



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 03:02 PM UTC

PDB ID : 8UP3 / pdb_00008up3
Title : Structure of atypical asparaginase from *Rhodospirillum rubrum* (mutant Y21F)
Authors : Lubkowski, J.; Wlodawer, A.; Zhang, D.
Deposited on : 2023-10-20
Resolution : 1.76 Å (reported)

This is a wwPDB X-ray Structure Validation Summary 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

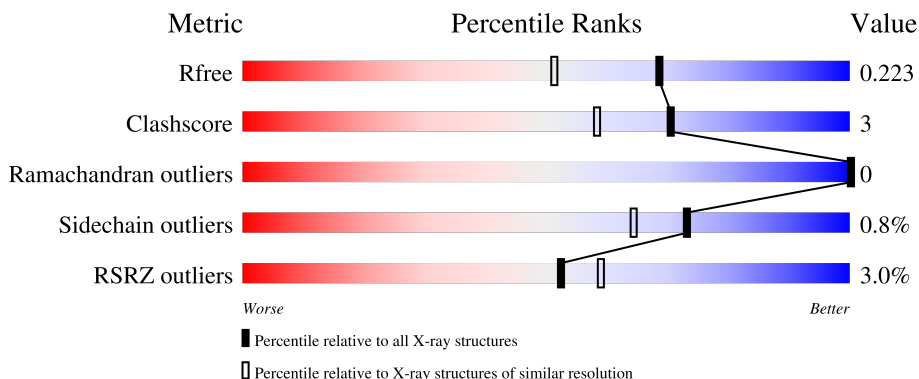
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.76 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	3183 (1.76-1.76)
Clashscore	190562	3299 (1.76-1.76)
Ramachandran outliers	187476	3274 (1.76-1.76)
Sidechain outliers	187428	3274 (1.76-1.76)
RSRZ outliers	180081	3183 (1.76-1.76)

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	185	 2% 80% 9% 11%
1	B	185	 4% 84% 5% 11%
1	C	185	 3% 82% 7% 11%
1	D	185	 2% 88% 10% 11%
1	E	185	 % 85% 10% 11%

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Mol	Chain	Length	Quality of chain
1	F	185	<p>3% 76% 11% 12%</p>
1	G	185	<p>3% 80% 8% 12%</p>
1	H	185	<p>3% 83% 13%</p>

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	A	205	-	-	X	-
2	EDO	B	202	-	-	X	-
4	ASP	F	201	-	-	X	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 10920 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 Asparaginase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	164	1207	765	214	223	5	0	2	1
1	B	165	1215	769	215	226	5	0	1	0
1	C	164	1213	767	214	227	5	0	2	0
1	D	165	1218	769	215	229	5	0	1	0
1	E	164	1222	773	220	224	5	0	2	0
1	F	163	1218	772	216	225	5	0	5	0
1	G	163	1210	766	216	223	5	0	2	0
1	H	161	1191	756	211	219	5	0	2	0

There are 112 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-12	HIS	-	expression tag	UNP Q2RMX1
A	-11	HIS	-	expression tag	UNP Q2RMX1
A	-10	HIS	-	expression tag	UNP Q2RMX1
A	-9	HIS	-	expression tag	UNP Q2RMX1
A	-8	HIS	-	expression tag	UNP Q2RMX1
A	-7	HIS	-	expression tag	UNP Q2RMX1
A	-6	GLU	-	expression tag	UNP Q2RMX1
A	-5	ASN	-	expression tag	UNP Q2RMX1
A	-4	LEU	-	expression tag	UNP Q2RMX1
A	-3	TYR	-	expression tag	UNP Q2RMX1
A	-2	PHE	-	expression tag	UNP Q2RMX1
A	-1	GLN	-	expression tag	UNP Q2RMX1
A	0	GLY	-	expression tag	UNP Q2RMX1

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Chain	Residue	Modelled	Actual	Comment	Reference
A	21	PHE	TYR	engineered mutation	UNP Q2RMX1
B	-12	HIS	-	expression tag	UNP Q2RMX1
B	-11	HIS	-	expression tag	UNP Q2RMX1
B	-10	HIS	-	expression tag	UNP Q2RMX1
B	-9	HIS	-	expression tag	UNP Q2RMX1
B	-8	HIS	-	expression tag	UNP Q2RMX1
B	-7	HIS	-	expression tag	UNP Q2RMX1
B	-6	GLU	-	expression tag	UNP Q2RMX1
B	-5	ASN	-	expression tag	UNP Q2RMX1
B	-4	LEU	-	expression tag	UNP Q2RMX1
B	-3	TYR	-	expression tag	UNP Q2RMX1
B	-2	PHE	-	expression tag	UNP Q2RMX1
B	-1	GLN	-	expression tag	UNP Q2RMX1
B	0	GLY	-	expression tag	UNP Q2RMX1
B	21	PHE	TYR	engineered mutation	UNP Q2RMX1
C	-12	HIS	-	expression tag	UNP Q2RMX1
C	-11	HIS	-	expression tag	UNP Q2RMX1
C	-10	HIS	-	expression tag	UNP Q2RMX1
C	-9	HIS	-	expression tag	UNP Q2RMX1
C	-8	HIS	-	expression tag	UNP Q2RMX1
C	-7	HIS	-	expression tag	UNP Q2RMX1
C	-6	GLU	-	expression tag	UNP Q2RMX1
C	-5	ASN	-	expression tag	UNP Q2RMX1
C	-4	LEU	-	expression tag	UNP Q2RMX1
C	-3	TYR	-	expression tag	UNP Q2RMX1
C	-2	PHE	-	expression tag	UNP Q2RMX1
C	-1	GLN	-	expression tag	UNP Q2RMX1
C	0	GLY	-	expression tag	UNP Q2RMX1
C	21	PHE	TYR	engineered mutation	UNP Q2RMX1
D	-12	HIS	-	expression tag	UNP Q2RMX1
D	-11	HIS	-	expression tag	UNP Q2RMX1
D	-10	HIS	-	expression tag	UNP Q2RMX1
D	-9	HIS	-	expression tag	UNP Q2RMX1
D	-8	HIS	-	expression tag	UNP Q2RMX1
D	-7	HIS	-	expression tag	UNP Q2RMX1
D	-6	GLU	-	expression tag	UNP Q2RMX1
D	-5	ASN	-	expression tag	UNP Q2RMX1
D	-4	LEU	-	expression tag	UNP Q2RMX1
D	-3	TYR	-	expression tag	UNP Q2RMX1
D	-2	PHE	-	expression tag	UNP Q2RMX1
D	-1	GLN	-	expression tag	UNP Q2RMX1
D	0	GLY	-	expression tag	UNP Q2RMX1

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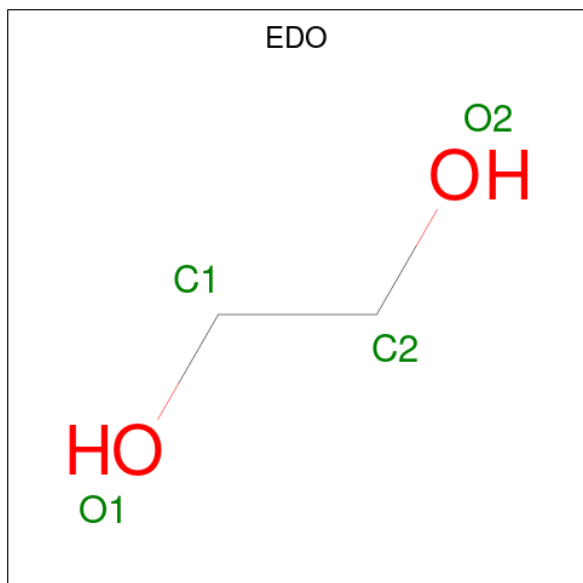
Chain	Residue	Modelled	Actual	Comment	Reference
D	21	PHE	TYR	engineered mutation	UNP Q2RMX1
E	-12	HIS	-	expression tag	UNP Q2RMX1
E	-11	HIS	-	expression tag	UNP Q2RMX1
E	-10	HIS	-	expression tag	UNP Q2RMX1
E	-9	HIS	-	expression tag	UNP Q2RMX1
E	-8	HIS	-	expression tag	UNP Q2RMX1
E	-7	HIS	-	expression tag	UNP Q2RMX1
E	-6	GLU	-	expression tag	UNP Q2RMX1
E	-5	ASN	-	expression tag	UNP Q2RMX1
E	-4	LEU	-	expression tag	UNP Q2RMX1
E	-3	TYR	-	expression tag	UNP Q2RMX1
E	-2	PHE	-	expression tag	UNP Q2RMX1
E	-1	GLN	-	expression tag	UNP Q2RMX1
E	0	GLY	-	expression tag	UNP Q2RMX1
E	21	PHE	TYR	engineered mutation	UNP Q2RMX1
F	-12	HIS	-	expression tag	UNP Q2RMX1
F	-11	HIS	-	expression tag	UNP Q2RMX1
F	-10	HIS	-	expression tag	UNP Q2RMX1
F	-9	HIS	-	expression tag	UNP Q2RMX1
F	-8	HIS	-	expression tag	UNP Q2RMX1
F	-7	HIS	-	expression tag	UNP Q2RMX1
F	-6	GLU	-	expression tag	UNP Q2RMX1
F	-5	ASN	-	expression tag	UNP Q2RMX1
F	-4	LEU	-	expression tag	UNP Q2RMX1
F	-3	TYR	-	expression tag	UNP Q2RMX1
F	-2	PHE	-	expression tag	UNP Q2RMX1
F	-1	GLN	-	expression tag	UNP Q2RMX1
F	0	GLY	-	expression tag	UNP Q2RMX1
F	21	PHE	TYR	engineered mutation	UNP Q2RMX1
G	-12	HIS	-	expression tag	UNP Q2RMX1
G	-11	HIS	-	expression tag	UNP Q2RMX1
G	-10	HIS	-	expression tag	UNP Q2RMX1
G	-9	HIS	-	expression tag	UNP Q2RMX1
G	-8	HIS	-	expression tag	UNP Q2RMX1
G	-7	HIS	-	expression tag	UNP Q2RMX1
G	-6	GLU	-	expression tag	UNP Q2RMX1
G	-5	ASN	-	expression tag	UNP Q2RMX1
G	-4	LEU	-	expression tag	UNP Q2RMX1
G	-3	TYR	-	expression tag	UNP Q2RMX1
G	-2	PHE	-	expression tag	UNP Q2RMX1
G	-1	GLN	-	expression tag	UNP Q2RMX1
G	0	GLY	-	expression tag	UNP Q2RMX1

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Chain	Residue	Modelled	Actual	Comment	Reference
G	21	PHE	TYR	engineered mutation	UNP Q2RMX1
H	-12	HIS	-	expression tag	UNP Q2RMX1
H	-11	HIS	-	expression tag	UNP Q2RMX1
H	-10	HIS	-	expression tag	UNP Q2RMX1
H	-9	HIS	-	expression tag	UNP Q2RMX1
H	-8	HIS	-	expression tag	UNP Q2RMX1
H	-7	HIS	-	expression tag	UNP Q2RMX1
H	-6	GLU	-	expression tag	UNP Q2RMX1
H	-5	ASN	-	expression tag	UNP Q2RMX1
H	-4	LEU	-	expression tag	UNP Q2RMX1
H	-3	TYR	-	expression tag	UNP Q2RMX1
H	-2	PHE	-	expression tag	UNP Q2RMX1
H	-1	GLN	-	expression tag	UNP Q2RMX1
H	0	GLY	-	expression tag	UNP Q2RMX1
H	21	PHE	TYR	engineered mutation	UNP Q2RMX1

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



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

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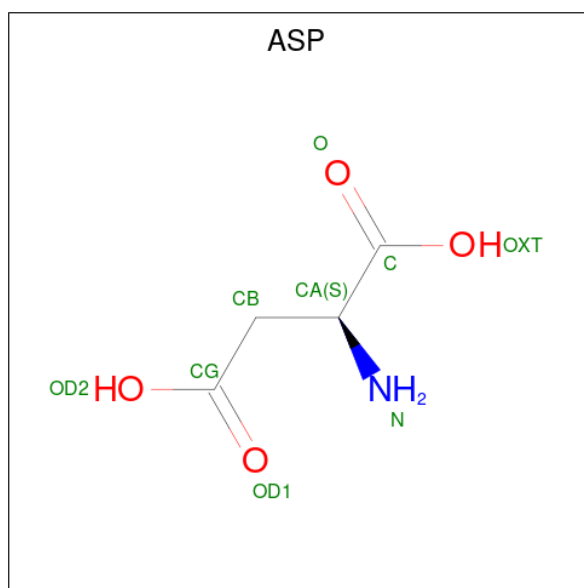
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 4	C 2	O 2	0	0
2	A	1	Total 4	C 2	O 2	0	0
2	A	1	Total 4	C 2	O 2	0	0
2	A	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0
2	C	1	Total 4	C 2	O 2	0	0
2	C	1	Total 4	C 2	O 2	0	0
2	D	1	Total 4	C 2	O 2	0	0
2	D	1	Total 4	C 2	O 2	0	0
2	D	1	Total 4	C 2	O 2	0	0
2	D	1	Total 4	C 2	O 2	0	0
2	D	1	Total 4	C 2	O 2	0	0
2	E	1	Total 4	C 2	O 2	0	0
2	E	1	Total 4	C 2	O 2	0	0
2	F	1	Total 4	C 2	O 2	0	0
2	G	1	Total 4	C 2	O 2	0	0
2	G	1	Total 4	C 2	O 2	0	0
2	H	1	Total 4	C 2	O 2	0	0

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Cl 3 3	0	1
3	B	2	Total Cl 2 2	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
3	F	1	Total Cl 1 1	0	0
3	G	1	Total Cl 1 1	0	0
3	H	2	Total Cl 2 2	0	0

- Molecule 4 is ASPARTIC ACID (CCD ID: ASP) (formula: C₄H₇NO₄).

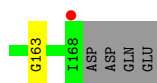


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	E	1	Total C N O 9 4 1 4	0	0
4	F	1	Total C N O 9 4 1 4	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	161	Total 163	O 163	0	2
5	B	132	Total 135	O 135	0	3
5	C	123	Total 125	O 125	0	2
5	D	143	Total 145	O 145	0	2
5	E	139	Total 139	O 139	0	0
5	F	129	Total 130	O 130	0	1
5	G	121	Total 122	O 122	0	1
5	H	128	Total 129	O 129	0	1

Chain F: 3% 76% 11% 12%



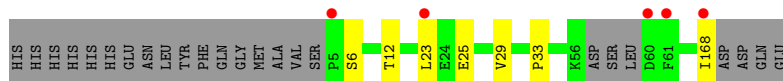
• Molecule 1: Asparaginase

Chain G: 3% 80% 8% 12%



• Molecule 1: Asparaginase

Chain H: 3% 83% 13%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	245.64Å 63.19Å 92.97Å 90.00° 103.42° 90.00°	Depositor
Resolution (Å)	39.40 – 1.76 39.40 – 1.76	Depositor EDS
% Data completeness (in resolution range)	94.3 (39.40-1.76) 94.3 (39.40-1.76)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.96 (at 1.76Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.164 , 0.216 0.175 , 0.223	Depositor DCC
R_{free} test set	1657 reflections (1.21%)	wwPDB-VP
Wilson B-factor (Å ²)	19.1	Xtrriage
Anisotropy	0.010	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 35.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	10920	wwPDB-VP
Average B, all atoms (Å ²)	24.0	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 29.86 % 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 1.4423e-03. 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CL, EDO

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	1.14	0/1236	1.28	1/1672 (0.1%)
1	B	1.13	1/1241 (0.1%)	1.31	3/1679 (0.2%)
1	C	1.12	0/1241	1.32	1/1678 (0.1%)
1	D	1.13	0/1243	1.31	1/1681 (0.1%)
1	E	1.15	1/1249 (0.1%)	1.26	0/1687
1	F	1.16	0/1257	1.32	4/1699 (0.2%)
1	G	1.12	1/1238 (0.1%)	1.33	4/1673 (0.2%)
1	H	1.10	0/1217	1.34	0/1644
All	All	1.13	3/9922 (0.0%)	1.31	14/13413 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	85	HIS	CE1-NE2	7.41	1.40	1.32
1	E	58	SER	C-O	6.61	1.32	1.24
1	G	120	GLY	C-O	5.84	1.29	1.23

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	123	ASP	CA-CB-CG	6.64	119.24	112.60
1	F	85	HIS	CA-CB-CG	6.07	119.87	113.80
1	F	92	GLU	CB-CG-CD	6.07	122.92	112.60
1	C	123	ASP	CA-CB-CG	5.77	118.37	112.60
1	G	85	HIS	CA-CB-CG	5.65	119.45	113.80

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	1207	0	1230	13	0
1	B	1215	0	1236	7	0
1	C	1213	0	1233	6	0
1	D	1218	0	1232	1	0
1	E	1222	0	1253	5	0
1	F	1218	0	1248	17	0
1	G	1210	0	1237	11	0
1	H	1191	0	1220	2	0
2	A	40	0	60	12	0
2	B	16	0	24	5	0
2	C	8	0	12	0	0
2	D	20	0	29	0	0
2	E	8	0	12	1	0
2	F	4	0	6	0	0
2	G	8	0	12	0	0
2	H	4	0	6	0	0
3	A	3	0	0	0	0
3	B	2	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
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	2	0	0	1	0
4	E	9	0	3	2	0
4	F	9	0	3	4	0
5	A	163	0	0	6	0
5	B	135	0	0	5	0
5	C	125	0	0	2	1
5	D	145	0	0	0	0
5	E	139	0	0	0	0
5	F	130	0	0	5	0
5	G	122	0	0	3	1
5	H	129	0	0	1	0
All	All	10920	0	10056	67	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 3.

The worst 5 of 67 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)
4:F:201:ASP:N	5:F:301:HOH:O	1.99	0.95
1:F:59:LEU:CD1	5:F:301:HOH:O	2.42	0.67
2:A:205:EDO:O1	2:B:202:EDO:O1	2.10	0.67
5:A:372:HOH:O	2:B:202:EDO:H12	1.93	0.66
1:C:159:ASN:HB2	1:C:166:GLU:OE2	1.96	0.65

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)
5:C:390:HOH:O	5:G:368:HOH:O 4_546	2.18	0.02

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	164/185 (89%)	164 (100%)	0	0	100	100
1	B	164/185 (89%)	163 (99%)	1 (1%)	0	100	100
1	C	164/185 (89%)	163 (99%)	1 (1%)	0	100	100
1	D	164/185 (89%)	164 (100%)	0	0	100	100
1	E	164/185 (89%)	162 (99%)	2 (1%)	0	100	100
1	F	166/185 (90%)	166 (100%)	0	0	100	100
1	G	163/185 (88%)	162 (99%)	1 (1%)	0	100	100
1	H	159/185 (86%)	158 (99%)	1 (1%)	0	100	100
All	All	1308/1480 (88%)	1302 (100%)	6 (0%)	0	100	100

There are no Ramachandran outliers to report.

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	123/141 (87%)	123 (100%)	0	100	100
1	B	124/141 (88%)	123 (99%)	1 (1%)	73	64
1	C	124/141 (88%)	122 (98%)	2 (2%)	55	38
1	D	124/141 (88%)	124 (100%)	0	100	100
1	E	124/141 (88%)	123 (99%)	1 (1%)	73	64
1	F	126/141 (89%)	126 (100%)	0	100	100
1	G	123/141 (87%)	122 (99%)	1 (1%)	73	64
1	H	121/141 (86%)	118 (98%)	3 (2%)	42	22
All	All	989/1128 (88%)	981 (99%)	8 (1%)	73	64

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	168	ILE
1	H	23	LEU
1	G	160	ARG
1	E	61	PHE
1	H	6	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 41 ligands modelled in this entry, 12 are monoatomic - leaving 29 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	A	208	-	3,3,3	0.14	0	2,2,2	0.03	0
2	EDO	B	203	-	3,3,3	0.04	0	2,2,2	0.23	0
2	EDO	H	201	-	3,3,3	0.17	0	2,2,2	0.22	0
2	EDO	A	204	-	3,3,3	0.35	0	2,2,2	0.48	0
2	EDO	A	207	-	3,3,3	0.24	0	2,2,2	0.42	0
2	EDO	F	202	-	3,3,3	0.53	0	2,2,2	0.31	0
4	ASP	F	201	-	7,8,8	0.90	0	6,10,10	0.94	0
2	EDO	A	201[B]	-	3,3,3	0.22	0	2,2,2	0.11	0
2	EDO	D	201	-	3,3,3	0.22	0	2,2,2	0.11	0
2	EDO	A	203[A]	-	3,3,3	0.19	0	2,2,2	0.33	0
2	EDO	E	202	-	3,3,3	0.32	0	2,2,2	0.25	0
2	EDO	D	204	-	3,3,3	0.08	0	2,2,2	0.14	0
2	EDO	B	204	-	3,3,3	0.26	0	2,2,2	0.21	0
2	EDO	A	202	-	3,3,3	0.28	0	2,2,2	0.31	0
2	EDO	A	203[B]	-	3,3,3	0.17	0	2,2,2	0.26	0
2	EDO	B	202	-	3,3,3	0.34	0	2,2,2	0.84	0
2	EDO	A	206	-	3,3,3	0.30	0	2,2,2	0.49	0
2	EDO	A	205	-	3,3,3	0.28	0	2,2,2	0.74	0
2	EDO	G	202	-	3,3,3	0.43	0	2,2,2	0.35	0
2	EDO	G	201	-	3,3,3	0.29	0	2,2,2	0.39	0
2	EDO	D	202	-	3,3,3	0.16	0	2,2,2	0.46	0
2	EDO	C	201	-	3,3,3	0.19	0	2,2,2	0.42	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	EDO	D	203	-	3,3,3	0.75	0	2,2,2	0.34	0
2	EDO	B	201	-	3,3,3	0.14	0	2,2,2	0.21	0
2	EDO	E	203	-	3,3,3	0.33	0	2,2,2	0.69	0
4	ASP	E	201	-	7,8,8	2.09	1 (14%)	6,10,10	0.78	0
2	EDO	D	205	-	3,3,3	0.23	0	2,2,2	0.21	0
2	EDO	A	201[A]	-	3,3,3	0.11	0	2,2,2	0.30	0
2	EDO	C	202	-	3,3,3	0.07	0	2,2,2	0.36	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	A	208	-	-	0/1/1/1	-
2	EDO	B	203	-	-	0/1/1/1	-
2	EDO	H	201	-	-	0/1/1/1	-
2	EDO	A	204	-	-	1/1/1/1	-
2	EDO	A	207	-	-	1/1/1/1	-
2	EDO	F	202	-	-	0/1/1/1	-
4	ASP	F	201	-	-	2/8/8/8	-
2	EDO	A	201[B]	-	-	0/1/1/1	-
2	EDO	D	201	-	-	0/1/1/1	-
2	EDO	A	203[A]	-	-	0/1/1/1	-
2	EDO	E	202	-	-	0/1/1/1	-
2	EDO	D	204	-	-	1/1/1/1	-
2	EDO	B	204	-	-	1/1/1/1	-
2	EDO	A	202	-	-	1/1/1/1	-
2	EDO	A	203[B]	-	-	1/1/1/1	-
2	EDO	B	202	-	-	1/1/1/1	-
2	EDO	A	206	-	-	1/1/1/1	-
2	EDO	A	205	-	-	1/1/1/1	-
2	EDO	G	202	-	-	0/1/1/1	-
2	EDO	G	201	-	-	1/1/1/1	-
2	EDO	D	202	-	-	1/1/1/1	-
2	EDO	C	201	-	-	0/1/1/1	-
2	EDO	D	203	-	-	1/1/1/1	-
2	EDO	B	201	-	-	0/1/1/1	-
2	EDO	E	203	-	-	1/1/1/1	-
4	ASP	E	201	-	-	4/8/8/8	-
2	EDO	D	205	-	-	1/1/1/1	-
2	EDO	A	201[A]	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	C	202	-	-	0/1/1/1	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	201	ASP	OXT-C	-4.72	1.15	1.30

There are no bond angle outliers.

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	F	201	ASP	O-C-CA-N
4	E	201	ASP	OXT-C-CA-N
4	F	201	ASP	OXT-C-CA-N
2	D	203	EDO	O1-C1-C2-O2
2	A	202	EDO	O1-C1-C2-O2

There are no ring outliers.

9 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	204	EDO	2	0
4	F	201	ASP	4	0
2	A	201[B]	EDO	1	0
2	B	202	EDO	5	0
2	A	206	EDO	2	0
2	A	205	EDO	6	0
2	E	203	EDO	1	0
4	E	201	ASP	2	0
2	A	201[A]	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	164/185 (88%)	-0.06	4 (2%) 59 66	9, 19, 33, 53	2 (1%)
1	B	165/185 (89%)	0.09	8 (4%) 35 41	10, 21, 41, 56	1 (0%)
1	C	164/185 (88%)	0.15	6 (3%) 45 51	11, 21, 42, 70	2 (1%)
1	D	165/185 (89%)	0.02	3 (1%) 67 74	10, 19, 36, 52	1 (0%)
1	E	164/185 (88%)	-0.12	2 (1%) 76 82	11, 17, 36, 53	2 (1%)
1	F	163/185 (88%)	0.17	5 (3%) 51 58	11, 22, 38, 54	5 (3%)
1	G	163/185 (88%)	0.08	6 (3%) 45 51	10, 21, 40, 60	2 (1%)
1	H	161/185 (87%)	0.11	5 (3%) 51 58	11, 20, 43, 56	2 (1%)
All	All	1309/1480 (88%)	0.05	39 (2%) 52 59	9, 20, 41, 70	17 (1%)

The worst 5 of 39 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	47	ALA	4.7
1	F	168	ILE	4.3
1	A	169	ASP	4.0
1	H	168	ILE	3.9
1	B	168	ILE	3.8

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(Å ²)	Q<0.9
2	EDO	D	202	4/4	0.76	0.17	42,44,45,48	0
2	EDO	A	208	4/4	0.81	0.14	42,43,43,44	0
2	EDO	A	202	4/4	0.83	0.18	44,47,49,51	0
3	CL	H	203	1/1	0.83	0.18	46,46,46,46	0
2	EDO	D	205	4/4	0.85	0.14	41,43,45,47	0
2	EDO	A	206	4/4	0.85	0.23	41,41,42,43	0
2	EDO	A	204	4/4	0.86	0.22	36,37,41,46	0
2	EDO	E	203	4/4	0.88	0.14	32,37,38,43	0
2	EDO	A	207	4/4	0.89	0.13	37,39,40,41	0
4	ASP	F	201	9/9	0.90	0.11	15,29,34,38	0
2	EDO	B	202	4/4	0.91	0.16	31,34,34,44	0
3	CL	B	206	1/1	0.91	0.18	51,51,51,51	0
2	EDO	D	204	4/4	0.91	0.10	33,34,39,40	0
2	EDO	B	204	4/4	0.91	0.13	37,43,44,46	0
2	EDO	B	203	4/4	0.92	0.10	33,38,44,46	0
2	EDO	A	203[B]	4/4	0.92	0.09	23,24,24,24	4
4	ASP	E	201	9/9	0.92	0.10	16,24,29,31	0
2	EDO	A	203[A]	4/4	0.92	0.09	17,24,27,29	4
3	CL	F	203	1/1	0.93	0.10	33,33,33,33	0
2	EDO	C	202	4/4	0.93	0.11	32,35,37,41	0
2	EDO	G	201	4/4	0.93	0.11	22,30,34,39	0
2	EDO	C	201	4/4	0.93	0.09	21,23,23,23	0
2	EDO	D	201	4/4	0.94	0.09	22,25,26,26	0
2	EDO	H	201	4/4	0.94	0.10	30,30,31,32	0
3	CL	B	205	1/1	0.94	0.08	24,24,24,24	0
2	EDO	A	201[B]	4/4	0.94	0.10	14,16,16,16	4
2	EDO	A	205	4/4	0.94	0.18	34,35,38,39	0
2	EDO	B	201	4/4	0.94	0.10	27,32,33,38	0
2	EDO	E	202	4/4	0.94	0.09	29,29,30,31	0
2	EDO	A	201[A]	4/4	0.94	0.10	20,22,23,26	4
2	EDO	F	202	4/4	0.95	0.08	19,20,21,23	0
3	CL	E	204	1/1	0.95	0.07	31,31,31,31	0
2	EDO	D	203	4/4	0.95	0.09	30,34,37,42	0
3	CL	A	210[A]	1/1	0.96	0.08	25,25,25,25	1
3	CL	A	210[B]	1/1	0.96	0.08	26,26,26,26	1
2	EDO	G	202	4/4	0.96	0.06	22,22,23,24	0
3	CL	D	206	1/1	0.98	0.07	25,25,25,25	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	CL	A	209	1/1	0.98	0.05	21,21,21,21	0
3	CL	H	202	1/1	0.99	0.07	40,40,40,40	0
3	CL	C	203	1/1	1.00	0.03	19,19,19,19	0
3	CL	G	203	1/1	1.00	0.08	27,27,27,27	0

6.5 Other polymers [i](#)

There are no such residues in this entry.