W O R L D W I D E
wwPDB
P R O T E I N D A T A B A N K

Full wwPDB X-ray Structure Validation Report ⓘ

Oct 23, 2024 – 10:40 PM EDT

PDB ID	:	1M4S
Title	:	Biosynthetic thiolase, Cys89 acetylated, unliganded form
Authors	:	Kursula, P.; Ojala, J.; Lambeir, A.-M.; Wierenga, R.K.
Deposited on	:	2002-07-03
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:

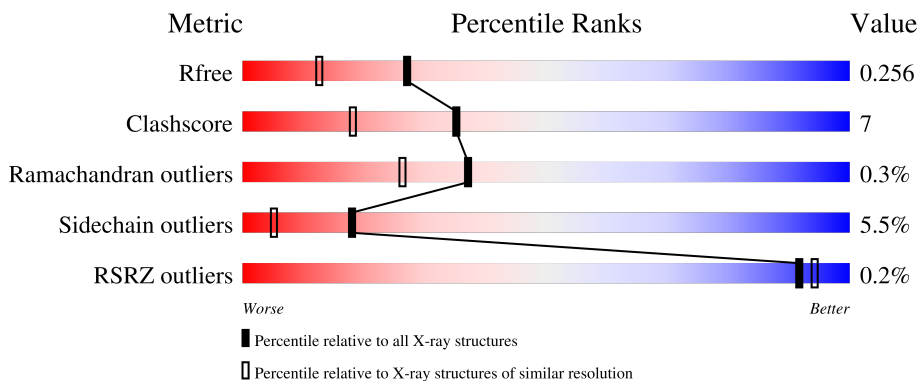|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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	Percentile Ranks	Value
Rfree		0.256
Clashscore		7
Ramachandran outliers		0.3%
Sidechain outliers		5.5%
RSRZ outliers		0.2%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1090 (1.88-1.88)
Clashscore	180529	1144 (1.88-1.88)
Ramachandran outliers	177936	1135 (1.88-1.88)
Sidechain outliers	177891	1135 (1.88-1.88)
RSRZ outliers	164620	1090 (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 <=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	83% 15% •
1	B	392	82% 16% •
1	C	392	% 83% 16% •
1	D	392	86% 13% •

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
1	SCY	A	89[A]	-	-	X	-
1	SCY	A	89[B]	-	X	-	-
1	SCY	B	89[A]	-	-	X	-
1	SCY	B	89[B]	-	X	-	-
1	SCY	C	89[B]	-	X	-	-

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 12506 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	392	Total	C	N	O	S	0	3	0
			2842	1763	512	545	22			
1	B	392	Total	C	N	O	S	0	3	0
			2842	1763	512	545	22			
1	C	392	Total	C	N	O	S	0	3	0
			2842	1763	512	545	22			
1	D	392	Total	C	N	O	S	0	3	0
			2842	1763	512	545	22			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	10	ALA	-	insertion	UNP P07097
A	89	SCY	CYS	modified residue	UNP P07097
A	129	ARG	ALA	conflict	UNP P07097
B	10	ALA	-	insertion	UNP P07097
B	89	SCY	CYS	modified residue	UNP P07097
B	129	ARG	ALA	conflict	UNP P07097
C	10	ALA	-	insertion	UNP P07097
C	89	SCY	CYS	modified residue	UNP P07097
C	129	ARG	ALA	conflict	UNP P07097
D	10	ALA	-	insertion	UNP P07097
D	89	SCY	CYS	modified residue	UNP P07097
D	129	ARG	ALA	conflict	UNP P07097

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

SO4

O1

O3 O⁻ — S — O⁻ O4

S

O2

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

• Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

C3

OH O3

C1   C2

HO

O1

OH

O2
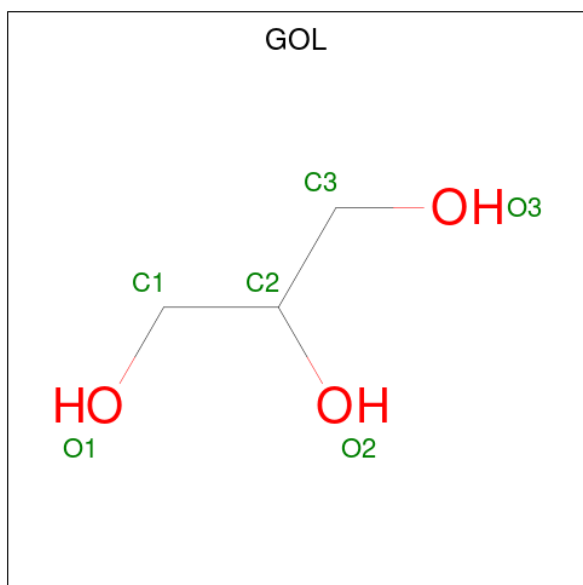
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 6	C 3	O 3	0	0
3	A	1	Total 6	C 3	O 3	0	0
3	B	1	Total 6	C 3	O 3	0	0
3	B	1	Total 6	C 3	O 3	0	0

- Molecule 4 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	420	Total 420	O 420	0	0
4	B	427	Total 427	O 427	0	0
4	C	116	Total 116	O 116	0	0
4	D	131	Total 131	O 131	0	0

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.
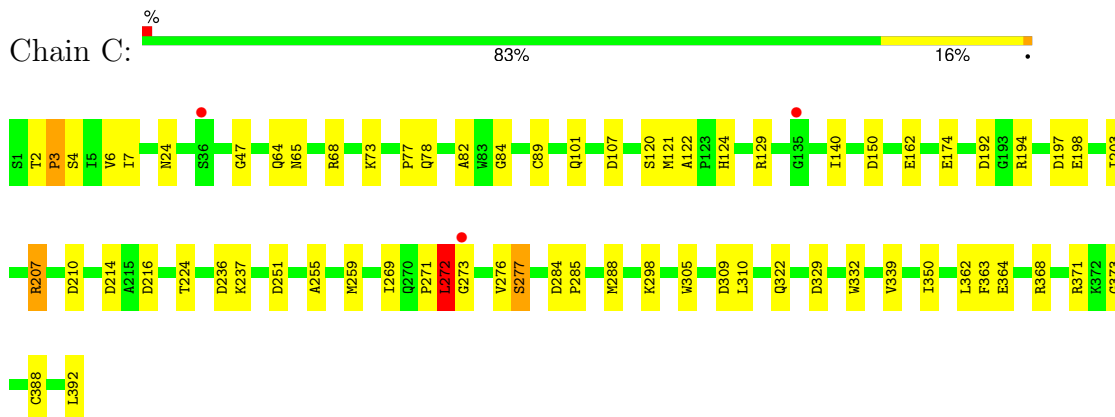
• Molecule 1: Acetyl-CoA acetyltransferase
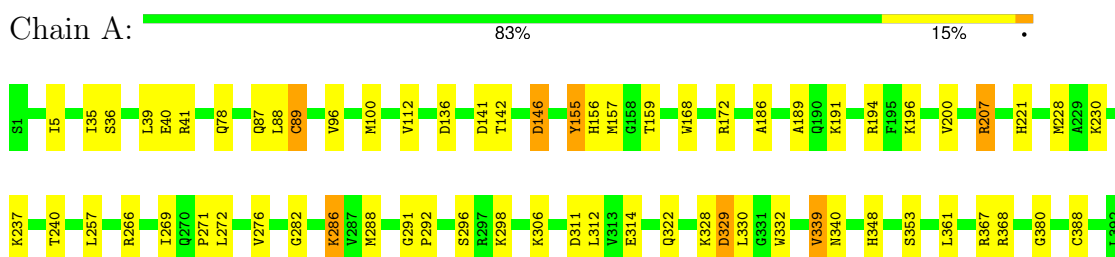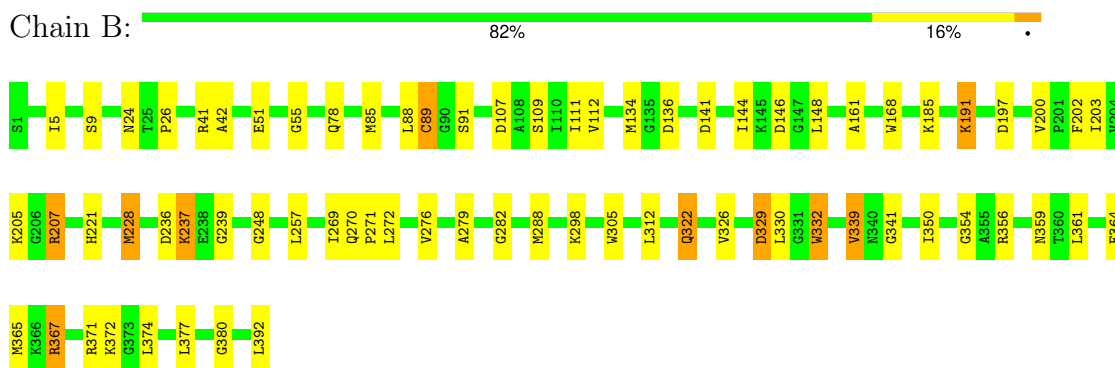
Chain A:

• Molecule 1: Acetyl-CoA acetyltransferase

Chain B:

• Molecule 1: Acetyl-CoA acetyltransferase

Chain C:

• Molecule 1: Acetyl-CoA acetyltransferase

Chain D:

86%

13%

S1 T2 P3 V38 L39 E40 L54 V57 A82 W83 G84 Q87 L88 C89 A97 Q102 T105 G106 D107 D136 D141 T142 M143 I144 F152 Y155 K166 E187 D197 R207 D216 E217 R220 T224 L225 D226 D236 K237 E238

L249 N250 D251 A256 L272 V276 A279 M288 G291 P292 K298 D311 A318 Q322 D329 W332 V339 I350 R368 R371 C378 M383 G384 V385 L392
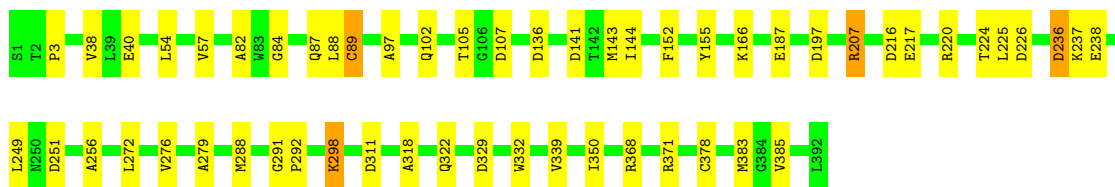
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	84.40Å 79.28Å 148.48Å 90.00° 92.21° 90.00°	Depositor
Resolution (Å)	20.00 – 1.87 20.00 – 1.87	Depositor EDS
% Data completeness (in resolution range)	98.0 (20.00-1.87) 87.8 (20.00-1.87)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$< I/\sigma(I) >$ [1]	4.54 (at 1.87Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.206 , 0.247 0.218 , 0.256	Depositor DCC
R_{free} test set	7188 reflections (4.46%)	wwPDB-VP
Wilson B-factor (Å^2)	17.4	Xtriage
Anisotropy	0.707	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 53.4	EDS
L-test for twinning[2]	$< |L| > = 0.37, < L^2 > = 0.20$	Xtriage
Estimated twinning fraction	0.158 for h,-k,-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	12506	wwPDB-VP
Average B, all atoms (Å^2)	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.67% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: GOL, SO4, SCY

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	0.91	1/2880 (0.0%)	1.00	11/3888 (0.3%)
1	B	0.92	0/2880	0.95	11/3888 (0.3%)
1	C	0.65	6/2880 (0.2%)	0.77	9/3888 (0.2%)
1	D	0.41	0/2880	0.73	9/3888 (0.2%)
All	All	0.75	7/11520 (0.1%)	0.87	40/15552 (0.3%)

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	277	SER	CB-OG	11.94	1.57	1.42
1	C	373	GLY	C-O	8.56	1.37	1.23
1	C	273	GLY	C-O	6.12	1.33	1.23
1	C	310	LEU	C-O	5.94	1.34	1.23
1	C	310	LEU	C-N	5.23	1.46	1.34
1	A	96	VAL	CB-CG2	5.08	1.63	1.52
1	C	272	LEU	C-O	5.07	1.32	1.23

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	41	ARG	NE-CZ-NH2	-9.19	115.71	120.30
1	A	141	ASP	CB-CG-OD2	8.85	126.26	118.30
1	A	266	ARG	NE-CZ-NH2	-8.71	115.95	120.30
1	A	367	ARG	NE-CZ-NH1	8.02	124.31	120.30
1	A	266	ARG	NE-CZ-NH1	7.86	124.23	120.30
1	A	367	ARG	NE-CZ-NH2	-7.13	116.73	120.30
1	D	136	ASP	CB-CG-OD2	6.31	123.97	118.30
1	B	41	ARG	NE-CZ-NH2	-6.30	117.15	120.30
1	A	146	ASP	CB-CG-OD2	6.18	123.86	118.30
1	D	251	ASP	CB-CG-OD2	6.12	123.81	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	367	ARG	NE-CZ-NH2	-6.10	117.25	120.30
1	B	141	ASP	CB-CG-OD2	6.00	123.70	118.30
1	D	107	ASP	CB-CG-OD2	5.96	123.66	118.30
1	B	107	ASP	CB-CG-OD2	5.95	123.65	118.30
1	B	146	ASP	CB-CG-OD2	5.94	123.64	118.30
1	C	210	ASP	CB-CG-OD2	5.93	123.63	118.30
1	B	41	ARG	NE-CZ-NH1	5.75	123.17	120.30
1	A	329	ASP	CB-CG-OD2	5.71	123.44	118.30
1	C	197	ASP	CB-CG-OD2	5.69	123.42	118.30
1	A	136	ASP	CB-CG-OD2	5.69	123.42	118.30
1	D	311	ASP	CB-CG-OD2	5.61	123.35	118.30
1	D	329	ASP	CB-CG-OD2	5.61	123.35	118.30
1	B	339	VAL	CG1-CB-CG2	5.61	119.87	110.90
1	D	141	ASP	CB-CG-OD2	5.59	123.34	118.30
1	C	309	ASP	CB-CG-OD2	5.48	123.23	118.30
1	A	311	ASP	CB-CG-OD2	5.46	123.21	118.30
1	A	41	ARG	NE-CZ-NH1	5.43	123.01	120.30
1	C	150	ASP	CB-CG-OD2	5.37	123.13	118.30
1	D	236	ASP	CB-CG-OD2	5.36	123.12	118.30
1	C	107	ASP	CB-CG-OD2	5.33	123.10	118.30
1	B	136	ASP	CB-CG-OD2	5.28	123.06	118.30
1	D	216	ASP	CB-CG-OD2	5.25	123.03	118.30
1	B	329	ASP	CB-CG-OD2	5.25	123.02	118.30
1	D	197	ASP	CB-CG-OD2	5.24	123.01	118.30
1	B	339	VAL	N-CA-CB	-5.22	100.02	111.50
1	B	85	MET	CA-CB-CG	5.17	122.10	113.30
1	C	192	ASP	CB-CG-OD2	5.11	122.90	118.30
1	C	329	ASP	CB-CG-OD2	5.08	122.87	118.30
1	C	214	ASP	CB-CG-OD2	5.08	122.87	118.30
1	C	216	ASP	CB-CG-OD2	5.06	122.85	118.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2842	0	2849	50	0
1	B	2842	0	2849	58	0
1	C	2842	0	2849	29	0
1	D	2842	0	2849	30	0
2	A	10	0	0	0	0
2	B	10	0	0	0	0
3	A	12	0	16	4	0
3	B	12	0	16	4	0
4	A	420	0	0	29	1
4	B	427	0	0	31	0
4	C	116	0	0	6	0
4	D	131	0	0	18	0
All	All	12506	0	11428	167	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 7.

All (167) 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:89[A]:SCY:HE1	1:B:380:GLY:H	1.02	1.11
1:A:100:MET:HG3	4:A:468:HOH:O	1.50	1.08
1:A:314:GLU:HB2	4:A:504:HOH:O	1.57	1.03
1:A:296:SER:HB2	4:A:528:HOH:O	1.60	1.01
1:B:257:LEU:HA	4:B:530:HOH:O	1.63	0.97
1:B:89[A]:SCY:HE1	1:B:380:GLY:N	1.78	0.96
1:A:276:VAL:HB	4:A:534:HOH:O	1.68	0.93
1:B:359:ASN:HB2	4:B:481:HOH:O	1.73	0.88
1:B:312:LEU:HB3	4:B:501:HOH:O	1.73	0.88
1:A:89[A]:SCY:HE1	1:A:380:GLY:H	1.42	0.83
1:B:89[A]:SCY:CE	1:B:380:GLY:H	1.88	0.82
1:B:112:VAL:HG22	4:B:530:HOH:O	1.80	0.81
1:D:144:ILE:HG12	4:D:484:HOH:O	1.81	0.81
1:C:276:VAL:HG22	1:C:388:CYS:O	1.83	0.79
3:B:6394:GOL:O3	4:B:9911:HOH:O	1.98	0.77
1:A:189:ALA:HB1	4:A:531:HOH:O	1.84	0.77
1:D:87:GLN:HB3	4:D:523:HOH:O	1.86	0.76
1:B:237:LYS:NZ	4:B:9964:HOH:O	2.20	0.74
1:B:191:LYS:HB3	1:B:191:LYS:NZ	2.02	0.73
1:B:356:ARG:HA	4:B:481:HOH:O	1.89	0.73
1:A:100:MET:CE	4:A:468:HOH:O	2.36	0.72
1:D:385:VAL:HG22	4:D:478:HOH:O	1.88	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:89[A]:SCY:SG	1:A:348:HIS:NE2	2.64	0.71
1:B:228:MET:HE3	4:B:524:HOH:O	1.90	0.70
1:C:255:ALA:HB3	4:C:457:HOH:O	1.91	0.70
3:B:6393:GOL:H12	4:B:468:HOH:O	1.92	0.69
1:B:185:LYS:HE3	4:B:525:HOH:O	1.90	0.68
1:B:89[A]:SCY:HE2	1:B:89[A]:SCY:H	1.58	0.68
1:B:202:PHE:CD1	4:B:517:HOH:O	2.46	0.68
1:A:35:ILE:HG23	4:A:495:HOH:O	1.93	0.68
1:B:322:GLN:HB3	4:B:476:HOH:O	1.93	0.68
1:A:100:MET:SD	4:A:468:HOH:O	2.51	0.68
1:B:341:GLY:HA2	4:B:525:HOH:O	1.92	0.68
1:B:361:LEU:HD11	4:B:501:HOH:O	1.93	0.67
1:A:87:GLN:C	4:A:464:HOH:O	2.33	0.66
1:D:38:VAL:HG21	4:D:518:HOH:O	1.95	0.66
1:B:203:ILE:HG23	4:B:502:HOH:O	1.96	0.65
1:A:89[A]:SCY:HE2	1:A:89[A]:SCY:H	1.62	0.64
1:B:257:LEU:CA	4:B:530:HOH:O	2.34	0.62
1:A:339:VAL:HG11	1:A:368:ARG:NH2	2.16	0.60
3:A:5393:GOL:H2	4:A:498:HOH:O	2.02	0.60
1:A:89[A]:SCY:CE	1:A:380:GLY:H	2.14	0.60
1:B:202:PHE:CE1	4:B:517:HOH:O	2.54	0.60
1:A:39:LEU:HG	4:A:495:HOH:O	2.03	0.59
1:C:277:SER:OG	1:C:388:CYS:HB2	2.02	0.59
1:C:120:SER:OG	1:C:251:ASP:OD2	2.13	0.59
1:D:256:ALA:C	4:D:518:HOH:O	2.41	0.58
1:B:191:LYS:HB3	1:B:191:LYS:HZ1	1.67	0.58
1:B:89[A]:SCY:HE1	1:B:380:GLY:CA	2.34	0.57
1:C:68:ARG:HG3	1:D:152:PHE:HZ	1.69	0.57
1:B:269:ILE:O	1:B:271:PRO:HD3	2.05	0.57
1:D:143:MET:HB3	4:D:484:HOH:O	2.04	0.56
1:D:225:LEU:N	4:D:423:HOH:O	2.37	0.56
1:B:88:LEU:HB3	1:B:89[A]:SCY:HE2	1.88	0.55
1:C:101:GLN:OE1	1:D:102:GLN:NE2	2.37	0.55
1:D:97:ALA:HA	4:D:497:HOH:O	2.06	0.55
1:A:112:VAL:HG21	4:A:495:HOH:O	2.06	0.54
1:A:286:LYS:HD3	4:A:9759:HOH:O	2.08	0.54
1:B:374:LEU:C	1:B:374:LEU:HD23	2.28	0.54
1:A:88:LEU:HD22	4:A:456:HOH:O	2.08	0.54
1:C:162:GLU:HG3	1:C:236:ASP:HB2	1.90	0.54
1:D:217:GLU:HA	4:D:433:HOH:O	2.06	0.54
1:B:279:ALA:HB1	4:B:537:HOH:O	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:122:ALA:HA	4:C:473:HOH:O	2.09	0.53
1:B:112:VAL:HA	4:B:530:HOH:O	2.08	0.53
1:D:144:ILE:N	4:D:484:HOH:O	2.41	0.53
1:B:144:ILE:HD13	1:B:148:LEU:HD12	1.90	0.53
1:B:161:ALA:HA	4:B:476:HOH:O	2.08	0.53
1:B:203:ILE:HD12	4:B:502:HOH:O	2.09	0.53
1:A:88:LEU:HD13	4:A:456:HOH:O	2.08	0.52
1:A:361:LEU:HD22	4:A:504:HOH:O	2.09	0.52
1:B:197:ASP:OD1	4:B:531:HOH:O	2.19	0.52
1:C:6:VAL:HG22	1:C:259:MET:O	2.10	0.52
1:D:166:LYS:HB3	4:D:500:HOH:O	2.09	0.52
1:A:168:TRP:CH2	1:A:329:ASP:HB2	2.45	0.51
1:B:270:GLN:NE2	1:B:392:LEU:OXT	2.43	0.51
1:A:36:SER:O	1:A:40:GLU:HG3	2.11	0.50
1:A:269:ILE:O	1:A:271:PRO:HD3	2.10	0.50
1:D:143:MET:HE2	4:D:484:HOH:O	2.11	0.50
1:D:40:GLU:HB3	4:D:459:HOH:O	2.12	0.49
1:D:291:GLY:N	1:D:292:PRO:CD	2.75	0.49
1:A:207:ARG:H	1:A:207:ARG:HD3	1.77	0.49
1:B:392:LEU:HD21	4:B:445:HOH:O	2.13	0.48
1:A:5:ILE:HD12	1:A:5:ILE:N	2.28	0.48
1:D:224:THR:C	4:D:423:HOH:O	2.51	0.48
3:A:5393:GOL:H32	4:A:524:HOH:O	2.12	0.48
1:A:194:ARG:HB2	4:A:531:HOH:O	2.14	0.47
1:C:82:ALA:HB2	4:C:469:HOH:O	2.14	0.47
1:D:339:VAL:HG11	1:D:368:ARG:NH2	2.30	0.47
1:C:272:LEU:O	1:C:362:LEU:HD22	2.14	0.47
1:B:26:PRO:HD3	4:B:444:HOH:O	2.14	0.47
1:D:238:GLU:C	4:D:520:HOH:O	2.53	0.47
1:A:40:GLU:HG3	4:A:9946:HOH:O	2.15	0.47
1:C:207:ARG:HD3	1:C:207:ARG:H	1.79	0.47
1:A:257:LEU:C	1:A:257:LEU:HD23	2.35	0.46
1:B:365:MET:CG	4:B:501:HOH:O	2.63	0.46
1:B:9:SER:HB3	1:B:42:ALA:HB2	1.97	0.46
1:D:383:MET:N	4:D:507:HOH:O	2.47	0.46
1:A:89[A]:SCY:HE1	1:A:380:GLY:N	2.21	0.46
1:A:172:ARG:HB2	1:A:240:THR:HG22	1.97	0.46
1:A:282:GLY:HA3	1:B:78:GLN:O	2.15	0.46
1:B:200:VAL:HG23	3:B:6394:GOL:H2	1.98	0.46
1:D:57:VAL:HG21	1:D:350:ILE:CG2	2.45	0.46
1:B:364:GLU:OE1	1:B:367:ARG:HD2	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:194:ARG:O	4:C:494:HOH:O	2.20	0.46
1:B:168:TRP:CH2	1:B:329:ASP:HB2	2.50	0.46
1:B:322:GLN:O	1:B:326:VAL:HG23	2.16	0.46
1:C:339:VAL:HG11	1:C:368:ARG:NH2	2.31	0.46
1:C:24:ASN:HA	1:C:121:MET:SD	2.56	0.46
1:C:7:ILE:HD13	1:C:362:LEU:HD11	1.98	0.45
1:C:284:ASP:OD1	1:C:285:PRO:HD2	2.17	0.45
1:C:269:ILE:O	1:C:271:PRO:HD3	2.15	0.45
1:B:248:GLY:O	3:B:6393:GOL:O1	2.34	0.45
1:C:198:GLU:HB3	1:C:363:PHE:CD2	2.51	0.45
1:B:205:LYS:HD2	4:B:456:HOH:O	2.17	0.45
1:D:318:ALA:HB1	4:D:461:HOH:O	2.17	0.45
1:A:330:LEU:HD21	4:A:528:HOH:O	2.17	0.45
1:A:286:LYS:CE	4:A:9759:HOH:O	2.64	0.44
1:B:88:LEU:HD12	1:B:380:GLY:O	2.17	0.44
1:A:200:VAL:HG23	3:A:5394:GOL:H2	1.98	0.44
1:A:286:LYS:CD	4:A:9759:HOH:O	2.65	0.44
1:B:305:TRP:CE2	1:B:372:LYS:HD3	2.53	0.44
1:A:157:MET:HB2	4:A:498:HOH:O	2.18	0.44
1:C:2:THR:HA	1:C:3:PRO:HD2	1.87	0.44
1:B:51:GLU:HB3	1:B:111:ILE:CD1	2.48	0.44
1:C:174:GLU:HG3	4:C:488:HOH:O	2.17	0.44
1:B:257:LEU:HD23	1:B:257:LEU:C	2.38	0.43
1:A:156:HIS:CE1	4:A:498:HOH:O	2.71	0.43
1:A:312:LEU:HD23	1:A:361:LEU:HD12	2.01	0.43
1:C:124:HIS:HA	1:C:140:ILE:O	2.18	0.43
1:B:24:ASN:C	4:B:444:HOH:O	2.56	0.43
1:A:291:GLY:N	1:A:292:PRO:CD	2.81	0.43
1:C:84:GLY:HA3	4:C:403:HOH:O	2.18	0.43
1:B:207:ARG:N	1:B:207:ARG:HD3	2.33	0.43
1:C:276:VAL:HG22	1:C:388:CYS:C	2.38	0.43
1:B:185:LYS:CE	4:B:525:HOH:O	2.58	0.43
1:A:306:LYS:NZ	4:A:523:HOH:O	2.51	0.42
1:A:78:GLN:O	1:B:282:GLY:HA3	2.19	0.42
1:A:196:LYS:NZ	4:A:9896:HOH:O	2.53	0.42
1:B:354:GLY:HA2	1:B:377:LEU:HD11	2.02	0.42
1:D:82:ALA:HB2	4:D:394:HOH:O	2.18	0.42
1:A:35:ILE:CG2	4:A:495:HOH:O	2.62	0.42
1:B:236:ASP:O	1:B:239:GLY:N	2.50	0.42
1:D:292:PRO:HD3	1:D:378:CYS:HB3	2.00	0.42
1:C:305:TRP:CZ3	1:C:388:CYS:HB3	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:88:LEU:HB3	1:D:89[B]:SCY:H	1.54	0.42
1:D:54:LEU:O	1:D:84:GLY:HA2	2.20	0.41
1:D:88:LEU:HB3	1:D:89[A]:SCY:H	1.55	0.41
1:C:64:GLN:O	1:C:65:ASN:C	2.58	0.41
1:A:276:VAL:CG2	4:A:534:HOH:O	2.67	0.41
1:B:26:PRO:CD	4:B:444:HOH:O	2.68	0.41
1:B:55:GLY:HA3	1:B:91:SER:HB3	2.02	0.41
1:C:47:GLY:HA2	1:C:77:PRO:HG3	2.03	0.41
1:D:207:ARG:N	1:D:207:ARG:HD3	2.35	0.41
1:A:186:ALA:HA	1:A:340:ASN:O	2.21	0.41
1:B:203:ILE:N	4:B:517:HOH:O	2.52	0.41
1:A:276:VAL:CG2	1:A:388:CYS:HB2	2.51	0.41
1:A:142:THR:O	1:A:146:ASP:HB2	2.21	0.41
1:B:392:LEU:HD22	4:B:493:HOH:O	2.21	0.41
1:D:279:ALA:CB	1:D:298:LYS:HB3	2.51	0.41
1:A:89[A]:SCY:SG	1:A:348:HIS:CE1	3.14	0.40
1:A:155:TYR:CD2	1:A:159:THR:HG21	2.57	0.40
1:C:101:GLN:HG2	1:D:105:THR:HG21	2.03	0.40
1:C:364:GLU:O	1:C:368:ARG:HG2	2.22	0.40
1:A:155:TYR:CG	1:A:159:THR:HG21	2.56	0.40
3:A:5394:GOL:H12	4:A:407:HOH:O	2.20	0.40
1:B:330:LEU:HD12	1:B:332:TRP:CZ2	2.57	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)
4:A:408:HOH:O	4:A:9967:HOH:O[2_645]	2.00	0.20

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	391/392 (100%)	376 (96%)	15 (4%)	0	100	100
1	B	391/392 (100%)	367 (94%)	23 (6%)	1 (0%)	37	26
1	C	391/392 (100%)	373 (95%)	15 (4%)	3 (1%)	16	6
1	D	391/392 (100%)	379 (97%)	11 (3%)	1 (0%)	37	26
All	All	1564/1568 (100%)	1495 (96%)	64 (4%)	5 (0%)	37	26

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	3	PRO
1	C	350	ILE
1	D	3	PRO
1	B	350	ILE
1	C	4	SER

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	280/278 (101%)	263 (94%)	17 (6%)	15	4
1	B	280/278 (101%)	264 (94%)	16 (6%)	17	5
1	C	280/278 (101%)	266 (95%)	14 (5%)	20	7
1	D	280/278 (101%)	265 (95%)	15 (5%)	18	6
All	All	1120/1112 (101%)	1058 (94%)	62 (6%)	18	5

All (62) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	155	TYR
1	A	191	LYS
1	A	207	ARG
1	A	221	HIS
1	A	228	MET
1	A	230	LYS

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Mol	Chain	Res	Type
1	A	237	LYS
1	A	272	LEU
1	A	286	LYS
1	A	288	MET
1	A	298	LYS
1	A	322	GLN
1	A	328	LYS
1	A	332	TRP
1	A	339	VAL
1	A	353[A]	SER
1	A	353[B]	SER
1	B	5	ILE
1	B	109	SER
1	B	134	MET
1	B	191	LYS
1	B	207	ARG
1	B	221	HIS
1	B	228	MET
1	B	237	LYS
1	B	272	LEU
1	B	276	VAL
1	B	288	MET
1	B	298	LYS
1	B	322	GLN
1	B	332	TRP
1	B	339	VAL
1	B	371	ARG
1	C	73	LYS
1	C	78	GLN
1	C	129	ARG
1	C	203	ILE
1	C	207	ARG
1	C	224	THR
1	C	237	LYS
1	C	272	LEU
1	C	288	MET
1	C	298	LYS
1	C	322	GLN
1	C	332	TRP
1	C	371	ARG
1	C	392	LEU
1	D	155	TYR

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Mol	Chain	Res	Type
1	D	187	GLU
1	D	207	ARG
1	D	220	ARG
1	D	226	ASP
1	D	236	ASP
1	D	237	LYS
1	D	249	LEU
1	D	272	LEU
1	D	276	VAL
1	D	288	MET
1	D	298	LYS
1	D	322	GLN
1	D	332	TRP
1	D	371	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

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

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

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

8 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	SCY	D	89[B]	-	7,5,9	2.32	1 (14%)	4,5,11	1.51	1 (25%)
1	SCY	A	89[A]	-	7,8,9	0.68	0	4,9,11	0.83	0
1	SCY	C	89[A]	-	7,8,9	0.60	0	4,9,11	0.51	0
1	SCY	B	89[B]	-	7,5,9	6.83	1 (14%)	4,5,11	6.02	2 (50%)
1	SCY	D	89[A]	-	7,8,9	0.65	0	4,9,11	0.53	0
1	SCY	A	89[B]	-	7,5,9	6.26	1 (14%)	4,5,11	5.00	2 (50%)
1	SCY	C	89[B]	-	7,5,9	2.14	1 (14%)	4,5,11	3.29	2 (50%)
1	SCY	B	89[A]	-	7,8,9	1.09	0	4,9,11	1.10	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
1	SCY	D	89[B]	-	-	2/5/4/9	-
1	SCY	A	89[A]	-	-	3/5/7/9	-
1	SCY	C	89[A]	-	-	3/5/7/9	-
1	SCY	B	89[B]	-	-	3/5/4/9	-
1	SCY	D	89[A]	-	-	3/5/7/9	-
1	SCY	A	89[B]	-	-	3/5/4/9	-
1	SCY	C	89[B]	-	-	3/5/4/9	-
1	SCY	B	89[A]	-	-	3/5/7/9	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	89[B]	SCY	CD-SG	-17.81	0.77	1.75
1	A	89[B]	SCY	CD-SG	-16.42	0.85	1.75
1	D	89[B]	SCY	CD-SG	-5.97	1.42	1.75
1	C	89[B]	SCY	CD-SG	-5.40	1.45	1.75

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	89[B]	SCY	CE-CD-SG	-8.92	57.73	114.13
1	A	89[B]	SCY	CE-CD-SG	-8.30	61.68	114.13
1	B	89[B]	SCY	OCD-CD-SG	7.91	154.65	122.65
1	C	89[B]	SCY	CE-CD-SG	-6.25	74.60	114.13
1	A	89[B]	SCY	OCD-CD-SG	5.13	143.39	122.65
1	D	89[B]	SCY	CE-CD-SG	-2.90	95.80	114.13
1	C	89[B]	SCY	OCD-CD-SG	2.02	130.84	122.65

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	89[A]	SCY	OCD-CD-SG-CB
1	A	89[A]	SCY	CE-CD-SG-CB
1	A	89[B]	SCY	N-CA-CB-SG
1	A	89[B]	SCY	CA-CB-SG-CD
1	A	89[B]	SCY	OCD-CD-SG-CB
1	B	89[A]	SCY	OCD-CD-SG-CB
1	B	89[A]	SCY	CE-CD-SG-CB
1	B	89[B]	SCY	N-CA-CB-SG
1	C	89[A]	SCY	CA-CB-SG-CD
1	C	89[A]	SCY	OCD-CD-SG-CB
1	C	89[A]	SCY	CE-CD-SG-CB
1	C	89[B]	SCY	N-CA-CB-SG
1	C	89[B]	SCY	OCD-CD-SG-CB
1	D	89[A]	SCY	OCD-CD-SG-CB
1	D	89[B]	SCY	N-CA-CB-SG
1	D	89[B]	SCY	OCD-CD-SG-CB
1	B	89[B]	SCY	OCD-CD-SG-CB
1	D	89[A]	SCY	CE-CD-SG-CB
1	A	89[A]	SCY	CA-CB-SG-CD
1	B	89[A]	SCY	CA-CB-SG-CD
1	C	89[B]	SCY	CA-CB-SG-CD
1	D	89[A]	SCY	CA-CB-SG-CD
1	B	89[B]	SCY	CE-CD-SG-CB

There are no ring outliers.

4 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	89[B]	SCY	1	0
1	A	89[A]	SCY	6	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	89[A]	SCY	1	0
1	B	89[A]	SCY	6	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

8 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	$\#|Z| > 2$
3	GOL	A	5393	-	5,5,5	0.53	0	5,5,5	0.46	0
3	GOL	B	6393	-	5,5,5	0.77	0	5,5,5	1.00	0
3	GOL	A	5394	-	5,5,5	0.55	0	5,5,5	0.90	0
2	SO4	B	9719	-	4,4,4	0.23	0	6,6,6	0.39	0
3	GOL	B	6394	-	5,5,5	0.43	0	5,5,5	0.65	0
2	SO4	B	9721	-	4,4,4	0.34	0	6,6,6	0.43	0
2	SO4	A	9722	-	4,4,4	0.24	0	6,6,6	0.22	0
2	SO4	A	9720	-	4,4,4	0.21	0	6,6,6	0.33	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	A	5394	-	-	2/4/4/4	-
3	GOL	A	5393	-	-	1/4/4/4	-
3	GOL	B	6393	-	-	0/4/4/4	-
3	GOL	B	6394	-	-	2/4/4/4	-

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There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	5394	GOL	O1-C1-C2-O2
3	A	5394	GOL	O1-C1-C2-C3
3	B	6394	GOL	O1-C1-C2-O2
3	B	6394	GOL	O1-C1-C2-C3
3	A	5393	GOL	O1-C1-C2-O2

There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5393	GOL	2	0
3	B	6393	GOL	2	0
3	A	5394	GOL	2	0
3	B	6394	GOL	2	0

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	391/392 (99%)	-1.29	0	100	100	6, 11, 28, 54	2 (0%)
1	B	391/392 (99%)	-1.31	0	100	100	5, 11, 30, 53	2 (0%)
1	C	391/392 (99%)	-0.82	3 (0%)	82	86	2, 9, 23, 40	2 (0%)
1	D	391/392 (99%)	-0.78	0	100	100	2, 10, 26, 41	2 (0%)
All	All	1564/1568 (99%)	-1.05	3 (0%)	92	94	2, 11, 26, 54	8 (0%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	36	SER	3.5
1	C	273	GLY	2.2
1	C	135	GLY	2.2

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

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	SCY	A	89[A]	9/10	0.99	0.04	12,13,22,24	5
1	SCY	A	89[B]	6/10	0.99	0.04	10,12,13,14	2
1	SCY	B	89[A]	9/10	0.99	0.04	8,11,18,24	5
1	SCY	B	89[B]	6/10	0.99	0.04	8,9,9,11	2
1	SCY	C	89[A]	9/10	0.99	0.04	5,8,9,11	5
1	SCY	C	89[B]	6/10	0.99	0.04	2,5,8,9	2
1	SCY	D	89[A]	9/10	0.99	0.04	5,6,9,10	5
1	SCY	D	89[B]	6/10	0.99	0.04	2,6,6,6	2

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, 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
3	GOL	B	6393	6/6	0.95	0.09	39,41,44,46	0
3	GOL	A	5394	6/6	0.96	0.09	19,29,32,32	0
2	SO4	A	9722	5/5	0.97	0.07	70,72,73,75	0
3	GOL	A	5393	6/6	0.97	0.10	28,29,31,34	0
2	SO4	B	9719	5/5	0.98	0.08	76,76,77,77	0
3	GOL	B	6394	6/6	0.98	0.08	11,27,27,28	0
2	SO4	A	9720	5/5	0.99	0.05	50,53,54,57	0
2	SO4	B	9721	5/5	0.99	0.05	48,49,51,54	0

6.5 Other polymers (i)

There are no such residues in this entry.