



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 08:02 PM UTC

PDB ID : 4PTN / pdb_00004ptn
Title : Crystal Structure of YagE, a KDG aldolase protein in complex with Magnesium cation coordinated L-glyceraldehyde
Authors : Manoj Kumar, P.; Baskar, V.; Manicka, S.; Krishnaswamy, S.
Deposited on : 2014-03-11
Resolution : 1.99 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
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

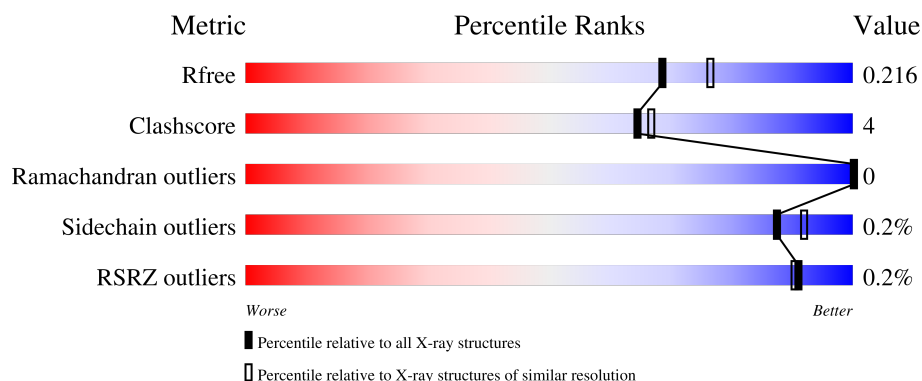
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.99 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	343	 82% 5% 13%
1	B	343	 80% 7% 13%
1	C	343	 79% 8% 13%
1	D	343	 82% 5% 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
2	EDO	B	404	-	-	X	-
2	EDO	C	403	-	-	X	-
3	GXV	D	403[B]	-	X	-	-
5	GOL	B	405	-	-	X	-
6	PYR	D	405	-	X	-	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 9706 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 Probable 2-keto-3-deoxy-galactonate aldolase YagE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	298	Total	C	N	O	S	0	1	0
			2267	1451	389	421	6			
1	B	298	Total	C	N	O	S	0	0	0
			2262	1447	388	421	6			
1	C	298	Total	C	N	O	S	0	1	0
			2268	1451	390	421	6			
1	D	298	Total	C	N	O	S	0	0	0
			2262	1447	388	421	6			

There are 164 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-17	MET	-	expression tag	UNP P75682
A	-16	GLY	-	expression tag	UNP P75682
A	-15	SER	-	expression tag	UNP P75682
A	-14	SER	-	expression tag	UNP P75682
A	-13	HIS	-	expression tag	UNP P75682
A	-12	HIS	-	expression tag	UNP P75682
A	-11	HIS	-	expression tag	UNP P75682
A	-10	HIS	-	expression tag	UNP P75682
A	-9	HIS	-	expression tag	UNP P75682
A	-8	HIS	-	expression tag	UNP P75682
A	-7	SER	-	expression tag	UNP P75682
A	-6	ALA	-	expression tag	UNP P75682
A	-5	GLY	-	expression tag	UNP P75682
A	-4	GLU	-	expression tag	UNP P75682
A	-3	ASN	-	expression tag	UNP P75682
A	-2	LEU	-	expression tag	UNP P75682
A	-1	TYR	-	expression tag	UNP P75682
A	0	PHE	-	expression tag	UNP P75682
A	1	GLN	-	expression tag	UNP P75682
A	2	GLY	-	expression tag	UNP P75682
A	3	GLN	-	expression tag	UNP P75682

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Chain	Residue	Modelled	Actual	Comment	Reference
A	4	GLN	-	expression tag	UNP P75682
A	5	GLY	-	expression tag	UNP P75682
A	6	ASP	-	expression tag	UNP P75682
A	7	LEU	-	expression tag	UNP P75682
A	310	CYS	-	expression tag	UNP P75682
A	311	GLY	-	expression tag	UNP P75682
A	312	ARG	-	expression tag	UNP P75682
A	313	THR	-	expression tag	UNP P75682
A	314	ARG	-	expression tag	UNP P75682
A	315	ALA	-	expression tag	UNP P75682
A	316	PRO	-	expression tag	UNP P75682
A	317	PRO	-	expression tag	UNP P75682
A	318	PRO	-	expression tag	UNP P75682
A	319	PRO	-	expression tag	UNP P75682
A	320	PRO	-	expression tag	UNP P75682
A	321	LEU	-	expression tag	UNP P75682
A	322	ARG	-	expression tag	UNP P75682
A	323	SER	-	expression tag	UNP P75682
A	324	GLY	-	expression tag	UNP P75682
A	325	CYS	-	expression tag	UNP P75682
B	-17	MET	-	expression tag	UNP P75682
B	-16	GLY	-	expression tag	UNP P75682
B	-15	SER	-	expression tag	UNP P75682
B	-14	SER	-	expression tag	UNP P75682
B	-13	HIS	-	expression tag	UNP P75682
B	-12	HIS	-	expression tag	UNP P75682
B	-11	HIS	-	expression tag	UNP P75682
B	-10	HIS	-	expression tag	UNP P75682
B	-9	HIS	-	expression tag	UNP P75682
B	-8	HIS	-	expression tag	UNP P75682
B	-7	SER	-	expression tag	UNP P75682
B	-6	ALA	-	expression tag	UNP P75682
B	-5	GLY	-	expression tag	UNP P75682
B	-4	GLU	-	expression tag	UNP P75682
B	-3	ASN	-	expression tag	UNP P75682
B	-2	LEU	-	expression tag	UNP P75682
B	-1	TYR	-	expression tag	UNP P75682
B	0	PHE	-	expression tag	UNP P75682
B	1	GLN	-	expression tag	UNP P75682
B	2	GLY	-	expression tag	UNP P75682
B	3	GLN	-	expression tag	UNP P75682
B	4	GLN	-	expression tag	UNP P75682

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Chain	Residue	Modelled	Actual	Comment	Reference
B	5	GLY	-	expression tag	UNP P75682
B	6	ASP	-	expression tag	UNP P75682
B	7	LEU	-	expression tag	UNP P75682
B	310	CYS	-	expression tag	UNP P75682
B	311	GLY	-	expression tag	UNP P75682
B	312	ARG	-	expression tag	UNP P75682
B	313	THR	-	expression tag	UNP P75682
B	314	ARG	-	expression tag	UNP P75682
B	315	ALA	-	expression tag	UNP P75682
B	316	PRO	-	expression tag	UNP P75682
B	317	PRO	-	expression tag	UNP P75682
B	318	PRO	-	expression tag	UNP P75682
B	319	PRO	-	expression tag	UNP P75682
B	320	PRO	-	expression tag	UNP P75682
B	321	LEU	-	expression tag	UNP P75682
B	322	ARG	-	expression tag	UNP P75682
B	323	SER	-	expression tag	UNP P75682
B	324	GLY	-	expression tag	UNP P75682
B	325	CYS	-	expression tag	UNP P75682
C	-17	MET	-	expression tag	UNP P75682
C	-16	GLY	-	expression tag	UNP P75682
C	-15	SER	-	expression tag	UNP P75682
C	-14	SER	-	expression tag	UNP P75682
C	-13	HIS	-	expression tag	UNP P75682
C	-12	HIS	-	expression tag	UNP P75682
C	-11	HIS	-	expression tag	UNP P75682
C	-10	HIS	-	expression tag	UNP P75682
C	-9	HIS	-	expression tag	UNP P75682
C	-8	HIS	-	expression tag	UNP P75682
C	-7	SER	-	expression tag	UNP P75682
C	-6	ALA	-	expression tag	UNP P75682
C	-5	GLY	-	expression tag	UNP P75682
C	-4	GLU	-	expression tag	UNP P75682
C	-3	ASN	-	expression tag	UNP P75682
C	-2	LEU	-	expression tag	UNP P75682
C	-1	TYR	-	expression tag	UNP P75682
C	0	PHE	-	expression tag	UNP P75682
C	1	GLN	-	expression tag	UNP P75682
C	2	GLY	-	expression tag	UNP P75682
C	3	GLN	-	expression tag	UNP P75682
C	4	GLN	-	expression tag	UNP P75682
C	5	GLY	-	expression tag	UNP P75682

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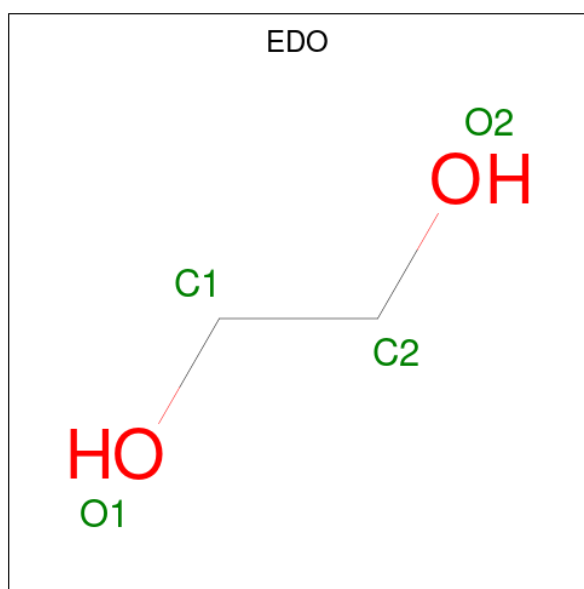
Chain	Residue	Modelled	Actual	Comment	Reference
C	6	ASP	-	expression tag	UNP P75682
C	7	LEU	-	expression tag	UNP P75682
C	310	CYS	-	expression tag	UNP P75682
C	311	GLY	-	expression tag	UNP P75682
C	312	ARG	-	expression tag	UNP P75682
C	313	THR	-	expression tag	UNP P75682
C	314	ARG	-	expression tag	UNP P75682
C	315	ALA	-	expression tag	UNP P75682
C	316	PRO	-	expression tag	UNP P75682
C	317	PRO	-	expression tag	UNP P75682
C	318	PRO	-	expression tag	UNP P75682
C	319	PRO	-	expression tag	UNP P75682
C	320	PRO	-	expression tag	UNP P75682
C	321	LEU	-	expression tag	UNP P75682
C	322	ARG	-	expression tag	UNP P75682
C	323	SER	-	expression tag	UNP P75682
C	324	GLY	-	expression tag	UNP P75682
C	325	CYS	-	expression tag	UNP P75682
D	-17	MET	-	expression tag	UNP P75682
D	-16	GLY	-	expression tag	UNP P75682
D	-15	SER	-	expression tag	UNP P75682
D	-14	SER	-	expression tag	UNP P75682
D	-13	HIS	-	expression tag	UNP P75682
D	-12	HIS	-	expression tag	UNP P75682
D	-11	HIS	-	expression tag	UNP P75682
D	-10	HIS	-	expression tag	UNP P75682
D	-9	HIS	-	expression tag	UNP P75682
D	-8	HIS	-	expression tag	UNP P75682
D	-7	SER	-	expression tag	UNP P75682
D	-6	ALA	-	expression tag	UNP P75682
D	-5	GLY	-	expression tag	UNP P75682
D	-4	GLU	-	expression tag	UNP P75682
D	-3	ASN	-	expression tag	UNP P75682
D	-2	LEU	-	expression tag	UNP P75682
D	-1	TYR	-	expression tag	UNP P75682
D	0	PHE	-	expression tag	UNP P75682
D	1	GLN	-	expression tag	UNP P75682
D	2	GLY	-	expression tag	UNP P75682
D	3	GLN	-	expression tag	UNP P75682
D	4	GLN	-	expression tag	UNP P75682
D	5	GLY	-	expression tag	UNP P75682
D	6	ASP	-	expression tag	UNP P75682

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Chain	Residue	Modelled	Actual	Comment	Reference
D	7	LEU	-	expression tag	UNP P75682
D	310	CYS	-	expression tag	UNP P75682
D	311	GLY	-	expression tag	UNP P75682
D	312	ARG	-	expression tag	UNP P75682
D	313	THR	-	expression tag	UNP P75682
D	314	ARG	-	expression tag	UNP P75682
D	315	ALA	-	expression tag	UNP P75682
D	316	PRO	-	expression tag	UNP P75682
D	317	PRO	-	expression tag	UNP P75682
D	318	PRO	-	expression tag	UNP P75682
D	319	PRO	-	expression tag	UNP P75682
D	320	PRO	-	expression tag	UNP P75682
D	321	LEU	-	expression tag	UNP P75682
D	322	ARG	-	expression tag	UNP P75682
D	323	SER	-	expression tag	UNP P75682
D	324	GLY	-	expression tag	UNP P75682
D	325	CYS	-	expression tag	UNP P75682

- Molecule 2 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



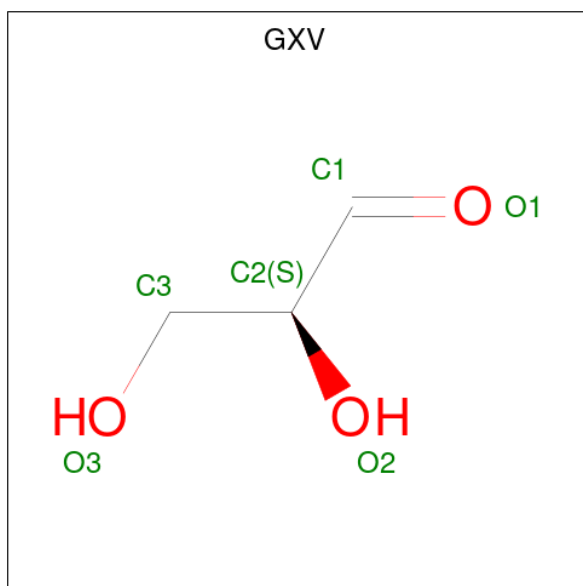
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	C	1	Total	C	O	0	0
			4	2	2		
2	C	1	Total	C	O	0	0
			4	2	2		
2	C	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	1
			8	4	4		

- Molecule 3 is L-glyceraldehyde (CCD ID: GXV) (formula: $C_3H_6O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	1
			12	6	6		
3	B	1	Total	C	O	0	1
			12	6	6		
3	C	1	Total	C	O	0	1
			12	6	6		

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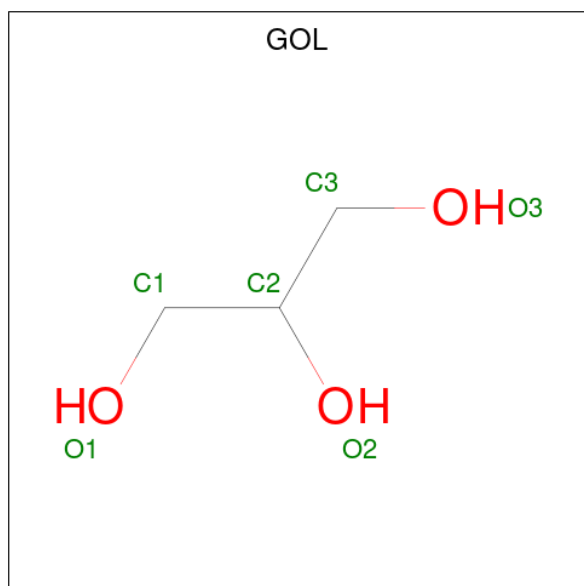
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total	C	O	0	1
			12	6	6		

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

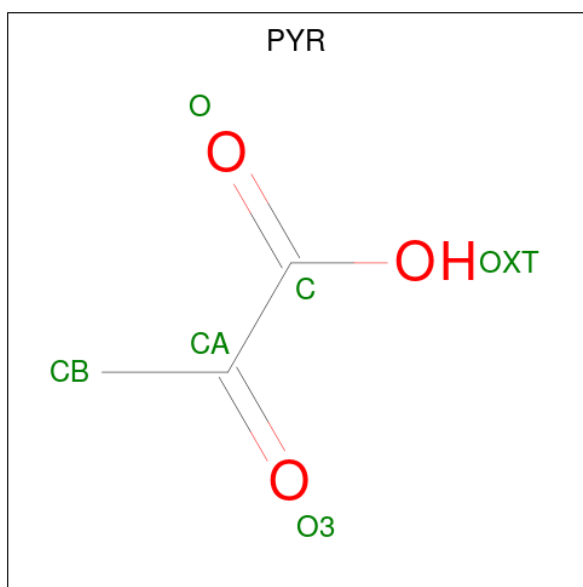
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	1
			2	2		
4	B	1	Total	Mg	0	1
			2	2		
4	C	1	Total	Mg	0	1
			2	2		
4	D	1	Total	Mg	0	1
			2	2		

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 6 is PYRUVIC ACID (CCD ID: PYR) (formula: C₃H₄O₃).



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

- Molecule 7 is water.

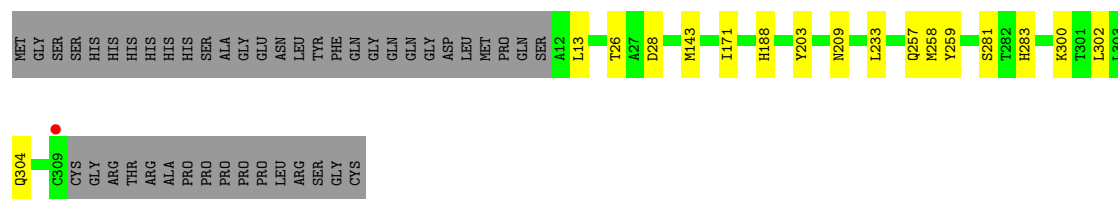
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	112	Total	O	0	0
			112	112		
7	B	145	Total	O	0	0
			145	145		
7	C	125	Total	O	0	0
			125	125		
7	D	143	Total	O	0	0
			143	143		

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.

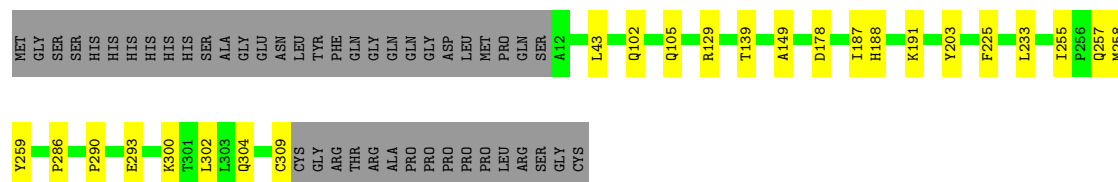
- Molecule 1: Probable 2-keto-3-deoxy-galactonate aldolase YagE

Chain A: 



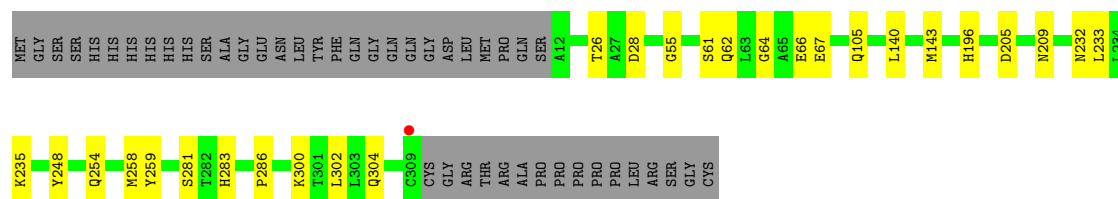
- Molecule 1: Probable 2-keto-3-deoxy-galactonate aldolase YagE

Chain B: 



- Molecule 1: Probable 2-keto-3-deoxy-galactonate aldolase YagE

Chain C: 



- Molecule 1: Probable 2-keto-3-deoxy-galactonate aldolase YagE

Chain D: 



K300				CYS	
				GLY	
Q304				ARG	
				THR	
				ARG	
				ALA	
				PRO	
				PRO	
				PRO	
				PRO	
				PRO	
				LEU	
				ARG	
				SER	
				GLY	
				CYS	

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	141.20Å 155.07Å 55.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.94 – 1.99 48.94 – 1.99	Depositor EDS
% Data completeness (in resolution range)	99.0 (48.94-1.99) 99.3 (48.94-1.99)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.82 (at 1.98Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.174 , 0.203 0.185 , 0.216	Depositor DCC
R_{free} test set	4194 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	16.8	Xtrriage
Anisotropy	0.106	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 35.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	9706	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 48.85 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 8.1141e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: GOL, GXV, EDO, PYR, MG

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	1.18	1/2318 (0.0%)	1.01	2/3159 (0.1%)
1	B	1.26	3/2310 (0.1%)	1.01	1/3147 (0.0%)
1	C	1.20	0/2319	1.02	2/3160 (0.1%)
1	D	1.24	1/2310 (0.0%)	1.01	1/3147 (0.0%)
All	All	1.22	5/9257 (0.1%)	1.01	6/12613 (0.0%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	286	PRO	CA-C	7.82	1.57	1.52
1	A	283	HIS	CA-C	6.19	1.60	1.52
1	D	181	ALA	CA-C	5.32	1.59	1.52
1	B	255	ILE	CA-CB	5.06	1.57	1.53
1	B	293	GLU	N-CA	5.01	1.51	1.46

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	257	GLN	CB-CA-C	-6.17	100.19	110.68
1	C	281	SER	CA-CB-OG	-6.13	98.84	111.10
1	A	281	SER	CA-CB-OG	-6.04	99.02	111.10
1	D	257	GLN	CB-CA-C	-5.54	101.27	110.68
1	B	257	GLN	CB-CA-C	-5.37	101.55	110.68
1	C	286	PRO	O-C-N	5.06	123.64	121.31

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	2267	0	2289	12	0
1	B	2262	0	2286	23	0
1	C	2268	0	2294	21	0
1	D	2262	0	2286	14	0
2	A	8	0	12	1	0
2	B	16	0	24	4	0
2	C	12	0	17	6	0
2	D	12	0	18	0	0
3	A	12	0	0	0	0
3	B	12	0	0	0	0
3	C	12	0	0	0	0
3	D	12	0	0	2	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
4	C	2	0	0	0	0
4	D	2	0	0	0	0
5	B	6	0	8	4	0
6	B	6	0	0	3	0
6	D	6	0	0	3	0
7	A	112	0	0	1	0
7	B	145	0	0	10	0
7	C	125	0	0	4	0
7	D	143	0	0	7	0
All	All	9706	0	9234	72	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 (72) 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:C:235:LYS:HE2	7:C:623:HOH:O	1.49	1.12
1:B:309:CYS:C	7:B:642:HOH:O	2.02	1.02
6:D:405:PYR:CA	7:D:609:HOH:O	2.11	0.97
1:B:259:TYR:HD2	7:B:644:HOH:O	1.48	0.95

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:TYR:CD2	7:B:644:HOH:O	2.20	0.91
1:C:66:GLU:HB2	2:C:403:EDO:H21	1.53	0.90
1:C:283:HIS:HB2	7:C:620:HOH:O	1.73	0.87
1:B:178:ASP:O	5:B:405:GOL:H2	1.77	0.84
6:B:408:PYR:CA	7:B:600:HOH:O	2.25	0.83
1:C:26:THR:OG1	1:C:28:ASP:OD1	1.97	0.83
5:B:405:GOL:H11	1:D:178:ASP:O	1.80	0.80
1:B:203:TYR:OH	2:B:404:EDO:O2	1.98	0.79
1:A:26:THR:OG1	1:A:28:ASP:OD1	2.00	0.79
1:B:105:GLN:HE22	1:B:139:THR:H	1.29	0.79
1:C:196:HIS:HD2	7:C:624:HOH:O	1.66	0.78
1:B:129:ARG:HD2	7:B:643:HOH:O	1.84	0.76
6:D:405:PYR:C	7:D:609:HOH:O	2.32	0.72
1:B:105:GLN:NE2	1:B:139:THR:H	1.95	0.65
3:D:403[B]:GXV:C2	7:D:643:HOH:O	2.46	0.64
6:B:408:PYR:C	7:B:600:HOH:O	2.46	0.63
1:D:225:PHE:CZ	1:D:258:MET:HE1	2.36	0.61
1:B:102:GLN:NE2	7:B:598:HOH:O	2.33	0.59
1:B:178:ASP:O	5:B:405:GOL:C2	2.49	0.59
1:B:225:PHE:CZ	1:B:258:MET:HE1	2.38	0.58
1:B:188:HIS:HE1	1:D:254:GLN:OE1	1.87	0.57
1:C:67:GLU:HG3	2:C:403:EDO:O2	2.05	0.57
1:C:66:GLU:CB	2:C:403:EDO:H21	2.33	0.56
1:B:178:ASP:O	5:B:405:GOL:C3	2.55	0.55
1:A:209:ASN:HD21	1:C:209:ASN:HD21	1.57	0.53
1:A:13:LEU:HD12	1:A:13:LEU:N	2.28	0.49
1:B:105:GLN:HE22	1:B:139:THR:N	2.05	0.49
1:D:233:LEU:C	1:D:233:LEU:HD23	2.39	0.47
1:D:209:ASN:ND2	7:D:625:HOH:O	2.47	0.47
1:D:300:LYS:HE2	1:D:304:GLN:NE2	2.30	0.47
1:B:309:CYS:CB	7:B:642:HOH:O	2.62	0.47
1:C:233:LEU:C	1:C:233:LEU:HD23	2.40	0.47
2:B:404:EDO:H22	7:B:511:HOH:O	2.15	0.46
1:C:64:GLY:C	2:C:403:EDO:H22	2.41	0.46
1:B:233:LEU:C	1:B:233:LEU:HD23	2.42	0.45
1:A:143:MET:HE3	1:A:143:MET:HB3	1.80	0.45
1:C:143:MET:HE3	1:C:143:MET:HB3	1.81	0.45
1:C:258:MET:HG3	1:C:259:TYR:CD1	2.51	0.45
1:B:300:LYS:HE2	1:B:304:GLN:NE2	2.32	0.44
1:D:290:PRO:O	6:D:405:PYR:CB	2.65	0.44
1:A:258:MET:HG3	1:A:259:TYR:CD1	2.53	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:61:SER:OG	1:C:62:GLN:NE2	2.51	0.44
1:B:149:ALA:HB2	2:B:404:EDO:H22	2.00	0.44
1:A:233:LEU:C	1:A:233:LEU:HD23	2.43	0.43
1:C:66:GLU:H	2:C:403:EDO:C2	2.30	0.43
1:D:187:ILE:O	1:D:191:LYS:HB2	2.18	0.43
1:A:188:HIS:HB3	7:A:612:HOH:O	2.18	0.43
1:B:259:TYR:CE2	7:B:644:HOH:O	2.64	0.43
1:C:55:GLY:C	7:C:622:HOH:O	2.62	0.42
1:C:105:GLN:HA	1:C:140:LEU:HD11	2.00	0.42
1:A:203:TYR:CG	2:A:402:EDO:H21	2.54	0.42
1:A:171:ILE:C	1:A:171:ILE:HD12	2.44	0.42
1:D:260:GLN:NE2	7:D:545:HOH:O	2.51	0.42
1:D:102:GLN:NE2	7:D:605:HOH:O	2.42	0.42
1:B:188:HIS:CE1	1:D:254:GLN:OE1	2.69	0.41
1:C:258:MET:HB3	1:C:302:LEU:HD23	2.02	0.41
1:D:143:MET:HE3	1:D:143:MET:HB3	1.97	0.41
1:A:188:HIS:CE1	1:C:254:GLN:OE1	2.73	0.41
1:A:258:MET:HB3	1:A:302:LEU:HD23	2.03	0.41
1:A:300:LYS:HE2	1:A:304:GLN:NE2	2.36	0.41
1:D:174:LYS:NZ	3:D:403[A]:GXV:O1	2.53	0.41
1:B:149:ALA:HB2	2:B:404:EDO:C2	2.51	0.41
1:B:290:PRO:O	6:B:408:PYR:CB	2.69	0.41
1:C:300:LYS:HE2	1:C:304:GLN:NE2	2.36	0.41
1:C:205:ASP:OD2	2:C:402:EDO:O2	2.36	0.40
1:C:232:ASN:HB3	1:C:248:TYR:CE1	2.56	0.40
1:B:187:ILE:O	1:B:191:LYS:HB2	2.22	0.40
1:D:12:ALA:N	7:D:642:HOH:O	2.53	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	297/343 (87%)	294 (99%)	3 (1%)	0	100	100
1	B	296/343 (86%)	292 (99%)	4 (1%)	0	100	100
1	C	297/343 (87%)	294 (99%)	3 (1%)	0	100	100
1	D	296/343 (86%)	293 (99%)	3 (1%)	0	100	100
All	All	1186/1372 (86%)	1173 (99%)	13 (1%)	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	242/280 (86%)	242 (100%)	0	100	100
1	B	243/280 (87%)	241 (99%)	2 (1%)	73	80
1	C	243/280 (87%)	243 (100%)	0	100	100
1	D	242/280 (86%)	242 (100%)	0	100	100
All	All	970/1120 (87%)	968 (100%)	2 (0%)	87	92

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	43	LEU
1	B	302	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	GLN
1	A	102	GLN
1	A	188	HIS
1	A	257	GLN
1	B	62	GLN

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Mol	Chain	Res	Type
1	B	105	GLN
1	B	126	ASN
1	B	188	HIS
1	C	62	GLN
1	C	102	GLN
1	C	209	ASN
1	C	305	GLN
1	D	62	GLN
1	D	102	GLN
1	D	126	ASN
1	D	209	ASN
1	D	257	GLN
1	D	260	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 31 ligands modelled in this entry, 8 are monoatomic - leaving 23 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	$\# Z > 2$
2	EDO	B	401	-	3,3,3	0.29	0	2,2,2	1.73	1 (50%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	EDO	B	402	-	3,3,3	0.72	0	2,2,2	0.23	0
2	EDO	D	402[A]	-	3,3,3	0.35	0	2,2,2	0.68	0
3	GXV	B	406[B]	-	4,5,5	0.50	0	4,5,5	1.48	1 (25%)
3	GXV	A	403[B]	-	4,5,5	1.13	0	4,5,5	1.68	1 (25%)
6	PYR	B	408	-	5,5,5	3.90	4 (80%)	3,6,6	1.11	0
5	GOL	B	405	-	5,5,5	0.90	0	5,5,5	1.27	0
2	EDO	C	402	-	3,3,3	0.53	0	2,2,2	0.34	0
2	EDO	C	401	-	3,3,3	0.95	0	2,2,2	1.28	0
2	EDO	B	404	-	3,3,3	0.39	0	2,2,2	1.19	0
2	EDO	D	401	-	3,3,3	0.45	0	2,2,2	0.61	0
3	GXV	D	403[A]	-	4,5,5	0.41	0	4,5,5	1.49	1 (25%)
2	EDO	D	402[B]	-	3,3,3	0.31	0	2,2,2	0.11	0
3	GXV	C	404[A]	4	4,5,5	3.40	1 (25%)	4,5,5	1.05	0
3	GXV	D	403[B]	4	4,5,5	3.66	2 (50%)	4,5,5	2.90	2 (50%)
2	EDO	A	401	-	3,3,3	0.16	0	2,2,2	1.20	0
6	PYR	D	405	-	5,5,5	3.89	5 (100%)	3,6,6	2.01	1 (33%)
2	EDO	C	403	-	3,3,3	0.69	0	2,2,2	1.47	1 (50%)
3	GXV	C	404[B]	-	4,5,5	0.90	0	4,5,5	2.66	2 (50%)
2	EDO	A	402	-	3,3,3	0.39	0	2,2,2	0.51	0
2	EDO	B	403	-	3,3,3	1.07	0	2,2,2	1.28	0
3	GXV	A	403[A]	4	4,5,5	3.30	1 (25%)	4,5,5	2.03	1 (25%)
3	GXV	B	406[A]	4	4,5,5	3.73	2 (50%)	4,5,5	1.26	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	EDO	B	401	-	-	0/1/1/1	-
2	EDO	B	402	-	-	0/1/1/1	-
2	EDO	D	402[A]	-	-	0/1/1/1	-
3	GXV	B	406[B]	-	-	2/3/4/4	-
3	GXV	A	403[B]	-	-	2/3/4/4	-
6	PYR	B	408	-	-	0/4/4/4	-
5	GOL	B	405	-	-	0/4/4/4	-
2	EDO	C	402	-	-	1/1/1/1	-
2	EDO	C	401	-	-	0/1/1/1	-
2	EDO	B	404	-	-	1/1/1/1	-
2	EDO	D	401	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GXV	D	403[A]	-	-	2/3/4/4	-
2	EDO	D	402[B]	-	-	0/1/1/1	-
3	GXV	C	404[A]	4	-	1/3/4/4	-
3	GXV	D	403[B]	4	-	2/3/4/4	-
2	EDO	A	401	-	-	0/1/1/1	-
6	PYR	D	405	-	-	0/4/4/4	-
2	EDO	C	403	-	-	1/1/1/1	-
3	GXV	C	404[B]	-	-	2/3/4/4	-
2	EDO	A	402	-	-	1/1/1/1	-
2	EDO	B	403	-	-	1/1/1/1	-
3	GXV	A	403[A]	4	-	1/3/4/4	-
3	GXV	B	406[A]	4	-	0/3/4/4	-

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	404[A]	GXV	O1-C1	6.75	1.45	1.20
3	B	406[A]	GXV	O1-C1	6.62	1.45	1.20
3	D	403[B]	GXV	O1-C1	6.57	1.44	1.20
3	A	403[A]	GXV	O1-C1	6.27	1.43	1.20
6	D	405	PYR	O3-CA	5.81	1.36	1.23
6	B	408	PYR	O3-CA	5.51	1.35	1.23
6	B	408	PYR	O-C	5.26	1.35	1.22
6	D	405	PYR	O-C	4.89	1.34	1.22
3	B	406[A]	GXV	C3-C2	3.19	1.55	1.50
6	B	408	PYR	CB-CA	3.06	1.56	1.50
6	D	405	PYR	CB-CA	2.84	1.55	1.50
3	D	403[B]	GXV	C3-C2	2.52	1.54	1.50
6	B	408	PYR	CA-C	-2.51	1.46	1.54
6	D	405	PYR	CA-C	-2.40	1.46	1.54
6	D	405	PYR	OXT-C	2.04	1.36	1.30

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	403[B]	GXV	O2-C2-C3	4.29	117.88	109.25
3	D	403[B]	GXV	O2-C2-C1	-3.68	101.10	109.03
3	C	404[B]	GXV	O3-C3-C2	-3.62	107.19	112.39
3	A	403[A]	GXV	O2-C2-C1	-3.46	101.57	109.03
3	C	404[B]	GXV	O2-C2-C1	2.86	115.19	109.03
3	A	403[B]	GXV	O3-C3-C2	2.82	116.43	112.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	405	PYR	O3-CA-CB	2.52	125.42	119.77
3	D	403[A]	GXV	O2-C2-C3	-2.46	104.29	109.25
2	B	401	EDO	O2-C2-C1	-2.25	95.23	112.39
3	B	406[B]	GXV	O2-C2-C3	-2.15	104.92	109.25
2	C	403	EDO	O1-C1-C2	-2.00	97.13	112.39

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	403[B]	GXV	O2-C2-C3-O3
3	A	403[B]	GXV	C1-C2-C3-O3
3	B	406[B]	GXV	O2-C2-C3-O3
3	C	404[B]	GXV	O2-C2-C3-O3
3	C	404[B]	GXV	C1-C2-C3-O3
3	D	403[A]	GXV	O2-C2-C3-O3
3	D	403[B]	GXV	O2-C2-C3-O3
3	A	403[A]	GXV	C1-C2-C3-O3
3	B	406[B]	GXV	C1-C2-C3-O3
3	D	403[A]	GXV	C1-C2-C3-O3
2	B	404	EDO	O1-C1-C2-O2
3	C	404[A]	GXV	O2-C2-C3-O3
2	A	402	EDO	O1-C1-C2-O2
2	B	403	EDO	O1-C1-C2-O2
2	C	402	EDO	O1-C1-C2-O2
2	C	403	EDO	O1-C1-C2-O2
3	D	403[B]	GXV	C1-C2-C3-O3

There are no ring outliers.

9 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	408	PYR	3	0
5	B	405	GOL	4	0
2	C	402	EDO	1	0
2	B	404	EDO	4	0
3	D	403[A]	GXV	1	0
3	D	403[B]	GXV	1	0
6	D	405	PYR	3	0
2	C	403	EDO	5	0
2	A	402	EDO	1	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 [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	298/343 (86%)	-0.21	1 (0%) 90 89	9, 16, 31, 46	1 (0%)
1	B	298/343 (86%)	-0.39	0 100 100	8, 13, 25, 37	0
1	C	298/343 (86%)	-0.25	1 (0%) 90 89	8, 15, 29, 46	1 (0%)
1	D	298/343 (86%)	-0.35	0 100 100	9, 14, 27, 38	0
All	All	1192/1372 (86%)	-0.30	2 (0%) 91 90	8, 14, 28, 46	2 (0%)

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	309	CYS	2.3
1	C	309	CYS	2.1

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	GOL	B	405	6/6	0.80	0.17	33,37,38,46	0
2	EDO	B	403	4/4	0.81	0.18	35,39,40,44	0
6	PYR	D	405	6/6	0.81	0.16	24,28,30,32	0
6	PYR	B	408	6/6	0.82	0.15	25,28,30,31	0
2	EDO	C	402	4/4	0.85	0.15	27,28,29,32	0
2	EDO	C	403	4/4	0.86	0.18	29,29,31,33	0
3	GXV	C	404[B]	6/6	0.87	0.17	15,19,21,21	6
3	GXV	A	403[A]	6/6	0.87	0.20	13,13,14,14	6
3	GXV	A	403[B]	6/6	0.87	0.20	14,19,20,25	6
3	GXV	C	404[A]	6/6	0.87	0.17	11,12,13,13	6
2	EDO	C	401	4/4	0.88	0.10	17,19,21,24	0
2	EDO	A	402	4/4	0.88	0.13	23,28,30,34	0
2	EDO	A	401	4/4	0.89	0.09	18,22,23,25	0
3	GXV	D	403[A]	6/6	0.90	0.12	18,26,26,28	6
3	GXV	D	403[B]	6/6	0.90	0.12	14,16,17,18	6
3	GXV	B	406[B]	6/6	0.90	0.10	19,24,25,27	6
2	EDO	B	401	4/4	0.90	0.09	14,21,22,25	0
3	GXV	B	406[A]	6/6	0.90	0.10	14,16,17,18	6
2	EDO	B	402	4/4	0.91	0.10	18,18,20,22	0
2	EDO	B	404	4/4	0.92	0.12	14,23,27,33	0
2	EDO	D	401	4/4	0.94	0.09	20,21,23,25	0
2	EDO	D	402[B]	4/4	0.95	0.08	17,17,18,18	4
2	EDO	D	402[A]	4/4	0.95	0.08	10,10,11,11	4
4	MG	A	404[C]	1/1	0.98	0.07	11,11,11,11	1
4	MG	A	404[A]	1/1	0.98	0.07	12,12,12,12	1
4	MG	C	405[B]	1/1	0.99	0.07	11,11,11,11	1
4	MG	D	404[A]	1/1	0.99	0.05	10,10,10,10	0
4	MG	D	404[B]	1/1	0.99	0.05	15,15,15,15	1
4	MG	B	407[A]	1/1	0.99	0.04	9,9,9,9	0
4	MG	B	407[B]	1/1	0.99	0.04	11,11,11,11	1
4	MG	C	405[A]	1/1	0.99	0.07	9,9,9,9	1

6.5 Other polymers ⓘ

There are no such residues in this entry.