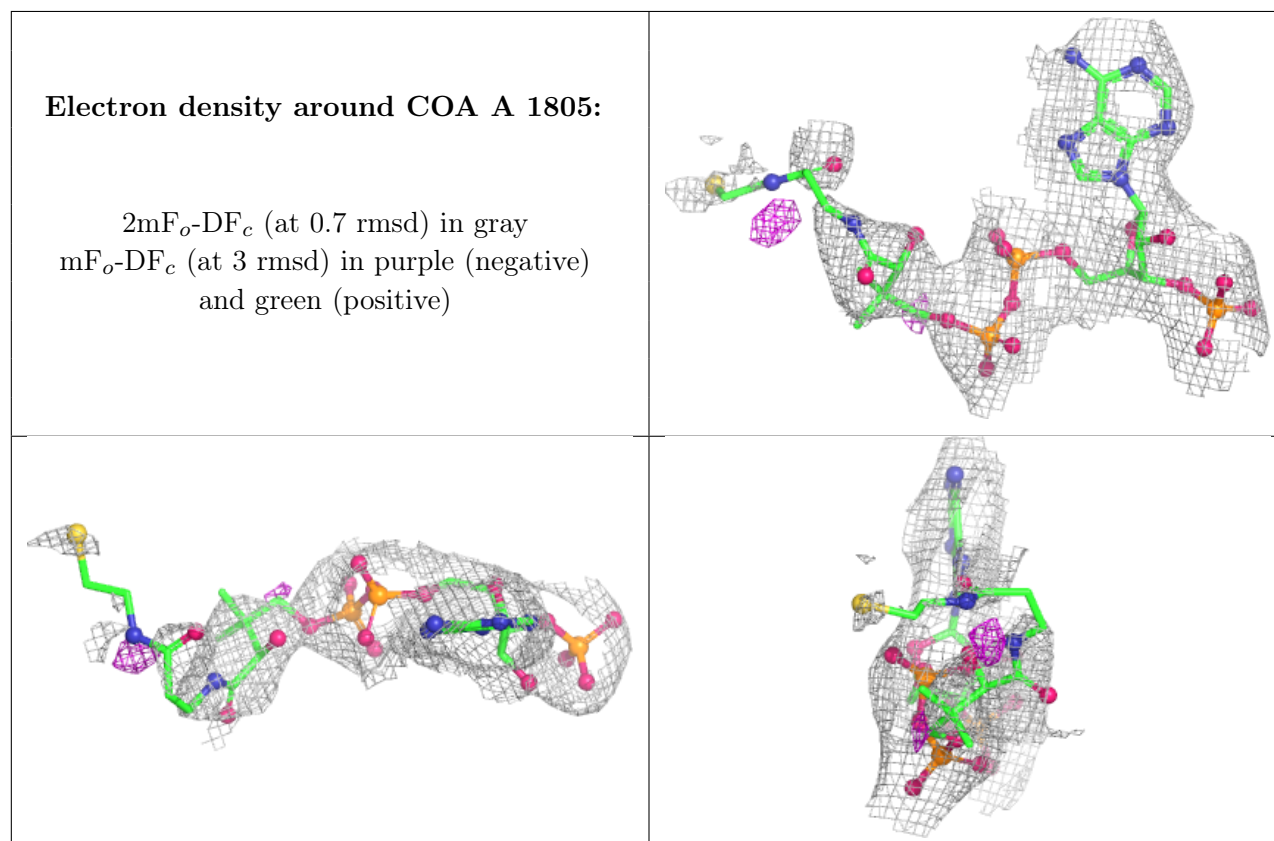
There are no oligosaccharides in this entry.

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	ZN	A	1804	1/1	0.88	0.10	211,211,211,211	0
2	ZN	A	1803	1/1	0.91	0.09	162,162,162,162	0
3	COA	A	1805	48/48	0.91	0.13	101,118,136,141	0
2	ZN	A	1801	1/1	0.98	0.06	56,56,56,56	0
2	ZN	A	1802	1/1	0.99	0.04	78,78,78,78	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.