



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 5, 2023 – 11:24 AM EST

PDB ID : 4ZUL
Title : Structure ALDH7A1 complexed with alpha-aminoadipate
Authors : Luo, M.; Tanner, J.J.
Deposited on : 2015-05-16
Resolution : 1.76 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 : 1.8.5 (274361), 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

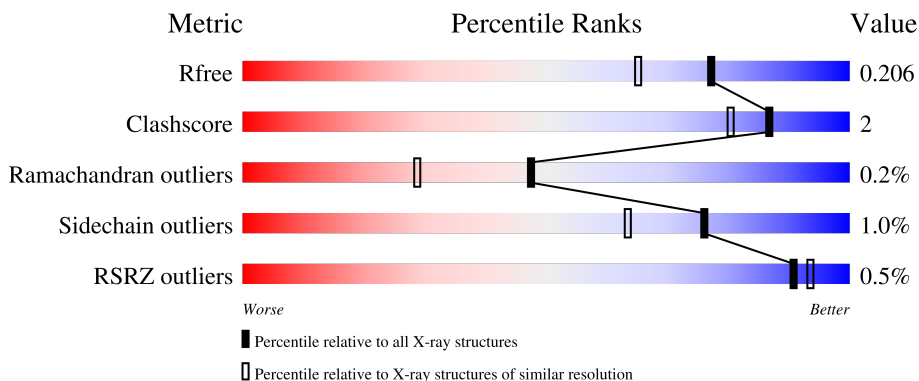
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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}	130704	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (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	513	95% . .
1	B	513	93% 6% .
1	C	513	93% 6% .
1	D	513	93% 6% .
1	E	513	91% 8% .

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Mol	Chain	Length	Quality of chain
1	F	513	 92% 7% •
1	G	513	 91% 8% •
1	H	513	 93% 6% •

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 32645 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 Alpha-aminoadipic semialdehyde dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	509	3834	2440	664	712	18	0	3	0
1	B	509	3815	2431	665	701	18	0	4	0
1	C	508	3824	2436	663	706	19	0	2	0
1	D	509	3795	2416	656	705	18	0	1	0
1	E	508	3821	2435	665	703	18	0	1	0
1	F	509	3831	2438	666	709	18	0	2	0
1	G	509	3814	2428	662	706	18	0	2	0
1	H	509	3828	2435	662	713	18	0	2	0

There are 16 discrepancies between the modelled and reference sequences:

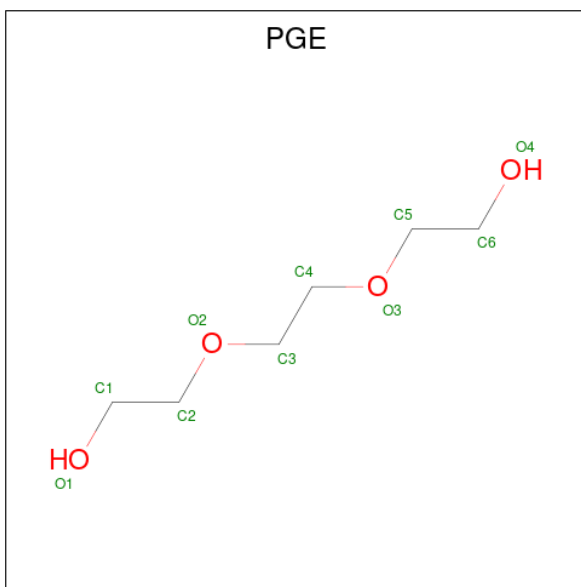
Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP P49419
A	0	HIS	-	expression tag	UNP P49419
B	-1	GLY	-	expression tag	UNP P49419
B	0	HIS	-	expression tag	UNP P49419
C	-1	GLY	-	expression tag	UNP P49419
C	0	HIS	-	expression tag	UNP P49419
D	-1	GLY	-	expression tag	UNP P49419
D	0	HIS	-	expression tag	UNP P49419
E	-1	GLY	-	expression tag	UNP P49419
E	0	HIS	-	expression tag	UNP P49419
F	-1	GLY	-	expression tag	UNP P49419
F	0	HIS	-	expression tag	UNP P49419
G	-1	GLY	-	expression tag	UNP P49419

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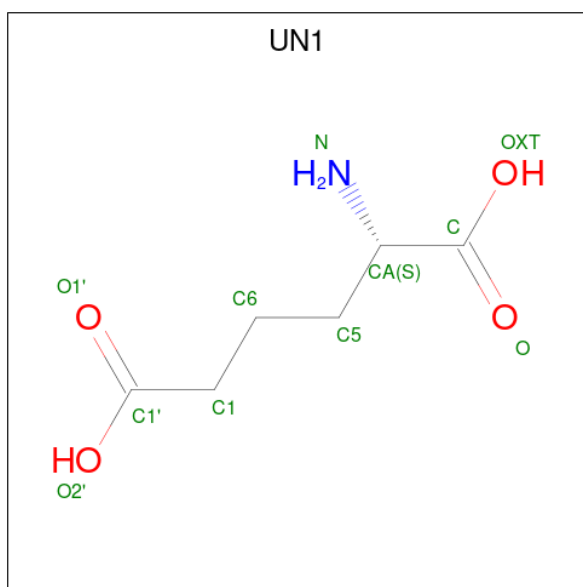
Chain	Residue	Modelled	Actual	Comment	Reference
G	0	HIS	-	expression tag	UNP P49419
H	-1	GLY	-	expression tag	UNP P49419
H	0	HIS	-	expression tag	UNP P49419

- Molecule 2 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: C₆H₁₄O₄).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 10 6 4	0	0
2	B	1	Total C O 10 6 4	0	0
2	C	1	Total C O 10 6 4	0	0
2	D	1	Total C O 10 6 4	0	0
2	F	1	Total C O 10 6 4	0	0
2	G	1	Total C O 10 6 4	0	0
2	H	1	Total C O 10 6 4	0	0

- Molecule 3 is 2-AMINOHEXANEDIOIC ACID (three-letter code: UN1) (formula: C₆H₁₁NO₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	11	6	1	4	0	0
3	B	1	11	6	1	4	0	0
3	C	1	11	6	1	4	0	0
3	D	1	11	6	1	4	0	0
3	E	1	11	6	1	4	0	0
3	F	1	11	6	1	4	0	0
3	G	1	11	6	1	4	0	0
3	H	1	11	6	1	4	0	0

- Molecule 4 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: C₈H₁₈O₅).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	E	1	Total C O 13 8 5	0	0
4	H	1	Total C O 13 8 5	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	225	Total O 225 225	0	0
5	B	249	Total O 249 249	0	0
5	C	252	Total O 252 252	0	0
5	D	214	Total O 214 214	0	0
5	E	249	Total O 249 249	0	0
5	F	243	Total O 243 243	0	0
5	G	239	Total O 239 239	0	0
5	H	228	Total O 228 228	0	0

3 Residue-property plots

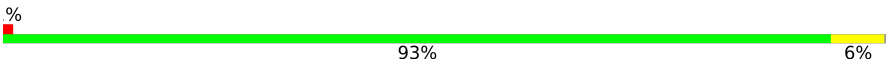
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

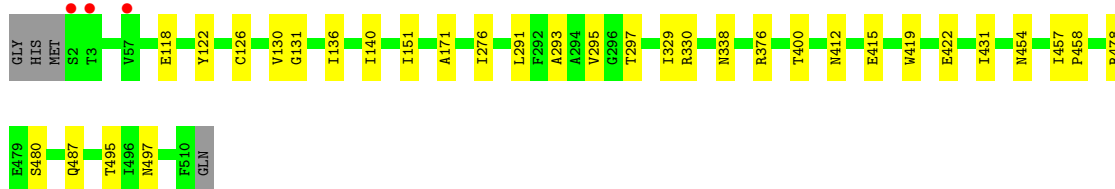
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain A:  95%



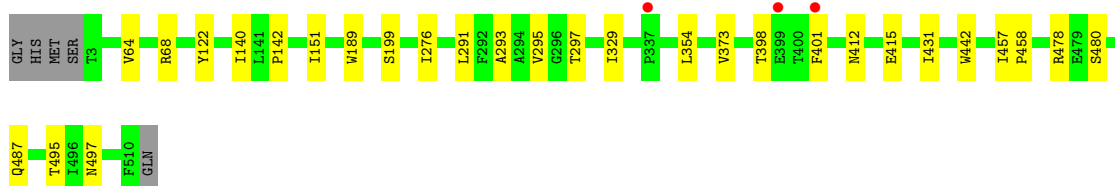
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain B:  93% 6%

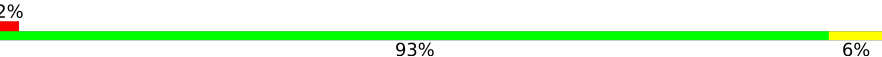


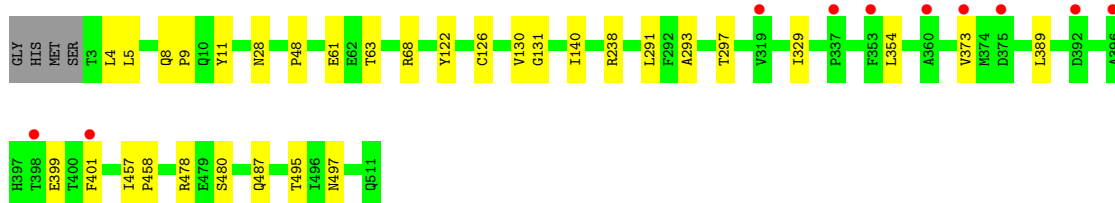
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain C:  93% 6%



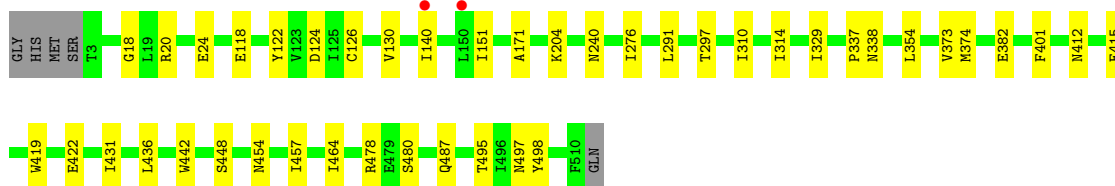
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain D:  93% 6%



- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain E:  91% 8%



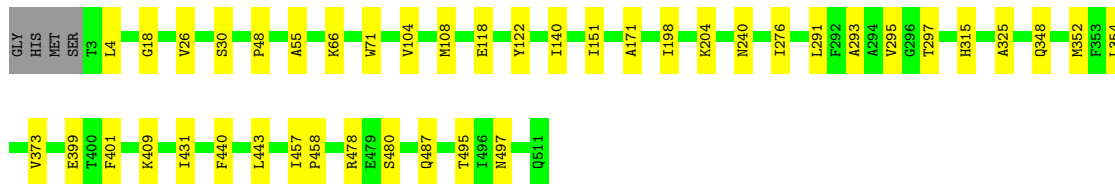
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain F:  92% 7%



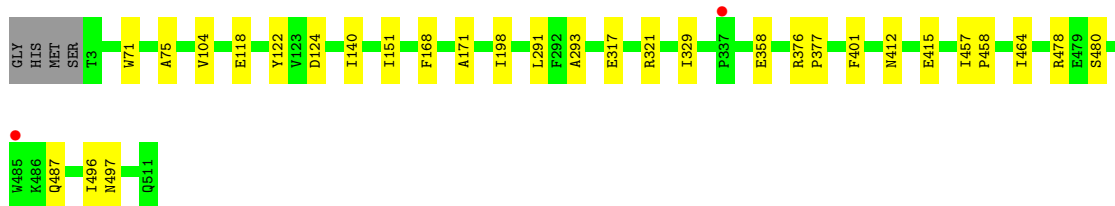
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain G:  91% 8%



- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

Chain H:  93% 6%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	154.43Å 162.53Å 158.68Å 90.00° 95.04° 90.00°	Depositor
Resolution (Å)	41.79 – 1.76 47.05 – 1.76	Depositor EDS
% Data completeness (in resolution range)	99.3 (41.79-1.76) 99.4 (47.05-1.76)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.20 (at 1.76Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.168 , 0.206 0.169 , 0.206	Depositor DCC
R_{free} test set	19260 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	20.3	Xtrriage
Anisotropy	0.515	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 50.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.26$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	32645	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.38% 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: UN1, PGE, PG4

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	0.34	0/3924	0.50	0/5331
1	B	0.34	0/3905	0.49	0/5307
1	C	0.35	0/3910	0.50	0/5310
1	D	0.32	0/3878	0.48	0/5275
1	E	0.35	0/3904	0.50	0/5300
1	F	0.34	0/3918	0.49	0/5320
1	G	0.34	0/3897	0.49	0/5296
1	H	0.33	0/3914	0.50	0/5319
All	All	0.34	0/31250	0.49	0/42458

There are no bond length outliers.

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	3834	0	3800	16	0
1	B	3815	0	3774	21	0
1	C	3824	0	3797	18	0
1	D	3795	0	3728	18	0
1	E	3821	0	3807	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3831	0	3802	19	0
1	G	3814	0	3766	23	0
1	H	3828	0	3784	18	0
2	A	10	0	14	4	0
2	B	10	0	14	0	0
2	C	10	0	14	0	0
2	D	10	0	14	1	0
2	F	10	0	14	0	0
2	G	10	0	14	3	0
2	H	10	0	14	0	0
3	A	11	0	4	0	0
3	B	11	0	4	0	0
3	C	11	0	4	0	0
3	D	11	0	4	0	0
3	E	11	0	4	0	0
3	F	11	0	4	0	0
3	G	11	0	4	0	0
3	H	11	0	4	1	0
4	E	13	0	18	1	0
4	H	13	0	18	0	0
5	A	225	0	0	2	0
5	B	249	0	0	0	0
5	C	252	0	0	1	0
5	D	214	0	0	1	0
5	E	249	0	0	0	0
5	F	243	0	0	0	0
5	G	239	0	0	0	0
5	H	228	0	0	0	0
All	All	32645	0	30424	131	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 2.

All (131) 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:A:240:ASN:HD21	2:A:601:PGE:H1	1.51	0.75
1:H:376[B]:ARG:HH21	1:H:376[B]:ARG:HG3	1.53	0.74
1:G:478:ARG:O	1:G:487:GLN:NE2	2.21	0.71
1:C:478:ARG:O	1:C:487:GLN:NE2	2.23	0.71
1:B:376[B]:ARG:HH21	1:B:376[B]:ARG:HG3	1.55	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:291:LEU:HD11	1:F:329:ILE:HD11	1.72	0.70
1:A:478:ARG:O	1:A:487:GLN:NE2	2.25	0.69
1:D:478:ARG:O	1:D:487:GLN:NE2	2.27	0.66
1:E:18:GLY:O	1:E:204:LYS:NZ	2.28	0.66
1:E:20:ARG:NH2	1:E:24:GLU:OE1	2.25	0.66
1:F:118:GLU:HG3	1:F:171:ALA:HB2	1.78	0.66
1:C:354:LEU:HD21	1:C:373:VAL:HG23	1.78	0.65
1:H:118:GLU:HG3	1:H:171:ALA:HB2	1.78	0.64
1:B:478:ARG:O	1:B:487:GLN:NE2	2.30	0.63
1:H:317:GLU:OE2	1:H:321:ARG:NH2	2.33	0.62
1:A:68:ARG:HH22	2:A:601:PGE:H12	1.63	0.62
1:E:478:ARG:O	1:E:487:GLN:NE2	2.32	0.62
1:H:376[B]:ARG:NH2	1:H:377:PRO:O	2.34	0.61
1:F:478:ARG:O	1:F:487:GLN:NE2	2.34	0.61
1:D:291:LEU:HD11	1:D:329:ILE:HD11	1.82	0.60
1:G:118:GLU:HG3	1:G:171:ALA:HB2	1.84	0.60
1:C:412:ASN:ND2	5:C:703:HOH:O	2.36	0.57
1:A:264:ARG:NH2	5:A:703:HOH:O	2.37	0.57
5:A:910:HOH:O	1:F:38:ILE:HD11	2.05	0.56
1:A:151:ILE:HB	1:D:140:ILE:HD11	1.88	0.56
1:B:291:LEU:HD11	1:B:329:ILE:HD11	1.86	0.56
1:A:293:ALA:HB2	1:A:458:PRO:HB3	1.88	0.55
1:B:293:ALA:HB2	1:B:458:PRO:HB3	1.89	0.55
1:H:478:ARG:O	1:H:487:GLN:NE2	2.36	0.55
1:F:354:LEU:HD21	1:F:373:VAL:HG23	1.88	0.54
1:G:348:GLN:O	1:G:352:MET:HG3	2.08	0.53
1:A:457:ILE:HD11	1:B:495:THR:HB	1.90	0.53
1:F:293:ALA:HB2	1:F:458:PRO:HB3	1.89	0.53
1:A:68:ARG:NH2	2:A:601:PGE:H12	2.23	0.53
1:C:457:ILE:HG23	1:D:497:ASN:HB2	1.91	0.53
1:H:104:VAL:HA	1:H:198:ILE:HD11	1.91	0.53
1:D:354:LEU:HD21	1:D:373:VAL:HG23	1.90	0.53
1:C:495:THR:HB	1:D:457:ILE:HD11	1.90	0.52
1:E:140:ILE:HD11	1:H:151:ILE:HB	1.90	0.52
1:E:495:THR:HB	1:F:457:ILE:HD11	1.91	0.52
1:A:431:ILE:HG23	1:A:442:TRP:CE2	2.45	0.52
1:B:412:ASN:O	1:B:415:GLU:HG2	2.11	0.51
1:G:293:ALA:HB2	1:G:458:PRO:HB3	1.92	0.51
1:H:293:ALA:HB2	1:H:458:PRO:HB3	1.92	0.50
1:E:151:ILE:HB	1:H:140:ILE:HD11	1.93	0.50
1:B:136:ILE:O	1:C:142:PRO:HD3	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:118:GLU:HG3	1:B:171:ALA:HB2	1.93	0.50
1:E:457:ILE:HD11	1:F:495:THR:HB	1.93	0.50
1:B:376[B]:ARG:HH21	1:B:376[B]:ARG:CG	2.23	0.50
1:G:18:GLY:O	1:G:204:LYS:NZ	2.40	0.50
1:E:291:LEU:HD11	1:E:329:ILE:HD11	1.93	0.49
1:E:457:ILE:HG23	1:F:497:ASN:HB2	1.93	0.49
1:E:354:LEU:HD21	1:E:373:VAL:HG23	1.93	0.49
1:D:61:GLU:OE2	1:D:238:ARG:NH1	2.43	0.49
1:D:68:ARG:CZ	2:D:601:PGE:H2	2.42	0.49
1:F:61:GLU:OE1	1:F:238:ARG:NH2	2.37	0.49
1:C:64:VAL:O	1:C:68:ARG:HG2	2.13	0.49
1:E:412:ASN:O	1:E:415:GLU:HG2	2.12	0.49
1:G:240:ASN:HD21	2:G:601:PGE:H52	1.78	0.48
1:A:495:THR:HB	1:B:457:ILE:HD11	1.96	0.48
1:G:457:ILE:HG23	1:H:497:ASN:HB2	1.94	0.48
1:D:293:ALA:HB2	1:D:458:PRO:HB3	1.95	0.48
1:C:457:ILE:HD11	1:D:495:THR:HB	1.96	0.48
1:C:293:ALA:HB2	1:C:458:PRO:HB3	1.94	0.48
1:E:454:ASN:HB3	1:E:457:ILE:HG13	1.96	0.48
1:G:276:ILE:HB	1:G:431:ILE:HG22	1.96	0.48
1:F:276:ILE:HB	1:F:431:ILE:HG22	1.95	0.47
1:F:419:TRP:O	1:F:422:GLU:HG2	2.14	0.47
1:A:291:LEU:O	1:A:295:VAL:HG22	2.15	0.47
1:E:310:ILE:HG22	1:E:314:ILE:HG13	1.97	0.47
1:G:4:LEU:HD23	1:G:48:PRO:HB2	1.97	0.47
1:B:151:ILE:HB	1:C:140:ILE:HD11	1.95	0.47
1:G:291:LEU:HD22	1:G:325:ALA:HB1	1.97	0.47
1:C:291:LEU:O	1:C:295:VAL:HG22	2.15	0.46
1:B:330:ARG:HD3	1:B:338:ASN:O	2.15	0.46
1:A:240:ASN:HD21	2:A:601:PGE:C1	2.24	0.45
1:D:4:LEU:HD23	1:D:48:PRO:HB2	1.98	0.45
1:B:276:ILE:HB	1:B:431:ILE:HG22	1.99	0.45
1:F:140:ILE:HD11	1:G:151:ILE:HB	1.99	0.45
1:G:71:TRP:CE3	2:G:601:PGE:H2	2.52	0.45
1:G:354:LEU:HD21	1:G:373:VAL:HG23	1.98	0.45
1:A:497:ASN:HB2	1:B:457:ILE:HG23	1.99	0.45
1:A:291:LEU:HD22	1:A:325:ALA:HB1	1.99	0.45
1:F:18:GLY:O	1:F:204:LYS:NZ	2.47	0.44
1:G:291:LEU:O	1:G:295:VAL:HG22	2.17	0.44
1:G:443:LEU:HD11	1:H:496:ILE:HD11	1.98	0.44
1:H:168:PHE:CE1	3:H:603:UN1:H6C2	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:28:ASN:HB3	1:D:63:THR:HG23	2.00	0.44
1:D:126:CYS:O	1:D:130:VAL:HG23	2.17	0.44
1:F:412:ASN:O	1:F:415:GLU:HG2	2.18	0.44
1:A:457:ILE:HG23	1:B:497:ASN:HB2	1.99	0.44
1:E:126:CYS:O	1:E:130:VAL:HG23	2.18	0.44
1:G:495:THR:HB	1:H:457:ILE:HD11	1.99	0.44
1:A:126:CYS:O	1:A:130:VAL:HG23	2.18	0.44
1:G:104:VAL:HA	1:G:198:ILE:HD11	2.00	0.44
1:E:118:GLU:HG3	1:E:171:ALA:HB2	2.00	0.43
1:B:291:LEU:O	1:B:295:VAL:HG22	2.18	0.43
1:E:497:ASN:HB2	1:F:457:ILE:HG23	2.00	0.43
1:H:124:ASP:HB3	1:H:464:ILE:HG12	1.99	0.43
1:F:442:TRP:CH2	1:F:448:SER:HB2	2.54	0.43
1:E:419:TRP:O	1:E:422:GLU:HG2	2.19	0.43
1:B:131:GLY:HA3	1:D:131:GLY:HA3	2.01	0.42
1:E:442:TRP:CH2	1:E:448:SER:HB2	2.54	0.42
1:C:497:ASN:HB2	1:D:457:ILE:HG23	2.00	0.42
1:D:5:LEU:HD22	1:D:11:TYR:CE2	2.55	0.42
1:C:291:LEU:HD11	1:C:329:ILE:HD11	2.00	0.42
1:B:126:CYS:O	1:B:130:VAL:HG23	2.20	0.42
1:F:151:ILE:HB	1:G:140:ILE:HD11	2.02	0.42
1:E:240:ASN:HD21	4:E:601:PG4:H22	1.84	0.42
1:G:497:ASN:HB2	1:H:457:ILE:HG23	2.01	0.42
1:C:431:ILE:HG23	1:C:442:TRP:CE2	2.54	0.41
1:C:276:ILE:HB	1:C:431:ILE:HG22	2.01	0.41
1:E:276:ILE:HB	1:E:431:ILE:HG22	2.02	0.41
1:D:8:GLN:HA	1:D:9:PRO:HD3	1.93	0.41
1:E:337:PRO:O	1:E:338:ASN:HB3	2.21	0.41
1:B:419:TRP:O	1:B:422:GLU:HG2	2.20	0.41
1:D:389:LEU:HB2	5:D:748:HOH:O	2.21	0.41
1:C:412:ASN:O	1:C:415:GLU:HG2	2.20	0.41
1:H:412:ASN:O	1:H:415:GLU:HG2	2.21	0.41
1:G:240:ASN:HD21	2:G:601:PGE:C5	2.34	0.41
1:B:454:ASN:HB3	1:B:457:ILE:HG13	2.01	0.41
1:B:140:ILE:HD11	1:C:151:ILE:HB	2.03	0.41
1:G:26:VAL:HG22	1:G:55:ALA:HB2	2.02	0.41
1:H:71:TRP:CE2	1:H:75:ALA:HB2	2.56	0.41
1:E:498:TYR:CD2	1:G:440:PHE:HB2	2.55	0.40
1:F:4:LEU:HD23	1:F:48:PRO:HB2	2.02	0.40
1:H:291:LEU:HD11	1:H:329:ILE:HD11	2.02	0.40
1:E:124:ASP:HB3	1:E:464:ILE:HG12	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:374:MET:HE3	1:E:382:GLU:HA	2.02	0.40
1:G:315:HIS:CD2	1:G:409:LYS:HG2	2.56	0.40
1:C:189:TRP:CH2	1:C:199:SER:HA	2.57	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	510/513 (99%)	496 (97%)	13 (2%)	1 (0%)	47 29
1	B	511/513 (100%)	496 (97%)	14 (3%)	1 (0%)	47 29
1	C	508/513 (99%)	492 (97%)	15 (3%)	1 (0%)	47 29
1	D	508/513 (99%)	489 (96%)	17 (3%)	2 (0%)	34 17
1	E	507/513 (99%)	492 (97%)	14 (3%)	1 (0%)	47 29
1	F	509/513 (99%)	496 (97%)	12 (2%)	1 (0%)	47 29
1	G	509/513 (99%)	493 (97%)	14 (3%)	2 (0%)	34 17
1	H	509/513 (99%)	494 (97%)	14 (3%)	1 (0%)	47 29
All	All	4071/4104 (99%)	3948 (97%)	113 (3%)	10 (0%)	47 29

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	480	SER
1	C	480	SER
1	D	480	SER
1	E	480	SER
1	F	480	SER
1	G	480	SER
1	H	480	SER

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Mol	Chain	Res	Type
1	A	480	SER
1	D	399	GLU
1	G	399	GLU

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	395/410 (96%)	391 (99%)	4 (1%)	76	63
1	B	388/410 (95%)	385 (99%)	3 (1%)	81	72
1	C	392/410 (96%)	388 (99%)	4 (1%)	76	63
1	D	385/410 (94%)	382 (99%)	3 (1%)	81	72
1	E	392/410 (96%)	388 (99%)	4 (1%)	76	63
1	F	394/410 (96%)	390 (99%)	4 (1%)	76	63
1	G	389/410 (95%)	383 (98%)	6 (2%)	65	49
1	H	393/410 (96%)	390 (99%)	3 (1%)	81	72
All	All	3128/3280 (95%)	3097 (99%)	31 (1%)	76	63

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

Mol	Chain	Res	Type
1	A	108	MET
1	A	122	TYR
1	A	297	THR
1	A	401	PHE
1	B	122	TYR
1	B	297	THR
1	B	400	THR
1	C	122	TYR
1	C	297	THR
1	C	398	THR
1	C	401	PHE
1	D	122	TYR

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Mol	Chain	Res	Type
1	D	297	THR
1	D	401	PHE
1	E	122	TYR
1	E	297	THR
1	E	401	PHE
1	E	436	LEU
1	F	47	GLU
1	F	108	MET
1	F	122	TYR
1	F	295	VAL
1	G	30	SER
1	G	66	LYS
1	G	108	MET
1	G	122	TYR
1	G	297	THR
1	G	401	PHE
1	H	122	TYR
1	H	358	GLU
1	H	401	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	10	GLN
1	C	46	ASN
1	C	379	ASN
1	C	412	ASN
1	F	338	ASN

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

17 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	PGE	H	602	-	9,9,9	0.64	0	8,8,8	0.67	0
3	UN1	B	602	-	9,10,10	0.91	0	11,12,12	1.07	0
3	UN1	A	602	-	9,10,10	0.92	0	11,12,12	1.03	0
2	PGE	A	601	-	9,9,9	0.37	0	8,8,8	0.48	0
3	UN1	C	602	-	9,10,10	0.92	0	11,12,12	1.05	0
3	UN1	E	602	-	9,10,10	0.97	0	11,12,12	1.00	0
3	UN1	H	603	-	9,10,10	0.95	0	11,12,12	0.99	0
4	PG4	H	601	-	12,12,12	0.70	0	11,11,11	0.74	0
3	UN1	D	602	-	9,10,10	0.93	0	11,12,12	1.00	0
3	UN1	G	602	-	9,10,10	0.88	0	11,12,12	1.02	0
3	UN1	F	602	-	9,10,10	0.92	0	11,12,12	1.01	0
2	PGE	D	601	-	9,9,9	0.34	0	8,8,8	0.34	0
2	PGE	B	601	-	9,9,9	0.28	0	8,8,8	0.40	0
2	PGE	F	601	-	9,9,9	0.30	0	8,8,8	0.36	0
2	PGE	C	601	-	9,9,9	0.30	0	8,8,8	0.37	0
2	PGE	G	601	-	9,9,9	0.31	0	8,8,8	0.34	0
4	PG4	E	601	-	12,12,12	0.68	0	11,11,11	0.73	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	PGE	H	602	-	-	1/7/7/7	-
3	UN1	B	602	-	-	2/10/10/10	-
3	UN1	A	602	-	-	4/10/10/10	-
2	PGE	A	601	-	-	2/7/7/7	-
3	UN1	C	602	-	-	2/10/10/10	-
3	UN1	E	602	-	-	2/10/10/10	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	UN1	H	603	-	-	1/10/10/10	-
4	PG4	H	601	-	-	2/10/10/10	-
3	UN1	D	602	-	-	3/10/10/10	-
3	UN1	G	602	-	-	2/10/10/10	-
3	UN1	F	602	-	-	2/10/10/10	-
2	PGE	D	601	-	-	4/7/7/7	-
2	PGE	B	601	-	-	0/7/7/7	-
2	PGE	F	601	-	-	0/7/7/7	-
2	PGE	C	601	-	-	3/7/7/7	-
2	PGE	G	601	-	-	2/7/7/7	-
4	PG4	E	601	-	-	0/10/10/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (32) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	601	PGE	O2-C3-C4-O3
2	D	601	PGE	O2-C3-C4-O3
2	G	601	PGE	O1-C1-C2-O2
2	D	601	PGE	O1-C1-C2-O2
2	D	601	PGE	O3-C5-C6-O4
2	H	602	PGE	O3-C5-C6-O4
3	F	602	UN1	OXT-C-CA-N
3	C	602	UN1	O-C-CA-N
3	E	602	UN1	O-C-CA-N
3	F	602	UN1	O-C-CA-N
2	D	601	PGE	C4-C3-O2-C2
2	C	601	PGE	C3-C4-O3-C5
4	H	601	PG4	C8-C7-O4-C6
2	G	601	PGE	C6-C5-O3-C4
2	C	601	PGE	C6-C5-O3-C4
2	A	601	PGE	O1-C1-C2-O2
3	A	602	UN1	O-C-CA-N
3	B	602	UN1	O-C-CA-N
3	G	602	UN1	O-C-CA-N
2	A	601	PGE	C1-C2-O2-C3
4	H	601	PG4	C5-C6-O4-C7

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Mol	Chain	Res	Type	Atoms
3	C	602	UN1	OXT-C-CA-N
3	E	602	UN1	OXT-C-CA-N
3	A	602	UN1	C6-C1-C1'-O2'
3	D	602	UN1	C6-C1-C1'-O2'
3	B	602	UN1	OXT-C-CA-N
3	D	602	UN1	OXT-C-CA-N
3	G	602	UN1	OXT-C-CA-N
3	A	602	UN1	C6-C1-C1'-O1'
3	A	602	UN1	OXT-C-CA-N
3	D	602	UN1	C6-C1-C1'-O1'
3	H	603	UN1	OXT-C-CA-N

There are no ring outliers.

5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	PGE	4	0
3	H	603	UN1	1	0
2	D	601	PGE	1	0
2	G	601	PGE	3	0
4	E	601	PG4	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	509/513 (99%)	-0.17	1 (0%) 95 96	14, 24, 38, 51	0
1	B	509/513 (99%)	-0.24	3 (0%) 89 92	15, 21, 37, 54	0
1	C	508/513 (99%)	-0.20	3 (0%) 89 92	14, 21, 35, 54	0
1	D	509/513 (99%)	0.02	10 (1%) 65 72	12, 25, 47, 58	0
1	E	508/513 (99%)	-0.27	2 (0%) 92 94	15, 21, 33, 44	0
1	F	509/513 (99%)	-0.14	1 (0%) 95 96	15, 22, 37, 51	0
1	G	509/513 (99%)	-0.21	0 100 100	15, 23, 34, 54	0
1	H	509/513 (99%)	-0.14	2 (0%) 92 94	14, 23, 40, 53	0
All	All	4070/4104 (99%)	-0.17	22 (0%) 91 93	12, 22, 39, 58	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2	SER	6.4
1	D	398	THR	3.4
1	D	360	ALA	3.3
1	D	401	PHE	3.0
1	D	375	ASP	2.9
1	C	337	PRO	2.8
1	D	396	ALA	2.8
1	C	399	GLU	2.6
1	D	373	VAL	2.4
1	F	2	SER	2.4
1	C	401	PHE	2.3
1	D	353	PHE	2.3
1	A	9	PRO	2.2
1	B	57	VAL	2.2
1	B	3	THR	2.2
1	E	150	LEU	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	319	VAL	2.1
1	H	337	PRO	2.1
1	E	140	ILE	2.1
1	H	485	TRP	2.0
1	D	337	PRO	2.0
1	D	392	ASP	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	PGE	G	601	10/10	0.84	0.16	33,39,41,42	0
4	PG4	E	601	13/13	0.86	0.15	29,35,44,45	0
2	PGE	C	601	10/10	0.87	0.13	28,34,40,42	0
2	PGE	D	601	10/10	0.87	0.12	27,36,40,41	0
3	UN1	E	602	11/11	0.88	0.14	23,31,35,36	0
3	UN1	D	602	11/11	0.89	0.13	26,28,46,50	0
2	PGE	F	601	10/10	0.91	0.11	26,29,32,33	0
2	PGE	A	601	10/10	0.91	0.12	30,34,40,42	0
3	UN1	H	603	11/11	0.91	0.10	24,30,37,45	0
2	PGE	H	602	10/10	0.91	0.13	35,40,46,51	0
3	UN1	C	602	11/11	0.92	0.10	21,23,35,36	0
3	UN1	F	602	11/11	0.92	0.12	26,28,33,38	0
2	PGE	B	601	10/10	0.93	0.11	28,32,37,38	0
3	UN1	A	602	11/11	0.93	0.11	25,35,43,46	0
3	UN1	B	602	11/11	0.93	0.12	20,25,37,39	0
3	UN1	G	602	11/11	0.94	0.12	24,29,35,39	0
4	PG4	H	601	13/13	0.94	0.11	29,32,43,45	0

6.5 Other polymers [i](#)

There are no such residues in this entry.