



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:43 AM UTC

PDB ID : 1XJA / pdb_00001xja
Title : Apo form of the Y31V mutant dimerization domain fragment of Escherichia coli regulatory protein AraC
Authors : Weldon, J.E.; Larkin, C.; Schleif, R.F.
Deposited on : 2004-09-23
Resolution : 2.40 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

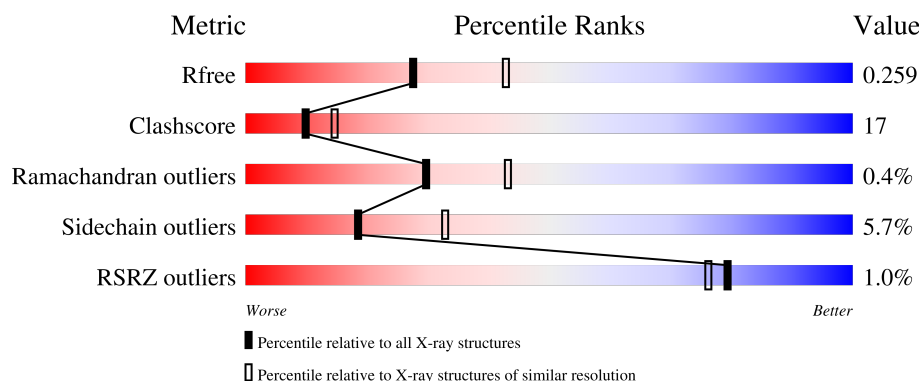
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	178	0.2% 60% 29% 7%
1	B	178	57% 26% 13%
1	C	178	2.0% 65% 25% 5%
1	D	178	0.2% 65% 24% 7%
1	E	178	0.2% 51% 37% 8%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6974 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 Arabinose operon regulatory protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	165	Total	C	N	O	S	0	1	0
			1340	870	237	230	3			
1	B	154	Total	C	N	O	S	0	0	0
			1218	797	213	205	3			
1	C	169	Total	C	N	O	S	0	3	0
			1385	897	246	239	3			
1	D	165	Total	C	N	O	S	0	0	0
			1349	878	240	228	3			
1	E	163	Total	C	N	O	S	0	1	0
			1323	862	231	227	3			

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	31	VAL	TYR	engineered mutation	UNP P0A9E0
B	31	VAL	TYR	engineered mutation	UNP P0A9E0
C	31	VAL	TYR	engineered mutation	UNP P0A9E0
D	31	VAL	TYR	engineered mutation	UNP P0A9E0
E	31	VAL	TYR	engineered mutation	UNP P0A9E0

- 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	A	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	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	D	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	0
			4	2	2		

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

- Molecule 3 is water.

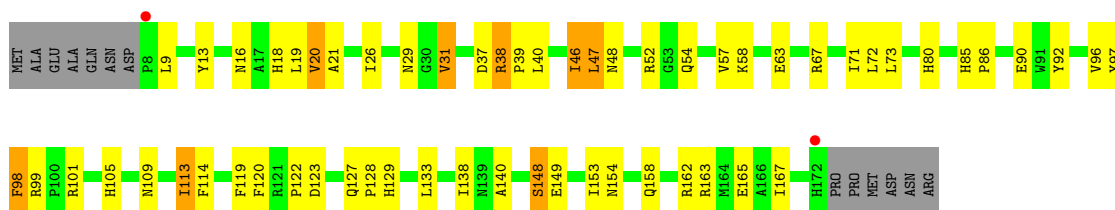
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	51	Total O 51 51	0	0
3	B	27	Total O 27 27	0	0
3	C	56	Total O 56 56	0	0
3	D	80	Total O 80 80	0	0
3	E	45	Total O 45 45	0	0

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.

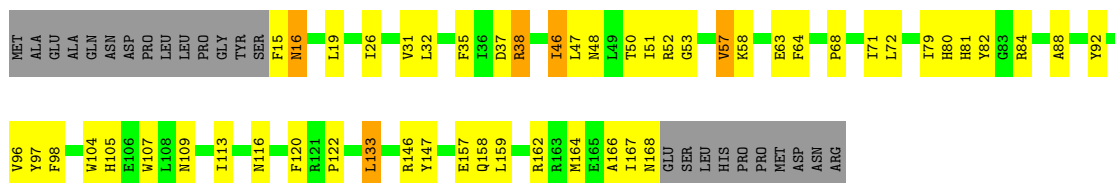
- Molecule 1: Arabinose operon regulatory protein

Chain A: 



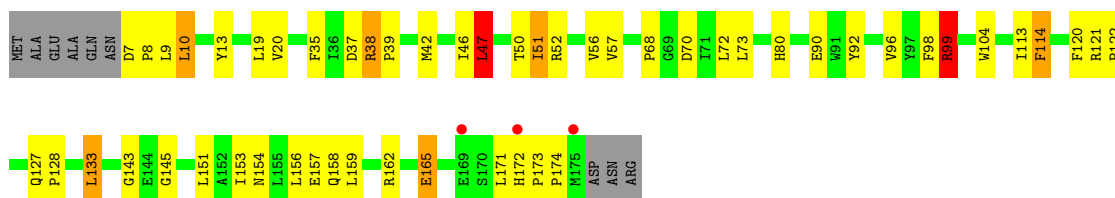
- Molecule 1: Arabinose operon regulatory protein

Chain B: 



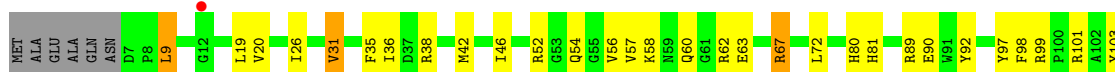
- Molecule 1: Arabinose operon regulatory protein

Chain C: 



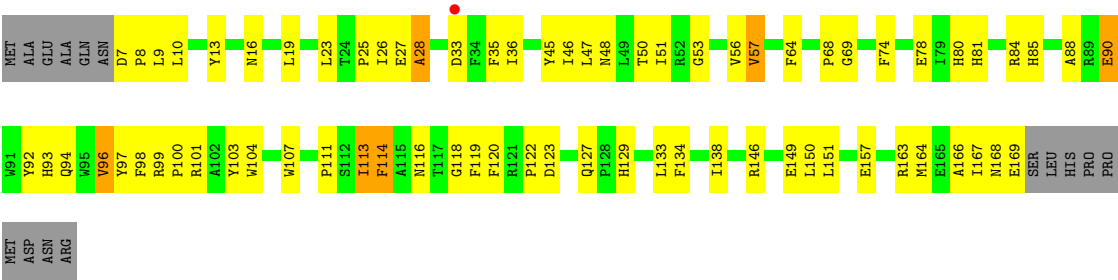
- Molecule 1: Arabinose operon regulatory protein

Chain D: 





● Molecule 1: Arabinose operon regulatory protein



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	260.63Å 40.62Å 102.59Å 90.00° 105.45° 90.00°	Depositor
Resolution (Å)	15.00 – 2.40 15.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	94.7 (15.00-2.40) 94.3 (15.00-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.57 (at 2.29Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.211 , 0.256 0.212 , 0.259	Depositor DCC
R_{free} test set	3942 reflections (8.65%)	wwPDB-VP
Wilson B-factor (Å ²)	30.0	Xtriage
Anisotropy	0.523	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 55.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	6974	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.77% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.42	0/1387	0.93	7/1889 (0.4%)
1	B	0.40	0/1261	0.86	4/1722 (0.2%)
1	C	0.46	0/1435	1.02	11/1960 (0.6%)
1	D	0.52	0/1396	0.99	4/1900 (0.2%)
1	E	0.40	0/1369	0.93	5/1868 (0.3%)
All	All	0.44	0/6848	0.95	31/9339 (0.3%)

There are no bond length outliers.

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	145	GLY	N-CA-C	-9.87	96.95	112.85
1	E	113	ILE	N-CA-C	-7.99	103.39	113.22
1	D	170	SER	N-CA-C	-7.56	103.62	112.92
1	D	98	PHE	N-CA-C	7.22	119.71	108.96
1	A	98	PHE	N-CA-C	7.09	118.95	108.60
1	A	101	ARG	N-CA-C	-6.89	100.28	110.48
1	D	101	ARG	N-CA-C	-6.59	101.65	110.55
1	C	99	ARG	N-CA-C	-6.45	96.73	108.85
1	A	38	ARG	CA-C-N	6.29	125.98	119.82
1	A	38	ARG	C-N-CA	6.29	125.98	119.82
1	A	105	HIS	N-CA-C	6.20	118.83	111.33
1	B	98	PHE	N-CA-C	5.99	117.88	108.96
1	C	38	ARG	CA-C-N	5.90	125.37	119.24
1	C	38	ARG	C-N-CA	5.90	125.37	119.24
1	E	168	ASN	N-CA-C	-5.74	105.98	112.87
1	C	98	PHE	N-CA-C	5.70	117.63	109.14
1	C	10	LEU	CA-C-N	5.61	126.86	119.84
1	C	10	LEU	C-N-CA	5.61	126.86	119.84
1	E	98	PHE	N-CA-C	5.61	117.50	109.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	99	ARG	N-CA-C	-5.61	99.78	109.15
1	D	113	ILE	N-CA-C	-5.60	104.46	112.35
1	E	90	GLU	N-CA-C	5.43	116.23	108.74
1	C	156	LEU	N-CA-C	-5.39	105.30	111.07
1	B	105	HIS	N-CA-C	5.30	117.74	111.33
1	C	47	LEU	N-CA-C	-5.29	100.27	108.90
1	B	133	LEU	N-CA-C	-5.26	105.44	111.07
1	C	143	GLY	N-CA-C	-5.23	104.43	112.85
1	C	113	ILE	N-CA-C	-5.15	105.49	113.16
1	B	167	ILE	N-CA-C	-5.13	106.56	112.98
1	A	113	ILE	N-CA-C	-5.11	105.55	113.16
1	A	99	ARG	N-CA-C	-5.02	100.76	109.15

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	1340	0	1260	54	0
1	B	1218	0	1131	46	0
1	C	1385	0	1290	44	0
1	D	1349	0	1293	45	0
1	E	1323	0	1247	52	0
2	A	12	0	18	3	0
2	B	20	0	30	1	0
2	C	8	0	12	3	0
2	D	44	0	66	5	0
2	E	16	0	24	2	0
3	A	51	0	0	4	0
3	B	27	0	0	4	0
3	C	56	0	0	2	0
3	D	80	0	0	5	0
3	E	45	0	0	3	0
All	All	6974	0	6371	229	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 17.

All (229) 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:B:38:ARG:HG3	1:B:80:HIS:HB2	1.38	1.01
1:D:158:GLN:HE21	1:D:162:ARG:HE	1.06	1.01
1:B:58:LYS:HB2	1:B:81:HIS:HD2	1.30	0.95
1:B:15:PHE:HD1	1:B:16:ASN:H	1.03	0.93
1:B:15:PHE:HD1	1:B:16:ASN:N	1.71	0.88
1:C:38:ARG:HB2	1:C:80:HIS:HB2	1.55	0.87
1:C:174:PRO:HA	2:C:321:EDO:H22	1.55	0.85
1:B:15:PHE:CD1	1:B:16:ASN:N	2.46	0.83
1:B:58:LYS:HB2	1:B:81:HIS:CD2	2.16	0.81
1:A:52:ARG:HB3	1:A:52:ARG:HH11	1.53	0.74
1:D:38:ARG:HB2	1:D:80:HIS:HB2	1.71	0.71
1:D:26:ILE:O	1:D:90:GLU:HB2	1.93	0.69
1:A:52:ARG:HB3	1:A:52:ARG:NH1	2.08	0.69
1:A:85:HIS:ND1	1:A:86:PRO:HD2	2.09	0.67
1:D:103:TYR:HB2	2:D:319:EDO:H22	1.76	0.67
1:A:47:LEU:CD1	1:A:73:LEU:HD13	2.24	0.67
1:A:165:GLU:HB3	2:A:318:EDO:H11	1.75	0.67
1:E:69:GLY:HA3	1:E:127[B]:GLN:OE1	1.94	0.67
1:E:101:ARG:HG2	1:E:101:ARG:HH11	1.60	0.67
1:A:129:HIS:HB3	3:A:370:HOH:O	1.94	0.66
1:C:158:GLN:HE21	1:C:162:ARG:HE	1.43	0.66
1:C:52:ARG:HB3	1:C:92:TYR:HB2	1.77	0.66
1:B:38:ARG:CG	1:B:80:HIS:HB2	2.19	0.65
1:A:122:PRO:HD2	1:A:127:GLN:HE22	1.61	0.65
1:C:47:LEU:HD13	1:C:73:LEU:HD13	1.78	0.65
1:C:120:PHE:CE2	1:C:122:PRO:HG3	2.32	0.64
1:A:31:VAL:CG1	1:C:13:TYR:HB2	2.28	0.63
1:D:89:ARG:NH1	3:D:388:HOH:O	2.27	0.63
1:C:171:LEU:C	1:C:173:PRO:HD3	2.23	0.63
1:A:26:ILE:O	1:A:90:GLU:HB2	1.99	0.63
1:E:16:ASN:HB3	1:E:149:GLU:OE2	2.00	0.62
1:E:84:ARG:NH2	1:E:88:ALA:O	2.33	0.61
1:B:57:VAL:HG23	1:B:64:PHE:HB3	1.82	0.61
1:B:146:ARG:HD2	1:B:147:TYR:CE2	2.34	0.61
1:E:120:PHE:CE2	1:E:122:PRO:HG3	2.36	0.61
1:E:47:LEU:HB2	1:E:96:VAL:HG13	1.82	0.60
1:D:31:VAL:HG22	3:D:378:HOH:O	2.01	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:172:HIS:N	1:C:173:PRO:HD3	2.16	0.60
1:B:158:GLN:HE21	1:B:162:ARG:HE	1.48	0.60
1:A:162:ARG:HD3	2:A:318:EDO:H12	1.83	0.60
1:A:19:LEU:C	1:A:19:LEU:HD23	2.26	0.59
1:A:153:ILE:HD12	3:A:345:HOH:O	2.02	0.59
1:B:47:LEU:HB2	1:B:96:VAL:HG12	1.84	0.59
1:D:9:LEU:HD22	1:D:97:TYR:CE2	2.38	0.59
1:E:166:ALA:O	1:E:169:GLU:HB3	2.02	0.59
1:E:9:LEU:HG	1:E:97:TYR:CE2	2.39	0.58
1:D:46:ILE:HD12	1:D:80:HIS:HE1	1.66	0.58
1:B:47:LEU:HB2	1:B:96:VAL:CG1	2.34	0.58
1:E:26:ILE:O	1:E:90:GLU:HB2	2.03	0.58
1:B:146:ARG:HD3	2:B:303:EDO:O1	2.04	0.57
1:E:7:ASP:O	1:E:8:PRO:C	2.46	0.57
1:C:151:LEU:HD21	1:D:162:ARG:NH1	2.19	0.57
1:D:158:GLN:NE2	1:D:162:ARG:HE	1.89	0.56
1:E:104:TRP:CZ2	1:E:157:GLU:HB2	2.40	0.56
1:B:51:ILE:HG13	1:B:52:ARG:N	2.19	0.56
1:B:57:VAL:HG12	1:B:82:TYR:HB3	1.86	0.56
1:C:38:ARG:HH22	2:C:310:EDO:H21	1.69	0.56
1:A:21:ALA:HB1	1:A:138:ILE:HD13	1.88	0.56
1:B:107:TRP:HD1	1:B:164:MET:HE2	1.71	0.56
1:C:42:MET:SD	1:C:46:ILE:HD11	2.46	0.55
1:B:158:GLN:O	1:B:162:ARG:HG2	2.07	0.55
1:D:60:GLN:H	2:D:302:EDO:C1	2.20	0.55
1:D:42:MET:SD	1:D:46:ILE:HD11	2.47	0.55
1:A:19:LEU:HB2	1:A:153:ILE:HD11	1.89	0.55
1:A:165:GLU:OE1	1:B:147:TYR:HB2	2.06	0.55
1:A:158:GLN:HE21	1:A:162:ARG:HE	1.56	0.54
1:C:51:ILE:HD11	1:C:92:TYR:HB3	1.90	0.54
1:A:57:VAL:HG21	1:A:72:LEU:HD11	1.90	0.54
1:E:78:GLU:OE1	1:E:116:ASN:HB3	2.09	0.53
1:B:79:ILE:HD13	3:B:324:HOH:O	2.08	0.53
1:A:54:GLN:OE1	1:A:67:ARG:NH1	2.42	0.53
1:C:70:ASP:OD1	1:C:121:ARG:HD3	2.09	0.53
1:D:19:LEU:HD23	1:D:19:LEU:C	2.34	0.53
1:E:57:VAL:HG23	1:E:114:PHE:HZ	1.74	0.53
1:C:153:ILE:HD12	3:C:338:HOH:O	2.08	0.53
1:A:52:ARG:HB2	1:A:92:TYR:HB2	1.91	0.52
1:D:46:ILE:HD12	1:D:80:HIS:CE1	2.44	0.52
1:A:16:ASN:HB3	1:A:149:GLU:OE2	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:158:GLN:O	1:C:162:ARG:HG2	2.09	0.52
1:C:52:ARG:HG3	1:C:52:ARG:HH11	1.75	0.52
1:D:58:LYS:HB2	1:D:81:HIS:CD2	2.45	0.51
1:B:58:LYS:NZ	3:B:342:HOH:O	2.43	0.51
1:C:19:LEU:C	1:C:19:LEU:HD23	2.36	0.51
1:A:31:VAL:HG12	1:C:10:LEU:HG	1.92	0.51
1:B:46:ILE:HG13	1:B:97:TYR:HD1	1.75	0.51
1:E:46:ILE:HB	1:E:74:PHE:HB2	1.92	0.51
1:E:90:GLU:HG3	1:E:92:TYR:CE1	2.46	0.51
1:D:158:GLN:HE21	1:D:162:ARG:NE	1.91	0.51
1:B:58:LYS:HD2	1:B:81:HIS:CD2	2.46	0.51
1:C:19:LEU:HB2	1:C:153:ILE:HD11	1.92	0.51
1:B:48:ASN:O	1:B:71:ILE:HA	2.10	0.51
1:A:58:LYS:HE2	1:A:63:GLU:OE2	2.11	0.50
1:E:150:LEU:HD11	2:E:312:EDO:H11	1.93	0.50
1:A:52:ARG:HH11	1:A:52:ARG:CB	2.22	0.50
1:A:154:ASN:HD21	1:B:158:GLN:HB2	1.76	0.50
1:D:54:GLN:NE2	1:D:67:ARG:HH11	2.09	0.50
1:D:127:GLN:HB3	1:D:128:PRO:HD3	1.94	0.50
1:A:122:PRO:HD2	1:A:127:GLN:NE2	2.26	0.50
1:E:101:ARG:HG2	1:E:101:ARG:NH1	2.27	0.50
1:B:19:LEU:C	1:B:19:LEU:HD23	2.37	0.49
1:B:35:PHE:CE2	1:B:58:LYS:HE3	2.48	0.49
1:D:60:GLN:H	2:D:302:EDO:H11	1.76	0.49
1:E:103:TYR:HD1	1:E:103:TYR:H	1.59	0.49
1:C:37:ASP:OD1	1:C:39:PRO:HD3	2.12	0.49
1:A:21:ALA:HB1	1:A:138:ILE:CD1	2.42	0.49
1:A:47:LEU:HD13	1:A:73:LEU:HD13	1.93	0.49
1:E:19:LEU:C	1:E:19:LEU:HD23	2.38	0.49
1:A:37:ASP:HB3	1:C:35:PHE:HB2	1.95	0.49
1:A:163:ARG:O	1:A:167:ILE:HG12	2.12	0.49
1:A:19:LEU:HD12	1:A:153:ILE:HD13	1.94	0.48
1:A:19:LEU:HD23	1:A:20:VAL:N	2.28	0.48
1:A:46:ILE:HG13	1:A:97:TYR:HD1	1.78	0.48
1:B:146:ARG:NH1	3:B:347:HOH:O	2.45	0.48
1:D:52:ARG:NH2	1:D:92:TYR:CZ	2.82	0.48
1:D:58:LYS:HD2	1:D:81:HIS:CD2	2.48	0.48
1:B:26:ILE:HD12	1:B:32:LEU:O	2.14	0.48
1:D:57:VAL:HG12	1:D:114:PHE:HZ	1.79	0.48
1:D:19:LEU:HD23	1:D:20:VAL:N	2.29	0.48
1:D:89:ARG:HA	1:D:89:ARG:NE	2.28	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:53:GLY:O	1:E:68:PRO:HD3	2.14	0.48
1:B:58:LYS:CB	1:B:81:HIS:HD2	2.15	0.47
1:B:57:VAL:CG1	1:B:82:TYR:HB3	2.44	0.47
1:E:50:THR:O	1:E:68:PRO:HA	2.14	0.47
1:A:18:HIS:HB3	3:A:373:HOH:O	2.15	0.47
1:D:133:LEU:HD13	1:D:159:LEU:HB2	1.97	0.47
1:E:36:ILE:O	1:E:81:HIS:HA	2.15	0.47
1:D:36:ILE:O	1:D:81:HIS:HA	2.14	0.47
1:D:62:ARG:HH22	2:D:301:EDO:C1	2.28	0.47
1:E:167:ILE:C	1:E:169:GLU:N	2.72	0.46
1:D:120:PHE:CE2	1:D:122:PRO:HG3	2.50	0.46
1:A:123:ASP:O	1:A:127:GLN:HG2	2.14	0.46
1:B:71:ILE:N	1:B:71:ILE:HD12	2.30	0.46
1:B:37:ASP:O	1:E:35:PHE:HB2	2.15	0.46
1:E:27:GLU:O	1:E:33:ASP:HB2	2.16	0.46
1:C:38:ARG:NH2	3:C:359:HOH:O	2.45	0.46
1:D:158:GLN:O	1:D:162:ARG:HG2	2.16	0.46
1:E:45:TYR:HE1	1:E:100:PRO:HG3	1.81	0.46
1:E:113:ILE:HG23	1:E:119:PHE:CD2	2.51	0.46
1:A:38:ARG:NH1	3:A:357:HOH:O	2.49	0.46
1:D:90:GLU:HG3	1:D:92:TYR:CE1	2.51	0.46
1:B:58:LYS:HE2	1:B:63:GLU:OE2	2.16	0.46
1:D:57:VAL:HG21	1:D:72:LEU:CD2	2.46	0.45
1:C:165[B]:GLU:OE2	1:D:147:TYR:N	2.43	0.45
1:E:27:GLU:HB2	3:E:352:HOH:O	2.15	0.45
1:C:7:ASP:N	1:C:8:PRO:HD2	2.31	0.45
1:A:38:ARG:HB2	1:A:80:HIS:HB2	1.98	0.45
1:B:51:ILE:HG13	1:B:52:ARG:H	1.81	0.45
1:A:120:PHE:CE2	1:A:122:PRO:HG3	2.52	0.45
1:A:113:ILE:HG23	1:A:119:PHE:HB2	1.97	0.45
1:E:23:LEU:HD13	1:E:94:GLN:HG2	1.99	0.45
1:E:51:ILE:HG12	1:E:92:TYR:O	2.17	0.45
1:A:58:LYS:HG2	1:A:63:GLU:HG2	1.99	0.45
1:E:134:PHE:O	1:E:138:ILE:HG12	2.16	0.45
1:B:84:ARG:HD2	1:B:88:ALA:O	2.17	0.44
1:A:140:ALA:O	1:A:148[B]:SER:HB3	2.17	0.44
1:B:166:ALA:C	1:B:168:ASN:H	2.25	0.44
1:E:10:LEU:HD22	1:E:13:TYR:HB2	1.99	0.44
1:D:38:ARG:HD3	3:D:382:HOH:O	2.16	0.44
1:D:58:LYS:HB2	1:D:81:HIS:HD2	1.82	0.44
1:E:10:LEU:HD11	2:E:308:EDO:H22	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:46:ILE:HG13	1:E:80:HIS:HE1	1.82	0.44
1:E:111:PRO:HB2	1:E:119:PHE:CZ	2.52	0.44
1:E:163:ARG:O	1:E:167:ILE:HG12	2.17	0.44
1:E:90:GLU:OE1	1:E:90:GLU:N	2.50	0.44
1:E:167:ILE:C	1:E:169:GLU:H	2.25	0.44
1:C:47:LEU:CD1	1:C:73:LEU:HD13	2.44	0.44
1:C:127:GLN:N	1:C:128:PRO:HD2	2.33	0.44
1:E:107:TRP:HD1	1:E:164:MET:HE2	1.82	0.44
1:A:39:PRO:O	1:A:40:LEU:HD23	2.17	0.44
1:C:154:ASN:HD21	1:D:158:GLN:HB2	1.83	0.44
1:A:109:ASN:C	1:A:109:ASN:HD22	2.25	0.44
1:C:9:LEU:O	1:C:10:LEU:C	2.60	0.43
1:E:45:TYR:CE1	1:E:100:PRO:HG3	2.52	0.43
1:D:107:TRP:CD1	1:D:164:MET:HE1	2.53	0.43
1:E:146:ARG:NH1	3:E:370:HOH:O	2.51	0.43
1:A:48:ASN:O	1:A:71:ILE:HA	2.18	0.43
1:D:31:VAL:CG2	3:D:378:HOH:O	2.63	0.43
1:E:127[B]:GLN:HE21	1:E:127[B]:GLN:HB2	1.52	0.43
1:C:172:HIS:N	1:C:173:PRO:CD	2.81	0.43
1:E:27:GLU:O	1:E:28:ALA:C	2.62	0.43
1:E:48:ASN:HD21	1:E:93:HIS:CD2	2.37	0.43
1:C:133:LEU:HD12	1:C:159:LEU:HD12	2.01	0.43
1:D:90:GLU:HG3	1:D:92:TYR:CD1	2.53	0.43
1:D:170:SER:O	1:D:171:LEU:O	2.36	0.42
1:A:13:TYR:CE2	1:A:20:VAL:HG13	2.54	0.42
1:C:46:ILE:HD13	1:C:80:HIS:CE1	2.55	0.42
1:B:31:VAL:HA	1:E:10:LEU:HD21	2.01	0.42
1:B:50:THR:O	1:B:68:PRO:HA	2.18	0.42
1:C:35:PHE:HE2	1:C:56:VAL:HG13	1.85	0.42
1:C:173:PRO:HA	1:C:174:PRO:HD3	1.80	0.42
1:D:35:PHE:HE2	1:D:56:VAL:HG13	1.84	0.42
1:E:7:ASP:N	1:E:8:PRO:CD	2.82	0.42
1:E:84:ARG:NH2	1:E:85:HIS:O	2.52	0.42
1:A:90:GLU:HG3	1:A:92:TYR:CE1	2.55	0.42
1:B:53:GLY:O	1:B:68:PRO:HD3	2.19	0.42
1:A:96:VAL:O	1:A:96:VAL:HG13	2.20	0.41
1:E:23:LEU:HG	1:E:25:PRO:HD3	2.01	0.41
1:B:52:ARG:CB	1:B:92:TYR:HB2	2.50	0.41
1:B:104:TRP:CZ2	1:B:157:GLU:HB2	2.55	0.41
1:D:63:GLU:OE1	2:D:322:EDO:H22	2.20	0.41
1:C:96[A]:VAL:HG13	1:C:96[A]:VAL:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:ALA:O	1:A:148[A]:SER:HB3	2.20	0.41
1:B:159:LEU:HD23	1:B:159:LEU:C	2.45	0.41
1:C:38:ARG:NH2	2:C:310:EDO:H21	2.35	0.41
1:C:57:VAL:HG21	1:C:72:LEU:HD11	2.01	0.41
1:C:104:TRP:CZ2	1:C:157:GLU:HB2	2.55	0.41
1:D:154:ASN:ND2	3:D:334:HOH:O	2.42	0.41
1:D:168:ASN:OD1	1:D:168:ASN:O	2.37	0.41
1:E:111:PRO:O	1:E:118:GLY:HA2	2.21	0.41
1:B:96:VAL:HG13	1:B:96:VAL:O	2.20	0.41
1:B:120:PHE:CE2	1:B:122:PRO:HG3	2.55	0.41
1:E:57:VAL:HG22	1:E:64:PHE:HB3	2.02	0.41
1:A:9:LEU:HG	1:A:97:TYR:CD2	2.55	0.41
1:A:127:GLN:N	1:A:128:PRO:HD2	2.36	0.41
1:C:158:GLN:HB2	1:D:154:ASN:HD21	1.86	0.41
1:D:159:LEU:HD23	1:D:159:LEU:C	2.46	0.41
1:A:31:VAL:CG1	1:C:10:LEU:HG	2.51	0.41
1:E:10:LEU:HD22	1:E:13:TYR:CB	2.51	0.41
1:C:114:PHE:HD1	1:C:114:PHE:O	2.04	0.41
1:B:47:LEU:HD23	1:B:47:LEU:HA	1.91	0.40
1:C:50:THR:O	1:C:68:PRO:HA	2.21	0.40
1:A:29:ASN:ND2	1:A:29:ASN:N	2.68	0.40
1:A:67:ARG:HH11	1:A:67:ARG:HG2	1.86	0.40
1:C:46:ILE:HD13	1:C:80:HIS:HE1	1.85	0.40
1:B:72:LEU:HD13	3:B:321:HOH:O	2.21	0.40
1:A:9:LEU:HD21	1:A:98:PHE:HA	2.04	0.40
1:A:129:HIS:CG	2:A:323:EDO:H22	2.56	0.40
1:C:9:LEU:HD21	1:C:99:ARG:HD3	2.04	0.40
1:E:100:PRO:HD2	3:E:356:HOH:O	2.21	0.40

There are no symmetry-related clashes.

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	164/178 (92%)	157 (96%)	7 (4%)	0	100	100
1	B	152/178 (85%)	140 (92%)	11 (7%)	1 (1%)	18	28
1	C	170/178 (96%)	160 (94%)	10 (6%)	0	100	100
1	D	163/178 (92%)	156 (96%)	7 (4%)	0	100	100
1	E	162/178 (91%)	151 (93%)	9 (6%)	2 (1%)	10	16
All	All	811/890 (91%)	764 (94%)	44 (5%)	3 (0%)	30	43

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	28	ALA
1	E	114	PHE
1	B	16	ASN

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	134/150 (89%)	126 (94%)	8 (6%)	17	31
1	B	117/150 (78%)	110 (94%)	7 (6%)	17	31
1	C	139/150 (93%)	130 (94%)	9 (6%)	15	27
1	D	137/150 (91%)	129 (94%)	8 (6%)	18	32
1	E	132/150 (88%)	125 (95%)	7 (5%)	20	36
All	All	659/750 (88%)	620 (94%)	39 (6%)	18	31

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	VAL
1	A	31	VAL
1	A	46	ILE
1	A	47	LEU
1	A	114	PHE

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Mol	Chain	Res	Type
1	A	133	LEU
1	A	148[A]	SER
1	A	148[B]	SER
1	B	38	ARG
1	B	46	ILE
1	B	57	VAL
1	B	109	ASN
1	B	113	ILE
1	B	116	ASN
1	B	133	LEU
1	C	20	VAL
1	C	47	LEU
1	C	51	ILE
1	C	90	GLU
1	C	99	ARG
1	C	114	PHE
1	C	133	LEU
1	C	165[A]	GLU
1	C	165[B]	GLU
1	D	9	LEU
1	D	31	VAL
1	D	67	ARG
1	D	99	ARG
1	D	114	PHE
1	D	133	LEU
1	D	144	GLU
1	D	151	LEU
1	E	56	VAL
1	E	57	VAL
1	E	96	VAL
1	E	123	ASP
1	E	129	HIS
1	E	133	LEU
1	E	151	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (37) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	29	ASN
1	A	60	GLN
1	A	93	HIS
1	A	109	ASN

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Mol	Chain	Res	Type
1	A	116	ASN
1	A	139	ASN
1	A	154	ASN
1	A	158	GLN
1	A	168	ASN
1	B	48	ASN
1	B	59	ASN
1	B	81	HIS
1	B	116	ASN
1	B	139	ASN
1	B	154	ASN
1	B	158	GLN
1	C	29	ASN
1	C	80	HIS
1	C	94	GLN
1	C	105	HIS
1	C	109	ASN
1	C	116	ASN
1	C	139	ASN
1	C	142	GLN
1	C	154	ASN
1	C	158	GLN
1	D	54	GLN
1	D	60	GLN
1	D	116	ASN
1	D	139	ASN
1	D	154	ASN
1	D	158	GLN
1	E	54	GLN
1	E	93	HIS
1	E	116	ASN
1	E	139	ASN
1	E	158	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

25 ligands are modelled in this entry.

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	D	311	-	3,3,3	0.48	0	2,2,2	0.49	0
2	EDO	D	307	-	3,3,3	0.51	0	2,2,2	0.54	0
2	EDO	B	316	-	3,3,3	0.59	0	2,2,2	0.55	0
2	EDO	D	301	-	3,3,3	0.36	0	2,2,2	0.40	0
2	EDO	C	310	-	3,3,3	0.56	0	2,2,2	0.55	0
2	EDO	D	319	-	3,3,3	0.48	0	2,2,2	0.50	0
2	EDO	E	312	-	3,3,3	0.56	0	2,2,2	0.57	0
2	EDO	D	322	-	3,3,3	0.48	0	2,2,2	0.52	0
2	EDO	B	320	-	3,3,3	0.51	0	2,2,2	0.50	0
2	EDO	E	325	-	3,3,3	0.49	0	2,2,2	0.53	0
2	EDO	A	304	-	3,3,3	0.47	0	2,2,2	0.52	0
2	EDO	B	306	-	3,3,3	0.55	0	2,2,2	0.55	0
2	EDO	A	318	-	3,3,3	0.44	0	2,2,2	0.54	0
2	EDO	E	308	-	3,3,3	0.49	0	2,2,2	0.53	0
2	EDO	D	314	-	3,3,3	0.46	0	2,2,2	0.47	0
2	EDO	D	315	-	3,3,3	0.47	0	2,2,2	0.57	0
2	EDO	B	317	-	3,3,3	0.51	0	2,2,2	0.51	0
2	EDO	B	303	-	3,3,3	0.45	0	2,2,2	0.46	0
2	EDO	D	305	-	3,3,3	0.47	0	2,2,2	0.50	0
2	EDO	D	309	-	3,3,3	0.59	0	2,2,2	0.57	0
2	EDO	D	324	-	3,3,3	0.47	0	2,2,2	0.55	0
2	EDO	A	323	-	3,3,3	0.52	0	2,2,2	0.52	0
2	EDO	C	321	-	3,3,3	0.51	0	2,2,2	0.56	0
2	EDO	E	313	-	3,3,3	0.56	0	2,2,2	0.55	0
2	EDO	D	302	-	3,3,3	0.36	0	2,2,2	0.45	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	D	311	-	-	1/1/1/1	-
2	EDO	D	307	-	-	1/1/1/1	-
2	EDO	B	316	-	-	0/1/1/1	-
2	EDO	D	301	-	-	1/1/1/1	-
2	EDO	C	310	-	-	1/1/1/1	-
2	EDO	D	319	-	-	1/1/1/1	-
2	EDO	E	312	-	-	1/1/1/1	-
2	EDO	D	322	-	-	1/1/1/1	-
2	EDO	B	320	-	-	0/1/1/1	-
2	EDO	E	325	-	-	1/1/1/1	-
2	EDO	A	304	-	-	1/1/1/1	-
2	EDO	B	306	-	-	0/1/1/1	-
2	EDO	A	318	-	-	1/1/1/1	-
2	EDO	E	308	-	-	0/1/1/1	-
2	EDO	D	314	-	-	1/1/1/1	-
2	EDO	D	315	-	-	0/1/1/1	-
2	EDO	B	317	-	-	1/1/1/1	-
2	EDO	B	303	-	-	1/1/1/1	-
2	EDO	D	305	-	-	0/1/1/1	-
2	EDO	D	309	-	-	1/1/1/1	-
2	EDO	D	324	-	-	0/1/1/1	-
2	EDO	A	323	-	-	0/1/1/1	-
2	EDO	C	321	-	-	0/1/1/1	-
2	EDO	E	313	-	-	1/1/1/1	-
2	EDO	D	302	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	310	EDO	O1-C1-C2-O2
2	D	302	EDO	O1-C1-C2-O2
2	E	313	EDO	O1-C1-C2-O2
2	A	304	EDO	O1-C1-C2-O2
2	B	317	EDO	O1-C1-C2-O2
2	D	301	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
2	D	314	EDO	O1-C1-C2-O2
2	D	311	EDO	O1-C1-C2-O2
2	D	322	EDO	O1-C1-C2-O2
2	D	307	EDO	O1-C1-C2-O2
2	D	309	EDO	O1-C1-C2-O2
2	B	303	EDO	O1-C1-C2-O2
2	E	312	EDO	O1-C1-C2-O2
2	A	318	EDO	O1-C1-C2-O2
2	D	319	EDO	O1-C1-C2-O2
2	E	325	EDO	O1-C1-C2-O2

There are no ring outliers.

11 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	301	EDO	1	0
2	C	310	EDO	2	0
2	D	319	EDO	1	0
2	E	312	EDO	1	0
2	D	322	EDO	1	0
2	A	318	EDO	2	0
2	E	308	EDO	1	0
2	B	303	EDO	1	0
2	A	323	EDO	1	0
2	C	321	EDO	1	0
2	D	302	EDO	2	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	165/178 (92%)	-0.20	2 (1%) 76 73	21, 37, 56, 72	1 (0%)
1	B	154/178 (86%)	0.12	0 100 100	26, 48, 62, 74	0
1	C	169/178 (94%)	-0.23	3 (1%) 67 63	10, 29, 54, 80	3 (1%)
1	D	165/178 (92%)	-0.52	2 (1%) 76 73	11, 23, 41, 61	0
1	E	163/178 (91%)	0.14	1 (0%) 85 83	23, 41, 64, 67	1 (0%)
All	All	816/890 (91%)	-0.14	8 (0%) 79 76	10, 36, 61, 80	5 (0%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	171	LEU	3.7
1	D	12	GLY	2.7
1	C	175	MET	2.5
1	A	172	HIS	2.4
1	E	33	ASP	2.3
1	A	8	PRO	2.1
1	C	172	HIS	2.1
1	C	169	GLU	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 ⓘ

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	B	316	4/4	0.59	0.13	57,57,58,58	0
2	EDO	E	325	4/4	0.59	0.16	71,72,73,74	0
2	EDO	B	317	4/4	0.67	0.14	52,52,53,54	0
2	EDO	E	312	4/4	0.69	0.13	67,69,69,69	0
2	EDO	C	321	4/4	0.71	0.17	74,74,74,75	0
2	EDO	B	306	4/4	0.79	0.12	57,57,58,58	0
2	EDO	E	313	4/4	0.80	0.18	62,63,64,64	0
2	EDO	C	310	4/4	0.80	0.11	54,56,56,56	0
2	EDO	D	301	4/4	0.81	0.16	54,56,57,58	0
2	EDO	B	320	4/4	0.81	0.08	66,67,67,67	0
2	EDO	B	303	4/4	0.81	0.15	65,66,66,69	0
2	EDO	A	323	4/4	0.81	0.14	64,64,64,65	0
2	EDO	D	324	4/4	0.83	0.22	56,57,57,58	0
2	EDO	D	302	4/4	0.84	0.19	49,51,52,53	0
2	EDO	D	319	4/4	0.84	0.12	68,69,69,69	0
2	EDO	A	318	4/4	0.84	0.13	54,55,55,57	0
2	EDO	A	304	4/4	0.86	0.11	55,56,58,58	0
2	EDO	D	311	4/4	0.89	0.09	51,52,53,53	0
2	EDO	D	307	4/4	0.89	0.14	68,68,68,68	0
2	EDO	D	315	4/4	0.90	0.14	63,64,64,64	0
2	EDO	D	314	4/4	0.91	0.14	46,46,47,48	0
2	EDO	D	322	4/4	0.91	0.11	58,59,60,60	0
2	EDO	E	308	4/4	0.92	0.11	66,67,67,68	0
2	EDO	D	305	4/4	0.92	0.10	52,53,53,53	0
2	EDO	D	309	4/4	0.93	0.06	45,48,48,48	0

6.5 Other polymers ⓘ

There are no such residues in this entry.