WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Sep 9, 2023 – 05:04 PM EDT

PDB ID	:	4H83
Title	:	Crystal structure of Mandelate racemase/muconate lactonizing enzyme (EFI target:502127)
Authors	:	Kim, J.; Toro, R.; Bhosle, R.; Al Obaidi, N.F.; Morisco, L.L.; Wasserman, S.R.; Sojitra, S.; Washington, E.; Scott Glenn, A.; Chowdhury, S.; Evans, B.; Hammonds, J.; Stead, M.; Hillerich, B.; Love, J.; Seidel, R.D.; Imker, H.J.; Gerlt, J.A.; Almo, S.C.; Enzyme Function Initiative (EFI)
Deposited on	:	2012-09-21
Resolution	:	2.09 Å(reported)

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

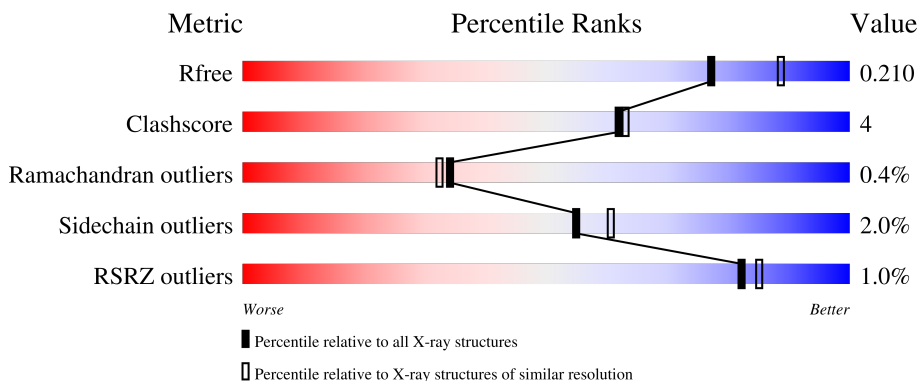|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)

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 2.09 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		0.210
Clashscore		4
Ramachandran outliers		0.4%
Sidechain outliers		2.0%
RSRZ outliers		1.0%

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}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	388	82% 8% · 8%
1	B	388	80% 11% 9%
1	C	388	82% 10% 8%
1	D	388	82% 11% · 6%

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Mol	Chain	Length	Quality of chain
1	E	388	80% 11% 9%
1	F	388	85% 8% 5%

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
4	PO4	C	402	-	-	X	-

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 17745 atoms, of which 26 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 Mandelate racemase/muconate lactonizing enzyme.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	356	Total	C	H	N	O	S	0	2	0
			2785	1751	12	483	524	15			
1	B	354	Total	C	N	O	S		0	0	0
			2758	1741	481	521	15				
1	C	356	Total	C	H	N	O	S	0	2	0
			2792	1753	14	485	525	15			
1	D	366	Total	C	N	O	S		0	0	0
			2868	1810	504	538	16				
1	E	355	Total	C	N	O	S		0	0	0
			2768	1747	483	523	15				
1	F	368	Total	C	N	O	S		0	0	0
			2880	1817	506	541	16				

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Na	0	0
			2	2		
2	B	2	Total	Na	0	0
			2	2		
2	C	1	Total	Na	0	0
			1	1		
2	D	1	Total	Na	0	0
			1	1		
2	E	1	Total	Na	0	0
			1	1		
2	F	1	Total	Na	0	0
			1	1		

- Molecule 3 is BICARBONATE ION (three-letter code: BCT) (formula: CHO_3).

BCT
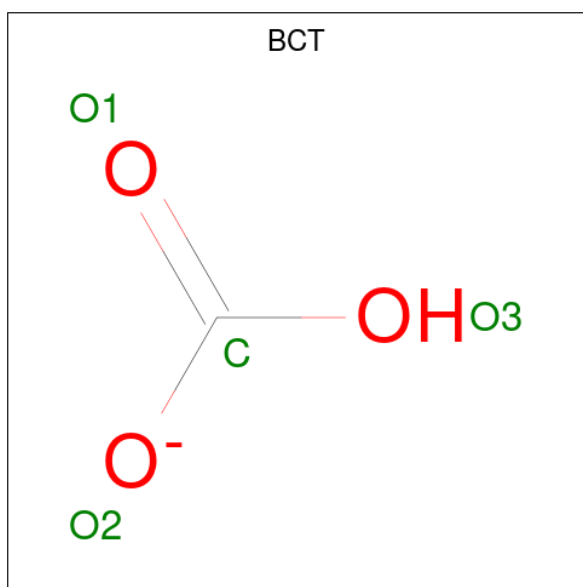
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 4	C 1	O 3	0	0
3	F	1	Total 4	C 1	O 3	0	0

• Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

PO4
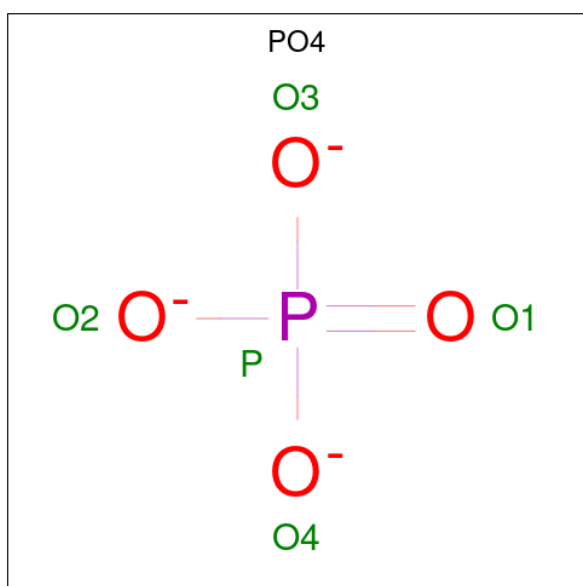
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	1	Total 5	O 4 P 1	0	0

• Molecule 5 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
5	F	1	Total	C	O	0	0
			6	3	3		

• Molecule 6 is water.

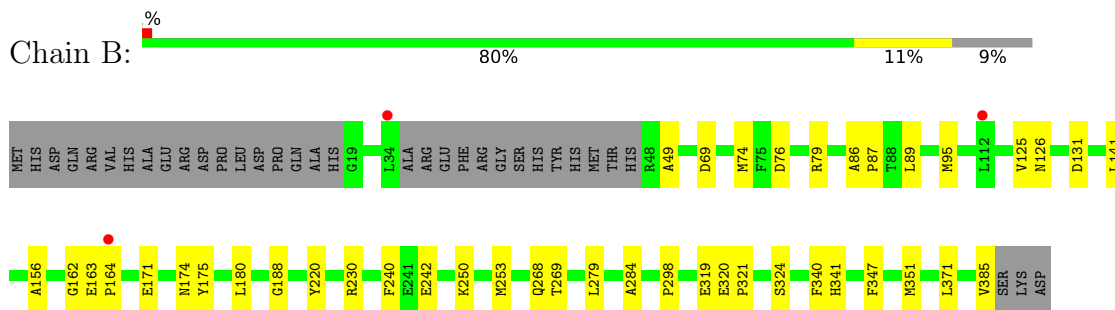| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	143	Total 143	O 143	0	0
6	B	125	Total 125	O 125	0	0
6	C	147	Total 147	O 147	0	0
6	D	138	Total 138	O 138	0	0
6	E	156	Total 156	O 156	0	0
6	F	158	Total 158	O 158	0	0

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: Mandelate racemase/muconate lactonizing enzyme
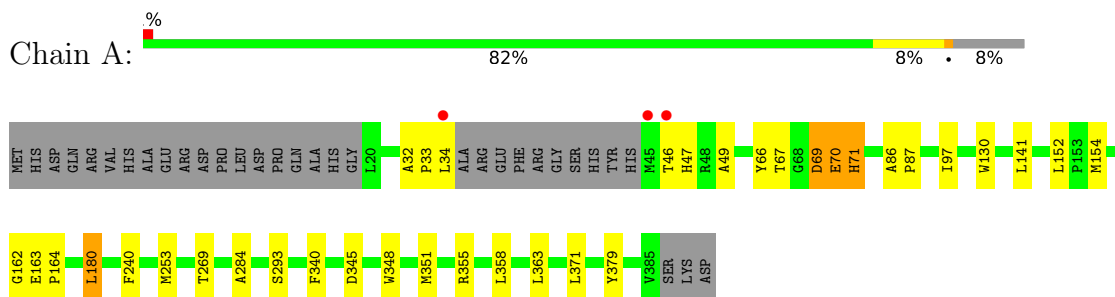
• Molecule 1: Mandelate racemase/muconate lactonizing enzyme

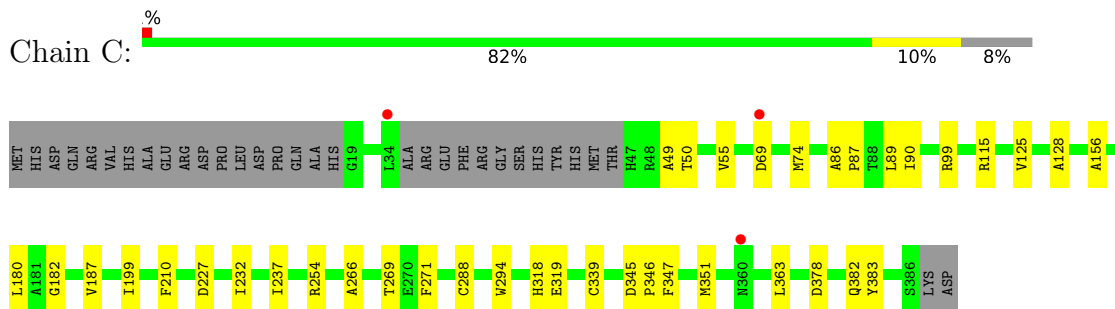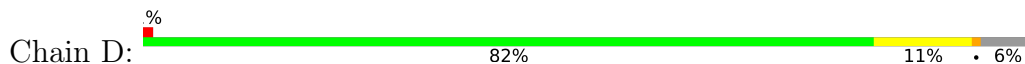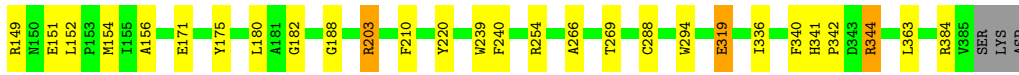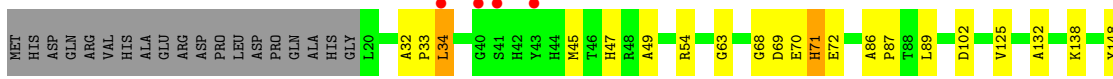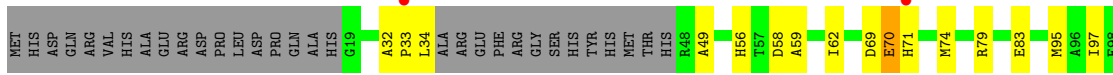• Molecule 1: Mandelate racemase/muconate lactonizing enzyme

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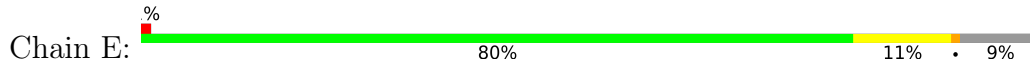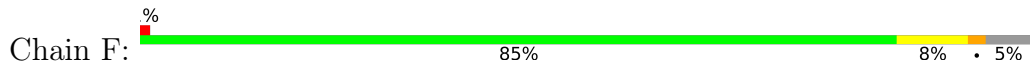
Chain E:

• Molecule 1: Mandelate racemase/muconate lactonizing enzyme

Chain F:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	89.98Å 102.95Å 234.43Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.13 – 2.09 47.13 – 2.09	Depositor EDS
% Data completeness (in resolution range)	83.3 (47.13-2.09) 80.8 (47.13-2.09)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.18 (at 2.10Å)	Xtriage
Refinement program	PHENIX 1.8_1069	Depositor
R, R_{free}	0.147 , 0.204 0.157 , 0.210	Depositor DCC
R_{free} test set	5358 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	22.8	Xtriage
Anisotropy	0.202	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 52.4	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	17745	wwPDB-VP
Average B, all atoms (Å^2)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.85% 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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, NA, BCT, PO4

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	0.57	0/2856	0.70	1/3891 (0.0%)
1	B	0.56	0/2826	0.69	0/3849
1	C	0.55	0/2854	0.71	3/3887 (0.1%)
1	D	0.57	0/2941	0.71	2/4003 (0.0%)
1	E	0.59	0/2836	0.71	1/3861 (0.0%)
1	F	0.61	0/2953	0.72	1/4019 (0.0%)
All	All	0.58	0/17266	0.71	8/23510 (0.0%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	254	ARG	NE-CZ-NH2	-11.00	114.80	120.30
1	D	254	ARG	NE-CZ-NH1	9.07	124.84	120.30
1	A	69	ASP	C-N-CA	7.24	139.79	121.70
1	C	254	ARG	NE-CZ-NH2	-6.28	117.16	120.30
1	F	257	ARG	NE-CZ-NH2	-6.10	117.25	120.30
1	C	254	ARG	NE-CZ-NH1	5.88	123.24	120.30
1	E	99	ARG	NE-CZ-NH1	5.12	122.86	120.30
1	C	227	ASP	CB-CG-OD1	5.05	122.85	118.30

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	2773	12	2652	22	0
1	B	2758	0	2645	30	0
1	C	2778	14	2654	24	0
1	D	2868	0	2751	26	0
1	E	2768	0	2661	24	0
1	F	2880	0	2766	20	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
3	A	4	0	0	0	0
3	F	4	0	1	0	0
4	C	5	0	0	2	0
5	F	6	0	8	0	0
6	A	143	0	0	0	0
6	B	125	0	0	3	0
6	C	147	0	0	1	0
6	D	138	0	0	1	0
6	E	156	0	0	0	0
6	F	158	0	0	4	0
All	All	17719	26	16138	145	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 4.

All (145) 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:E:33:PRO:HA	1:E:34:LEU:CB	2.17	0.73
1:D:89:LEU:HD11	1:D:125:VAL:HG11	1.69	0.72
1:F:359:ASN:HB2	6:F:631:HOH:O	1.91	0.70
1:C:49:ALA:O	1:C:69:ASP:HA	1.92	0.69
1:C:89:LEU:HD11	1:C:125:VAL:HG11	1.75	0.69
1:A:70:GLU:O	1:A:71:HIS:CB	2.44	0.65
1:E:156:ALA:HB2	1:E:180:LEU:HD13	1.79	0.64
1:A:162:GLY:C	1:A:164:PRO:HD3	2.18	0.64
1:D:32:ALA:HB1	1:D:33:PRO:HD2	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:384:ARG:HD3	6:F:611:HOH:O	1.97	0.62
1:D:89:LEU:CD1	1:D:125:VAL:HG11	2.30	0.61
1:A:141:LEU:HD12	1:A:371:LEU:HD13	1.84	0.59
1:A:49:ALA:O	1:A:69:ASP:HA	2.03	0.58
1:B:163:GLU:N	1:B:164:PRO:HD3	2.18	0.58
1:D:49:ALA:O	1:D:69:ASP:HA	2.04	0.58
1:B:319:GLU:HG3	1:B:340:PHE:CE2	2.40	0.57
1:B:89:LEU:HD11	1:B:125:VAL:HG11	1.86	0.57
1:D:269:THR:O	1:D:269:THR:HG22	2.03	0.57
1:F:70:GLU:HG3	1:F:77:ILE:HD12	1.87	0.57
1:C:49:ALA:HB1	1:C:74:MET:CE	2.35	0.56
1:E:49:ALA:HB1	1:E:74:MET:HE3	1.87	0.56
1:B:347:PHE:O	1:B:351:MET:HB2	2.06	0.56
1:D:154:MET:CE	1:D:363:LEU:HD13	2.37	0.55
1:E:200:THR:O	1:E:204:GLU:HG2	2.06	0.55
1:C:269:THR:HG22	1:C:269:THR:O	2.05	0.55
1:B:89:LEU:CD1	1:B:125:VAL:HG11	2.36	0.55
1:B:49:ALA:HB1	1:B:74:MET:CE	2.36	0.55
1:A:163:GLU:N	1:A:164:PRO:HD3	2.22	0.55
1:E:346:PRO:HB2	1:E:379:TYR:OH	2.06	0.55
1:B:242:GLU:HG3	6:B:624:HOH:O	2.07	0.54
1:E:49:ALA:HB1	1:E:74:MET:CE	2.37	0.54
1:A:351:MET:HG3	1:A:379:TYR:CD2	2.42	0.54
1:C:90:ILE:HD11	6:C:604:HOH:O	2.07	0.54
1:B:319:GLU:CG	1:B:320:GLU:H	2.21	0.53
1:E:97:ILE:HD12	1:E:97:ILE:N	2.24	0.53
1:A:163:GLU:N	1:A:164:PRO:CD	2.70	0.53
1:B:188:GLY:HA2	1:B:220:TYR:CZ	2.44	0.52
1:D:319:GLU:HG3	1:D:340:PHE:CE2	2.43	0.52
1:F:340:PHE:HB2	1:F:345:ASP:HB3	1.91	0.52
1:E:163:GLU:N	1:E:164:PRO:CD	2.72	0.52
1:E:269:THR:HG22	1:E:269:THR:O	2.10	0.51
1:B:49:ALA:HB1	1:B:74:MET:HE3	1.93	0.51
1:D:341:HIS:CD2	1:D:342:PRO:HD2	2.45	0.51
1:D:171:GLU:HG2	1:D:175:TYR:CE2	2.46	0.51
1:F:269:THR:HG22	1:F:269:THR:O	2.10	0.51
1:B:162:GLY:C	1:B:164:PRO:HD3	2.31	0.50
1:E:340:PHE:CD1	1:E:344:ARG:HD2	2.45	0.50
1:C:49:ALA:HB1	1:C:74:MET:HE1	1.93	0.50
1:E:250:LYS:HG2	1:E:279:LEU:HD23	1.94	0.50
1:F:24:ARG:HB3	1:F:56:HIS:HB2	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:156:ALA:HB2	1:F:180:LEU:HD13	1.94	0.50
1:C:182:GLY:HA2	1:C:210:PHE:CE1	2.47	0.50
1:B:131:ASP:HB2	1:B:371:LEU:CD2	2.41	0.49
1:B:156:ALA:HB2	1:B:180:LEU:HD13	1.95	0.49
1:D:34:LEU:HD13	1:D:47:HIS:CE1	2.48	0.49
1:E:70:GLU:O	1:E:71:HIS:C	2.50	0.49
1:C:182:GLY:HA2	1:C:210:PHE:CZ	2.47	0.49
1:C:318:HIS:CD2	1:C:319:GLU:HG2	2.47	0.49
1:A:33:PRO:HA	1:A:46:THR:O	2.12	0.48
1:C:271:PHE:CE2	4:C:402:PO4:O2	2.66	0.48
1:E:95:MET:HE2	1:E:133:VAL:HG22	1.96	0.48
1:B:319:GLU:CD	1:B:320:GLU:H	2.17	0.48
1:C:86:ALA:HB3	1:C:87:PRO:HD3	1.95	0.48
1:F:48:ARG:NH2	6:F:652:HOH:O	2.45	0.48
1:A:86:ALA:HB3	1:A:87:PRO:HD3	1.94	0.48
1:C:156:ALA:HB2	1:C:180:LEU:HD13	1.95	0.48
1:C:156:ALA:HA	1:C:339:CYS:O	2.14	0.47
1:D:266:ALA:O	1:D:288:CYS:HA	2.13	0.47
1:E:340:PHE:HB2	1:E:345:ASP:HB3	1.95	0.47
1:B:174:ASN:OD1	1:B:341:HIS:NE2	2.45	0.47
1:D:156:ALA:HB2	1:D:180:LEU:HD13	1.97	0.47
1:D:188:GLY:HA2	1:D:220:TYR:CZ	2.50	0.47
1:C:266:ALA:O	1:C:288:CYS:HA	2.14	0.47
1:D:49:ALA:HB3	1:D:71:HIS:H	1.79	0.47
1:E:49:ALA:O	1:E:69:ASP:HA	2.14	0.47
1:E:79:ARG:HG3	1:E:83:GLU:OE2	2.15	0.47
1:F:86:ALA:N	1:F:87:PRO:CD	2.77	0.47
1:A:269:THR:HG22	1:A:269:THR:O	2.15	0.46
1:B:171:GLU:HG2	1:B:175:TYR:CE2	2.50	0.46
1:A:32:ALA:O	1:A:47:HIS:HA	2.15	0.46
1:B:86:ALA:N	1:B:87:PRO:CD	2.78	0.46
1:B:230:ARG:NH1	6:B:614:HOH:O	2.49	0.46
1:D:86:ALA:HB3	1:D:87:PRO:HD3	1.96	0.46
1:C:50:THR:N	1:C:74:MET:HE1	2.30	0.45
1:D:340:PHE:HB3	1:D:344:ARG:HB3	1.98	0.45
1:A:34:LEU:N	1:A:46:THR:O	2.49	0.45
1:C:232:ILE:HD12	1:C:237:ILE:HG13	1.97	0.45
1:A:33:PRO:O	1:A:34:LEU:CB	2.63	0.45
1:B:49:ALA:O	1:B:69:ASP:HA	2.16	0.45
1:C:55:VAL:HG23	1:C:128:ALA:HB1	1.99	0.45
1:C:115:ARG:NE	4:C:402:PO4:O4	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:86:ALA:N	1:D:87:PRO:CD	2.79	0.45
1:B:269:THR:O	1:B:269:THR:CG2	2.64	0.45
1:F:49:ALA:O	1:F:69:ASP:HA	2.16	0.45
1:A:66:TYR:CD2	1:A:351:MET:HE2	2.52	0.44
1:D:203:ARG:NH2	1:D:210:PHE:O	2.41	0.44
1:B:76:ASP:OD1	1:B:79:ARG:NH1	2.44	0.44
1:D:319:GLU:HG3	1:D:340:PHE:CD2	2.53	0.44
1:E:58:ASP:C	1:E:59:ALA:O	2.56	0.44
1:B:268:GLN:CD	6:B:624:HOH:O	2.56	0.44
1:E:174:ASN:HD22	1:E:174:ASN:C	2.19	0.44
1:A:180:LEU:HD13	1:A:358:LEU:CD1	2.48	0.43
1:B:269:THR:O	1:B:269:THR:HG22	2.17	0.43
1:E:266:ALA:O	1:E:288:CYS:HA	2.18	0.43
1:C:187:VAL:HG11	1:C:199:ILE:HD11	2.00	0.43
1:B:141:LEU:HD12	1:B:371:LEU:HD13	2.00	0.43
1:C:382:GLN:OE1	1:C:383:TYR:CZ	2.71	0.43
1:C:347:PHE:O	1:C:351:MET:HB2	2.18	0.43
1:D:70:GLU:O	1:D:72:GLU:N	2.48	0.43
1:C:99:ARG:HD3	1:D:148:TYR:O	2.19	0.43
1:F:104:GLY:O	1:F:107:VAL:HG22	2.19	0.43
1:B:250:LYS:HG2	1:B:279:LEU:HD23	2.00	0.43
1:D:63:GLY:HA3	1:D:132:ALA:HB2	2.01	0.43
1:D:182:GLY:HA2	1:D:210:PHE:CE1	2.54	0.42
1:F:46:THR:O	1:F:46:THR:HG22	2.19	0.42
1:A:348:TRP:CE2	1:A:355:ARG:HD3	2.53	0.42
1:F:149:ARG:HD2	1:F:151:GLU:O	2.19	0.42
1:B:131:ASP:HB2	1:B:371:LEU:HD23	1.99	0.42
1:D:102:ASP:OD2	6:D:593:HOH:O	2.21	0.42
1:F:153:PRO:HB2	1:F:336:ILE:HD12	2.01	0.42
1:E:347:PHE:O	1:E:351:MET:HB2	2.19	0.42
1:A:253:MET:CG	1:A:284:ALA:HB1	2.50	0.42
1:A:340:PHE:HB2	1:A:345:ASP:CB	2.50	0.42
1:E:116:ARG:O	1:E:120:VAL:HG23	2.20	0.42
1:A:97:ILE:HD13	1:A:130:TRP:CE2	2.54	0.42
1:F:41:SER:O	1:F:42:HIS:CB	2.68	0.42
1:D:54:ARG:HA	1:D:63:GLY:O	2.21	0.41
1:E:32:ALA:O	1:E:34:LEU:CB	2.69	0.41
1:F:86:ALA:HB3	1:F:87:PRO:HD3	2.02	0.41
1:F:70:GLU:O	1:F:71:HIS:C	2.59	0.41
1:F:234:ASP:HB2	6:F:550:HOH:O	2.21	0.41
1:B:321:PRO:HA	1:B:324:SER:OG	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:385:VAL:O	1:B:385:VAL:HG23	2.20	0.41
1:C:269:THR:O	1:C:269:THR:CG2	2.69	0.41
1:D:149:ARG:HD2	1:D:151:GLU:O	2.21	0.41
1:C:345:ASP:HA	1:C:346:PRO:HD3	1.98	0.41
1:A:67:THR:HG23	1:A:293[A]:SER:HB2	2.03	0.40
1:A:154:MET:HE3	1:A:363:LEU:HD13	2.03	0.40
1:A:253:MET:HG3	1:A:284:ALA:HB1	2.02	0.40
1:B:126:ASN:OD1	1:B:298:PRO:HD2	2.21	0.40
1:F:40:GLY:HA3	1:F:43:TYR:CE2	2.56	0.40
1:F:240:PHE:HB2	1:F:262:VAL:HG22	2.04	0.40
1:B:253:MET:CG	1:B:284:ALA:HB1	2.52	0.40
1:E:56:HIS:ND1	1:E:62:ILE:HD12	2.37	0.40
1:E:203:ARG:CZ	1:E:212:ILE:HD12	2.51	0.40

There are no symmetry-related clashes.

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	354/388 (91%)	341 (96%)	11 (3%)	2 (1%)	25	21
1	B	350/388 (90%)	335 (96%)	15 (4%)	0	100	100
1	C	354/388 (91%)	337 (95%)	17 (5%)	0	100	100
1	D	364/388 (94%)	344 (94%)	17 (5%)	3 (1%)	19	15
1	E	351/388 (90%)	338 (96%)	12 (3%)	1 (0%)	41	41
1	F	366/388 (94%)	349 (95%)	15 (4%)	2 (0%)	29	26
All	All	2139/2328 (92%)	2044 (96%)	87 (4%)	8 (0%)	34	32

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	70	GLU
1	A	71	HIS
1	D	68	GLY
1	D	71	HIS
1	D	34	LEU
1	F	35	ALA
1	F	42	HIS
1	E	187	VAL

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	285/316 (90%)	282 (99%)	3 (1%)	73	79
1	B	283/316 (90%)	281 (99%)	2 (1%)	84	88
1	C	286/316 (90%)	283 (99%)	3 (1%)	76	82
1	D	294/316 (93%)	283 (96%)	11 (4%)	34	35
1	E	285/316 (90%)	280 (98%)	5 (2%)	59	65
1	F	296/316 (94%)	286 (97%)	10 (3%)	37	39
All	All	1729/1896 (91%)	1695 (98%)	34 (2%)	55	60

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	152	LEU
1	A	180	LEU
1	A	240	PHE
1	B	95	MET
1	B	240	PHE
1	C	294	TRP
1	C	363	LEU
1	C	378	ASP
1	D	45	MET
1	D	138	LYS
1	D	152	LEU

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Mol	Chain	Res	Type
1	D	203	ARG
1	D	239	TRP
1	D	240	PHE
1	D	294	TRP
1	D	319	GLU
1	D	336	ILE
1	D	344	ARG
1	D	384	ARG
1	E	70	GLU
1	E	154	MET
1	E	174	ASN
1	E	319	GLU
1	E	336	ILE
1	F	36	ARG
1	F	48	ARG
1	F	50	THR
1	F	64	GLU
1	F	70	GLU
1	F	71	HIS
1	F	72	GLU
1	F	111	ILE
1	F	240	PHE
1	F	262	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	174	ASN
1	C	318	HIS
1	D	47	HIS
1	D	341	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
4	PO4	C	402	-	4,4,4	0.91	0	6,6,6	0.98	0
3	BCT	A	403	-	2,3,3	0.29	0	2,3,3	0.82	0
5	GOL	F	401	-	5,5,5	0.40	0	5,5,5	0.44	0
3	BCT	F	403	-	2,3,3	0.41	0	2,3,3	0.23	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
5	GOL	F	401	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	F	401	GOL	O1-C1-C2-C3
5	F	401	GOL	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	402	PO4	2	0

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å²)	Q<0.9
1	A	356/388 (91%)	-0.38	3 (0%)	86	88	14, 26, 51, 83	0
1	B	354/388 (91%)	-0.31	3 (0%)	86	88	14, 27, 52, 76	0
1	C	356/388 (91%)	-0.34	3 (0%)	86	88	14, 27, 48, 87	0
1	D	366/388 (94%)	-0.33	4 (1%)	80	84	14, 27, 57, 112	0
1	E	355/388 (91%)	-0.56	3 (0%)	86	88	13, 23, 44, 77	0
1	F	368/388 (94%)	-0.53	5 (1%)	75	78	13, 23, 50, 113	0
All	All	2155/2328 (92%)	-0.41	21 (0%)	82	85	13, 25, 51, 113	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	41	SER	6.0
1	D	40	GLY	4.7
1	C	34	LEU	3.8
1	D	43	TYR	3.7
1	F	43	TYR	3.7
1	E	386	SER	3.4
1	D	34	LEU	3.4
1	B	164	PRO	3.4
1	A	34	LEU	3.3
1	E	71	HIS	2.9
1	F	42	HIS	2.9
1	F	40	GLY	2.8
1	A	46	THR	2.8
1	B	112	LEU	2.6
1	F	41	SER	2.6
1	C	69	ASP	2.5
1	A	45	MET	2.4
1	B	34	LEU	2.3
1	C	360	ASN	2.3

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Mol	Chain	Res	Type	RSRZ
1	E	33	PRO	2.2
1	F	36	ARG	2.1

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 monosaccharides 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
3	BCT	A	403	4/4	0.76	0.18	39,42,43,45	4
2	NA	A	402	1/1	0.81	0.07	38,38,38,38	0
3	BCT	F	403	4/4	0.90	0.11	28,31,38,42	4
4	PO4	C	402	5/5	0.90	0.39	35,37,38,43	0
5	GOL	F	401	6/6	0.92	0.13	32,37,40,45	0
2	NA	B	402	1/1	0.95	0.05	41,41,41,41	0
2	NA	C	401	1/1	0.96	0.11	37,37,37,37	0
2	NA	E	401	1/1	0.97	0.04	31,31,31,31	0
2	NA	F	402	1/1	0.97	0.08	33,33,33,33	0
2	NA	A	401	1/1	0.98	0.08	26,26,26,26	0
2	NA	B	401	1/1	0.98	0.05	23,23,23,23	0
2	NA	D	401	1/1	0.99	0.10	39,39,39,39	0

6.5 Other polymers ⓘ

There are no such residues in this entry.