wwPDB X-ray Structure Validation Summary Report (i)

Mar 6, 2026 – 05:39 AM UTC

PDB ID	:	1ZQ1 / pdb_00001zq1
Title	:	Structure of GatDE tRNA-Dependent Amidotransferase from Pyrococcus abyssi
Authors	:	Schmitt, E.; Panvert, M.; Blanquet, S.; Mechulam, Y.
Deposited on	:	2005-05-18
Resolution	:	3.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

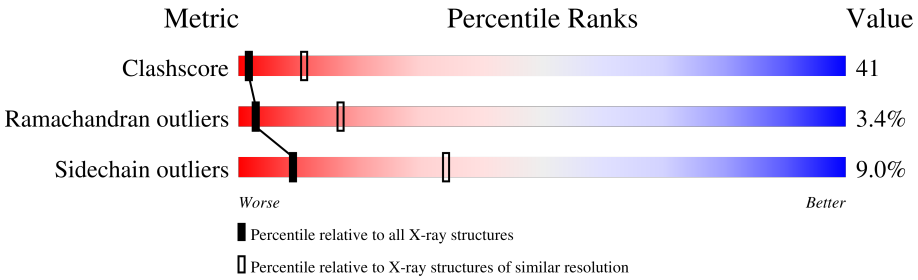
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	438	38% 50% 11%
1	B	438	37% 51% 11%
2	C	633	36% 38% 6% 20%
2	D	633	34% 40% 5% 20%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	ASP	A	1000	-	-	X	-

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 14869 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 Glutamyl-tRNA(Gln) amidotransferase subunit D.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	437	Total	C	N	O	S	Se	0	0	0
			3406	2159	578	650	5	14			
1	B	437	Total	C	N	O	S	Se	0	0	0
			3406	2162	575	650	5	14			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	MET	modified residue	UNP Q9V0T9
A	36	MSE	MET	modified residue	UNP Q9V0T9
A	127	LEU	VAL	conflict	UNP Q9V0T9
A	149	MSE	MET	modified residue	UNP Q9V0T9
A	181	MSE	MET	modified residue	UNP Q9V0T9
A	191	MSE	MET	modified residue	UNP Q9V0T9
A	217	MSE	MET	modified residue	UNP Q9V0T9
A	225	MSE	MET	modified residue	UNP Q9V0T9
A	234	MSE	MET	modified residue	UNP Q9V0T9
A	237	MSE	MET	modified residue	UNP Q9V0T9
A	257	MSE	MET	modified residue	UNP Q9V0T9
A	362	MSE	MET	modified residue	UNP Q9V0T9
A	393	MSE	MET	modified residue	UNP Q9V0T9
A	403	MSE	MET	modified residue	UNP Q9V0T9
A	418	MSE	MET	modified residue	UNP Q9V0T9
A	419	MSE	MET	modified residue	UNP Q9V0T9
B	1	MSE	MET	modified residue	UNP Q9V0T9
B	36	MSE	MET	modified residue	UNP Q9V0T9
B	127	LEU	VAL	conflict	UNP Q9V0T9
B	149	MSE	MET	modified residue	UNP Q9V0T9
B	181	MSE	MET	modified residue	UNP Q9V0T9
B	191	MSE	MET	modified residue	UNP Q9V0T9
B	217	MSE	MET	modified residue	UNP Q9V0T9
B	225	MSE	MET	modified residue	UNP Q9V0T9
B	234	MSE	MET	modified residue	UNP Q9V0T9

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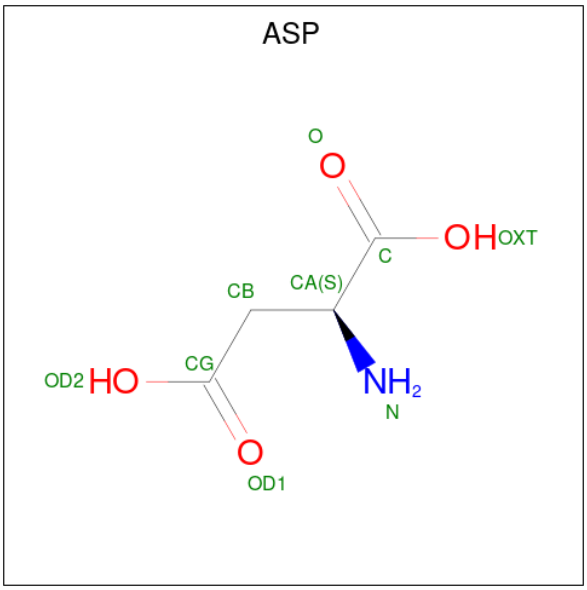
Chain	Residue	Modelled	Actual	Comment	Reference
B	237	MSE	MET	modified residue	UNP Q9V0T9
B	257	MSE	MET	modified residue	UNP Q9V0T9
B	362	MSE	MET	modified residue	UNP Q9V0T9
B	393	MSE	MET	modified residue	UNP Q9V0T9
B	403	MSE	MET	modified residue	UNP Q9V0T9
B	418	MSE	MET	modified residue	UNP Q9V0T9
B	419	MSE	MET	modified residue	UNP Q9V0T9

- Molecule 2 is a protein called Glutamyl-tRNA(Gln) amidotransferase subunit E.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	508	Total	C	N	O	S	0	0	0
			4005	2543	700	755	7			
2	D	508	Total	C	N	O	S	0	0	0
			3966	2523	693	743	7			

- Molecule 3 is ASPARTIC ACID (CCD ID: ASP) (formula: $C_4H_7NO_4$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			9	4	1	4		
3	B	1	Total	C	N	O	0	0
			9	4	1	4		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	12	Total O 12 12	0	0
4	B	24	Total O 24 24	0	0
4	C	22	Total O 22 22	0	0
4	D	10	Total O 10 10	0	0

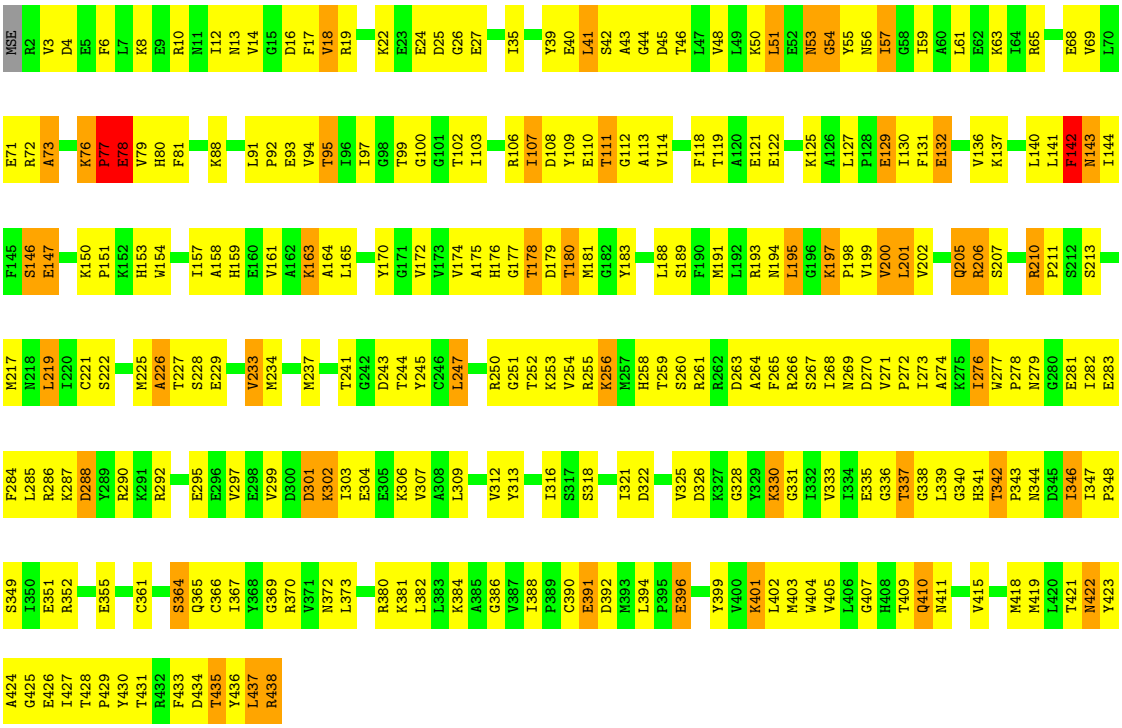
3 Residue-property plots (i)

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. 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. 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.

Note EDS was not executed.

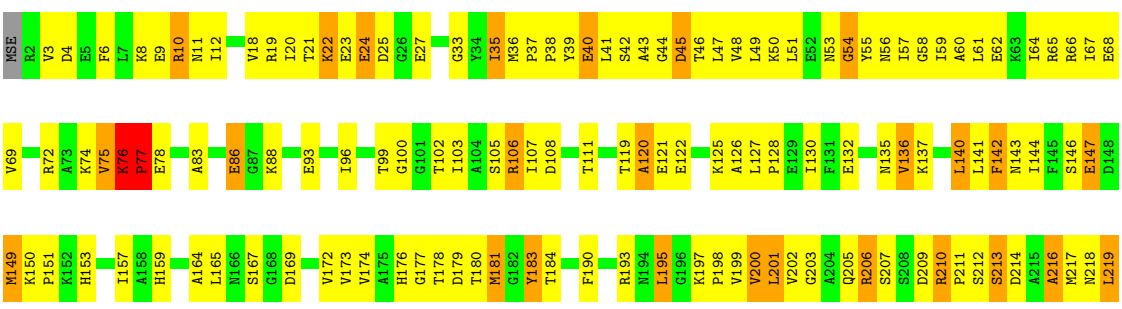
• Molecule 1: Glutamyl-tRNA(Gln) amidotransferase subunit D

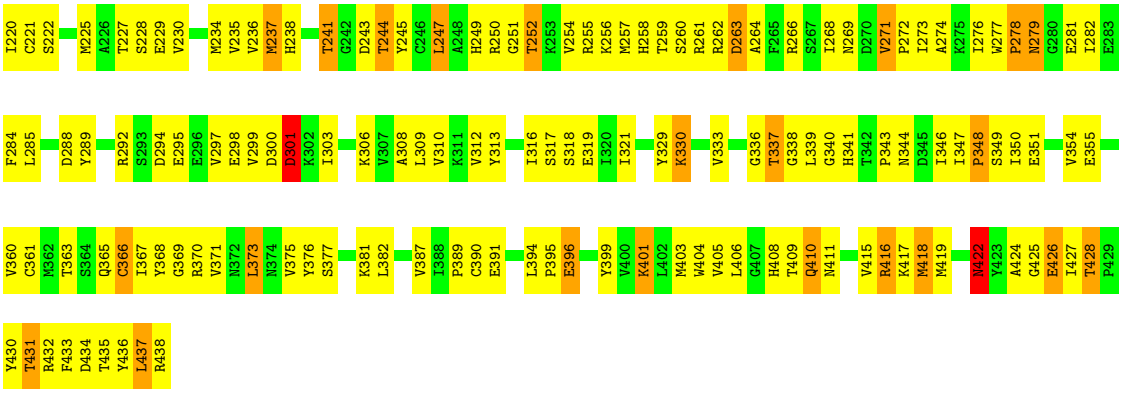
Chain A:



• Molecule 1: Glutamyl-tRNA(Gln) amidotransferase subunit D

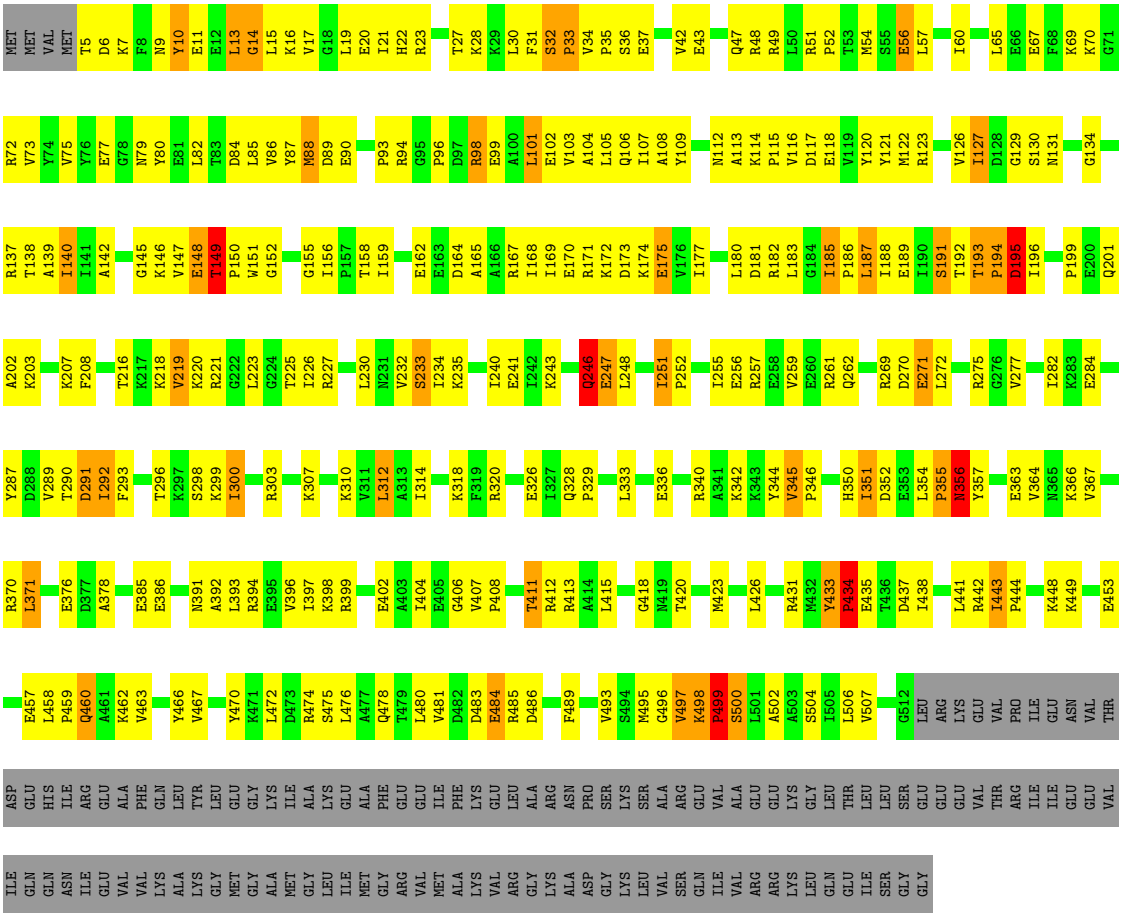
Chain B:





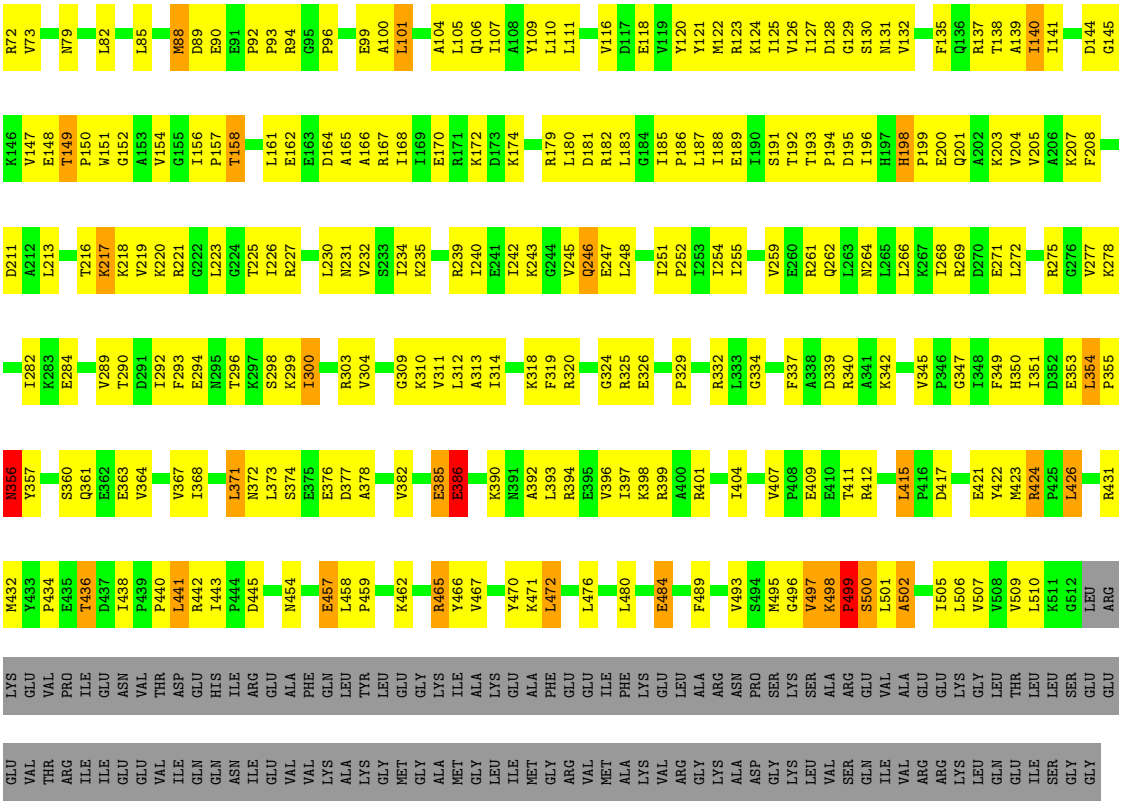
• Molecule 2: Glutamyl-tRNA(Gln) amidotransferase subunit E

Chain C:



• Molecule 2: Glutamyl-tRNA(Gln) amidotransferase subunit E

Chain D:


R72 V73 N79 L82 L85 M88 D89 E90 E91 P92 P93 R94 G95 P96 E99 A100 L101 A104 L105 Q106 I107 A108 Y109 L110 L111 V116 D117 E118 V119 Y120 Y121 M122 R123 K124 I125 V126 I127 D128 G129 S130 N131 V132 F135 Q136 R137 T138 A139 I140 I141 D144 G145
K146 V147 E148 T149 P150 W151 G152 A153 V154 G155 I156 P157 T158 L161 E162 E163 D164 A165 A166 R167 I168 I169 E170 R171 K172 D173 K174 R179 L180 D181 R182 L183 G184 I185 P186 L187 I188 E189 I190 S191 T192 T193 P194 D195 I196 H197 H198 P199 E200 Q201 A202 K203 V204 V205 A206 K207 F208
D211 A212 L213 T216 K217 K218 V219 K220 R221 G222 L223 G224 T225 I226 R227 L230 N231 V232 S233 I234 K235 R239 I240 E241 I242 K243 G244 V245 Q246 E247 L248 I251 P252 I253 I254 I255 V259 E260 R261 Q262 L263 N264 L265 L266 K267 I268 R269 D270 E271 L272 R275 G276 V277 K278
I282 K283 E284 V289 T290 D291 I292 F293 E294 N295 T296 K297 S298 K299 I300 R303 V304 G309 K310 V311 L312 A313 I314 K318 F319 R320 G324 R325 E326 P329 R332 L333 G334 F337 A338 D339 R340 A341 K342 V345 P346 G347 I348 F349 H350 I351 D352 E353 L354 P355
N356 Y357 S360 Q361 E362 E363 V364 V367 I368 L371 N372 L373 S374 E375 E376 D377 A378 V382 E385 E386 K390 N391 A392 L393 R394 E396 V396 I397 K398 R399 A400 R401 I404 V407 P408 E409 E410 T411 R412 L415 P416 D417 E421 Y422 M423 R424 P425 L426 R431
M432 Y433 P434 E435 T436 D437 I438 P439 P440 L441 R442 I443 P444 D445 N454 E457 L458 P459 K462 R465 Y466 V467 Y470 K471 L472 L476 L480 E484 F489 V493 S494 M495 G496 V497 K498 P499 S500 L501 A502 I505 L506 V507 V508 V509 L510 K511 G512 LEU ARG
LYS GLU VAL PRO ILE GLU ASN VAL THR ASP GLU HIS ILE ARG GLU ALA PHE GLN LEU TYR LEU GLU GLY LYS ILE ALA LYS GLU ALA PHE GLU GLU ILE PHE LYS GLU LEU ALA ARG ASN PRO SER LYS SER ALA ARG GLU VAL ALA GLU GLU LYS GLY LEU THR LEU LEU SER GLU GLU
GLU VAL THR ARG ILE ILE GLU GLU VAL ILE GLN GLN ASN ILE GLU VAL VAL LYS ALA LYS GLY MET GLY ALA MET GLY LEU ILE MET GLY ARG VAL MET ALA LYS VAL ARG GLY LYS ALA ASP GLY LYS LEU VAL SER GLN ILE VAL ARG ARG LYS LEU GLN GLU ILE SER GLY GLY

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	102.70Å 138.20Å 134.40Å 90.00° 109.60° 90.00°	Depositor
Resolution (Å)	50.00 – 3.00	Depositor
% Data completeness (in resolution range)	98.9 (50.00-3.00)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.217 , 0.256	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	14869	wwPDB-VP
Average B, all atoms (Å^2)	67.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.52	0/3455	1.12	26/4651 (0.6%)
1	B	0.53	0/3455	1.10	22/4652 (0.5%)
2	C	0.48	0/4070	1.07	26/5497 (0.5%)
2	D	0.42	0/4031	0.99	18/5450 (0.3%)
All	All	0.49	0/15011	1.07	92/20250 (0.5%)

There are no bond length outliers.

The worst 5 of 92 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	45	ASP	N-CA-C	-12.45	96.82	112.88
2	C	345	VAL	CA-C-N	8.53	129.36	119.47
2	C	345	VAL	C-N-CA	8.53	129.36	119.47
2	C	418	GLY	N-CA-C	-8.44	102.85	115.00
1	A	53	ASN	N-CA-C	-8.40	103.63	114.04

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	3406	0	3410	370	0
1	B	3406	0	3417	353	0
2	C	4005	0	4058	296	0
2	D	3966	0	4003	299	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	9	0	3	4	0
3	B	9	0	3	1	0
4	A	12	0	0	0	0
4	B	24	0	0	0	0
4	C	22	0	0	0	0
4	D	10	0	0	0	0
All	All	14869	0	14894	1216	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 41.

The worst 5 of 1216 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)
2:C:192:THR:HG22	2:C:193:THR:H	1.02	1.12
2:D:192:THR:HG22	2:D:193:THR:H	1.00	1.11
1:B:276:ILE:HG22	1:B:282:ILE:HG12	1.27	1.09
1:A:266:ARG:HD2	1:B:437:LEU:HD21	1.36	1.07
1:A:409:THR:HG22	1:A:411:ASN:H	1.18	1.05

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	435/438 (99%)	374 (86%)	49 (11%)	12 (3%)	4	21
1	B	435/438 (99%)	366 (84%)	56 (13%)	13 (3%)	3	19
2	C	506/633 (80%)	434 (86%)	54 (11%)	18 (4%)	2	16
2	D	506/633 (80%)	428 (85%)	57 (11%)	21 (4%)	2	13
All	All	1882/2142 (88%)	1602 (85%)	216 (12%)	64 (3%)	3	17

5 of 64 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	GLU
1	A	77	PRO
1	A	78	GLU
1	A	163	LYS
1	A	251	GLY

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	366/357 (102%)	329 (90%)	37 (10%)	7	29
1	B	367/357 (103%)	323 (88%)	44 (12%)	5	22
2	C	421/548 (77%)	392 (93%)	29 (7%)	14	45
2	D	412/548 (75%)	381 (92%)	31 (8%)	12	41
All	All	1566/1810 (86%)	1425 (91%)	141 (9%)	9	34

5 of 141 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	65	LEU
2	D	148	GLU
2	D	385	GLU
1	B	147	GLU
1	B	142	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 39 such sidechains are listed below:

Mol	Chain	Res	Type
2	C	372	ASN
2	D	262	GLN
2	C	391	ASN
2	D	106	GLN
2	D	356	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

2 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	$\#\|Z\| > 2$
3	ASP	B	5000	-	7,8,8	1.19	1 (14%)	6,10,10	1.16	1 (16%)
3	ASP	A	1000	-	7,8,8	1.16	1 (14%)	6,10,10	1.02	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
3	ASP	B	5000	-	-	4/8/8/8	-
3	ASP	A	1000	-	-	4/8/8/8	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1000	ASP	OXT-C	-2.26	1.23	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	5000	ASP	OXT-C	-2.24	1.23	1.30

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	5000	ASP	OXT-C-O	-2.11	119.30	124.08

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1000	ASP	O-C-CA-N
3	B	5000	ASP	O-C-CA-N
3	A	1000	ASP	OXT-C-CA-N
3	B	5000	ASP	OXT-C-CA-N
3	A	1000	ASP	OXT-C-CA-CB

There are no ring outliers.

2 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	5000	ASP	1	0
3	A	1000	ASP	4	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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.