



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 11, 2024 – 08:09 PM EST

PDB ID : 9AY8
Title : Structure of the A type blood alpha-D-galactosamine galactosaminidase from *Flavonifractor plautii*
Authors : Worrall, L.J.; Strynadka, N.C.J.
Deposited on : 2024-03-07
Resolution : 2.00 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) : 1.21
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

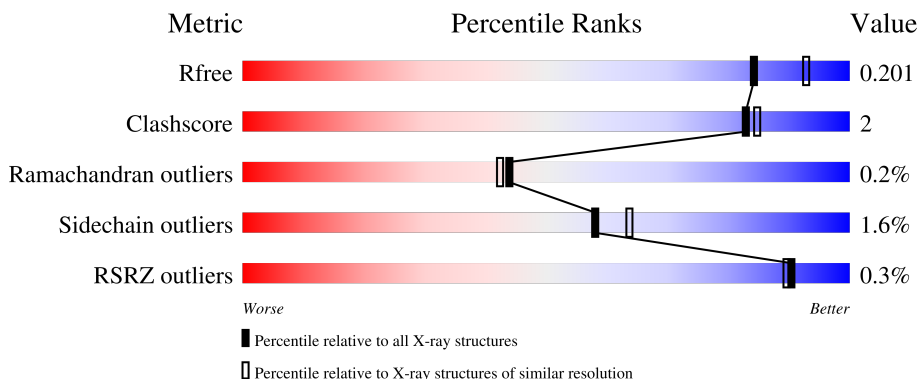
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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}	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (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	672	91% 6% .
1	B	672	91% 6% .
1	C	672	92% 5% .
1	D	672	% 92% 5% .
1	E	672	% 91% 6% .

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 28727 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 A type blood alpha-D-galactosamine galactosaminidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	654	5067	3200	832	1011	24	0	0	0
1	B	654	5067	3200	832	1011	24	0	0	0
1	C	654	5067	3200	832	1011	24	0	0	0
1	D	654	5067	3200	832	1011	24	0	0	0
1	E	654	5072	3204	832	1011	25	0	1	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	624	ALA	GLU	conflict	UNP P0DTR5
A	625	ALA	LYS	conflict	UNP P0DTR5
B	624	ALA	GLU	conflict	UNP P0DTR5
B	625	ALA	LYS	conflict	UNP P0DTR5
C	624	ALA	GLU	conflict	UNP P0DTR5
C	625	ALA	LYS	conflict	UNP P0DTR5
D	624	ALA	GLU	conflict	UNP P0DTR5
D	625	ALA	LYS	conflict	UNP P0DTR5
E	624	ALA	GLU	conflict	UNP P0DTR5
E	625	ALA	LYS	conflict	UNP P0DTR5

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	C	1	Total Zn 1 1	0	0
2	D	1	Total Zn 1 1	0	0
2	E	1	Total Zn 1 1	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Cl 1 1	0	0
3	B	1	Total Cl 1 1	0	0
3	C	1	Total Cl 1 1	0	0
3	D	1	Total Cl 1 1	0	0
3	E	1	Total Cl 1 1	0	0

- Molecule 4 is COBALT (II) ION (three-letter code: CO) (formula: Co).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Co 1 1	0	0
4	B	1	Total Co 1 1	0	0
4	C	1	Total Co 1 1	0	0
4	D	1	Total Co 1 1	0	0
4	E	1	Total Co 1 1	0	0

- Molecule 5 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

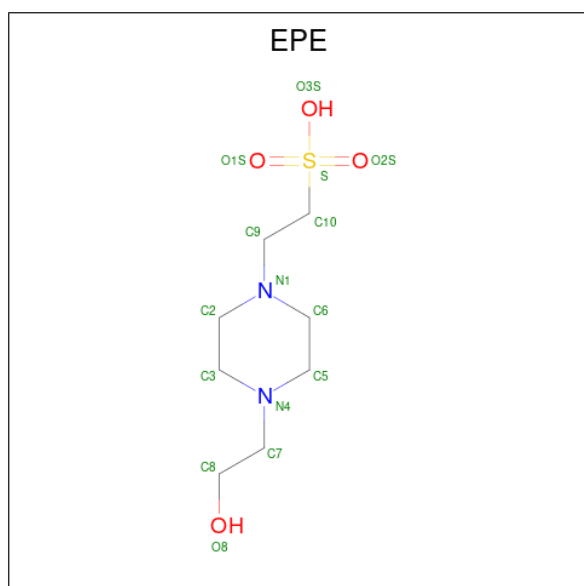
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Mn 1 1	0	0
5	B	1	Total Mn 1 1	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	1	Total	Mn	0	0
			1	1		
5	D	1	Total	Mn	0	0
			1	1		
5	E	1	Total	Mn	0	0
			1	1		

- Molecule 6 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula: C₈H₁₈N₂O₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
6	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	763	Total	O	0	0
			763	763		
7	B	776	Total	O	0	0
			776	776		
7	C	536	Total	O	0	0
			536	536		
7	D	621	Total	O	0	0
			621	621		

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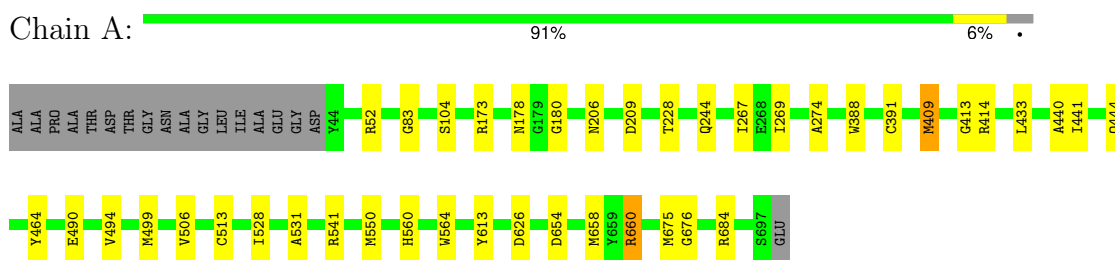
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	E	641	Total 641	O 641	0	0

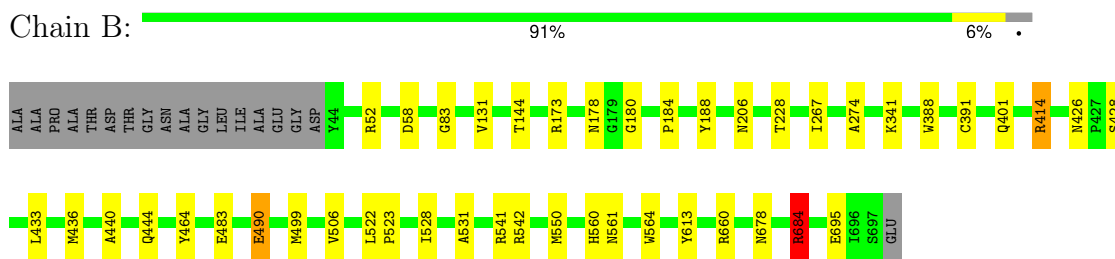
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

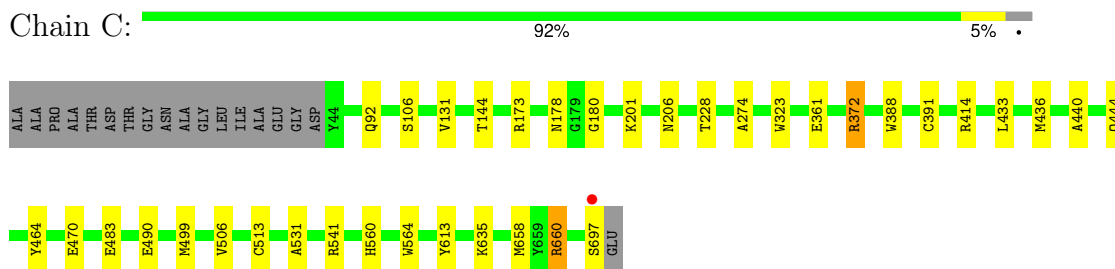
- Molecule 1: A type blood alpha-D-galactosamine galactosaminidase



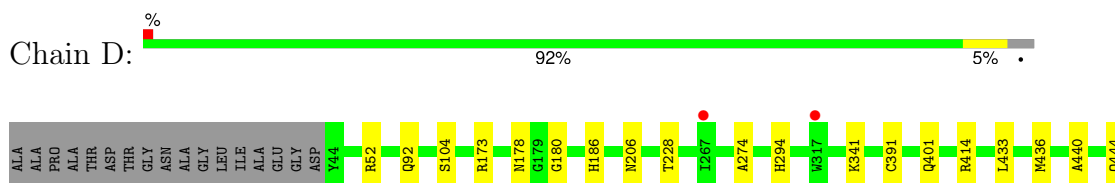
- Molecule 1: A type blood alpha-D-galactosamine galactosaminidase



- Molecule 1: A type blood alpha-D-galactosamine galactosaminidase

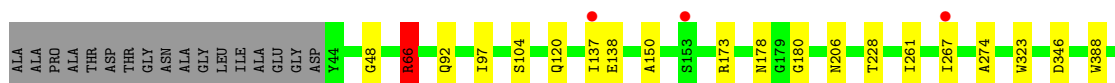


- Molecule 1: A type blood alpha-D-galactosamine galactosaminidase





- Molecule 1: A type blood alpha-D-galactosamine galactosaminidase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	102.69Å 164.57Å 131.65Å 90.00° 90.30° 90.00°	Depositor
Resolution (Å)	39.44 – 2.00 39.44 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.7 (39.44-2.00) 98.7 (39.44-2.00)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.42 (at 2.00Å)	Xtrriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.168 , 0.193 0.176 , 0.201	Depositor DCC
R_{free} test set	14699 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	35.1	Xtrriage
Anisotropy	0.229	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 42.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.014 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	28727	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.62% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: EPE, CL, MN, ZN, CO

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	0.48	0/5200	0.81	6/7087 (0.1%)
1	B	0.50	1/5200 (0.0%)	0.81	3/7087 (0.0%)
1	C	0.45	1/5200 (0.0%)	0.78	3/7087 (0.0%)
1	D	0.45	0/5200	0.77	2/7087 (0.0%)
1	E	0.46	0/5208	0.78	2/7097 (0.0%)
All	All	0.47	2/26008 (0.0%)	0.79	16/35445 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	3
1	C	0	3
1	D	0	3
All	All	0	11

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	490	GLU	CD-OE1	-5.72	1.19	1.25
1	C	490	GLU	CD-OE2	-5.10	1.20	1.25

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	414	ARG	NE-CZ-NH2	9.66	125.13	120.30
1	A	409	MET	CG-SD-CE	-7.70	87.88	100.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	414	ARG	NE-CZ-NH1	-6.94	116.83	120.30
1	A	414	ARG	CD-NE-CZ	6.57	132.80	123.60
1	A	660	ARG	NE-CZ-NH2	-6.53	117.04	120.30
1	E	66	ARG	N-CA-CB	-6.28	99.30	110.60
1	D	684	ARG	NE-CZ-NH1	-6.25	117.18	120.30
1	C	660	ARG	NE-CZ-NH2	-6.11	117.25	120.30
1	C	658	MET	CG-SD-CE	5.85	109.56	100.20
1	E	677	ASP	CB-CG-OD2	-5.68	113.19	118.30
1	B	52	ARG	NE-CZ-NH1	5.65	123.12	120.30
1	B	684	ARG	NE-CZ-NH1	-5.46	117.57	120.30
1	A	52	ARG	NE-CZ-NH1	5.39	123.00	120.30
1	C	372	ARG	NE-CZ-NH1	-5.36	117.62	120.30
1	D	52	ARG	NE-CZ-NH2	5.21	122.90	120.30
1	B	542	ARG	NE-CZ-NH2	-5.19	117.71	120.30

There are no chirality outliers.

All (11) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	660	ARG	Sidechain
1	A	684	ARG	Sidechain
1	B	414	ARG	Sidechain
1	B	660	ARG	Sidechain
1	B	684	ARG	Sidechain
1	C	372	ARG	Sidechain
1	C	414	ARG	Sidechain
1	C	660	ARG	Sidechain
1	D	414	ARG	Sidechain
1	D	668	ARG	Sidechain
1	D	684	ARG	Sidechain

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	5067	0	4765	23	0
1	B	5067	0	4765	27	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	5067	0	4765	16	0
1	D	5067	0	4764	19	0
1	E	5072	0	4773	26	0
2	A	1	0	0	0	0
2	B	1	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
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
4	A	1	0	0	1	0
4	B	1	0	0	0	0
4	C	1	0	0	1	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
6	A	15	0	17	1	0
6	B	15	0	17	1	0
7	A	763	0	0	9	0
7	B	776	0	0	11	0
7	C	536	0	0	5	1
7	D	621	0	0	5	0
7	E	641	0	0	8	1
All	All	28727	0	23866	113	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 2.

All (113) 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:D:626:ASP:HB3	7:D:1186:HOH:O	1.35	1.27
1:A:626:ASP:HB3	7:A:1309:HOH:O	1.58	1.03
1:C:513:CYS:HG	4:C:703:CO:CO	0.66	0.93

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:58:ASP:HB3	7:B:1452:HOH:O	1.68	0.92
1:A:513:CYS:HG	4:A:703:CO:CO	0.54	0.84
1:E:178:ASN:HD22	1:E:206:ASN:HD21	1.29	0.80
1:B:178:ASN:HD22	1:B:206:ASN:HD21	1.29	0.80
1:C:178:ASN:HD22	1:C:206:ASN:HD21	1.27	0.79
1:A:178:ASN:HD22	1:A:206:ASN:HD21	1.28	0.79
1:A:490:GLU:OE1	7:A:801:HOH:O	2.00	0.79
1:D:178:ASN:HD22	1:D:206:ASN:HD21	1.27	0.79
1:E:97:ILE:HD11	1:E:120:GLN:HB2	1.65	0.78
1:E:695:GLU:OE2	7:E:801:HOH:O	2.05	0.73
1:C:470:GLU:OE2	7:C:801:HOH:O	2.07	0.72
1:E:426:ASN:HD22	1:E:429:LEU:HG	1.55	0.71
1:B:678:ASN:ND2	7:B:803:HOH:O	2.23	0.70
1:B:695:GLU:OE2	7:B:801:HOH:O	2.12	0.67
1:E:261:ILE:HG12	1:E:267:ILE:HD11	1.78	0.66
1:E:138:GLU:OE2	7:E:802:HOH:O	2.14	0.66
1:A:409:MET:HE3	1:A:413:GLY:HA2	1.78	0.66
1:E:402:GLN:HG2	7:E:1385:HOH:O	1.96	0.65
1:A:244:GLN:HB3	7:A:1333:HOH:O	1.96	0.64
1:B:490:GLU:OE1	7:B:802:HOH:O	2.15	0.64
1:C:391:CYS:H	1:C:444:GLN:HE22	1.46	0.63
1:B:341:LYS:HD3	7:B:969:HOH:O	2.00	0.61
1:B:528:ILE:CD1	1:B:550:MET:HG3	2.31	0.61
1:E:391:CYS:H	1:E:444:GLN:HE22	1.48	0.60
1:B:58:ASP:CB	7:B:1452:HOH:O	2.38	0.60
1:A:209:ASP:OD2	7:A:802:HOH:O	2.17	0.60
7:A:1240:HOH:O	1:D:186:HIS:HD2	1.85	0.60
1:A:391:CYS:H	1:A:444:GLN:HE22	1.49	0.59
1:B:267:ILE:HD12	7:B:990:HOH:O	2.01	0.59
1:B:414:ARG:NH1	7:B:806:HOH:O	2.33	0.59
1:D:391:CYS:H	1:D:444:GLN:HE22	1.48	0.59
1:E:436[B]:MET:SD	1:E:483:GLU:HG2	2.43	0.59
1:E:528:ILE:CD1	1:E:550:MET:HG3	2.33	0.59
1:A:528:ILE:CD1	1:A:550:MET:HG3	2.33	0.58
1:B:391:CYS:H	1:B:444:GLN:HE22	1.50	0.58
1:A:528:ILE:HD12	1:A:550:MET:HG3	1.85	0.58
6:A:705:EPE:H51	7:A:1426:HOH:O	2.04	0.57
1:E:426:ASN:HD21	1:E:428:SER:HB2	1.71	0.56
1:E:436[B]:MET:SD	1:E:483:GLU:CD	2.85	0.55
1:B:528:ILE:HD12	1:B:550:MET:HG3	1.88	0.54
1:A:658:MET:HG2	1:A:675:MET:SD	2.48	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:150:ALA:O	7:E:803:HOH:O	2.18	0.53
1:D:436:MET:SD	1:D:483:GLU:HG2	2.48	0.53
1:E:97:ILE:HD11	1:E:120:GLN:CB	2.37	0.53
1:A:267:ILE:HD13	7:A:1160:HOH:O	2.08	0.53
1:E:528:ILE:HD12	1:E:550:MET:HG3	1.91	0.53
1:B:401:GLN:NE2	7:B:815:HOH:O	2.39	0.52
1:D:499:MET:HB3	1:D:506:VAL:HG21	1.92	0.51
1:E:541:ARG:HD3	1:E:613:TYR:CZ	2.46	0.51
1:B:499:MET:HB3	1:B:506:VAL:HG21	1.94	0.50
1:C:499:MET:HB3	1:C:506:VAL:HG21	1.93	0.50
1:A:541:ARG:HD3	1:A:613:TYR:CZ	2.47	0.50
1:A:499:MET:HB3	1:A:506:VAL:HG21	1.93	0.50
1:B:684:ARG:HA	7:B:1048:HOH:O	2.10	0.50
1:B:426:ASN:ND2	1:B:428:SER:H	2.10	0.50
1:D:294:HIS:ND1	7:D:805:HOH:O	2.35	0.49
1:D:541:ARG:HD3	1:D:613:TYR:CZ	2.47	0.49
1:B:541:ARG:HD3	1:B:613:TYR:CZ	2.49	0.48
1:E:261:ILE:HG23	1:E:267:ILE:HG12	1.94	0.48
1:C:201:LYS:HE2	7:C:1203:HOH:O	2.12	0.48
1:C:391:CYS:H	1:C:444:GLN:NE2	2.12	0.47
1:C:541:ARG:HD3	1:C:613:TYR:CZ	2.49	0.47
1:D:684:ARG:HE	1:D:684:ARG:HB3	1.39	0.47
1:B:83:GLY:HA3	7:B:830:HOH:O	2.14	0.47
1:D:401:GLN:HG3	7:D:971:HOH:O	2.14	0.47
1:E:499:MET:HB3	1:E:506:VAL:HG21	1.97	0.47
1:D:683:THR:HG21	1:D:685:PHE:HD1	1.80	0.46
1:E:66:ARG:HG3	7:E:862:HOH:O	2.16	0.46
1:C:635:LYS:CE	7:C:1107:HOH:O	2.63	0.46
1:D:660:ARG:HD2	7:D:810:HOH:O	2.16	0.46
1:D:391:CYS:H	1:D:444:GLN:NE2	2.12	0.45
1:A:433:LEU:HB3	1:A:440:ALA:HB1	1.98	0.45
1:E:323:TRP:HB3	7:E:908:HOH:O	2.17	0.45
1:C:635:LYS:HE3	7:C:1107:HOH:O	2.16	0.44
1:B:391:CYS:H	1:B:444:GLN:NE2	2.15	0.44
1:C:323:TRP:HB3	7:C:976:HOH:O	2.17	0.44
1:A:391:CYS:H	1:A:444:GLN:NE2	2.14	0.44
1:C:433:LEU:HB3	1:C:440:ALA:HB1	2.00	0.44
1:D:433:LEU:HB3	1:D:440:ALA:HB1	1.99	0.44
1:D:228:THR:O	1:D:274:ALA:HA	2.18	0.44
1:B:131:VAL:O	1:B:144:THR:HA	2.18	0.43
1:E:180:GLY:HA3	1:E:206:ASN:HA	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:436:MET:SD	1:C:483:GLU:HG2	2.59	0.43
6:B:705:EPE:H101	6:B:705:EPE:H22	1.76	0.43
1:E:436[B]:MET:SD	1:E:483:GLU:CG	3.07	0.43
1:A:83:GLY:HA3	7:A:843:HOH:O	2.19	0.43
1:E:228:THR:O	1:E:274:ALA:HA	2.19	0.43
1:D:683:THR:CG2	1:D:685:PHE:HD1	2.32	0.43
1:B:180:GLY:HA3	1:B:206:ASN:HA	2.01	0.42
1:E:391:CYS:H	1:E:444:GLN:NE2	2.14	0.42
1:E:48:GLY:HA2	7:E:1321:HOH:O	2.19	0.42
1:B:433:LEU:HB3	1:B:440:ALA:HB1	2.01	0.42
1:B:228:THR:O	1:B:274:ALA:HA	2.19	0.42
1:D:341:LYS:HE2	7:D:1112:HOH:O	2.18	0.42
1:B:184:PRO:HD2	1:B:188:TYR:HB2	2.01	0.42
1:C:228:THR:O	1:C:274:ALA:HA	2.19	0.41
1:A:228:THR:O	1:A:274:ALA:HA	2.20	0.41
1:B:436:MET:SD	1:B:483:GLU:HG2	2.60	0.41
1:A:180:GLY:HA3	1:A:206:ASN:HA	2.02	0.41
1:B:522:LEU:N	1:B:523:PRO:CD	2.84	0.41
1:E:433:LEU:HB3	1:E:440:ALA:HB1	2.03	0.41
1:A:409:MET:HE3	7:A:1459:HOH:O	2.21	0.41
1:C:131:VAL:O	1:C:144:THR:HA	2.20	0.41
1:D:683:THR:HG23	1:D:685:PHE:H	1.85	0.41
1:B:561:ASN:HB3	7:E:1197:HOH:O	2.21	0.40
1:C:180:GLY:HA3	1:C:206:ASN:HA	2.02	0.40
1:A:269:ILE:C	1:A:269:ILE:HD12	2.42	0.40
1:A:654:ASP:O	1:A:676:GLY:HA3	2.21	0.40
1:A:441:ILE:CG2	1:A:494:VAL:HG11	2.52	0.40
1:D:180:GLY:HA3	1:D:206:ASN:HA	2.03	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)
7:C:842:HOH:O	7:E:1305:HOH:O[1_556]	1.79	0.41

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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	652/672 (97%)	629 (96%)	22 (3%)	1 (0%)	44	42
1	B	652/672 (97%)	630 (97%)	21 (3%)	1 (0%)	44	42
1	C	652/672 (97%)	631 (97%)	20 (3%)	1 (0%)	44	42
1	D	652/672 (97%)	629 (96%)	22 (3%)	1 (0%)	44	42
1	E	653/672 (97%)	631 (97%)	21 (3%)	1 (0%)	44	42
All	All	3261/3360 (97%)	3150 (97%)	106 (3%)	5 (0%)	44	42

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	531	ALA
1	B	531	ALA
1	C	531	ALA
1	D	531	ALA
1	E	531	ALA

5.3.2 Protein sidechains [i](#)

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	536/546 (98%)	530 (99%)	6 (1%)	70	76
1	B	536/546 (98%)	530 (99%)	6 (1%)	70	76
1	C	536/546 (98%)	527 (98%)	9 (2%)	56	61
1	D	536/546 (98%)	526 (98%)	10 (2%)	52	57

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	537/546 (98%)	526 (98%)	11 (2%)	50	55
All	All	2681/2730 (98%)	2639 (98%)	42 (2%)	58	64

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	104	SER
1	A	173	ARG
1	A	388	TRP
1	A	464	TYR
1	A	560	HIS
1	A	564	TRP
1	B	173	ARG
1	B	388	TRP
1	B	464	TYR
1	B	560	HIS
1	B	564	TRP
1	B	684	ARG
1	C	92	GLN
1	C	106	SER
1	C	173	ARG
1	C	361	GLU
1	C	388	TRP
1	C	464	TYR
1	C	560	HIS
1	C	564	TRP
1	C	697	SER
1	D	92	GLN
1	D	104	SER
1	D	173	ARG
1	D	464	TYR
1	D	560	HIS
1	D	564	TRP
1	D	668	ARG
1	D	682	ASN
1	D	683	THR
1	D	684	ARG
1	E	66	ARG
1	E	92	GLN
1	E	104	SER
1	E	137	ILE
1	E	173	ARG

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Mol	Chain	Res	Type
1	E	346	ASP
1	E	388	TRP
1	E	426	ASN
1	E	464	TYR
1	E	560	HIS
1	E	564	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	178	ASN
1	A	444	GLN
1	B	178	ASN
1	B	186	HIS
1	B	426	ASN
1	B	444	GLN
1	C	178	ASN
1	C	444	GLN
1	D	178	ASN
1	D	444	GLN
1	E	178	ASN
1	E	426	ASN
1	E	444	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 22 ligands modelled in this entry, 20 are monoatomic - leaving 2 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
6	EPE	A	705	-	15,15,15	1.09	1 (6%)	19,20,20	1.06	2 (10%)
6	EPE	B	705	-	15,15,15	1.29	1 (6%)	19,20,20	1.13	2 (10%)

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
6	EPE	A	705	-	-	5/9/19/19	0/1/1/1
6	EPE	B	705	-	-	5/9/19/19	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	705	EPE	O1S-S	4.61	1.58	1.45
6	A	705	EPE	O1S-S	4.02	1.56	1.45

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	705	EPE	O1S-S-C10	-3.03	102.15	106.73
6	A	705	EPE	O3S-S-O2S	2.53	117.72	111.40
6	B	705	EPE	O3S-S-O2S	2.22	116.97	111.40
6	B	705	EPE	O1S-S-C10	-2.22	103.37	106.73

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	705	EPE	C10-C9-N1-C2
6	A	705	EPE	C9-C10-S-O2S
6	A	705	EPE	C9-C10-S-O3S

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Mol	Chain	Res	Type	Atoms
6	B	705	EPE	C10-C9-N1-C2
6	B	705	EPE	C10-C9-N1-C6
6	A	705	EPE	C10-C9-N1-C6
6	B	705	EPE	C9-C10-S-O3S
6	A	705	EPE	C9-C10-S-O1S
6	B	705	EPE	C9-C10-S-O1S
6	B	705	EPE	C9-C10-S-O2S

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	705	EPE	1	0
6	B	705	EPE	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	654/672 (97%)	-0.57	0 100 100	22, 32, 56, 74	0
1	B	654/672 (97%)	-0.59	0 100 100	21, 30, 52, 68	0
1	C	654/672 (97%)	-0.35	1 (0%) 92 91	26, 39, 68, 89	0
1	D	654/672 (97%)	-0.33	5 (0%) 82 82	26, 40, 66, 95	0
1	E	654/672 (97%)	-0.33	5 (0%) 82 82	23, 36, 65, 89	1 (0%)
All	All	3270/3360 (97%)	-0.44	11 (0%) 90 89	21, 35, 63, 95	1 (0%)

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	697	SER	2.7
1	E	153	SER	2.5
1	D	683	THR	2.5
1	E	267	ILE	2.5
1	E	137	ILE	2.4
1	E	697	SER	2.4
1	D	267	ILE	2.3
1	D	685	PHE	2.2
1	D	697	SER	2.1
1	E	683	THR	2.0
1	D	317	TRP	2.0

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 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
6	EPE	A	705	15/15	0.76	0.19	67,91,117,142	0
6	EPE	B	705	15/15	0.89	0.14	53,65,74,83	0
4	CO	C	703	1/1	0.98	0.13	58,58,58,58	0
4	CO	A	703	1/1	0.98	0.15	55,55,55,55	0
4	CO	B	703	1/1	0.98	0.15	52,52,52,52	0
2	ZN	C	701	1/1	0.99	0.03	32,32,32,32	0
2	ZN	D	701	1/1	0.99	0.02	31,31,31,31	0
2	ZN	E	701	1/1	0.99	0.04	33,33,33,33	0
4	CO	D	703	1/1	0.99	0.13	59,59,59,59	0
4	CO	E	703	1/1	0.99	0.11	52,52,52,52	0
5	MN	A	704	1/1	0.99	0.07	36,36,36,36	0
5	MN	B	704	1/1	0.99	0.07	41,41,41,41	0
5	MN	C	704	1/1	0.99	0.10	45,45,45,45	0
5	MN	D	704	1/1	0.99	0.06	43,43,43,43	0
5	MN	E	704	1/1	0.99	0.05	44,44,44,44	0
3	CL	C	702	1/1	0.99	0.06	30,30,30,30	0
3	CL	D	702	1/1	0.99	0.04	29,29,29,29	0
2	ZN	B	701	1/1	1.00	0.01	28,28,28,28	0
2	ZN	A	701	1/1	1.00	0.01	31,31,31,31	0
3	CL	E	702	1/1	1.00	0.04	26,26,26,26	0
3	CL	A	702	1/1	1.00	0.03	25,25,25,25	0
3	CL	B	702	1/1	1.00	0.03	26,26,26,26	0

6.5 Other polymers [i](#)

There are no such residues in this entry.