



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 16, 2024 – 02:59 am GMT

PDB ID : 8OON
Title : Glutamine synthetase from Methanothermococcus thermolithotrophicus at a resolution of 2.43 Å
Authors : Mueller, M.-C.; Lemaire, O.N.; Wagner, T.
Deposited on : 2023-04-05
Resolution : 2.43 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 : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

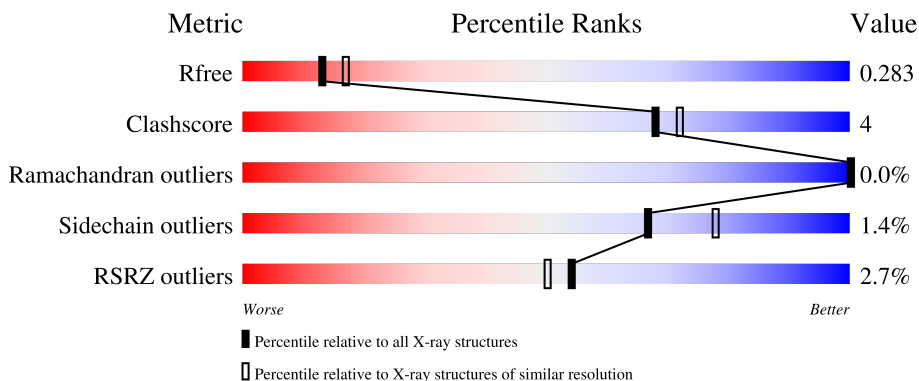
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.43 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}	130704	1564 (2.46-2.42)
Clashscore	141614	1631 (2.46-2.42)
Ramachandran outliers	138981	1617 (2.46-2.42)
Sidechain outliers	138945	1617 (2.46-2.42)
RSRZ outliers	127900	1547 (2.46-2.42)

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	448	 4% 88% 10% ..
1	B	448	 2% 87% 12% .
1	C	448	 2% 93% 6% .
1	D	448	 3% 90% 9% .
1	E	448	 4% 88% 10% .

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Mol	Chain	Length	Quality of chain
1	F	448	 A horizontal bar chart representing the quality of the chain. The bar is divided into three segments: a small red segment at the beginning labeled '2%', a large green segment in the middle labeled '91%', and a small yellow segment at the end labeled '8%'. The total length of the bar represents 100%.

2 Entry composition [i](#)

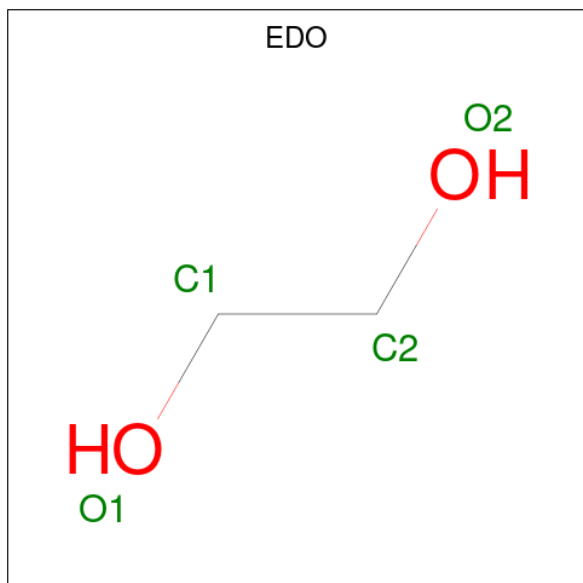
There are 5 unique types of molecules in this entry. The entry contains 21529 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Glutamine synthetase from *Methanothermococcus thermolithotrophicus*.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	443	Total 3517	C 2256	N 583	O 662	S 16	0	2	0
1	B	444	Total 3513	C 2251	N 584	O 662	S 16	0	1	0
1	C	443	Total 3505	C 2247	N 582	O 660	S 16	0	0	0
1	D	443	Total 3512	C 2254	N 582	O 659	S 17	0	1	0
1	E	444	Total 3524	C 2262	N 584	O 661	S 17	0	2	0
1	F	445	Total 3511	C 2248	N 584	O 663	S 16	0	0	0

- Molecule 2 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

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

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	D	1	Total Na 1 1	0	0
4	E	1	Total Na 1 1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	53	Total O 53 53	0	0
5	B	43	Total O 43 43	0	0
5	C	43	Total O 43 43	0	0
5	D	45	Total O 45 45	0	0
5	E	52	Total O 52 52	0	0

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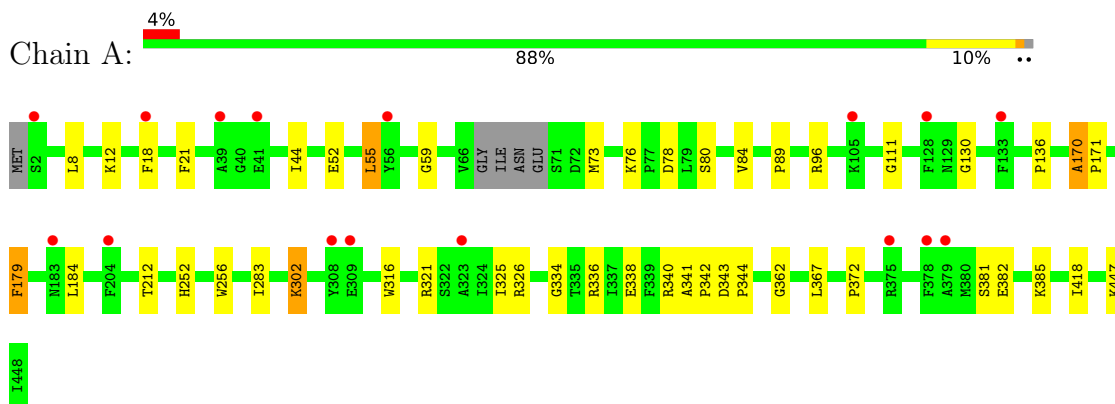
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	F	57	Total	O	0	0
			57	57		

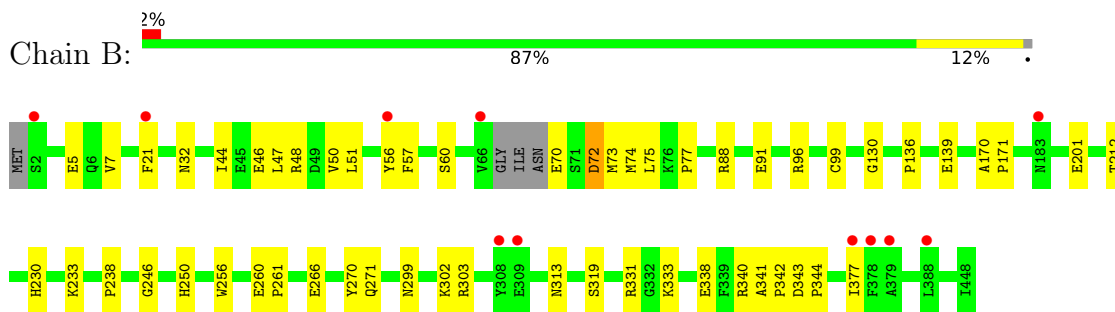
3 Residue-property plots [i](#)

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.

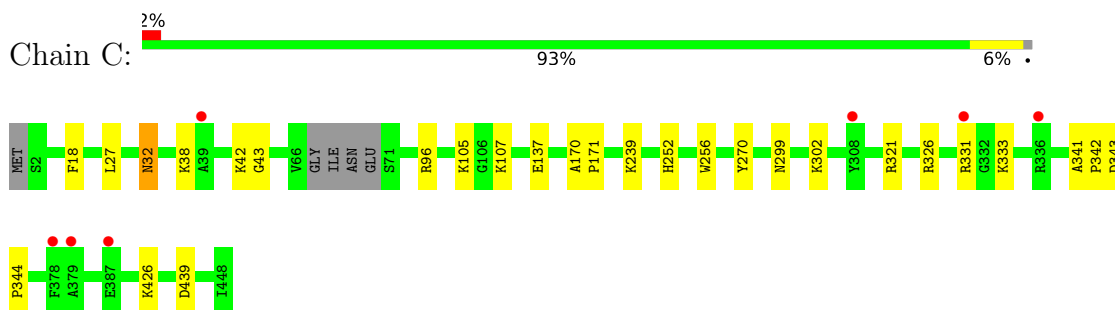
- Molecule 1: Glutamine synthetase from *Methanothermococcus thermolithotrophicus*



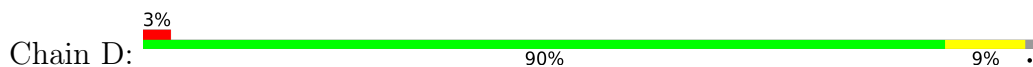
- Molecule 1: Glutamine synthetase from *Methanothermococcus thermolithotrophicus*

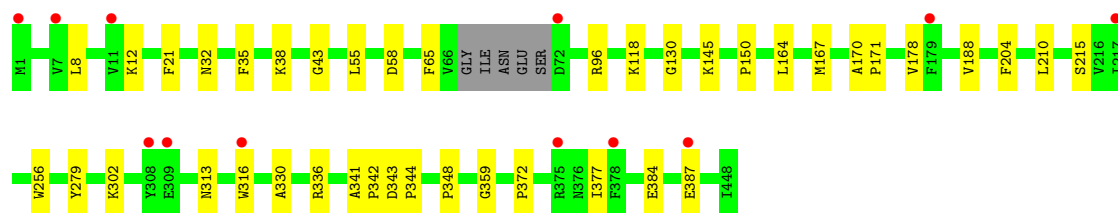


- Molecule 1: Glutamine synthetase from *Methanothermococcus thermolithotrophicus*

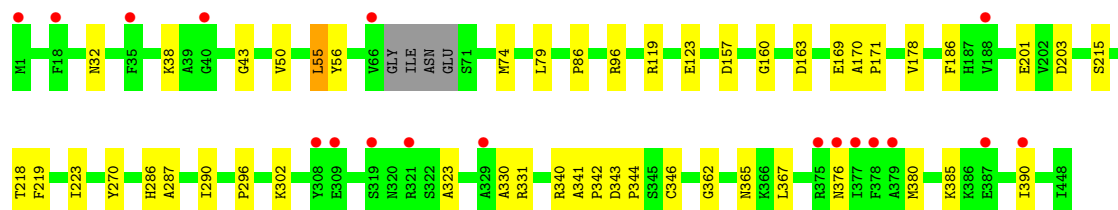
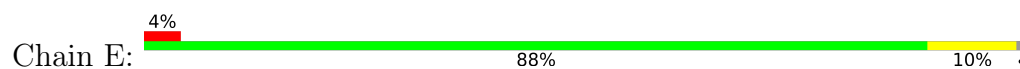


- Molecule 1: Glutamine synthetase from *Methanothermococcus thermolithotrophicus*

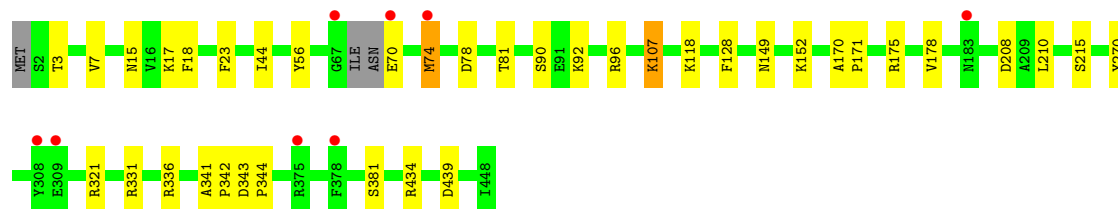
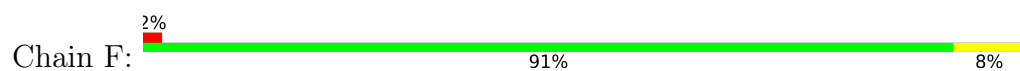




- Molecule 1: Glutamine synthetase from *Methanothermococcus thermolithotrophicus*



- Molecule 1: Glutamine synthetase from *Methanothermococcus thermolithotrophicus*



4 Data and refinement statistics i

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	132.65Å 230.24Å 205.59Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	58.89 – 2.43 76.68 – 2.43	Depositor EDS
% Data completeness (in resolution range)	86.6 (58.89-2.43) 86.6 (76.68-2.43)	Depositor EDS
R_{merge}	0.27	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.95 (at 2.42Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.229 , 0.268 0.246 , 0.283	Depositor DCC
R_{free} test set	4910 reflections (4.80%)	wwPDB-VP
Wilson B-factor (Å ²)	41.5	Xtrriage
Anisotropy	0.022	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 40.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	0.074 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.095 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	21529	wwPDB-VP
Average B, all atoms (Å ²)	52.0	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 44.76 % 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 1.4577e-04. 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: EDO, NA, GOL

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	0.31	0/3613	0.48	0/4891
1	B	0.31	0/3605	0.49	0/4880
1	C	0.29	0/3595	0.47	0/4868
1	D	0.34	1/3605 (0.0%)	0.49	0/4881
1	E	0.29	0/3620	0.47	0/4900
1	F	0.29	0/3600	0.48	0/4874
All	All	0.30	1/21638 (0.0%)	0.48	0/29294

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	348	PRO	N-CD	10.16	1.62	1.47

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	3517	0	3450	32	0
1	B	3513	0	3443	37	0
1	C	3505	0	3431	17	0
1	D	3512	0	3449	25	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	3524	0	3467	32	0
1	F	3511	0	3433	19	0
2	A	36	0	54	0	0
2	B	24	0	36	2	0
2	C	36	0	54	2	0
2	D	20	0	30	0	0
2	E	16	0	24	0	0
2	F	8	0	12	0	0
3	B	6	0	8	1	0
3	F	6	0	8	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
5	A	53	0	0	1	0
5	B	43	0	0	1	0
5	C	43	0	0	0	0
5	D	45	0	0	0	0
5	E	52	0	0	0	0
5	F	57	0	0	0	0
All	All	21529	0	20899	158	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 (158) 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:F:175:ARG:HG2	1:F:175:ARG:O	1.96	0.65
1:A:170:ALA:N	1:A:171:PRO:CD	2.65	0.59
1:F:70:GLU:O	1:F:70:GLU:HG3	2.02	0.59
1:A:338:GLU:HG2	1:A:338:GLU:O	2.04	0.58
1:B:57:PHE:CD1	1:B:75:LEU:HG	2.42	0.55
1:A:252:HIS:HB3	1:A:336:ARG:HD2	1.89	0.54
1:A:283:ILE:CG2	1:A:325:ILE:HD11	2.38	0.52
1:C:321:ARG:HA	1:C:326:ARG:HH22	1.76	0.51
1:E:380:MET:HE2	1:E:385:LYS:HG2	1.93	0.51
1:F:118:LYS:HE2	1:F:210:LEU:HD21	1.92	0.51
1:D:38:LYS:HB2	1:D:43:GLY:HA2	1.91	0.51
1:C:38:LYS:HB2	1:C:43:GLY:HA2	1.93	0.50
1:E:56:TYR:HD1	1:E:74:MET:HG2	1.77	0.50
1:C:27:LEU:HD22	2:C:503:EDO:H21	1.93	0.50
1:D:21:PHE:CD2	1:D:55:LEU:HD21	2.46	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:250:HIS:CD2	1:B:338:GLU:OE2	2.65	0.50
1:C:256:TRP:HH2	1:C:333:LYS:HG2	1.77	0.50
1:F:3:THR:O	1:F:7:VAL:HG23	2.11	0.50
1:A:447:LYS:NZ	5:A:703:HOH:O	2.44	0.49
1:B:77:PRO:HA	1:B:99:CYS:HA	1.95	0.49
1:F:56:TYR:CD1	1:F:74:MET:HG3	2.47	0.49
1:B:256:TRP:HH2	1:B:333:LYS:HD3	1.77	0.49
1:D:118:LYS:HE2	1:D:210:LEU:HD21	1.94	0.49
1:D:38:LYS:HB2	1:D:43:GLY:CA	2.43	0.48
1:C:42:LYS:HE3	1:C:42:LYS:HA	1.95	0.48
1:A:179:PHE:C	1:A:179:PHE:CD1	2.86	0.48
1:D:21:PHE:HD2	1:D:55:LEU:HD21	1.78	0.48
1:D:313:ASN:CG	1:D:377:ILE:HG21	2.34	0.48
1:E:38:LYS:HB3	1:E:43:GLY:HA2	1.96	0.48
1:D:330:ALA:HB3	1:D:336:ARG:HH12	1.77	0.48
1:B:70:GLU:OE2	1:B:72:ASP:HB2	2.13	0.48
1:A:381:SER:OG	1:A:382:GLU:N	2.47	0.48
1:D:343:ASP:HB2	1:D:344:PRO:HD2	1.95	0.47
1:C:27:LEU:HD21	1:C:426:LYS:HE2	1.96	0.47
1:C:341:ALA:N	1:C:342:PRO:CD	2.77	0.47
1:E:380:MET:HE1	1:E:390:ILE:HD12	1.96	0.47
1:C:105:LYS:HD2	1:C:107:LYS:HE3	1.96	0.47
1:E:376:ASN:O	1:E:380:MET:HG3	2.14	0.47
1:B:170:ALA:N	1:B:171:PRO:CD	2.77	0.47
1:B:250:HIS:NE2	1:B:340:ARG:NH1	2.62	0.47
1:B:341:ALA:N	1:B:342:PRO:CD	2.78	0.47
1:D:58:ASP:C	1:D:58:ASP:OD1	2.53	0.47
1:E:50:VAL:HG13	1:E:55:LEU:HB3	1.97	0.47
1:E:157:ASP:HB3	1:E:169:GLU:HB2	1.97	0.47
1:E:178:VAL:HB	1:F:18:PHE:HZ	1.80	0.47
1:E:186:PHE:HD1	1:E:215:SER:HG	1.62	0.47
1:E:323:ALA:O	1:E:340:ARG:NH1	2.48	0.47
1:E:341:ALA:N	1:E:342:PRO:CD	2.78	0.47
1:F:341:ALA:N	1:F:342:PRO:CD	2.78	0.47
1:A:316:TRP:CZ2	1:A:372:PRO:HD3	2.49	0.47
1:A:321:ARG:NH1	1:B:60:SER:OG	2.48	0.47
1:B:271:GLN:HB2	1:B:331:ARG:HE	1.79	0.47
1:A:170:ALA:N	1:A:171:PRO:HD2	2.30	0.46
1:F:170:ALA:N	1:F:171:PRO:CD	2.78	0.46
1:B:7:VAL:HG11	1:B:51:LEU:CD2	2.46	0.46
1:D:341:ALA:N	1:D:342:PRO:CD	2.79	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:384:GLU:OE2	1:D:387:GLU:OE1	2.33	0.46
1:D:204:PHE:HE2	1:D:215:SER:HG	1.60	0.46
1:E:380:MET:CE	1:E:385:LYS:HG2	2.46	0.46
1:A:341:ALA:N	1:A:342:PRO:CD	2.79	0.46
1:E:56:TYR:HE1	1:E:74:MET:SD	2.38	0.46
1:E:79:LEU:HD22	1:E:79:LEU:H	1.81	0.46
1:F:270:TYR:O	1:F:331:ARG:NH1	2.48	0.46
1:C:239:LYS:N	1:C:299:ASN:OD1	2.44	0.45
1:D:145:LYS:NZ	1:D:150:PRO:O	2.45	0.45
1:A:326:ARG:HB2	1:A:340:ARG:HD2	1.97	0.45
1:D:55:LEU:N	1:D:55:LEU:HD23	2.32	0.45
1:F:343:ASP:HB2	1:F:344:PRO:HD2	1.98	0.45
1:A:8:LEU:O	1:A:12:LYS:HG3	2.16	0.45
1:A:59:GLY:HA3	1:A:73:MET:HE3	1.99	0.45
1:B:21:PHE:HB3	1:B:75:LEU:HD13	1.99	0.45
1:C:439:ASP:N	1:C:439:ASP:OD1	2.49	0.45
1:F:439:ASP:N	1:F:439:ASP:OD1	2.48	0.45
1:B:139:GLU:HG2	1:B:201:GLU:HB2	1.98	0.45
1:B:313:ASN:HB3	1:B:377:ILE:HG21	1.99	0.45
1:E:201:GLU:OE2	1:E:203:ASP:OD1	2.35	0.45
1:F:149:ASN:ND2	1:F:152:LYS:HD2	2.32	0.45
1:D:170:ALA:N	1:D:171:PRO:CD	2.80	0.45
1:E:296:PRO:HG3	1:E:346:CYS:HA	1.98	0.45
1:C:32:ASN:C	1:C:32:ASN:HD22	2.20	0.44
1:D:8:LEU:O	1:D:12:LYS:HG3	2.17	0.44
1:A:18:PHE:HZ	1:F:178:VAL:HB	1.83	0.44
1:B:343:ASP:HB2	1:B:344:PRO:HD2	1.99	0.44
1:C:321:ARG:HA	1:C:326:ARG:NH2	2.31	0.44
1:E:38:LYS:HB3	1:E:43:GLY:CA	2.47	0.44
1:E:86:PRO:HG2	1:E:218:THR:HG23	1.99	0.44
1:A:52:GLU:O	1:A:76:LYS:NZ	2.48	0.44
1:B:5:GLU:OE2	1:B:48:ARG:NH1	2.34	0.44
1:B:21:PHE:O	1:B:32:ASN:HA	2.17	0.44
1:B:46:GLU:O	1:B:50:VAL:HG23	2.17	0.44
1:B:313:ASN:CB	1:B:377:ILE:HG21	2.47	0.44
1:C:170:ALA:N	1:C:171:PRO:CD	2.81	0.44
1:A:78:ASP:OD1	1:A:80:SER:OG	2.31	0.44
1:A:111:GLY:HA2	1:A:418:ILE:HG13	1.99	0.44
1:A:343:ASP:HB2	1:A:344:PRO:HD2	2.00	0.44
1:B:47:LEU:CD1	1:B:51:LEU:HD11	2.47	0.44
1:C:27:LEU:HD22	2:C:503:EDO:C2	2.48	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:343:ASP:HB2	1:C:344:PRO:HD2	2.00	0.44
1:B:56:TYR:HD1	1:B:74:MET:HG2	1.83	0.43
1:E:160:GLY:N	1:E:163:ASP:OD2	2.51	0.43
1:E:170:ALA:N	1:E:171:PRO:CD	2.80	0.43
1:B:303:ARG:HG3	3:B:502:GOL:H11	2.00	0.43
1:E:119:ARG:O	1:E:123:GLU:HG3	2.18	0.43
1:E:287:ALA:HA	1:E:290:ILE:HD12	1.99	0.43
1:B:266:GLU:OE1	1:B:266:GLU:N	2.49	0.43
1:F:128:PHE:CD1	1:F:128:PHE:N	2.86	0.43
1:A:316:TRP:O	1:A:372:PRO:HA	2.19	0.43
1:E:365:ASN:HB2	1:E:367:LEU:HD21	1.99	0.43
1:B:246:GLY:O	2:B:501:EDO:O2	2.36	0.43
1:D:316:TRP:CZ2	1:D:372:PRO:HG3	2.54	0.43
1:A:84:VAL:HG21	1:A:89:PRO:O	2.18	0.43
1:A:381:SER:O	1:A:385:LYS:HG3	2.18	0.43
1:E:219:PHE:O	1:E:223:ILE:HG22	2.19	0.43
1:F:78:ASP:O	1:F:81:THR:OG1	2.33	0.43
1:E:56:TYR:CD1	1:E:74:MET:HG2	2.54	0.43
1:A:362:GLY:HA2	1:A:367:LEU:HG	2.01	0.42
1:B:233:LYS:HB3	2:B:504:EDO:H21	2.01	0.42
1:E:343:ASP:HB2	1:E:344:PRO:HD2	2.00	0.42
1:D:65:PHE:CD1	1:D:65:PHE:N	2.86	0.42
1:E:286:HIS:O	1:E:290:ILE:HG13	2.18	0.42
1:A:84:VAL:CG1	1:A:184:LEU:HD11	2.50	0.42
1:B:130:GLY:HA2	1:B:256:TRP:O	2.20	0.42
1:D:65:PHE:N	1:D:65:PHE:HD1	2.18	0.42
1:B:88:ARG:NH1	1:B:91:GLU:OE2	2.53	0.42
1:B:266:GLU:O	1:B:271:GLN:NE2	2.53	0.42
1:E:362:GLY:HA2	1:E:367:LEU:HG	2.00	0.42
1:A:334:GLY:O	1:A:336:ARG:NH1	2.52	0.42
1:B:47:LEU:O	1:B:50:VAL:N	2.44	0.42
1:E:330:ALA:O	1:E:331:ARG:NE	2.53	0.42
1:F:44:ILE:HD13	1:F:44:ILE:HA	1.89	0.42
1:A:130:GLY:HA2	1:A:256:TRP:O	2.19	0.42
1:A:283:ILE:HG21	1:A:325:ILE:HD11	2.01	0.41
1:F:107:LYS:HD2	1:F:107:LYS:C	2.40	0.41
1:D:178:VAL:HG13	1:D:188:VAL:CG2	2.51	0.41
1:D:279:TYR:CE1	1:D:359:GLY:HA3	2.55	0.41
1:B:44:ILE:HD13	1:B:44:ILE:N	2.35	0.41
1:B:47:LEU:HG	1:B:51:LEU:HD11	2.02	0.41
1:B:230:HIS:HE1	5:B:631:HOH:O	2.01	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:260:GLU:OE1	1:B:261:PRO:HD2	2.20	0.41
1:F:15:ASN:O	1:F:17:LYS:NZ	2.50	0.41
1:C:137:GLU:OE2	1:C:252:HIS:NE2	2.54	0.41
1:D:21:PHE:CD2	1:D:55:LEU:CD2	3.03	0.41
1:B:57:PHE:CE1	1:B:73:MET:HB3	2.56	0.41
1:B:136:PRO:HD3	1:B:212:THR:HG21	2.02	0.41
1:F:208:ASP:OD1	1:F:210:LEU:N	2.53	0.41
1:D:164:LEU:HD11	1:E:32:ASN:HB3	2.02	0.41
1:A:59:GLY:HA3	1:A:73:MET:CE	2.50	0.41
1:A:136:PRO:HD3	1:A:212:THR:HG21	2.03	0.41
1:C:270:TYR:O	1:C:331:ARG:NH1	2.54	0.41
1:A:44:ILE:N	1:A:44:ILE:HD13	2.36	0.41
1:A:302:LYS:N	1:A:302:LYS:HD2	2.35	0.41
1:B:56:TYR:CD1	1:B:74:MET:HG2	2.55	0.41
1:B:238:PRO:HD2	1:B:299:ASN:OD1	2.21	0.41
1:D:35:PHE:CD1	1:D:35:PHE:N	2.90	0.40
1:A:21:PHE:HD2	1:A:55:LEU:HD22	1.87	0.40
1:D:130:GLY:HA2	1:D:256:TRP:O	2.21	0.40
1:E:55:LEU:O	1:E:55:LEU:HD23	2.21	0.40
1:E:270:TYR:O	1:E:331:ARG:NH1	2.54	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	441/448 (98%)	428 (97%)	12 (3%)	1 (0%)	47 57
1	B	441/448 (98%)	427 (97%)	14 (3%)	0	100 100
1	C	439/448 (98%)	421 (96%)	18 (4%)	0	100 100
1	D	440/448 (98%)	424 (96%)	16 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	442/448 (99%)	427 (97%)	15 (3%)	0	100	100
1	F	441/448 (98%)	425 (96%)	16 (4%)	0	100	100
All	All	2644/2688 (98%)	2552 (96%)	91 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	170	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	381/383 (100%)	377 (99%)	4 (1%)	76	84
1	B	380/383 (99%)	375 (99%)	5 (1%)	69	80
1	C	379/383 (99%)	375 (99%)	4 (1%)	73	83
1	D	380/383 (99%)	376 (99%)	4 (1%)	73	83
1	E	382/383 (100%)	379 (99%)	3 (1%)	81	88
1	F	379/383 (99%)	368 (97%)	11 (3%)	42	54
All	All	2281/2298 (99%)	2250 (99%)	31 (1%)	67	78

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	55	LEU
1	A	96	ARG
1	A	179	PHE
1	A	302	LYS
1	B	72	ASP
1	B	96	ARG
1	B	270	TYR
1	B	302	LYS
1	B	319	SER

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Mol	Chain	Res	Type
1	C	18	PHE
1	C	32	ASN
1	C	96	ARG
1	C	302	LYS
1	D	32	ASN
1	D	96	ARG
1	D	167	MET
1	D	302	LYS
1	E	55	LEU
1	E	96	ARG
1	E	302	LYS
1	F	23	PHE
1	F	74	MET
1	F	90	SER
1	F	92	LYS
1	F	96	ARG
1	F	107	LYS
1	F	215	SER
1	F	321	ARG
1	F	336	ARG
1	F	381	SER
1	F	434	ARG

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 monosaccharides in this entry.

5.6 Ligand geometry

Of 39 ligands modelled in this entry, 2 are monoatomic - leaving 37 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	604	-	3,3,3	0.50	0	2,2,2	0.54	0
3	GOL	B	502	-	5,5,5	0.87	0	5,5,5	1.10	1 (20%)
2	EDO	C	508	-	3,3,3	0.06	0	2,2,2	0.18	0
2	EDO	C	509	-	3,3,3	0.05	0	2,2,2	0.18	0
2	EDO	A	606	-	3,3,3	0.06	0	2,2,2	0.19	0
2	EDO	D	502	-	3,3,3	0.49	0	2,2,2	0.45	0
2	EDO	F	501	-	3,3,3	0.49	0	2,2,2	0.45	0
2	EDO	D	505	-	3,3,3	0.54	0	2,2,2	0.28	0
2	EDO	C	503	-	3,3,3	0.50	0	2,2,2	0.31	0
2	EDO	B	505	-	3,3,3	0.50	0	2,2,2	0.39	0
2	EDO	F	503	-	3,3,3	0.50	0	2,2,2	0.38	0
2	EDO	E	504	-	3,3,3	0.50	0	2,2,2	0.40	0
2	EDO	C	505	-	3,3,3	0.50	0	2,2,2	0.43	0
2	EDO	A	608	-	3,3,3	0.51	0	2,2,2	0.52	0
2	EDO	B	506	-	3,3,3	0.05	0	2,2,2	0.19	0
2	EDO	A	602	-	3,3,3	0.49	0	2,2,2	0.45	0
2	EDO	E	502	-	3,3,3	0.50	0	2,2,2	0.46	0
2	EDO	E	503	-	3,3,3	0.53	0	2,2,2	0.22	0
2	EDO	D	504	-	3,3,3	0.50	0	2,2,2	0.43	0
2	EDO	E	501	-	3,3,3	0.50	0	2,2,2	0.39	0
2	EDO	A	603	-	3,3,3	0.53	0	2,2,2	0.30	0
2	EDO	A	607	-	3,3,3	0.52	0	2,2,2	0.25	0
2	EDO	B	501	-	3,3,3	0.52	0	2,2,2	0.47	0
2	EDO	C	502	-	3,3,3	0.48	0	2,2,2	0.44	0
2	EDO	A	601	-	3,3,3	0.51	0	2,2,2	0.29	0
3	GOL	F	502	-	5,5,5	0.70	0	5,5,5	0.90	0
2	EDO	D	503	-	3,3,3	0.54	0	2,2,2	0.22	0
2	EDO	A	609	-	3,3,3	0.06	0	2,2,2	0.18	0
2	EDO	B	507	-	3,3,3	0.51	0	2,2,2	0.49	0
2	EDO	B	504	-	3,3,3	0.56	0	2,2,2	0.38	0
2	EDO	A	605	-	3,3,3	0.53	0	2,2,2	0.34	0
2	EDO	C	507	-	3,3,3	0.54	0	2,2,2	0.29	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	EDO	D	501	-	3,3,3	0.53	0	2,2,2	0.31	0
2	EDO	C	504	-	3,3,3	0.52	0	2,2,2	0.36	0
2	EDO	C	506	-	3,3,3	0.51	0	2,2,2	0.36	0
2	EDO	C	501	-	3,3,3	0.50	0	2,2,2	0.38	0
2	EDO	B	503	-	3,3,3	0.52	0	2,2,2	0.33	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	604	-	-	1/1/1/1	-
3	GOL	B	502	-	-	0/4/4/4	-
2	EDO	C	508	-	-	0/1/1/1	-
2	EDO	C	509	-	-	1/1/1/1	-
2	EDO	A	606	-	-	0/1/1/1	-
2	EDO	D	502	-	-	1/1/1/1	-
2	EDO	F	501	-	-	1/1/1/1	-
2	EDO	D	505	-	-	1/1/1/1	-
2	EDO	C	503	-	-	1/1/1/1	-
2	EDO	B	505	-	-	1/1/1/1	-
2	EDO	F	503	-	-	0/1/1/1	-
2	EDO	E	504	-	-	1/1/1/1	-
2	EDO	C	505	-	-	1/1/1/1	-
2	EDO	A	608	-	-	0/1/1/1	-
2	EDO	B	506	-	-	0/1/1/1	-
2	EDO	A	602	-	-	1/1/1/1	-
2	EDO	E	502	-	-	1/1/1/1	-
2	EDO	E	503	-	-	1/1/1/1	-
2	EDO	D	504	-	-	0/1/1/1	-
2	EDO	E	501	-	-	1/1/1/1	-
2	EDO	A	603	-	-	0/1/1/1	-
2	EDO	A	607	-	-	1/1/1/1	-
2	EDO	B	501	-	-	0/1/1/1	-
2	EDO	C	502	-	-	1/1/1/1	-
2	EDO	A	601	-	-	0/1/1/1	-
3	GOL	F	502	-	-	4/4/4/4	-
2	EDO	D	503	-	-	1/1/1/1	-
2	EDO	A	609	-	-	1/1/1/1	-
2	EDO	B	507	-	-	0/1/1/1	-
2	EDO	B	504	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	A	605	-	-	1/1/1/1	-
2	EDO	C	507	-	-	1/1/1/1	-
2	EDO	D	501	-	-	1/1/1/1	-
2	EDO	C	504	-	-	1/1/1/1	-
2	EDO	C	506	-	-	0/1/1/1	-
2	EDO	C	501	-	-	1/1/1/1	-
2	EDO	B	503	-	-	1/1/1/1	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	502	GOL	C3-C2-C1	-2.02	103.84	111.70

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	F	502	GOL	O1-C1-C2-O2
3	F	502	GOL	O1-C1-C2-C3
3	F	502	GOL	C1-C2-C3-O3
2	A	602	EDO	O1-C1-C2-O2
2	B	503	EDO	O1-C1-C2-O2
2	C	502	EDO	O1-C1-C2-O2
2	C	505	EDO	O1-C1-C2-O2
2	D	502	EDO	O1-C1-C2-O2
2	E	502	EDO	O1-C1-C2-O2
2	E	504	EDO	O1-C1-C2-O2
2	F	501	EDO	O1-C1-C2-O2
2	A	607	EDO	O1-C1-C2-O2
2	B	504	EDO	O1-C1-C2-O2
2	C	509	EDO	O1-C1-C2-O2
2	D	503	EDO	O1-C1-C2-O2
2	D	505	EDO	O1-C1-C2-O2
2	C	503	EDO	O1-C1-C2-O2
2	C	504	EDO	O1-C1-C2-O2
2	E	503	EDO	O1-C1-C2-O2
2	A	609	EDO	O1-C1-C2-O2
2	E	501	EDO	O1-C1-C2-O2
3	F	502	GOL	O2-C2-C3-O3
2	D	501	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
2	C	507	EDO	O1-C1-C2-O2
2	A	604	EDO	O1-C1-C2-O2
2	A	605	EDO	O1-C1-C2-O2
2	C	501	EDO	O1-C1-C2-O2
2	B	505	EDO	O1-C1-C2-O2

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	502	GOL	1	0
2	C	503	EDO	2	0
2	B	501	EDO	1	0
2	B	504	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

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	443/448 (98%)	0.28	16 (3%) 42 39	26, 49, 87, 132	0
1	B	444/448 (99%)	0.18	11 (2%) 57 53	28, 51, 91, 129	0
1	C	443/448 (98%)	0.08	7 (1%) 72 69	19, 46, 87, 122	0
1	D	443/448 (98%)	0.19	12 (2%) 54 50	30, 52, 86, 129	0
1	E	444/448 (99%)	0.21	18 (4%) 37 34	25, 49, 85, 141	0
1	F	445/448 (99%)	0.09	8 (1%) 68 64	30, 47, 81, 163	0
All	All	2662/2688 (99%)	0.17	72 (2%) 54 50	19, 49, 87, 163	0

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	308	TYR	9.4
1	A	308	TYR	8.6
1	F	67	GLY	8.2
1	E	308	TYR	7.4
1	E	378	PHE	6.7
1	A	378	PHE	6.3
1	B	379	ALA	6.0
1	C	378	PHE	6.0
1	B	308	TYR	5.9
1	C	379	ALA	5.3
1	C	308	TYR	5.1
1	B	2	SER	4.6
1	A	379	ALA	4.3
1	E	375	ARG	4.2
1	C	39	ALA	4.1
1	B	378	PHE	4.1
1	F	309	GLU	3.9
1	A	183	ASN	3.9
1	A	375	ARG	3.9

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Mol	Chain	Res	Type	RSRZ
1	E	379	ALA	3.7
1	D	378	PHE	3.7
1	D	1	MET	3.6
1	F	308	TYR	3.5
1	E	390	ILE	3.4
1	E	309	GLU	3.4
1	E	377	ILE	3.4
1	D	387	GLU	3.4
1	A	41	GLU	3.3
1	E	18	PHE	3.3
1	B	183	ASN	3.3
1	E	40	GLY	3.2
1	B	377	ILE	3.1
1	F	70	GLU	3.0
1	F	378	PHE	3.0
1	A	105	LYS	3.0
1	D	316	TRP	2.9
1	D	217[A]	ILE	2.9
1	E	376	ASN	2.9
1	D	7	VAL	2.8
1	E	321	ARG	2.8
1	D	309	GLU	2.7
1	E	66	VAL	2.6
1	C	331	ARG	2.6
1	A	2	SER	2.5
1	B	56	TYR	2.5
1	A	309	GLU	2.5
1	E	319	SER	2.5
1	D	375	ARG	2.4
1	E	387	GLU	2.4
1	F	74	MET	2.4
1	C	387	GLU	2.4
1	F	375	ARG	2.4
1	F	183	ASN	2.3
1	E	1	MET	2.3
1	B	309	GLU	2.3
1	A	204	PHE	2.3
1	B	388	LEU	2.2
1	A	133	PHE	2.2
1	B	66	VAL	2.2
1	D	179	PHE	2.2
1	A	39	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	323	ALA	2.1
1	A	18	PHE	2.1
1	B	21	PHE	2.1
1	A	56	TYR	2.1
1	D	11	VAL	2.1
1	E	35	PHE	2.1
1	E	329	ALA	2.0
1	D	72	ASP	2.0
1	E	188	VAL	2.0
1	A	128	PHE	2.0
1	C	336	ARG	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
2	EDO	A	604	4/4	0.70	0.32	38,47,57,80	0
2	EDO	B	503	4/4	0.74	0.40	45,49,49,58	0
2	EDO	B	506	4/4	0.74	0.19	53,53,54,56	0
2	EDO	A	606	4/4	0.76	0.36	40,53,56,61	0
2	EDO	B	507	4/4	0.77	0.29	36,37,48,54	0
2	EDO	F	503	4/4	0.77	0.22	38,47,52,75	0
2	EDO	C	509	4/4	0.79	0.15	41,44,50,53	0
2	EDO	C	501	4/4	0.79	0.14	34,51,56,57	0
2	EDO	E	503	4/4	0.80	0.21	33,34,46,54	0
2	EDO	A	602	4/4	0.80	0.34	50,56,57,58	0
2	EDO	C	508	4/4	0.81	0.14	39,46,46,62	0
3	GOL	F	502	6/6	0.81	0.15	43,51,65,66	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	EDO	B	501	4/4	0.83	0.25	37,40,40,52	0
2	EDO	E	502	4/4	0.83	0.34	43,47,51,59	0
2	EDO	C	504	4/4	0.83	0.18	36,42,47,49	0
2	EDO	C	505	4/4	0.83	0.25	45,47,52,57	0
2	EDO	B	504	4/4	0.83	0.19	25,32,35,53	0
2	EDO	D	502	4/4	0.84	0.54	43,53,60,63	0
2	EDO	E	501	4/4	0.84	0.16	34,36,39,43	0
2	EDO	A	607	4/4	0.84	0.43	35,38,43,47	0
2	EDO	C	507	4/4	0.84	0.31	25,29,31,38	0
2	EDO	F	501	4/4	0.84	0.15	31,33,42,47	0
2	EDO	A	609	4/4	0.84	0.27	48,51,57,63	0
2	EDO	A	603	4/4	0.84	0.14	44,51,52,55	0
2	EDO	A	605	4/4	0.85	0.16	42,49,52,59	0
2	EDO	D	505	4/4	0.85	0.13	51,57,64,68	0
2	EDO	E	504	4/4	0.87	0.15	48,58,59,64	0
2	EDO	C	502	4/4	0.88	0.29	31,36,37,42	0
2	EDO	D	504	4/4	0.89	0.34	30,39,50,51	0
2	EDO	B	505	4/4	0.90	0.24	31,35,38,49	0
3	GOL	B	502	6/6	0.90	0.18	35,41,43,56	0
2	EDO	A	608	4/4	0.90	0.37	27,38,39,49	0
2	EDO	D	501	4/4	0.92	0.48	35,42,43,56	0
2	EDO	C	506	4/4	0.92	0.20	21,24,30,43	0
2	EDO	C	503	4/4	0.92	0.25	27,27,29,41	0
4	NA	E	505	1/1	0.93	0.16	46,46,46,46	0
2	EDO	D	503	4/4	0.95	0.26	19,34,44,45	0
4	NA	D	506	1/1	0.95	0.09	30,30,30,30	0
2	EDO	A	601	4/4	0.95	0.18	33,41,42,43	0

6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.