



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 08:12 PM UTC

PDB ID : 2VU0 / pdb_00002vu0
Title : Biosynthetic thiolase from *Z. ramigera*. Complex of the oxidised enzyme with coenzyme A.
Authors : Kursula, P.; Wierenga, R.K.
Deposited on : 2008-05-19
Resolution : 1.87 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

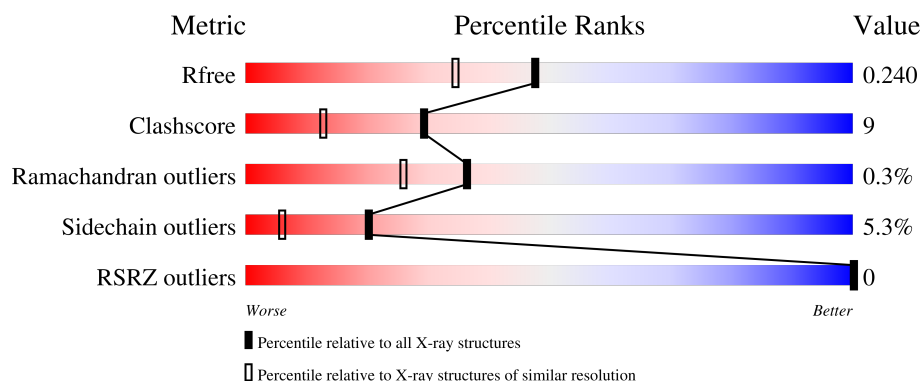
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.87 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	1220 (1.88-1.88)
Clashscore	190562	1234 (1.88-1.88)
Ramachandran outliers	187476	1222 (1.88-1.88)
Sidechain outliers	187428	1222 (1.88-1.88)
RSRZ outliers	180081	1220 (1.88-1.88)

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	392	 81% 16% .
1	B	392	 86% 13% .
1	C	392	 83% 15% .
1	D	392	 81% 16% ..

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 12643 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.

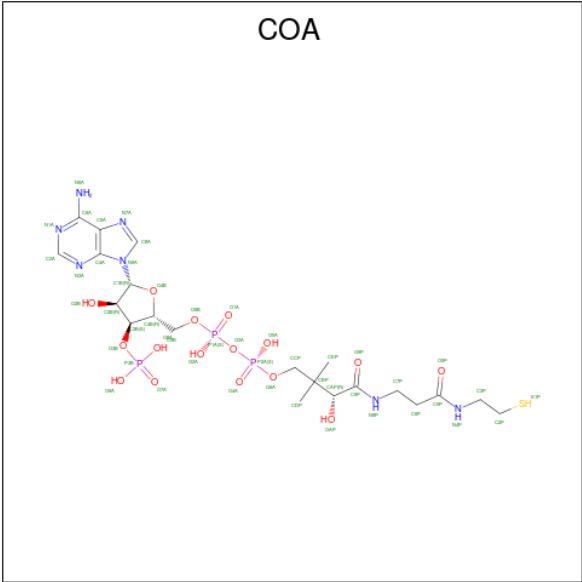
- Molecule 1 is a protein called Acetyl-CoA acetyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	391	Total	C	N	O	S	0	7	0
			2864	1781	514	548	21			
1	B	391	Total	C	N	O	S	0	10	0
			2869	1788	512	548	21			
1	C	391	Total	C	N	O	S	0	0	0
			2828	1755	511	541	21			
1	D	390	Total	C	N	O	S	0	0	0
			2821	1751	510	539	21			

There are 8 discrepancies between the modelled and reference sequences:

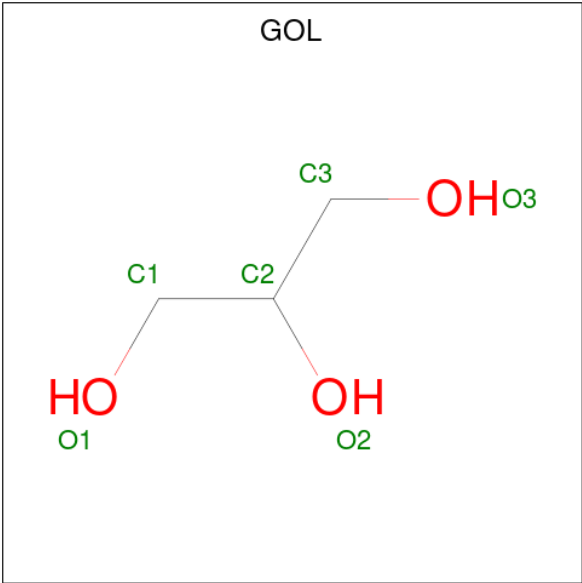
Chain	Residue	Modelled	Actual	Comment	Reference
A	10	ALA	-	insertion	UNP P07097
A	129	ARG	ALA	conflict	UNP P07097
B	10	ALA	-	insertion	UNP P07097
B	129	ARG	ALA	conflict	UNP P07097
C	10	ALA	-	insertion	UNP P07097
C	129	ARG	ALA	conflict	UNP P07097
D	10	ALA	-	insertion	UNP P07097
D	129	ARG	ALA	conflict	UNP P07097

- Molecule 2 is COENZYME A (CCD ID: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$).



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

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

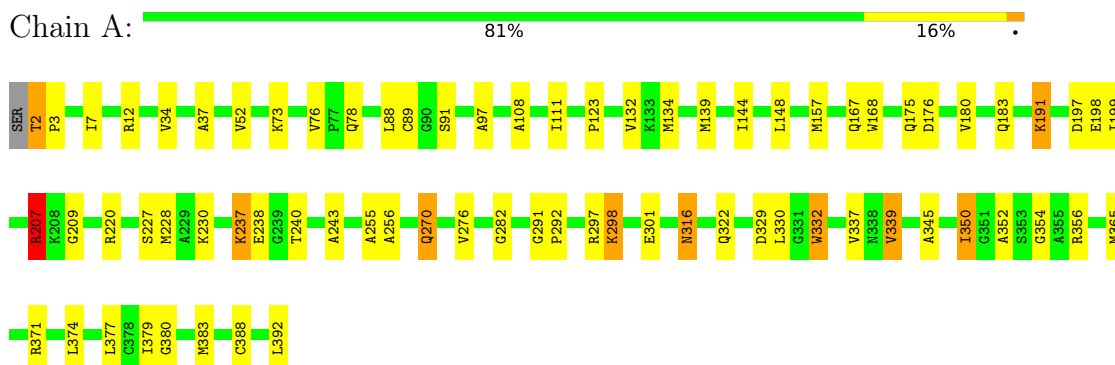
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	401	Total	O	0	0
			401	401		
5	B	392	Total	O	0	0
			392	392		
5	C	191	Total	O	0	0
			191	191		
5	D	155	Total	O	0	0
			155	155		

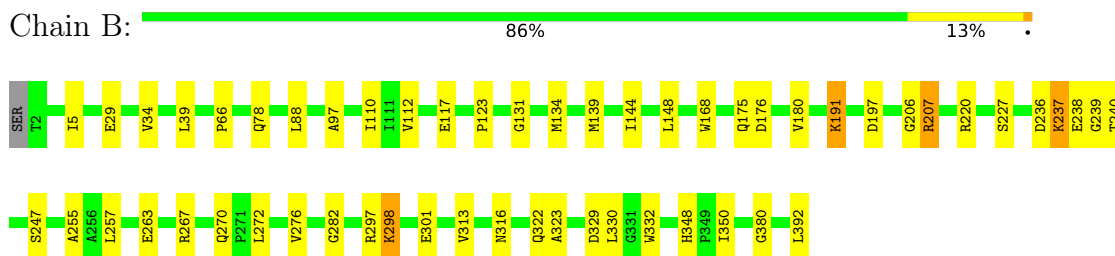
3 Residue-property plots [i](#)

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.

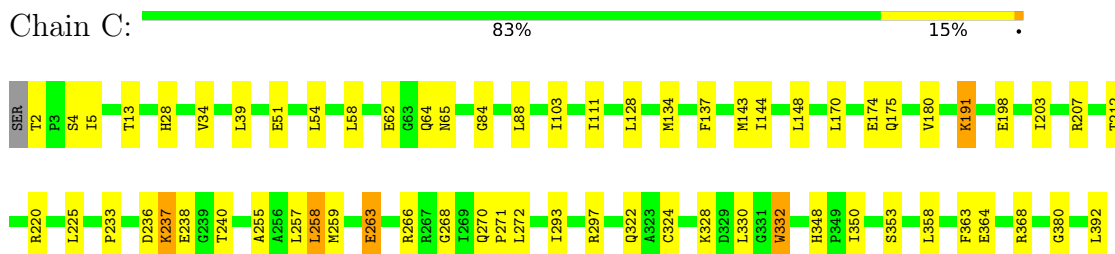
- Molecule 1: Acetyl-CoA acetyltransferase



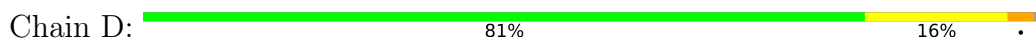
- Molecule 1: Acetyl-CoA acetyltransferase

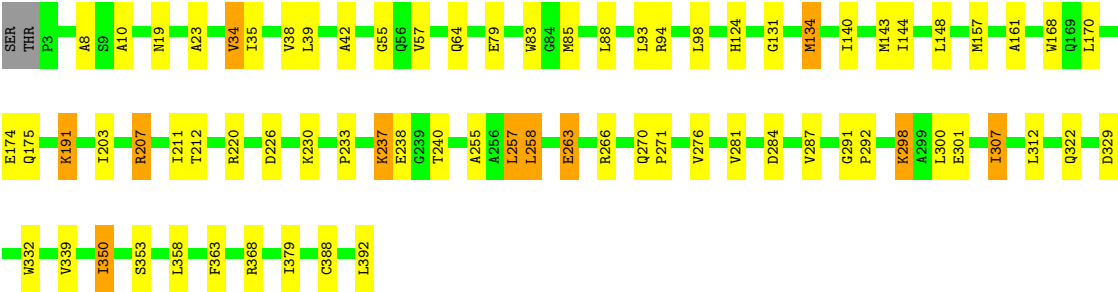


- Molecule 1: Acetyl-CoA acetyltransferase



- Molecule 1: Acetyl-CoA acetyltransferase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	84.40Å 79.06Å 148.80Å 90.00° 92.66° 90.00°	Depositor
Resolution (Å)	20.00 – 1.87 20.00 – 1.87	Depositor EDS
% Data completeness (in resolution range)	97.4 (20.00-1.87) 85.4 (20.00-1.87)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.55 (at 1.87Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.194 , 0.229 (Not available) , 0.240	Depositor DCC
R_{free} test set	7205 reflections (4.51%)	wwPDB-VP
Wilson B-factor (Å ²)	16.7	Xtriage
Anisotropy	0.661	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 49.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.39$, $\langle L^2 \rangle = 0.21$	Xtriage
Estimated twinning fraction	0.118 for h,-k,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	12643	wwPDB-VP
Average B, all atoms (Å ²)	9.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.14% 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, CSO, GOL, SO4

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	1.32	8/2919 (0.3%)	1.16	8/3941 (0.2%)
1	B	1.28	5/2933 (0.2%)	1.08	0/3960
1	C	0.82	0/2862	0.94	1/3864 (0.0%)
1	D	0.78	0/2855	0.91	0/3853
All	All	1.08	13/11569 (0.1%)	1.03	9/15618 (0.1%)

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	123	PRO	N-CA	-7.55	1.39	1.46
1	A	97	ALA	CA-CB	7.39	1.64	1.53
1	B	97	ALA	CA-CB	6.87	1.64	1.53
1	A	37	ALA	CA-CB	6.63	1.63	1.53
1	A	91	SER	C-O	-6.29	1.16	1.24
1	B	313	VAL	CA-CB	-5.84	1.46	1.54
1	A	52	VAL	C-O	-5.55	1.18	1.24
1	B	123	PRO	N-CA	-5.41	1.41	1.46
1	B	323	ALA	CA-CB	5.39	1.61	1.53
1	A	337	VAL	CA-CB	5.24	1.60	1.54
1	B	117	GLU	CA-C	-5.24	1.46	1.52
1	A	352	ALA	CA-CB	-5.22	1.45	1.53
1	A	365	MET	N-CA	5.03	1.52	1.46

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	197	ASP	N-CA-C	-5.63	105.22	111.36
1	A	207	ARG	N-CA-C	-5.60	104.57	111.40
1	A	76	VAL	N-CA-C	-5.55	103.51	108.95
1	A	339	VAL	N-CA-CB	-5.40	101.41	110.65

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	198	GLU	N-CA-C	5.32	117.16	111.36
1	A	350	ILE	N-CA-C	5.30	120.37	109.34
1	A	316	ASN	N-CA-C	5.27	117.67	110.24
1	C	13	THR	N-CA-C	-5.23	103.98	110.41
1	A	199	ILE	N-CA-C	5.00	115.55	109.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2864	0	2885	53	0
1	B	2869	0	2908	48	0
1	C	2828	0	2833	48	0
1	D	2821	0	2827	60	0
2	A	48	0	32	7	0
2	B	48	0	32	5	0
3	A	6	0	8	0	0
4	A	10	0	0	1	0
4	B	10	0	0	0	0
5	A	401	0	0	9	1
5	B	392	0	0	6	0
5	C	191	0	0	3	0
5	D	155	0	0	8	0
All	All	12643	0	11525	198	1

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 9.

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:B:191:LYS:HB3	1:B:191:LYS:NZ	1.81	0.94
1:D:144:ILE:CD1	1:D:148:LEU:HD12	2.10	0.82

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:230:LYS:HE3	5:A:2276:HOH:O	1.80	0.81
1:D:191:LYS:NZ	1:D:191:LYS:HB3	1.98	0.79
1:A:175:GLN:HE22	1:A:240:THR:CG2	1.96	0.78
1:D:57:VAL:HG21	1:D:350:ILE:HG22	1.66	0.78
1:D:207:ARG:HG2	1:D:207:ARG:HH11	1.47	0.76
1:D:57:VAL:HG21	1:D:350:ILE:CG2	2.16	0.74
1:B:191:LYS:HB3	1:B:191:LYS:HZ2	1.52	0.72
1:B:298:LYS:HE2	1:B:301:GLU:OE1	1.90	0.72
1:D:257:LEU:C	1:D:257:LEU:HD23	2.14	0.72
1:B:237:LYS:HD2	1:B:237:LYS:N	2.05	0.71
1:B:144:ILE:HD11	1:C:134:MET:HE3	1.74	0.70
1:B:29:GLU:OE1	5:B:2042:HOH:O	2.09	0.70
1:B:134:MET:CE	1:C:144:ILE:HD11	2.22	0.69
1:B:175:GLN:HE22	1:B:240[A]:THR:CG2	2.06	0.69
1:D:98:LEU:HB3	5:D:2062:HOH:O	1.93	0.68
1:A:175:GLN:HE22	1:A:240:THR:HG23	1.57	0.68
1:A:207:ARG:HG2	1:A:207:ARG:HH11	1.59	0.68
1:C:144:ILE:HD13	1:C:148:LEU:HD12	1.76	0.68
1:D:339:VAL:HG11	1:D:368:ARG:NH2	2.09	0.67
1:B:191:LYS:HB3	1:B:191:LYS:HZ1	1.59	0.65
1:C:268:GLY:HA2	5:C:2139:HOH:O	1.97	0.64
1:D:237:LYS:N	1:D:237:LYS:HD2	2.12	0.64
1:C:191:LYS:HB3	1:C:191:LYS:NZ	2.11	0.64
1:D:191:LYS:NZ	1:D:191:LYS:CB	2.61	0.64
1:C:5:ILE:HD12	1:C:103:ILE:HG21	1.80	0.63
1:B:168:TRP:CH2	1:B:329:ASP:HB2	2.33	0.63
1:D:144:ILE:HD12	1:D:148:LEU:HD12	1.79	0.63
1:B:191:LYS:NZ	1:B:191:LYS:CB	2.58	0.62
1:C:128:LEU:HD21	1:C:137:PHE:CE2	2.34	0.62
1:C:34:VAL:HB	5:C:2013:HOH:O	1.98	0.62
1:B:144:ILE:HD13	1:B:148:LEU:HD12	1.79	0.62
1:A:168:TRP:CH2	1:A:329:ASP:HB2	2.35	0.61
1:C:258:LEU:HD22	1:C:258:LEU:N	2.15	0.61
1:A:144:ILE:HD13	1:A:148:LEU:HD12	1.83	0.61
1:A:144:ILE:CD1	1:A:148:LEU:HD12	2.31	0.60
1:A:175:GLN:HE22	1:A:240:THR:HG21	1.65	0.60
1:B:134:MET:HE3	1:C:144:ILE:HD11	1.82	0.60
1:B:175:GLN:HE22	1:B:240[A]:THR:HG21	1.65	0.60
1:C:28:HIS:ND1	1:C:62:GLU:OE2	2.26	0.60
1:C:237:LYS:N	1:C:237:LYS:HD2	2.16	0.60
1:A:157:MET:HG3	2:A:1393:COA:S1P	2.41	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:144:ILE:HD13	1:D:148:LEU:HD12	1.82	0.59
1:B:134:MET:HE3	1:C:143:MET:HE3	1.85	0.59
1:C:175:GLN:HE22	1:C:240:THR:HG21	1.67	0.59
1:D:300:LEU:HD13	1:D:307:ILE:HG12	1.84	0.59
1:B:206:GLY:C	1:B:207:ARG:HG2	2.28	0.58
1:D:276:VAL:HG22	1:D:388:CYS:O	2.05	0.57
1:A:209:GLY:HA2	5:A:2249:HOH:O	2.03	0.57
1:B:112:VAL:HG22	1:B:257[B]:LEU:HD13	1.85	0.57
1:B:197:ASP:OD1	5:B:2225:HOH:O	2.17	0.57
1:A:78:GLN:NE2	5:A:2116:HOH:O	2.35	0.57
1:A:34[A]:VAL:HG12	1:A:255:ALA:HB3	1.86	0.56
1:D:191:LYS:HB3	1:D:191:LYS:HZ3	1.70	0.56
1:A:276[A]:VAL:HG23	1:A:388:CYS:HB2	1.88	0.56
1:A:191:LYS:HG3	5:A:2221:HOH:O	2.06	0.56
1:D:257:LEU:C	1:D:257:LEU:CD2	2.79	0.56
1:D:191:LYS:CB	1:D:191:LYS:HZ2	2.19	0.56
1:A:297[B]:ARG:NH2	1:A:329:ASP:OD1	2.39	0.55
1:D:83:TRP:HZ2	5:D:2062:HOH:O	1.88	0.55
1:C:348:HIS:ND1	1:C:353:SER:OG	2.36	0.55
1:B:168:TRP:HH2	1:B:329:ASP:HB2	1.69	0.55
1:B:34[A]:VAL:HG12	1:B:255:ALA:HB3	1.89	0.54
1:C:257:LEU:HD22	1:C:259:MET:HE3	1.90	0.54
1:D:157:MET:HA	1:D:157:MET:HE2	1.89	0.54
1:A:168:TRP:HH2	1:A:329:ASP:HB2	1.71	0.54
1:D:8:ALA:HB3	1:D:257:LEU:HD22	1.91	0.53
1:C:58:LEU:O	5:C:2033:HOH:O	2.18	0.53
1:D:263:GLU:HA	1:D:266:ARG:NH1	2.24	0.53
1:D:257:LEU:HD23	1:D:258:LEU:N	2.23	0.53
1:C:5:ILE:HD12	1:C:103:ILE:CG2	2.37	0.53
1:A:371:ARG:CZ	5:A:2387:HOH:O	2.57	0.53
1:A:2:THR:N	1:A:3:PRO:HD2	2.24	0.53
1:A:191:LYS:CB	1:A:191:LYS:NZ	2.72	0.52
1:B:134:MET:HE2	1:C:144:ILE:HD11	1.89	0.52
1:D:57:VAL:CG2	1:D:350:ILE:HG22	2.39	0.52
1:B:131:GLY:HA2	1:D:131:GLY:HA2	1.92	0.52
1:D:298:LYS:HE2	1:D:301:GLU:OE1	2.10	0.52
1:A:374:LEU:C	1:A:374:LEU:HD23	2.36	0.51
1:A:237:LYS:HD2	1:A:237:LYS:H	1.75	0.51
1:B:227:SER:HB2	2:B:1393:COA:H2A	1.92	0.51
1:C:34:VAL:HG12	1:C:255:ALA:HB3	1.92	0.51
1:B:207:ARG:NH1	5:B:2234:HOH:O	2.43	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:191:LYS:HB3	1:D:191:LYS:HZ2	1.72	0.51
1:B:297:ARG:NE	5:B:2318:HOH:O	2.44	0.51
1:B:330:LEU:HD12	1:B:332:TRP:CZ2	2.45	0.50
1:C:257:LEU:C	1:C:258:LEU:HD22	2.37	0.50
1:C:330:LEU:HD12	1:C:332:TRP:CZ2	2.46	0.50
1:C:175:GLN:HE22	1:C:240:THR:CG2	2.25	0.50
1:A:191:LYS:NZ	1:A:191:LYS:HB2	2.27	0.49
1:B:134:MET:HE3	1:C:143:MET:CE	2.41	0.49
1:B:110:ILE:CG2	1:B:257[B]:LEU:HD11	2.42	0.49
1:D:271:PRO:HD2	1:D:392:LEU:HD12	1.94	0.49
1:D:34:VAL:HG13	1:D:255:ALA:HB3	1.95	0.48
1:D:175:GLN:NE2	1:D:240:THR:OG1	2.45	0.48
1:C:5:ILE:CD1	1:C:103:ILE:CG2	2.92	0.48
1:D:79:GLU:HB2	5:D:2056:HOH:O	2.13	0.48
1:A:298:LYS:HD2	4:A:1395:SO4:O3	2.13	0.48
1:D:57:VAL:HG21	1:D:350:ILE:HG21	1.92	0.48
1:A:176:ASP:O	1:A:180:VAL:HG23	2.14	0.47
1:B:5:ILE:N	1:B:5:ILE:HD12	2.29	0.47
1:C:5:ILE:HD11	1:C:103:ILE:HG22	1.97	0.47
1:D:258:LEU:N	1:D:258:LEU:HD22	2.29	0.47
1:A:73:LYS:NZ	5:A:2101:HOH:O	2.41	0.47
1:C:174:GLU:OE2	1:C:328:LYS:NZ	2.40	0.47
1:A:298:LYS:HE2	1:A:301:GLU:OE1	2.15	0.47
1:A:330:LEU:HD13	1:A:332:TRP:CH2	2.50	0.47
1:C:258:LEU:N	1:C:258:LEU:CD2	2.78	0.47
1:C:170:LEU:HD13	1:C:324:CYS:HB2	1.97	0.47
1:B:34[A]:VAL:CG1	1:B:255:ALA:HB3	2.45	0.47
1:B:131:GLY:HA2	1:D:131:GLY:CA	2.45	0.47
1:D:284:ASP:HB3	1:D:287:VAL:HG22	1.97	0.47
1:C:64:GLN:O	1:C:65:ASN:C	2.59	0.46
1:A:88:LEU:HD12	1:A:380:GLY:O	2.16	0.46
1:A:108:ALA:CB	1:A:111:ILE:HD11	2.46	0.46
1:C:271:PRO:HD2	1:C:392:LEU:HD12	1.97	0.46
1:B:112:VAL:CG2	1:B:257[B]:LEU:HD13	2.46	0.46
1:D:168:TRP:CH2	1:D:329:ASP:HB2	2.50	0.45
1:A:316:ASN:HB3	5:A:2353:HOH:O	2.16	0.45
1:C:348:HIS:CE1	1:C:353:SER:HG	2.33	0.45
1:D:203:ILE:HD13	1:D:212:THR:OG1	2.16	0.45
1:A:276[A]:VAL:CG2	1:A:388:CYS:HB2	2.46	0.45
1:C:293:ILE:O	1:C:297:ARG:HG3	2.17	0.45
1:D:35:ILE:O	1:D:38:VAL:HG22	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:228:MET:HE1	2:A:1393:COA:H61A	1.82	0.45
1:A:78:GLN:O	1:B:282:GLY:HA3	2.17	0.45
1:A:276[A]:VAL:HG22	1:A:388:CYS:O	2.16	0.45
1:C:263:GLU:HA	1:C:266:ARG:HH11	1.82	0.45
1:A:282:GLY:HA3	1:B:78:GLN:O	2.17	0.45
1:D:207:ARG:HH11	1:D:207:ARG:CG	2.24	0.45
1:A:7:ILE:HG23	1:A:256:ALA:HB1	1.99	0.44
1:A:354:GLY:HA2	1:A:377:LEU:HD11	1.99	0.44
1:B:263[B]:GLU:CD	1:B:267:ARG:HE	2.25	0.44
1:B:316:ASN:HB3	5:B:2339:HOH:O	2.16	0.44
1:D:226:ASP:O	1:D:230:LYS:HG3	2.17	0.44
1:D:237:LYS:HD2	1:D:237:LYS:H	1.82	0.44
1:B:88:LEU:HD12	1:B:380:GLY:O	2.17	0.44
1:A:2:THR:N	1:A:3:PRO:CD	2.80	0.44
1:B:131:GLY:CA	1:D:131:GLY:CA	2.95	0.44
1:C:233:PRO:HB2	1:C:236:ASP:O	2.17	0.44
1:D:312:LEU:HD13	1:D:368:ARG:HD2	1.98	0.44
1:C:203:ILE:HD13	1:C:212:THR:OG1	2.18	0.43
1:D:10:ALA:HB3	1:D:363:PHE:HE1	1.82	0.43
1:C:257:LEU:C	1:C:257:LEU:HD23	2.44	0.43
1:D:233:PRO:HG3	5:D:2121:HOH:O	2.17	0.43
1:A:227:SER:HB2	2:A:1393:COA:H2A	2.01	0.43
1:C:257:LEU:CD2	1:C:259:MET:HE3	2.48	0.43
1:B:39:LEU:HD23	1:B:257[B]:LEU:CD2	2.49	0.43
1:D:161:ALA:N	5:D:2084:HOH:O	2.52	0.43
1:A:12:ARG:HD2	1:A:356:ARG:HG2	2.01	0.43
1:A:237:LYS:HD2	1:A:237:LYS:N	2.34	0.43
2:B:1393:COA:CDP	5:B:2272:HOH:O	2.66	0.43
1:C:271:PRO:HG2	1:C:392:LEU:CD1	2.49	0.43
1:C:263:GLU:OE1	1:C:266:ARG:NH1	2.52	0.43
1:C:364:GLU:O	1:C:368:ARG:HG2	2.18	0.43
1:B:110:ILE:HG23	1:B:257[B]:LEU:HD11	2.01	0.42
1:B:220:ARG:NH1	2:B:1393:COA:C6A	2.82	0.42
1:D:19:ASN:C	1:D:23:ALA:HB2	2.44	0.42
1:B:176:ASP:O	1:B:180:VAL:HG23	2.19	0.42
1:C:180:VAL:HG21	1:C:225:LEU:HA	2.02	0.42
1:A:139:MET:HE1	1:B:139:MET:HE1	2.01	0.42
1:A:276[A]:VAL:HG22	1:A:388:CYS:C	2.44	0.42
1:D:226:ASP:HB2	5:D:2119:HOH:O	2.18	0.42
1:B:220:ARG:NH1	2:B:1393:COA:N1A	2.68	0.42
1:B:236:ASP:O	1:B:239:GLY:N	2.52	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:42:ALA:CB	1:D:257:LEU:HD13	2.50	0.42
1:D:143:MET:HE3	1:D:144:ILE:HD11	2.01	0.41
1:D:88:LEU:HB2	1:D:379:ILE:HG23	2.02	0.41
1:D:170:LEU:HD22	1:D:174:GLU:OE2	2.21	0.41
1:A:227:SER:CB	2:A:1393:COA:H2A	2.49	0.41
1:C:51:GLU:HB3	1:C:111:ILE:CD1	2.50	0.41
1:A:270:GLN:HG2	5:A:2307:HOH:O	2.20	0.41
1:D:124:HIS:HA	1:D:140:ILE:O	2.20	0.41
1:A:371:ARG:HG2	5:A:2392:HOH:O	2.18	0.41
1:C:88:LEU:HD11	1:D:64:GLN:HB3	2.02	0.41
1:C:128:LEU:HD21	1:C:137:PHE:CZ	2.56	0.41
1:A:183:GLN:HA	1:A:345:ALA:HB2	2.02	0.41
1:D:93:LEU:O	1:D:94:ARG:C	2.64	0.41
1:D:291:GLY:N	1:D:292:PRO:CD	2.84	0.41
1:D:339:VAL:HG12	1:D:339:VAL:O	2.19	0.41
1:A:228:MET:HE1	2:A:1393:COA:N6A	2.36	0.41
1:B:247[B]:SER:OG	1:B:348:HIS:HB2	2.21	0.41
1:D:55:GLY:HA2	1:D:85:MET:O	2.21	0.41
1:A:291:GLY:N	1:A:292:PRO:CD	2.84	0.40
2:A:1393:COA:O5A	1:D:134:MET:HE1	2.21	0.40
1:C:54:LEU:O	1:C:84:GLY:HA2	2.20	0.40
1:C:198:GLU:HB3	1:C:363:PHE:CD2	2.56	0.40
1:D:83:TRP:CZ2	5:D:2062:HOH:O	2.57	0.40
1:A:191:LYS:HB2	1:A:191:LYS:HZ2	1.85	0.40
1:B:175:GLN:HE22	1:B:240[A]:THR:HG23	1.84	0.40
1:C:88:LEU:HD12	1:C:380:GLY:O	2.22	0.40
1:D:211:ILE:HD12	5:D:2105:HOH:O	2.21	0.40
1:A:243:ALA:CB	2:A:1393:COA:H51A	2.52	0.40
1:A:379:ILE:HB	1:A:383:MET:HB2	2.03	0.40
2:B:1393:COA:H131	2:B:1393:COA:O9P	2.22	0.40

All (1) 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)
5:A:2110:HOH:O	5:A:2385:HOH:O[2_655]	2.13	0.07

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	395/392 (101%)	382 (97%)	12 (3%)	1 (0%)	36	26
1	B	398/392 (102%)	388 (98%)	9 (2%)	1 (0%)	36	26
1	C	388/392 (99%)	373 (96%)	13 (3%)	2 (0%)	24	13
1	D	387/392 (99%)	377 (97%)	9 (2%)	1 (0%)	36	26
All	All	1568/1568 (100%)	1520 (97%)	43 (3%)	5 (0%)	36	26

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	350	ILE
1	C	350	ILE
1	C	4	SER
1	A	350	ILE
1	B	350	ILE

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	284/278 (102%)	269 (95%)	15 (5%)	20	6
1	B	287/278 (103%)	275 (96%)	12 (4%)	26	10
1	C	277/278 (100%)	263 (95%)	14 (5%)	21	7
1	D	276/278 (99%)	257 (93%)	19 (7%)	14	3
All	All	1124/1112 (101%)	1064 (95%)	60 (5%)	20	6

All (60) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	THR
1	A	132	VAL
1	A	134	MET
1	A	167	GLN
1	A	191	LYS
1	A	207	ARG
1	A	220	ARG
1	A	237	LYS
1	A	238	GLU
1	A	270	GLN
1	A	298	LYS
1	A	322	GLN
1	A	332	TRP
1	A	339	VAL
1	A	392	LEU
1	B	66	PRO
1	B	191	LYS
1	B	207	ARG
1	B	237	LYS
1	B	238	GLU
1	B	270	GLN
1	B	272	LEU
1	B	276[A]	VAL
1	B	276[B]	VAL
1	B	298	LYS
1	B	322	GLN
1	B	392	LEU
1	C	2	THR
1	C	39	LEU
1	C	191	LYS
1	C	207	ARG
1	C	220	ARG
1	C	237	LYS
1	C	238	GLU
1	C	258	LEU
1	C	263	GLU
1	C	270	GLN
1	C	272	LEU
1	C	322	GLN
1	C	332	TRP
1	C	358	LEU
1	D	34	VAL

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Mol	Chain	Res	Type
1	D	39	LEU
1	D	134	MET
1	D	191	LYS
1	D	207	ARG
1	D	220	ARG
1	D	237	LYS
1	D	238	GLU
1	D	257	LEU
1	D	258	LEU
1	D	263	GLU
1	D	270	GLN
1	D	281	VAL
1	D	298	LYS
1	D	307	ILE
1	D	322	GLN
1	D	332	TRP
1	D	353	SER
1	D	358	LEU

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

Mol	Chain	Res	Type
1	A	78	GLN
1	A	175	GLN
1	A	184	ASN
1	A	221	HIS
1	B	78	GLN
1	B	175	GLN
1	B	184	ASN
1	B	322	GLN
1	C	78	GLN
1	C	167	GLN
1	C	175	GLN
1	C	184	ASN
1	C	221	HIS
1	C	316	ASN
1	D	78	GLN
1	D	167	GLN
1	D	175	GLN
1	D	184	ASN
1	D	316	ASN
1	D	359	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
1	CSO	D	89	1	3,6,7	0.40	0	1,6,8	1.14	0
1	CSO	C	89	1	3,6,7	0.68	0	1,6,8	0.51	0
1	CSO	B	89	1	3,6,7	1.12	0	1,6,8	0.95	0
1	CSO	A	89	1	3,6,7	0.66	0	1,6,8	2.35	1 (100%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CSO	D	89	1	-	1/1/5/7	-
1	CSO	C	89	1	-	1/1/5/7	-
1	CSO	B	89	1	-	0/1/5/7	-
1	CSO	A	89	1	-	1/1/5/7	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	89	CSO	CB-CA-C	-2.35	104.42	110.80

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	C	89	CSO	N-CA-CB-SG
1	A	89	CSO	N-CA-CB-SG
1	D	89	CSO	N-CA-CB-SG

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

7 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	SO4	B	1394	-	4,4,4	0.30	0	6,6,6	0.54	0
4	SO4	B	1395	-	4,4,4	0.27	0	6,6,6	0.12	0
4	SO4	A	1395	-	4,4,4	0.27	0	6,6,6	0.50	0
4	SO4	A	1396	-	4,4,4	0.33	0	6,6,6	0.23	0
2	COA	A	1393	-	47,50,50	1.89	6 (12%)	69,75,75	1.44	8 (11%)
2	COA	B	1393	-	47,50,50	1.96	6 (12%)	69,75,75	1.71	13 (18%)
3	GOL	A	1394	-	5,5,5	0.72	0	5,5,5	0.68	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
2	COA	A	1393	-	-	4/48/64/64	0/3/3/3
2	COA	B	1393	-	-	9/48/64/64	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	A	1394	-	-	3/4/4/4	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1393	COA	O9P-C9P	10.28	1.43	1.23
2	A	1393	COA	O9P-C9P	10.02	1.42	1.23
2	B	1393	COA	P2A-O3A	4.47	1.64	1.59
2	B	1393	COA	P1A-O3A	4.27	1.64	1.59
2	A	1393	COA	P2A-O3A	3.54	1.63	1.59
2	A	1393	COA	P1A-O3A	3.27	1.63	1.59
2	A	1393	COA	C2A-N1A	3.09	1.39	1.33
2	B	1393	COA	C2A-N1A	2.71	1.38	1.33
2	B	1393	COA	C8A-N7A	2.34	1.36	1.31
2	A	1393	COA	C2A-N3A	2.32	1.38	1.33
2	A	1393	COA	C8A-N7A	2.25	1.36	1.31
2	B	1393	COA	C2A-N3A	2.07	1.37	1.33

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1393	COA	N3A-C2A-N1A	-6.51	118.72	128.58
2	A	1393	COA	N3A-C2A-N1A	-5.32	120.53	128.58
2	A	1393	COA	N9A-C8A-N7A	-4.35	107.76	113.94
2	B	1393	COA	N9A-C8A-N7A	-3.94	108.35	113.94
2	B	1393	COA	C6P-C7P-N8P	-3.89	103.72	112.00
2	A	1393	COA	C5A-C4A-N3A	-3.55	121.83	126.72
2	A	1393	COA	C5A-N7A-C8A	3.50	108.95	103.45
2	B	1393	COA	C5A-C4A-N3A	-3.49	121.91	126.72
2	B	1393	COA	C4A-N9A-C1B	-3.44	118.60	126.63
2	B	1393	COA	C2A-N3A-C4A	3.43	120.20	111.83
2	A	1393	COA	C2A-N3A-C4A	3.19	119.63	111.83
2	B	1393	COA	C5A-N7A-C8A	3.14	108.39	103.45
2	A	1393	COA	C4A-C5A-N7A	-2.94	107.22	110.58
2	B	1393	COA	O4B-C1B-N9A	2.92	113.70	108.09
2	B	1393	COA	CAP-C9P-N8P	-2.67	111.42	116.48
2	B	1393	COA	C4A-C5A-N7A	-2.53	107.69	110.58
2	A	1393	COA	C4A-N9A-C8A	2.46	108.32	105.74
2	B	1393	COA	O9P-C9P-N8P	2.23	127.70	122.98
2	B	1393	COA	C5A-C6A-N6A	-2.23	117.76	123.29
2	A	1393	COA	C7P-C6P-C5P	2.02	115.75	112.39
2	B	1393	COA	C4B-O4B-C1B	-2.01	105.03	109.47

There are no chirality outliers.

All (16) torsion outliers are listed below:

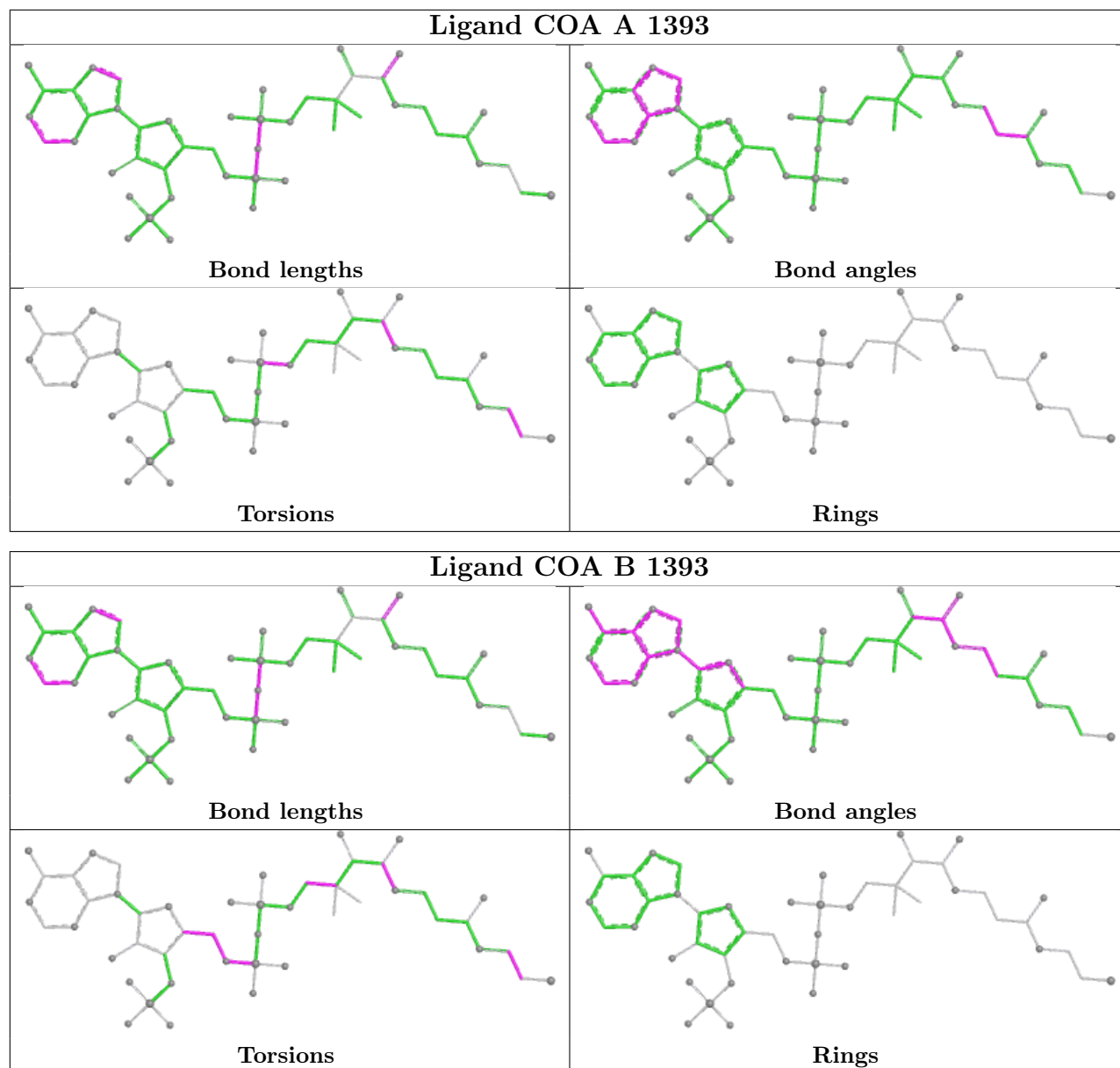
Mol	Chain	Res	Type	Atoms
2	B	1393	COA	C5B-O5B-P1A-O1A
2	B	1393	COA	C5B-O5B-P1A-O2A
2	B	1393	COA	C5B-O5B-P1A-O3A
2	B	1393	COA	S1P-C2P-C3P-N4P
3	A	1394	GOL	O1-C1-C2-C3
2	A	1393	COA	CAP-C9P-N8P-C7P
3	A	1394	GOL	O1-C1-C2-O2
2	A	1393	COA	O9P-C9P-N8P-C7P
3	A	1394	GOL	O2-C2-C3-O3
2	B	1393	COA	C4B-C5B-O5B-P1A
2	A	1393	COA	S1P-C2P-C3P-N4P
2	A	1393	COA	CCP-O6A-P2A-O4A
2	B	1393	COA	CAP-C9P-N8P-C7P
2	B	1393	COA	O4B-C4B-C5B-O5B
2	B	1393	COA	O9P-C9P-N8P-C7P
2	B	1393	COA	CDP-CBP-CCP-O6A

There are no ring outliers.

3 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1395	SO4	1	0
2	A	1393	COA	7	0
2	B	1393	COA	5	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	390/392 (99%)	-1.45	0 100 100	2, 6, 17, 37	7 (1%)
1	B	390/392 (99%)	-1.43	0 100 100	2, 6, 16, 36	10 (2%)
1	C	390/392 (99%)	-1.25	0 100 100	2, 8, 17, 33	0
1	D	389/392 (99%)	-1.18	0 100 100	2, 8, 17, 34	0
All	All	1559/1568 (99%)	-1.33	0 100 100	2, 7, 17, 37	17 (1%)

There are no RSRZ outliers to report.

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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(Å ²)	Q<0.9
1	CSO	C	89	7/8	0.98	0.04	10,11,18,19	0
1	CSO	D	89	7/8	0.99	0.03	5,9,12,14	0
1	CSO	A	89	7/8	1.00	0.02	7,8,10,18	0
1	CSO	B	89	7/8	1.00	0.02	4,6,7,21	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

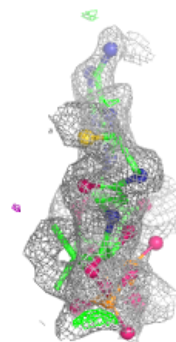
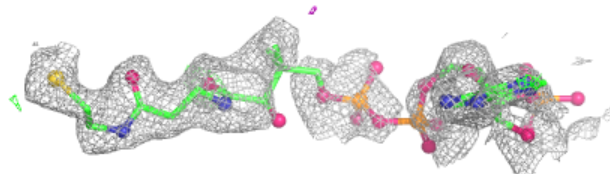
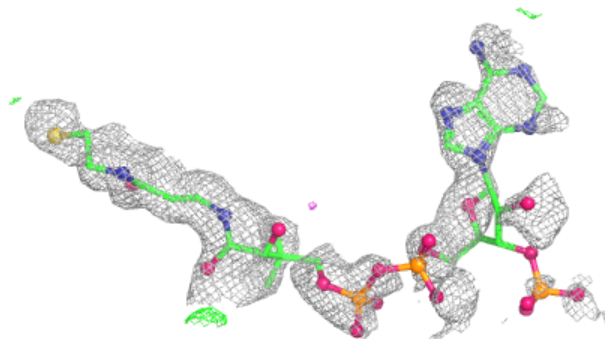
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	A	1395	5/5	0.97	0.08	42,44,45,45	0
2	COA	B	1393	48/48	0.98	0.07	28,53,69,71	0
2	COA	A	1393	48/48	0.98	0.07	27,50,60,62	0
4	SO4	B	1395	5/5	0.98	0.05	42,43,44,45	0
4	SO4	A	1396	5/5	0.99	0.05	27,28,30,30	0
3	GOL	A	1394	6/6	0.99	0.04	10,17,20,20	0
4	SO4	B	1394	5/5	1.00	0.05	19,22,25,27	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.

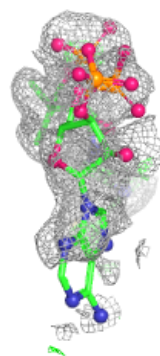
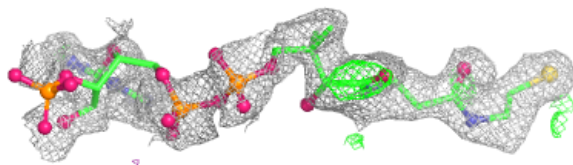
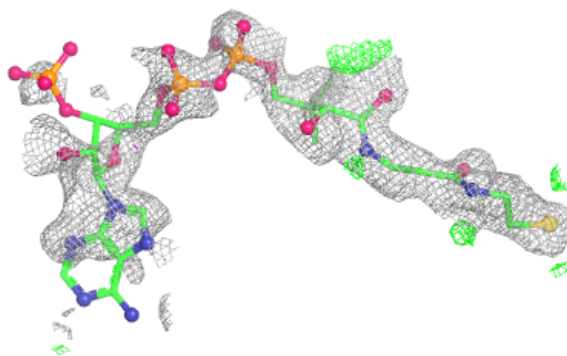
Electron density around COA B 1393:

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 1393:

$2mF_o-DF_c$ (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.