



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 10:38 AM GMT

PDB ID : 3LXV
Title : Tyrosine 447 of Protocatechuate 3,4-Dioxygenase Controls Efficient Progress Through Catalysis
Authors : Purpero, V.M.; Lipscomb, J.D.
Deposited on : 2010-02-25
Resolution : 1.90 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

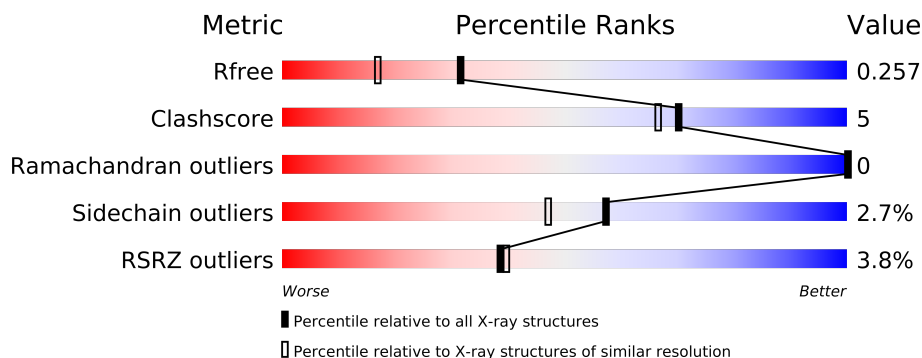
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 1.90 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}	66092	3684 (1.90-1.90)
Clashscore	79885	4465 (1.90-1.90)
Ramachandran outliers	78287	4413 (1.90-1.90)
Sidechain outliers	78261	4414 (1.90-1.90)
RSRZ outliers	66119	3686 (1.90-1.90)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	200	
1	B	200	
1	C	200	
2	M	238	
2	N	238	
2	O	238	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
10	CL	B	204	-	X
4	GOL	A	202	-	X

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Mol	Type	Chain	Res	Geometry	Electron density
4	GOL	M	7	-	X
4	GOL	N	10	-	X
4	GOL	N	6	-	X
4	GOL	N	9	-	X
5	BME	A	203	-	X
5	BME	A	204	-	X
5	BME	B	202	-	X
5	BME	C	203	-	X
5	BME	C	204	-	X
5	BME	M	15	-	X
5	BME	M	18	-	X
5	BME	N	22	-	X
5	BME	O	14[A]	-	X
5	BME	O	14[B]	-	X
5	BME	O	17	-	X
5	BME	O	19	-	X
5	BME	O	21	-	X
6	TRS	B	203	-	X
6	TRS	O	27	-	X
7	CO3	A	206	-	X
7	CO3	M	33	-	X
7	CO3	N	31	-	X
9	4NC	M	1	-	X
9	4NC	N	2	-	X
9	4NC	O	37[A]	-	X
9	4NC	O	37[B]	-	X

2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 11718 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Protocatechuate 3,4-dioxygenase alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	200	Total	C	N	O	S	0	3	0
			1589	1005	277	304	3			
1	B	200	Total	C	N	O	S	0	1	0
			1578	998	277	300	3			
1	C	200	Total	C	N	O	S	0	1	0
			1578	998	277	300	3			

- Molecule 2 is a protein called Protocatechuate 3,4-dioxygenase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	M	238	Total	C	N	O	S	0	2	0
			1893	1198	348	339	8			
2	N	238	Total	C	N	O	S	0	2	0
			1890	1197	347	338	8			
2	O	238	Total	C	N	O	S	0	2	0
			1891	1196	347	340	8			

There are 3 discrepancies between the modelled and reference sequences:

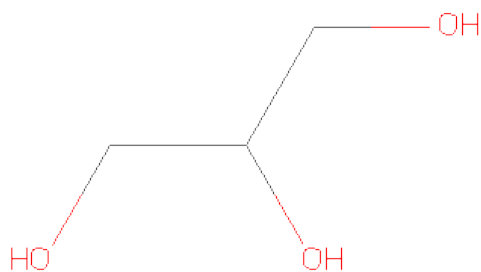
Chain	Residue	Modelled	Actual	Comment	Reference
M	447	HIS	TYR	engineered	UNP P00437
N	447	HIS	TYR	engineered	UNP P00437
O	447	HIS	TYR	engineered	UNP P00437

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



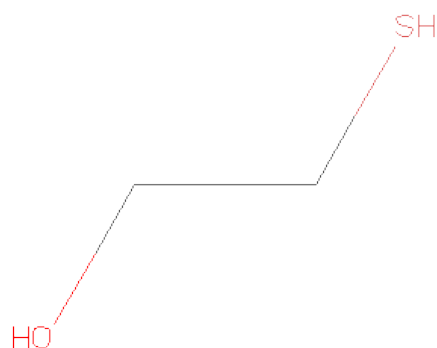
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	M	1	Total	C	O	0	0
			6	3	3		
4	N	1	Total	C	O	0	0
			6	3	3		
4	M	1	Total	C	O	0	0
			6	3	3		
4	N	1	Total	C	O	0	0
			6	3	3		
4	N	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is BETA-MERCAPTOETHANOL (three-letter code: BME) (formula: C₂H₆OS).



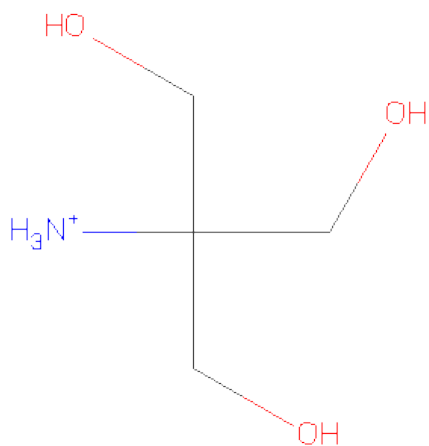
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O	S	0	0
			4	2	1	1		
5	A	1	Total	C	O	S	0	0
			4	2	1	1		
5	M	1	Total	C	O	S	0	0
			4	2	1	1		
5	M	1	Total	C	O	S	0	0
			4	2	1	1		
5	M	1	Total	C	O	S	0	0
			4	2	1	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	N	1	Total	C	O	S	0	0
			4	2	1	1		
5	B	1	Total	C	O	S	0	0
			4	2	1	1		
5	N	1	Total	C	O	S	0	0
			4	2	1	1		
5	C	1	Total	C	O	S	0	0
			4	2	1	1		
5	C	1	Total	C	O	S	0	0
			4	2	1	1		
5	O	1	Total	C	O	S	0	1
			8	4	2	2		
5	O	1	Total	C	O	S	0	0
			4	2	1	1		
5	O	1	Total	C	O	S	0	0
			4	2	1	1		
5	O	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 6 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C₄H₁₂NO₃).



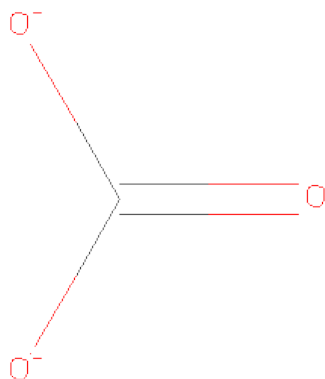
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N	O	0	0
			8	4	1	3		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	B	1	Total	C	N	O	0	0
			8	4	1	3		
6	O	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 7 is CARBONATE ION (three-letter code: CO3) (formula: CO₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			4	1	3		
7	M	1	Total	C	O	0	0
			4	1	3		
7	M	1	Total	C	O	0	0
			4	1	3		
7	N	1	Total	C	O	0	0
			4	1	3		
7	C	1	Total	C	O	0	0
			4	1	3		

- Molecule 8 is FE (III) ION (three-letter code: FE) (formula: Fe).

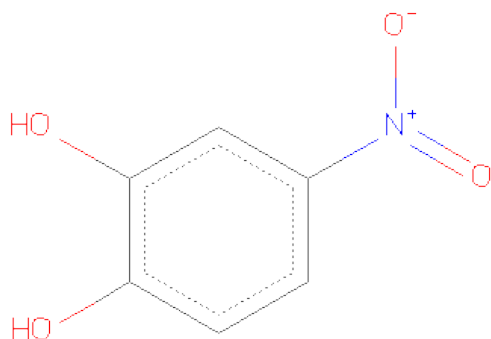
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	O	1	Total	Fe	0	0
			1	1		
8	N	1	Total	Fe	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	M	1	Total	Fe	0	0
			1	1		

- Molecule 9 is 4-NITROCATECHOL (three-letter code: 4NC) (formula: $C_6H_5NO_4$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
9	M	1	Total	C	N	O	0	0
			11	6	1	4		
9	N	1	Total	C	N	O	0	0
			11	6	1	4		
9	O	1	Total	C	N	O	0	1
			22	12	2	8		
9	O	1	Total	C	N	O	0	0
			11	6	1	4		

- Molecule 10 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	O	1	Total	Cl	0	0
			1	1		
10	B	1	Total	Cl	0	0
			1	1		
10	N	1	Total	Cl	0	0
			1	1		

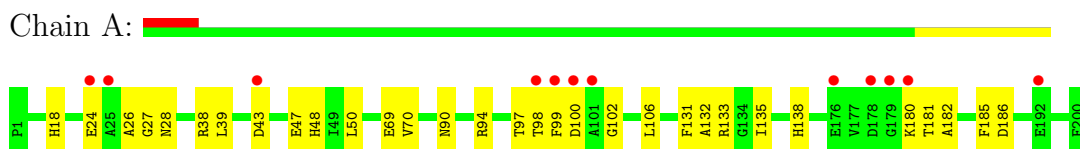
- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	164	Total 168	O 168	0	4
11	M	210	Total 211	O 211	0	1
11	B	156	Total 157	O 157	0	1
11	N	208	Total 210	O 210	0	2
11	C	124	Total 125	O 125	0	1
11	O	200	Total 202	O 202	0	2

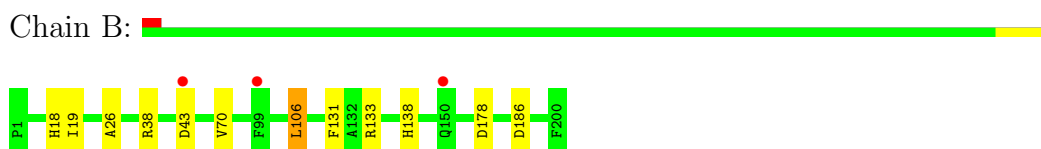
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

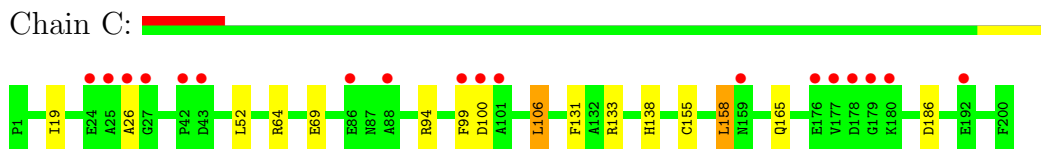
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



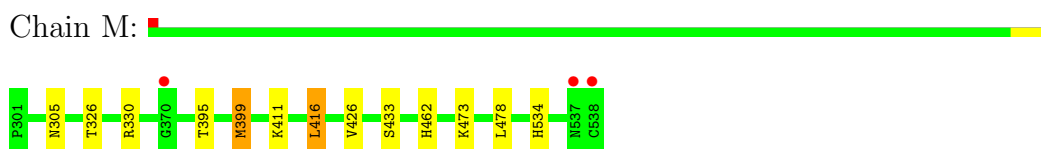
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



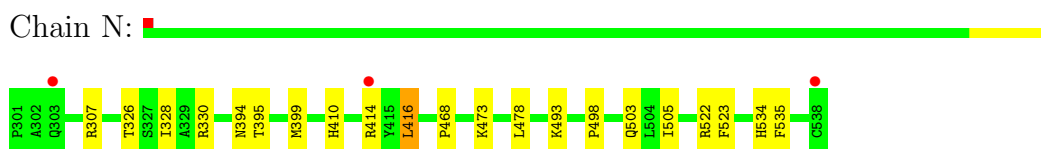
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



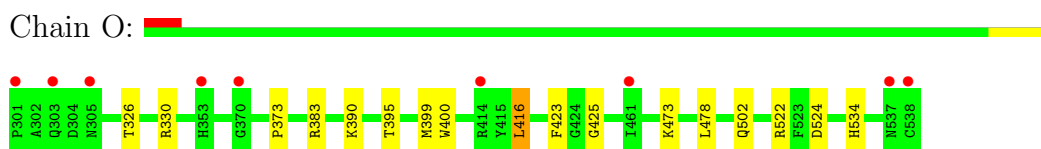
- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	128.11Å 140.59Å 167.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.99 – 1.90 41.44 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.5 (41.99-1.90) 99.5 (41.44-1.90)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.94 (at 1.89Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.201 , 0.246 0.211 , 0.257	Depositor DCC
R_{free} test set	5928 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	24.9	Xtriage
Anisotropy	0.003	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 44.4	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.55$, $\langle L^2 \rangle = 0.39$	Xtriage
Outliers	4 of 118321 reflections (0.003%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11718	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.20% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, CO3, BME, CL, FE, 4NC, TRS, 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	0.68	0/1638	0.70	0/2230
1	B	0.67	0/1621	0.73	1/2207 (0.0%)
1	C	0.63	0/1621	0.69	1/2207 (0.0%)
2	M	0.71	0/1955	0.72	1/2659 (0.0%)
2	N	0.69	0/1953	0.71	1/2657 (0.0%)
2	O	0.67	0/1950	0.69	1/2653 (0.0%)
All	All	0.68	0/10738	0.71	5/14613 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	106	LEU	CA-CB-CG	7.18	131.83	115.30
1	C	106	LEU	CA-CB-CG	6.64	130.57	115.30
2	N	416	LEU	CA-CB-CG	6.26	129.70	115.30
2	M	416	LEU	CA-CB-CG	6.02	129.15	115.30
2	O	416	LEU	CA-CB-CG	6.01	129.13	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1589	0	1525	34	0
1	B	1578	0	1515	8	0
1	C	1578	0	1515	11	0
2	M	1893	0	1852	9	0
2	N	1890	0	1849	16	0
2	O	1891	0	1847	10	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
4	A	6	0	8	7	0
4	C	6	0	8	2	0
4	M	12	0	16	0	0
4	N	18	0	24	3	0
5	A	8	0	12	5	0
5	B	4	0	6	0	0
5	C	8	0	12	1	0
5	M	12	0	18	3	0
5	N	8	0	12	4	0
5	O	24	0	36	4	0
6	A	8	0	12	5	0
6	B	8	0	12	1	0
6	O	8	0	12	4	0
7	A	4	0	0	0	0
7	C	4	0	0	1	0
7	M	8	0	0	0	0
7	N	4	0	0	0	0
8	M	1	0	0	0	0
8	N	1	0	0	0	0
8	O	1	0	0	0	0
9	M	11	0	3	2	0
9	N	11	0	3	0	0
9	O	33	0	9	5	0
10	B	1	0	0	0	0
10	N	1	0	0	0	0
10	O	1	0	0	0	0
11	A	168	0	0	14	0
11	B	157	0	0	2	0
11	C	125	0	0	2	0
11	M	211	0	0	2	0
11	N	210	0	0	4	0
11	O	202	0	0	8	0
All	All	11718	0	10306	97	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including

hydrogens) of the entry. The overall clashscore for this entry is 5.

All (97) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
9:O:3:4NC:H3	11:O:955:HOH:O	1.23	1.29
9:M:1:4NC:H3	11:M:964:HOH:O	0.89	1.07
2:O:524:ASP:H	6:O:27:TRS:H11	1.18	1.06
9:O:3:4NC:C3	11:O:955:HOH:O	1.87	1.03
1:A:26:ALA:O	11:A:1042:HOH:O	1.76	1.03
2:O:383:ARG:HH22	5:O:20:BME:H21	1.24	1.00
2:N:493:LYS:HE2	11:N:979:HOH:O	1.62	0.96
1:C:99:PHE:HB3	11:C:1041:HOH:O	1.68	0.93
1:B:178:ASP:OD2	11:B:871:HOH:O	1.86	0.93
2:O:502:GLN:OE1	9:O:37[B]:4NC:O8	1.93	0.87
1:B:70:VAL:HG11	1:B:106:LEU:HD21	1.57	0.86
1:B:186:ASP:H	6:B:203:TRS:H12	1.40	0.85
1:A:186:ASP:H	6:A:205:TRS:H12	1.42	0.84
9:O:3:4NC:O8	11:O:955:HOH:O	1.95	0.84
1:A:38:ARG:O	4:A:202:GOL:H32	1.77	0.82
5:A:204:BME:H21	2:M:426:VAL:HG12	1.60	0.81
1:A:98:THR:HA	11:A:864:HOH:O	1.81	0.81
6:O:27:TRS:H21	11:O:1005:HOH:O	1.80	0.80
1:C:186:ASP:H	4:C:202:GOL:H31	1.48	0.77
2:N:535:PHE:H	5:N:12:BME:H21	1.51	0.75
1:A:27:GLY:N	11:A:1036:HOH:O	1.69	0.74
2:O:524:ASP:H	6:O:27:TRS:C1	2.00	0.73
2:O:524:ASP:N	6:O:27:TRS:H11	2.00	0.72
2:M:433:SER:N	5:M:16:BME:H22	2.05	0.71
1:C:19:ILE:HG22	1:C:26:ALA:HB1	1.72	0.70
5:A:204:BME:H21	2:M:426:VAL:CG1	2.20	0.70
9:M:1:4NC:C3	11:M:964:HOH:O	1.69	0.70
1:A:186:ASP:H	6:A:205:TRS:C1	2.05	0.69
2:N:394[A]:ASN:OD1	11:N:569[A]:HOH:O	2.11	0.67
1:A:47[A]:GLU:HG2	11:A:867:HOH:O	1.94	0.67
1:A:97:THR:O	11:A:734:HOH:O	2.13	0.65
5:O:19:BME:H21	11:O:1062:HOH:O	1.95	0.65
2:N:307:ARG:HD2	5:N:22:BME:H11	1.78	0.65
5:A:204:BME:H11	11:A:705:HOH:O	1.99	0.62
1:A:27:GLY:CA	11:A:1036:HOH:O	2.33	0.62
1:B:38:ARG:HD3	11:B:901:HOH:O	1.99	0.62
2:N:505:ILE:CD1	4:N:10:GOL:H11	2.29	0.62
1:C:133:ARG:HG2	2:O:326[A]:THR:HG21	1.81	0.61
1:A:90:ASN:ND2	4:A:202:GOL:H2	2.17	0.60
2:O:326[A]:THR:HG22	2:O:330:ARG:HD2	1.86	0.58

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:155:CYS:HB3	1:C:158:LEU:HB2	1.87	0.56
1:B:19:ILE:HD11	2:N:410:HIS:HB2	1.87	0.56
1:A:98:THR:O	1:A:102:GLY:HA2	2.07	0.55
1:A:180:LYS:HG2	1:A:181:THR:N	2.21	0.55
1:A:90:ASN:HD22	4:A:202:GOL:C3	2.20	0.55
1:C:19:ILE:HG22	1:C:26:ALA:CB	2.38	0.54
2:N:307:ARG:HD2	5:N:22:BME:C1	2.38	0.54
1:C:131:PHE:CE2	1:C:138:HIS:HB3	2.43	0.53
1:A:186:ASP:N	6:A:205:TRS:H12	2.19	0.53
2:M:433:SER:H	5:M:16:BME:H22	1.71	0.53
1:A:99:PHE:HB2	11:A:897:HOH:O	2.07	0.52
1:A:133:ARG:HG2	2:M:326:THR:HG21	1.91	0.52
1:C:186:ASP:H	4:C:202:GOL:C3	2.18	0.52
6:A:205:TRS:O2	6:A:205:TRS:O1	2.20	0.51
1:A:18:HIS:ND1	11:A:802:HOH:O	2.34	0.51
1:A:18:HIS:CG	11:A:802:HOH:O	2.64	0.49
1:A:38:ARG:O	4:A:202:GOL:C3	2.54	0.49
1:C:69:GLU:HG2	1:C:94:ARG:HG2	1.95	0.48
2:M:326:THR:HG22	2:M:330:ARG:HD2	1.95	0.48
2:O:400:TRP:HA	2:O:425:GLY:O	2.13	0.47
1:C:64:ARG:HD3	1:C:99:PHE:O	2.15	0.47
1:A:39:LEU:O	4:A:202:GOL:H31	2.15	0.47
9:O:3:4NC:C2	11:O:955:HOH:O	2.20	0.47
2:N:505:ILE:HD12	4:N:10:GOL:H11	1.95	0.47
5:C:204:BME:H22	11:O:811:HOH:O	2.14	0.47
1:A:70:VAL:HG11	1:A:106:LEU:HD11	1.97	0.46
1:C:131:PHE:CD2	1:C:138:HIS:HB3	2.51	0.46
1:A:90:ASN:HD22	4:A:202:GOL:H2	1.81	0.46
1:A:18:HIS:CE1	11:A:734:HOH:O	2.68	0.46
2:N:523:PHE:HA	4:N:6:GOL:H2	1.98	0.46
1:A:90:ASN:HD22	4:A:202:GOL:C2	2.28	0.46
1:A:18:HIS:HE1	11:A:734:HOH:O	1.97	0.46
2:M:433:SER:H	5:M:16:BME:C2	2.29	0.45
2:O:478:LEU:C	2:O:478:LEU:HD23	2.38	0.45
2:N:326:THR:HG22	2:N:330:ARG:HD2	2.00	0.44
1:A:50:LEU:O	1:A:182:ALA:HA	2.18	0.44
2:N:498:PRO:HB3	11:N:1057:HOH:O	2.18	0.43
2:N:535:PHE:N	5:N:12:BME:H21	2.25	0.43
2:M:478:LEU:C	2:M:478:LEU:HD23	2.38	0.43
1:A:131:PHE:CE2	1:A:138:HIS:HB3	2.52	0.43
1:B:131:PHE:CE2	1:B:138:HIS:HB3	2.53	0.43
1:A:24:GLU:C	11:A:1036:HOH:O	2.58	0.42

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:N:328:ILE:HD13	5:O:21:BME:H21	2.00	0.42
1:A:132:ALA:HB3	1:A:135:ILE:HD12	2.01	0.42
2:M:399:MET:HA	2:M:462:HIS:O	2.19	0.42
1:A:185:PHE:HA	6:A:205:TRS:H11	2.00	0.42
2:O:373:PRO:HB3	2:O:423:PHE:HB2	2.02	0.42
1:B:18:HIS:HB2	1:B:26:ALA:HB2	2.02	0.42
5:O:19:BME:C2	11:O:1062:HOH:O	2.62	0.41
1:A:69:GLU:HG2	1:A:94:ARG:HG2	2.02	0.41
7:C:205:CO3:C	11:C:1055:HOH:O	2.69	0.41
1:A:28:ASN:HB3	5:A:204:BME:O1	2.21	0.41
1:A:48:HIS:CG	5:A:203:BME:H21	2.55	0.41
1:B:133:ARG:HG2	2:N:326:THR:HG21	2.03	0.41
2:N:503:GLN:HG2	11:N:180:HOH:O	2.21	0.41
2:N:478:LEU:C	2:N:478:LEU:HD23	2.42	0.40
1:A:99:PHE:N	11:A:864:HOH:O	2.45	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	201/200 (100%)	197 (98%)	4 (2%)	0	100	100
1	B	199/200 (100%)	197 (99%)	2 (1%)	0	100	100
1	C	199/200 (100%)	194 (98%)	5 (2%)	0	100	100
2	M	238/238 (100%)	230 (97%)	8 (3%)	0	100	100
2	N	238/238 (100%)	232 (98%)	6 (2%)	0	100	100
2	O	238/238 (100%)	233 (98%)	5 (2%)	0	100	100
All	All	1313/1314 (100%)	1283 (98%)	30 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	166/163 (102%)	164 (99%)	2 (1%)	82	80
1	B	164/163 (101%)	163 (99%)	1 (1%)	92	92
1	C	164/163 (101%)	159 (97%)	5 (3%)	53	42
2	M	204/202 (101%)	197 (97%)	7 (3%)	49	36
2	N	204/202 (101%)	196 (96%)	8 (4%)	43	30
2	O	204/202 (101%)	197 (97%)	7 (3%)	49	36
All	All	1106/1095 (101%)	1076 (97%)	30 (3%)	57	47

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	43	ASP
1	A	100	ASP
2	M	305	ASN
2	M	395	THR
2	M	399	MET
2	M	411	LYS
2	M	416	LEU
2	M	473	LYS
2	M	534	HIS
1	B	43	ASP
2	N	395	THR
2	N	399	MET
2	N	414	ARG
2	N	416	LEU
2	N	468	PRO
2	N	473	LYS
2	N	522	ARG
2	N	534	HIS
1	C	52	LEU
1	C	100	ASP
1	C	106	LEU
1	C	158	LEU
1	C	165	GLN

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Mol	Chain	Res	Type
2	O	390	LYS
2	O	395	THR
2	O	399	MET
2	O	416	LEU
2	O	473	LYS
2	O	522	ARG
2	O	534	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
2	M	305	ASN
2	N	502	GLN
2	O	502	GLN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 45 ligands modelled in this entry, 6 are monoatomic - leaving 39 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	SO4	A	201	-	4,4,4	0.36	0	6,6,6	0.40	0
4	GOL	A	202	-	5,5,5	0.39	0	5,5,5	1.11	0
5	BME	A	203	-	3,3,3	0.30	0	2,2,2	1.47	1 (50%)
5	BME	A	204	-	3,3,3	0.27	0	2,2,2	3.22	1 (50%)
6	TRS	A	205	-	7,7,7	0.98	1 (14%)	9,9,9	1.05	1 (11%)
7	CO3	A	206	-	0,3,3	0.00	-	0,3,3	0.00	-
3	SO4	B	201	-	4,4,4	0.32	0	6,6,6	0.18	0
5	BME	B	202	-	3,3,3	0.49	0	2,2,2	0.98	0
6	TRS	B	203	-	7,7,7	1.02	1 (14%)	9,9,9	0.93	1 (11%)
3	SO4	C	201	-	4,4,4	1.45	0	6,6,6	0.54	0
4	GOL	C	202	-	5,5,5	0.36	0	5,5,5	0.44	0
5	BME	C	203	-	3,3,3	0.45	0	2,2,2	1.58	1 (50%)
5	BME	C	204	-	3,3,3	0.31	0	2,2,2	1.84	1 (50%)
7	CO3	C	205	-	0,3,3	0.00	-	0,3,3	0.00	-
9	4NC	M	1	8	11,11,11	1.56	2 (18%)	15,15,15	1.08	1 (6%)
5	BME	M	15	-	3,3,3	0.23	0	2,2,2	1.37	0
5	BME	M	16	-	3,3,3	0.35	0	2,2,2	3.82	1 (50%)
5	BME	M	18	-	3,3,3	0.32	0	2,2,2	2.38	1 (50%)
7	CO3	M	29	-	0,3,3	0.00	-	0,3,3	0.00	-
7	CO3	M	33	-	0,3,3	0.00	-	0,3,3	0.00	-
4	GOL	M	5	-	5,5,5	0.34	0	5,5,5	0.53	0
4	GOL	M	7	-	5,5,5	0.49	0	5,5,5	0.53	0
4	GOL	N	10	-	5,5,5	0.29	0	5,5,5	1.13	1 (20%)
5	BME	N	12	-	3,3,3	0.39	0	2,2,2	1.12	0
9	4NC	N	2	8	11,11,11	1.70	2 (18%)	15,15,15	1.44	3 (20%)
5	BME	N	22	-	3,3,3	0.53	0	2,2,2	0.66	0
7	CO3	N	31	-	0,3,3	0.00	-	0,3,3	0.00	-
4	GOL	N	6	-	5,5,5	0.58	0	5,5,5	0.41	0
4	GOL	N	9	-	5,5,5	0.40	0	5,5,5	0.72	0
5	BME	O	14[A]	-	3,3,3	0.30	0	2,2,2	3.71	1 (50%)
5	BME	O	14[B]	-	3,3,3	0.37	0	2,2,2	1.70	1 (50%)
5	BME	O	17	-	3,3,3	0.38	0	2,2,2	0.98	0
5	BME	O	19	-	3,3,3	0.40	0	2,2,2	4.22	1 (50%)
5	BME	O	20	-	3,3,3	0.31	0	2,2,2	1.17	0
5	BME	O	21	-	3,3,3	0.54	0	2,2,2	1.28	0
6	TRS	O	27	-	7,7,7	1.62	1 (14%)	9,9,9	2.02	4 (44%)
9	4NC	O	3	8	11,11,11	2.44	3 (27%)	15,15,15	2.09	4 (26%)
9	4NC	O	37[A]	-	11,11,11	1.97	4 (36%)	15,15,15	1.73	3 (20%)
9	4NC	O	37[B]	-	11,11,11	1.98	3 (27%)	15,15,15	1.75	5 (33%)

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	SO4	A	201	-	-	0/0/0/0	0/0/0/0
4	GOL	A	202	-	-	0/4/4/4	0/0/0/0
5	BME	A	203	-	-	0/1/1/1	0/0/0/0
5	BME	A	204	-	-	0/1/1/1	0/0/0/0
6	TRS	A	205	-	-	0/9/9/9	0/0/0/0
7	CO3	A	206	-	-	0/0/0/0	0/0/0/0
3	SO4	B	201	-	-	0/0/0/0	0/0/0/0
5	BME	B	202	-	-	0/1/1/1	0/0/0/0
6	TRS	B	203	-	-	0/9/9/9	0/0/0/0
3	SO4	C	201	-	-	0/0/0/0	0/0/0/0
4	GOL	C	202	-	-	0/4/4/4	0/0/0/0
5	BME	C	203	-	-	0/1/1/1	0/0/0/0
5	BME	C	204	-	-	0/1/1/1	0/0/0/0
7	CO3	C	205	-	-	0/0/0/0	0/0/0/0
9	4NC	M	1	8	-	0/4/4/4	0/1/1/1
5	BME	M	15	-	-	0/1/1/1	0/0/0/0
5	BME	M	16	-	-	0/1/1/1	0/0/0/0
5	BME	M	18	-	-	0/1/1/1	0/0/0/0
7	CO3	M	29	-	-	0/0/0/0	0/0/0/0
7	CO3	M	33	-	-	0/0/0/0	0/0/0/0
4	GOL	M	5	-	-	0/4/4/4	0/0/0/0
4	GOL	M	7	-	-	0/4/4/4	0/0/0/0
4	GOL	N	10	-	-	0/4/4/4	0/0/0/0
5	BME	N	12	-	-	0/1/1/1	0/0/0/0
9	4NC	N	2	8	-	0/4/4/4	0/1/1/1
5	BME	N	22	-	-	0/1/1/1	0/0/0/0
7	CO3	N	31	-	-	0/0/0/0	0/0/0/0
4	GOL	N	6	-	-	0/4/4/4	0/0/0/0
4	GOL	N	9	-	-	0/4/4/4	0/0/0/0
5	BME	O	14[A]	-	-	0/1/1/1	0/0/0/0
5	BME	O	14[B]	-	-	0/1/1/1	0/0/0/0
5	BME	O	17	-	-	0/1/1/1	0/0/0/0
5	BME	O	19	-	-	0/1/1/1	0/0/0/0
5	BME	O	20	-	-	0/1/1/1	0/0/0/0
5	BME	O	21	-	-	0/1/1/1	0/0/0/0
6	TRS	O	27	-	-	0/9/9/9	0/0/0/0
9	4NC	O	3	8	-	0/4/4/4	0/1/1/1
9	4NC	O	37[A]	-	-	0/4/4/4	0/1/1/1
9	4NC	O	37[B]	-	-	0/4/4/4	0/1/1/1

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	O	3	4NC	C4-N9	-4.60	1.39	1.46
9	O	3	4NC	O11-N9	-4.59	1.17	1.25
9	O	37[B]	4NC	C2-C1	4.23	1.47	1.40
9	O	37[A]	4NC	C2-C1	3.89	1.47	1.40
6	O	27	TRS	C-N	-3.80	1.45	1.50
9	N	2	4NC	C4-N9	-3.76	1.40	1.46
9	M	1	4NC	C4-N9	-3.72	1.40	1.46
9	O	37[A]	4NC	C4-N9	-3.63	1.40	1.46
9	O	3	4NC	C2-C1	3.58	1.46	1.40
9	O	37[B]	4NC	C4-N9	-3.42	1.41	1.46
9	N	2	4NC	C2-C1	3.29	1.46	1.40
9	O	37[B]	4NC	O11-N9	-2.90	1.20	1.25
9	M	1	4NC	C2-C1	2.89	1.45	1.40
6	B	203	TRS	C-N	-2.66	1.46	1.50
9	O	37[A]	4NC	O11-N9	-2.53	1.21	1.25
6	A	205	TRS	C-N	-2.41	1.47	1.50
9	O	37[A]	4NC	O10-N9	-2.01	1.20	1.23

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	O	19	BME	C1-C2-S2	-5.83	102.99	113.03
5	M	16	BME	C1-C2-S2	-5.23	104.02	113.03
5	O	14[A]	BME	C1-C2-S2	-5.20	104.08	113.03
9	O	3	4NC	C5-C4-N9	4.69	123.31	118.96
5	A	204	BME	C1-C2-S2	-4.52	105.25	113.03
9	O	3	4NC	C3-C4-N9	-4.24	115.35	118.71
6	O	27	TRS	C2-C-C1	-3.89	104.31	110.70
9	O	3	4NC	O10-N9-C4	3.71	124.08	119.12
9	O	37[A]	4NC	O11-N9-C4	3.66	121.45	114.42
9	O	37[B]	4NC	O11-N9-C4	3.57	121.28	114.42
5	M	18	BME	C1-C2-S2	-3.33	107.30	113.03
9	O	37[A]	4NC	C4-C3-C2	3.15	120.77	118.72
9	O	37[B]	4NC	C5-C6-C1	-2.91	117.33	120.50
9	O	37[B]	4NC	C6-C5-C4	2.91	124.30	120.15
6	O	27	TRS	O2-C2-C	-2.87	105.26	111.55
9	N	2	4NC	C5-C4-N9	2.70	121.46	118.96
9	N	2	4NC	C4-C3-C2	2.70	120.47	118.72
9	O	37[B]	4NC	C3-C4-N9	2.62	120.78	118.71
9	O	37[A]	4NC	C5-C6-C1	-2.52	117.75	120.50
9	M	1	4NC	O11-N9-C4	2.50	119.22	114.42
5	O	14[B]	BME	C1-C2-S2	-2.41	108.89	113.03

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	204	BME	C1-C2-S2	-2.34	108.99	113.03
6	O	27	TRS	O1-C1-C	-2.30	106.52	111.55
6	O	27	TRS	C3-C-C1	2.23	114.36	110.70
5	C	203	BME	C1-C2-S2	-2.22	109.20	113.03
9	N	2	4NC	O10-N9-C4	2.12	121.96	119.12
5	A	203	BME	C1-C2-S2	-2.07	109.47	113.03
4	N	10	GOL	O3-C3-C2	2.05	119.73	109.71
6	A	205	TRS	C2-C-C1	2.04	114.06	110.70
9	O	3	4NC	C4-C3-C2	2.03	120.04	118.72
6	B	203	TRS	O2-C2-C	-2.02	107.12	111.55
9	O	37[B]	4NC	O11-N9-O10	-2.00	117.30	121.35

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

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(Å ²)	Q<0.9
1	A	200/200 (100%)	0.07	12 (6%) 21 21	23, 30, 47, 56	0
1	B	200/200 (100%)	0.00	3 (1%) 70 72	24, 30, 41, 50	3 (1%)
1	C	200/200 (100%)	0.47	18 (9%) 10 9	25, 36, 51, 60	1 (0%)
2	M	238/238 (100%)	0.01	3 (1%) 74 75	23, 28, 38, 51	1 (0%)
2	N	238/238 (100%)	-0.12	3 (1%) 74 75	24, 28, 37, 48	0
2	O	238/238 (100%)	0.18	9 (3%) 38 40	24, 30, 40, 54	0
All	All	1314/1314 (100%)	0.09	48 (3%) 38 41	23, 30, 44, 60	5 (0%)

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	178	ASP	4.8
1	A	99	PHE	4.7
1	C	178	ASP	4.5
1	C	177	VAL	4.3
1	C	100	ASP	4.1
1	C	43	ASP	3.9
1	A	101	ALA	3.7
1	C	101	ALA	3.7
1	A	100	ASP	3.6
2	O	303	GLN	3.5
1	C	179	GLY	3.2
1	C	99	PHE	3.1
2	O	538	CYS	3.1
1	C	26	ALA	3.1
2	M	538	CYS	3.0
2	O	301	PRO	3.0
2	O	370	GLY	2.9
2	O	414	ARG	2.8
1	C	180	LYS	2.8

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Mol	Chain	Res	Type	RSRZ
1	C	176	GLU	2.8
1	A	43	ASP	2.7
2	O	353	HIS	2.7
1	C	42	PRO	2.7
1	A	98	THR	2.6
2	O	537	ASN	2.6
1	C	27	GLY	2.6
1	A	176	GLU	2.6
1	C	24	GLU	2.6
2	N	303	GLN	2.6
1	A	180	LYS	2.5
2	M	537	ASN	2.5
1	C	192	GLU	2.4
1	A	179	GLY	2.4
2	O	305	ASN	2.4
1	A	25	ALA	2.4
1	C	25	ALA	2.3
1	B	150	GLN	2.2
2	O	461	ILE	2.2
1	C	159	ASN	2.2
1	A	24	GLU	2.2
2	M	370	GLY	2.2
1	C	88	ALA	2.1
1	A	192	GLU	2.1
2	N	414	ARG	2.0
1	B	99	PHE	2.0
2	N	538	CYS	2.0
1	C	86	GLU	2.0
1	B	43	ASP	2.0

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

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

6.3 Carbohydrates ⓘ

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	RSR	LLDF	B-factors(Å ²)	Q<0.9
5	BME	A	204	4/4	0.67	15.51	20,20,20,20	0
4	GOL	M	7	6/6	0.22	9.95	50,51,52,52	0
5	BME	O	17	4/4	0.25	9.87	68,69,69,69	0
5	BME	O	14[B]	4/4	0.26	7.96	20,20,21,22	4
5	BME	O	14[A]	4/4	0.26	7.93	73,75,75,76	4
7	CO3	M	33	4/4	0.55	7.25	20,20,20,20	0
4	GOL	N	9	6/6	0.23	7.11	57,58,59,59	0
5	BME	B	202	4/4	0.36	7.00	39,41,42,45	0
5	BME	O	19	4/4	0.17	6.13	68,68,68,69	0
9	4NC	O	37[A]	11/11	0.29	5.73	52,54,56,56	11
5	BME	M	15	4/4	0.15	5.57	56,58,59,60	0
7	CO3	A	206	4/4	0.23	5.54	61,61,61,61	0
5	BME	C	204	4/4	0.17	5.50	60,61,61,63	0
9	4NC	O	37[B]	11/11	0.29	5.39	61,63,64,64	11
5	BME	A	203	4/4	0.64	4.88	20,20,20,20	0
6	TRS	B	203	8/8	0.27	4.64	57,58,59,59	0
6	TRS	O	27	8/8	0.28	4.56	61,63,63,63	0
5	BME	N	22	4/4	0.20	4.42	55,56,57,60	0
4	GOL	A	202	6/6	0.25	4.10	49,52,55,55	0
5	BME	O	21	4/4	0.21	3.74	57,59,59,62	0
5	BME	M	18	4/4	0.19	3.61	64,65,65,66	0
9	4NC	M	1	11/11	0.18	3.55	39,43,44,45	0
4	GOL	N	10	6/6	0.23	3.40	47,48,50,51	0
9	4NC	N	2	11/11	0.14	3.08	39,41,43,43	0
7	CO3	N	31	4/4	0.16	2.59	60,60,61,61	0
4	GOL	N	6	6/6	0.19	2.49	48,51,51,54	0
5	BME	C	203	4/4	0.28	2.24	65,67,68,70	0
10	CL	B	204	1/1	0.19	2.05	52,52,52,52	0
9	4NC	O	3	11/11	0.17	1.97	38,41,44,45	0
4	GOL	M	5	6/6	0.21	1.87	45,50,51,53	0
5	BME	O	20	4/4	0.16	1.85	79,80,80,80	0
6	TRS	A	205	8/8	0.18	1.77	48,49,49,52	0
5	BME	M	16	4/4	0.17	1.72	74,76,76,77	0
5	BME	N	12	4/4	0.12	1.63	70,70,70,72	0

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Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(\AA^2)	Q<0.9
7	CO3	M	29	4/4	0.16	1.54	60,61,61,61	0
3	SO4	C	201	5/5	0.19	1.52	52,53,54,54	5
10	CL	O	36	1/1	0.21	0.95	77,77,77,77	0
10	CL	N	34	1/1	0.18	0.87	54,54,54,54	0
7	CO3	C	205	4/4	0.20	0.50	40,40,41,42	4
4	GOL	C	202	6/6	0.14	0.20	47,49,51,51	0
3	SO4	B	201	5/5	0.11	0.05	50,50,52,52	5
3	SO4	A	201	5/5	0.12	-0.16	49,50,50,51	5
8	FE	O	600	1/1	0.07	-3.30	28,28,28,28	0
8	FE	N	600	1/1	0.03	-5.04	27,27,27,27	0
8	FE	M	600	1/1	0.04	-5.10	27,27,27,27	0

6.5 Other polymers ⓘ

There are no such residues in this entry.