



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 14, 2017 – 07:39 pm GMT

PDB ID : 3AAW
Title : Crystal structure of aspartate kinase from *Corynebacterium glutamicum* in complex with lysine and threonine
Authors : Yoshida, A.; Tomita, T.; Kuzuyama, T.; Nishiyama, M.
Deposited on : 2009-11-27
Resolution : 2.50 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : trunk28620
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : recalc28949

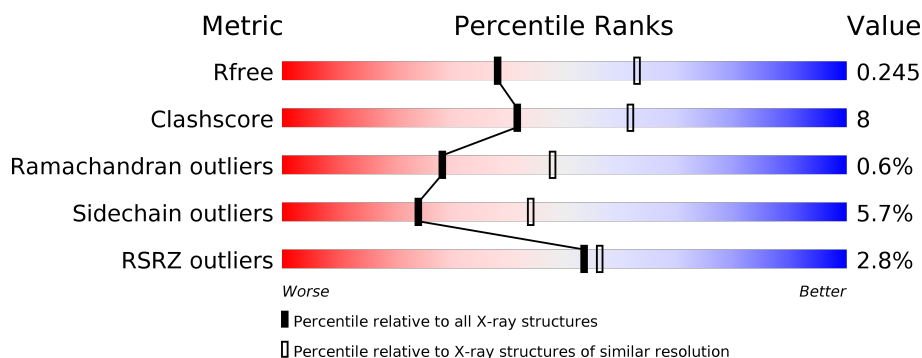
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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}	100719	3846 (2.50-2.50)
Clashscore	112137	4554 (2.50-2.50)
Ramachandran outliers	110173	4463 (2.50-2.50)
Sidechain outliers	110143	4465 (2.50-2.50)
RSRZ outliers	101464	3876 (2.50-2.50)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	421	<div> <div>2%</div> <div> <div></div> <div>75%</div> <div>14%</div> <div>•</div> <div>8%</div> </div> </div>
1	C	421	<div> <div>3%</div> <div> <div></div> <div>77%</div> <div>14%</div> <div>•</div> <div>7%</div> </div> </div>
2	B	178	<div> <div>4%</div> <div> <div></div> <div>74%</div> <div>11%</div> <div>• •</div> <div>10%</div> </div> </div>
2	D	178	<div> <div>2%</div> <div> <div></div> <div>85%</div> <div>•</div> <div>11%</div> </div> </div>

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	LYS	C	701	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8483 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 Aspartokinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	387	Total	C	N	O	S	0	0	0
			2883	1789	498	582	14			
1	C	392	Total	C	N	O	S	0	0	0
			2905	1801	503	586	15			

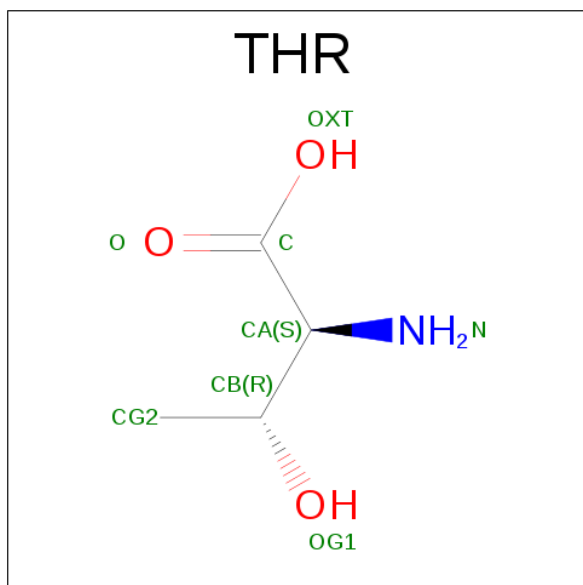
- Molecule 2 is a protein called Aspartokinase LysC beta subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	160	Total	C	N	O	S	0	0	0
			1209	749	209	245	6			
2	D	159	Total	C	N	O	S	0	0	0
			1202	745	208	244	5			

There are 12 discrepancies between the modelled and reference sequences:

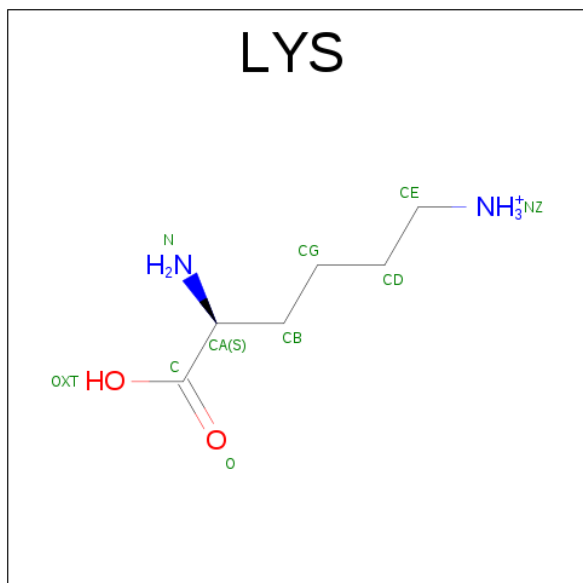
Chain	Residue	Modelled	Actual	Comment	Reference
B	173	HIS	-	EXPRESSION TAG	UNP Q93C54
B	174	HIS	-	EXPRESSION TAG	UNP Q93C54
B	175	HIS	-	EXPRESSION TAG	UNP Q93C54
B	176	HIS	-	EXPRESSION TAG	UNP Q93C54
B	177	HIS	-	EXPRESSION TAG	UNP Q93C54
B	178	HIS	-	EXPRESSION TAG	UNP Q93C54
D	173	HIS	-	EXPRESSION TAG	UNP Q93C54
D	174	HIS	-	EXPRESSION TAG	UNP Q93C54
D	175	HIS	-	EXPRESSION TAG	UNP Q93C54
D	176	HIS	-	EXPRESSION TAG	UNP Q93C54
D	177	HIS	-	EXPRESSION TAG	UNP Q93C54
D	178	HIS	-	EXPRESSION TAG	UNP Q93C54

- Molecule 3 is THREONINE (three-letter code: THR) (formula: C₄H₉NO₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	B	1	Total	C	N	O	0	0
			8	4	1	3		
3	A	1	Total	C	N	O	0	0
			8	4	1	3		
3	D	1	Total	C	N	O	0	0
			8	4	1	3		
3	C	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 4 is LYSINE (three-letter code: LYS) (formula: $C_6H_{15}N_2O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			10	6	2	2		
4	C	1	Total	C	N	O	0	0
			10	6	2	2		
4	C	1	Total	C	N	O	0	0
			10	6	2	2		

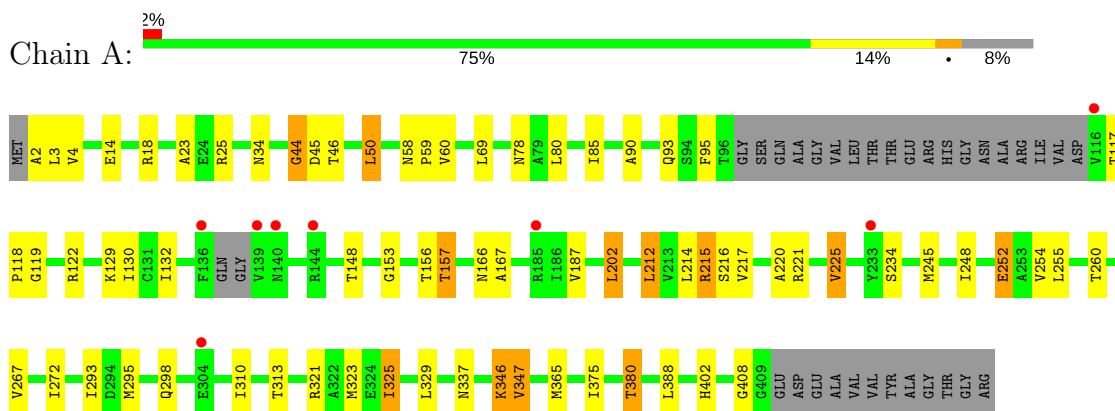
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	77	Total	O	0	0
			77	77		
5	B	21	Total	O	0	0
			21	21		
5	C	84	Total	O	0	0
			84	84		
5	D	40	Total	O	0	0
			40	40		

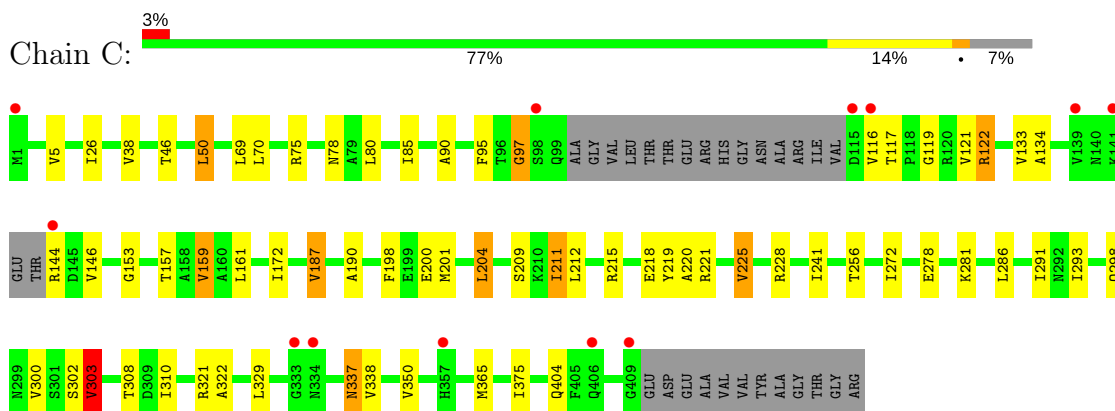
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

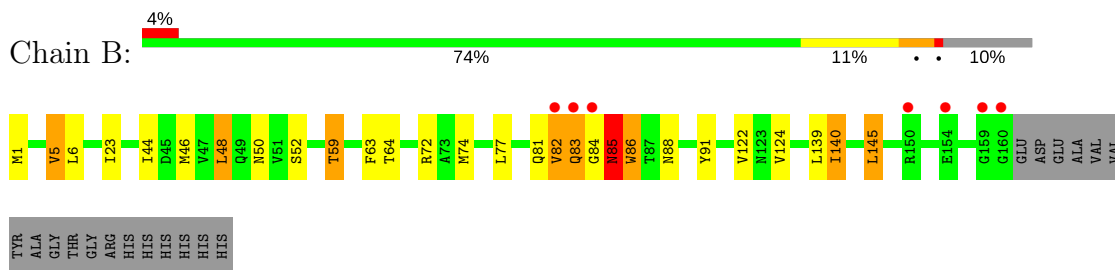
- Molecule 1: Aspartokinase



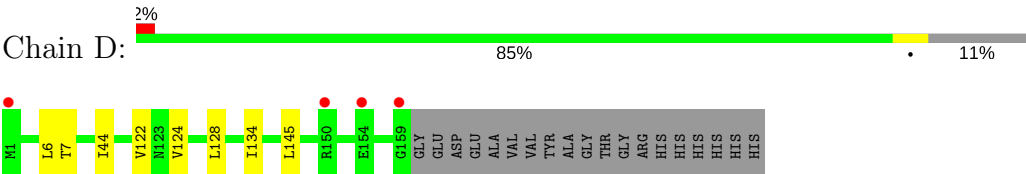
- Molecule 1: Aspartokinase



- Molecule 2: Aspartokinase LysC beta subunit



- Molecule 2: Aspartokinase LysC beta subunit



4 Data and refinement statistics

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, α , β , γ	162.23Å 162.23Å 133.93Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.56 – 2.50 43.56 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.7 (43.56-2.50) 99.7 (43.56-2.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.37 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.210 , 0.250 0.208 , 0.245	Depositor DCC
R_{free} test set	3019 reflections (5.32%)	DCC
Wilson B-factor (Å ²)	45.8	Xtriage
Anisotropy	0.311	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 34.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.52$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	0.012 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8483	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.65% 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](#)

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	0.41	0/2910	0.58	0/3943
1	C	0.41	0/2932	0.58	0/3973
2	B	0.39	0/1220	0.60	1/1649 (0.1%)
2	D	0.39	0/1213	0.56	0/1641
All	All	0.40	0/8275	0.58	1/11206 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	48	LEU	CA-CB-CG	5.60	128.19	115.30

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	2883	0	2908	58	0
1	C	2905	0	2924	49	0
2	B	1209	0	1217	27	0
2	D	1202	0	1207	5	0
3	A	8	0	6	0	0
3	B	8	0	6	0	0
3	C	8	0	6	0	0
3	D	8	0	6	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	10	0	12	1	0
4	C	20	0	24	1	0
5	A	77	0	0	0	0
5	B	21	0	0	0	0
5	C	84	0	0	1	0
5	D	40	0	0	0	0
All	All	8483	0	8316	133	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 8.

All (133) 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:B:46:MET:HE1	2:B:139:LEU:HD21	1.15	1.10
1:A:78:ASN:HD22	1:A:132:ILE:HG22	1.18	1.07
2:B:50:ASN:O	2:B:59:THR:HG21	1.69	0.93
2:B:46:MET:HE1	2:B:139:LEU:CD2	1.99	0.92
1:A:85:ILE:HG23	1:A:90:ALA:HB3	1.51	0.91
1:A:295:MET:HE3	1:A:388:LEU:HD11	1.51	0.91
2:B:46:MET:CE	2:B:139:LEU:HD21	2.02	0.88
1:A:215:ARG:HG2	2:B:5:VAL:HG22	1.58	0.86
1:C:187:VAL:HG22	1:C:190:ALA:HB2	1.57	0.84
1:A:90:ALA:HB1	1:A:130:ILE:HD13	1.60	0.84
1:C:97:GLY:O	1:C:116:VAL:HG12	1.78	0.83
1:C:85:ILE:HG23	1:C:90:ALA:HB3	1.61	0.82
1:A:156:THR:HG22	1:A:216:SER:HB3	1.63	0.81
1:A:78:ASN:ND2	1:A:132:ILE:HG22	1.96	0.81
1:A:2:ALA:HB1	1:A:34:ASN:HD22	1.46	0.80
1:A:295:MET:CE	1:A:388:LEU:HD11	2.14	0.78
1:C:302:SER:O	1:C:303:VAL:HG12	1.86	0.76
1:A:3:LEU:HD12	1:A:167:ALA:HB2	1.69	0.75
1:A:3:LEU:HD12	1:A:167:ALA:CB	2.16	0.74
2:B:52:SER:HA	2:B:59:THR:HG23	1.71	0.73
1:C:153:GLY:O	1:C:157:THR:HG23	1.88	0.73
1:A:78:ASN:HD22	1:A:132:ILE:CG2	2.01	0.72
1:C:365:MET:SD	1:C:375:ILE:HD13	2.29	0.71
1:A:220:ALA:HA	1:A:225:VAL:HG13	1.71	0.71
1:C:85:ILE:CG2	1:C:90:ALA:HB3	2.22	0.69
1:A:260:THR:HG22	1:A:347:VAL:HG13	1.77	0.66
1:C:133:VAL:HG11	1:C:161:LEU:HD11	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:46:MET:CE	2:B:139:LEU:HD11	2.30	0.62
1:C:97:GLY:O	1:C:116:VAL:CG1	2.47	0.61
1:C:209:SER:OG	1:C:211:ILE:HD12	2.01	0.60
2:B:85:ASN:HB2	2:B:86:TRP:CD1	2.37	0.59
2:B:46:MET:HE3	2:B:139:LEU:HD11	1.84	0.58
1:A:59:PRO:O	1:A:60:VAL:CG1	2.51	0.58
1:C:46:THR:HG22	1:C:50:LEU:HD22	1.86	0.58
1:C:172:ILE:HG12	1:C:212:LEU:HD21	1.86	0.57
1:A:380:THR:HG21	2:B:46:MET:HA	1.87	0.56
1:C:198:PHE:HB3	1:C:221:ARG:HB3	1.87	0.56
1:C:220:ALA:HA	1:C:225:VAL:HG13	1.86	0.56
1:C:278:GLU:OE1	1:C:281:LYS:NZ	2.39	0.56
2:B:81:GLN:C	2:B:83:GLN:H	2.09	0.56
1:A:295:MET:HE3	1:A:388:LEU:CD1	2.30	0.56
2:B:140:ILE:HD11	2:B:145:LEU:CD1	2.36	0.56
1:C:218:GLU:OE1	2:D:7:THR:HG21	2.06	0.56
1:A:153:GLY:O	1:A:157:THR:HG23	2.06	0.56
1:A:156:THR:HG22	1:A:216:SER:CB	2.35	0.55
1:C:117:THR:HG22	1:C:119:GLY:H	1.72	0.54
1:A:267:VAL:HG22	1:A:323:MET:HE1	1.89	0.54
1:A:78:ASN:ND2	1:A:132:ILE:CG2	2.67	0.54
2:B:52:SER:CA	2:B:59:THR:HG23	2.37	0.54
2:B:82:VAL:O	2:B:84:GLY:N	2.41	0.54
1:C:187:VAL:CG2	1:C:190:ALA:HB2	2.32	0.54
2:D:122:VAL:HG13	2:D:124:VAL:HG23	1.90	0.54
1:A:44:GLY:O	1:A:45:ASP:HB2	2.08	0.54
1:A:14:GLU:OE1	1:A:18:ARG:NH1	2.42	0.53
1:A:153:GLY:O	1:A:157:THR:CG2	2.57	0.53
1:A:212:LEU:H	1:A:212:LEU:HD12	1.74	0.53
1:A:2:ALA:HB1	1:A:34:ASN:ND2	2.21	0.53
1:C:300:VAL:HG12	2:D:128:LEU:HD11	1.91	0.53
1:A:46:THR:HG22	1:A:50:LEU:HD22	1.91	0.52
1:C:172:ILE:N	1:C:172:ILE:HD12	2.25	0.52
1:A:298:GLN:HE21	1:A:310:ILE:HG12	1.75	0.52
1:A:212:LEU:HD12	1:A:212:LEU:N	2.26	0.51
1:C:144:ARG:NH1	1:C:146:VAL:HG11	2.26	0.51
1:A:59:PRO:O	1:A:60:VAL:HG13	2.11	0.51
1:C:211:ILE:HD13	1:C:212:LEU:N	2.26	0.51
1:A:90:ALA:HB1	1:A:130:ILE:CD1	2.36	0.51
1:A:60:VAL:O	1:A:60:VAL:HG22	2.10	0.51
1:A:117:THR:HG22	1:A:119:GLY:H	1.75	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:272:ILE:HD12	1:C:308:THR:O	2.10	0.51
1:A:321:ARG:O	1:A:325:ILE:HD13	2.12	0.50
1:C:300:VAL:CG1	2:D:128:LEU:HD11	2.42	0.49
1:C:198:PHE:CB	1:C:221:ARG:HB3	2.42	0.49
1:A:245:MET:O	1:A:248:ILE:HG22	2.12	0.49
1:C:159:VAL:HG21	1:C:219:TYR:HB3	1.95	0.49
1:A:295:MET:HE1	1:A:388:LEU:HD21	1.95	0.48
2:B:122:VAL:HG23	2:B:124:VAL:HG23	1.95	0.48
1:C:198:PHE:CG	1:C:221:ARG:HB3	2.48	0.48
1:C:201:MET:CE	1:C:211:ILE:HD11	2.43	0.48
1:A:293:ILE:C	1:A:293:ILE:HD12	2.33	0.48
2:B:81:GLN:HG2	2:B:82:VAL:HG23	1.94	0.48
1:A:215:ARG:HG2	2:B:5:VAL:CG2	2.36	0.48
1:C:116:VAL:O	1:C:116:VAL:HG13	2.13	0.48
1:A:202:LEU:HD13	1:A:217:VAL:CG1	2.44	0.47
1:C:337:ASN:HD22	1:C:338:VAL:H	1.61	0.47
1:A:23:ALA:CB	1:A:85:ILE:HD12	2.44	0.47
1:A:245:MET:O	1:A:248:ILE:CG2	2.62	0.47
1:A:93:GLN:HG3	1:A:95:PHE:CE2	2.50	0.47
1:A:58:ASN:OD1	1:A:59:PRO:O	2.33	0.47
1:C:133:VAL:CG1	1:C:161:LEU:HD11	2.44	0.47
1:C:286:LEU:HD13	1:C:293:ILE:HG21	1.96	0.47
1:A:117:THR:HG23	1:A:118:PRO:HD2	1.97	0.46
1:A:252:GLU:O	1:A:254:VAL:HG13	2.14	0.46
1:A:3:LEU:C	1:A:3:LEU:HD13	2.35	0.46
1:C:298:GLN:HE21	1:C:310:ILE:HG12	1.80	0.46
1:C:200:GLU:OE2	1:C:256:THR:HG21	2.15	0.46
1:C:78:ASN:HD21	1:C:134:ALA:HB2	1.80	0.46
1:C:95:PHE:HB3	1:C:116:VAL:HB	1.98	0.46
1:A:25:ARG:NH2	1:A:234:SER:O	2.44	0.46
1:C:201:MET:HG2	1:C:241:ILE:HD13	1.98	0.46
1:C:201:MET:HE2	1:C:211:ILE:HD11	1.98	0.45
2:B:46:MET:HE1	2:B:139:LEU:HD11	1.99	0.45
2:B:46:MET:O	2:B:63:PHE:HA	2.16	0.45
1:C:116:VAL:HG23	1:C:121:VAL:HG23	1.98	0.45
1:A:272:ILE:HD12	1:A:310:ILE:HG13	1.98	0.45
1:C:200:GLU:OE2	1:C:256:THR:CG2	2.65	0.44
1:A:93:GLN:HB2	1:A:129:LYS:HD3	1.98	0.44
2:B:140:ILE:HD11	2:B:145:LEU:HD12	1.99	0.44
1:A:187:VAL:HG11	1:A:402:HIS:CG	2.52	0.44
2:B:46:MET:HE1	2:B:139:LEU:CG	2.48	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:601:LYS:N	2:B:44:ILE:O	2.51	0.44
1:C:200:GLU:CD	1:C:256:THR:HG21	2.38	0.43
1:C:291:ILE:HD13	1:C:322:ALA:HA	2.00	0.43
1:A:50:LEU:HG	1:A:69:LEU:HD11	1.99	0.43
1:C:144:ARG:NH1	5:C:775:HOH:O	2.51	0.43
1:A:365:MET:SD	1:A:375:ILE:HD13	2.59	0.43
2:B:140:ILE:HD13	2:B:140:ILE:H	1.83	0.43
1:C:122:ARG:HG3	1:C:122:ARG:HH11	1.83	0.43
1:A:255:LEU:HD22	1:A:255:LEU:N	2.34	0.43
1:A:3:LEU:HD13	1:A:4:VAL:N	2.34	0.43
2:B:46:MET:CE	2:B:64:THR:HG21	2.48	0.43
1:C:272:ILE:HD13	1:C:310:ILE:HG13	2.01	0.43
1:C:26:ILE:HD13	1:C:38:VAL:HG21	2.01	0.42
2:B:23:ILE:HG22	2:B:59:THR:O	2.19	0.42
4:C:601:LYS:N	2:D:44:ILE:O	2.52	0.42
1:C:204:LEU:HD13	1:C:350:VAL:HG21	2.02	0.41
1:A:132:ILE:HD12	1:A:132:ILE:N	2.36	0.41
1:A:295:MET:HE1	1:A:313:THR:HG21	2.01	0.41
2:B:74:MET:HG3	2:B:91:TYR:HB2	2.01	0.41
1:C:272:ILE:H	1:C:272:ILE:HD12	1.85	0.41
2:B:81:GLN:O	2:B:83:GLN:N	2.52	0.41
1:A:122:ARG:O	1:A:122:ARG:HD3	2.21	0.41
1:C:50:LEU:HG	1:C:69:LEU:HD11	2.03	0.41
1:A:346:LYS:CB	1:A:388:LEU:HD23	2.51	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	381/421 (90%)	372 (98%)	7 (2%)	2 (0%)	32 53

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	386/421 (92%)	373 (97%)	11 (3%)	2 (0%)	32	53
2	B	158/178 (89%)	150 (95%)	5 (3%)	3 (2%)	9	15
2	D	157/178 (88%)	154 (98%)	3 (2%)	0	100	100
All	All	1082/1198 (90%)	1049 (97%)	26 (2%)	7 (1%)	28	48

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	82	VAL
2	B	85	ASN
1	A	44	GLY
1	A	408	GLY
2	B	83	GLN
1	C	97	GLY
1	C	303	VAL

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	311/336 (93%)	293 (94%)	18 (6%)	23	43
1	C	312/336 (93%)	294 (94%)	18 (6%)	23	43
2	B	132/146 (90%)	120 (91%)	12 (9%)	11	21
2	D	131/146 (90%)	128 (98%)	3 (2%)	56	81
All	All	886/964 (92%)	835 (94%)	51 (6%)	24	43

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	LEU
1	A	80	LEU
1	A	148	THR
1	A	157	THR

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Mol	Chain	Res	Type
1	A	166	ASN
1	A	202	LEU
1	A	212	LEU
1	A	214	LEU
1	A	215	ARG
1	A	221	ARG
1	A	225	VAL
1	A	252	GLU
1	A	325	ILE
1	A	329	LEU
1	A	337	ASN
1	A	346	LYS
1	A	347	VAL
1	A	380	THR
2	B	1	MET
2	B	5	VAL
2	B	6	LEU
2	B	48	LEU
2	B	59	THR
2	B	72	ARG
2	B	77	LEU
2	B	85	ASN
2	B	86	TRP
2	B	88	ASN
2	B	140	ILE
2	B	145	LEU
1	C	5	VAL
1	C	50	LEU
1	C	70	LEU
1	C	75	ARG
1	C	80	LEU
1	C	122	ARG
1	C	159	VAL
1	C	187	VAL
1	C	204	LEU
1	C	211	ILE
1	C	215	ARG
1	C	225	VAL
1	C	228	ARG
1	C	303	VAL
1	C	321	ARG
1	C	329	LEU

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Mol	Chain	Res	Type
1	C	337	ASN
1	C	404	GLN
2	D	6	LEU
2	D	134	ILE
2	D	145	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	34	ASN
1	A	78	ASN
1	A	166	ASN
1	A	292	ASN
1	A	298	GLN
1	A	337	ASN
1	A	343	GLN
1	A	374	ASN
2	B	43	ASN
2	B	88	ASN
1	C	140	ASN
1	C	189	ASN
1	C	292	ASN
1	C	298	GLN
1	C	337	ASN
1	C	343	GLN
1	C	374	ASN
1	C	402	HIS
1	C	404	GLN
2	D	43	ASN
2	D	49	GLN
2	D	83	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

There are no carbohydrates in this entry.

5.6 Ligand geometry

7 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	THR	A	501	-	4,7,7	0.38	0	3,9,9	0.52	0
4	LYS	A	601	-	4,9,9	0.46	0	3,10,10	0.24	0
3	THR	B	201	-	4,7,7	0.34	0	3,9,9	0.37	0
3	THR	C	501	-	4,7,7	0.57	0	3,9,9	0.48	0
4	LYS	C	601	-	4,9,9	0.35	0	3,10,10	0.23	0
4	LYS	C	701	-	4,9,9	0.49	0	3,10,10	0.20	0
3	THR	D	201	-	4,7,7	0.48	0	3,9,9	0.30	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	THR	A	501	-	-	0/4/8/8	0/0/0/0
4	LYS	A	601	-	-	0/5/9/9	0/0/0/0
3	THR	B	201	-	-	0/4/8/8	0/0/0/0
3	THR	C	501	-	-	0/4/8/8	0/0/0/0
4	LYS	C	601	-	-	0/5/9/9	0/0/0/0
4	LYS	C	701	-	-	0/5/9/9	0/0/0/0
3	THR	D	201	-	-	0/4/8/8	0/0/0/0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	601	LYS	1	0
4	C	601	LYS	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	387/421 (91%)	-0.10	8 (2%) 64 66	31, 43, 66, 76	0
1	C	392/421 (93%)	-0.11	12 (3%) 49 52	28, 41, 66, 90	0
2	B	160/178 (89%)	0.02	7 (4%) 35 37	33, 47, 73, 86	0
2	D	159/178 (89%)	-0.08	4 (2%) 58 60	33, 49, 64, 76	0
All	All	1098/1198 (91%)	-0.08	31 (2%) 53 56	28, 43, 67, 90	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	1	MET	7.7
1	C	98	SER	5.2
2	B	82	VAL	4.4
1	A	139	VAL	4.2
2	B	84	GLY	3.7
2	B	160	GLY	3.5
2	B	159	GLY	3.2
1	C	409	GLY	3.2
1	C	139	VAL	3.1
1	C	141	LYS	3.0
1	A	140	ASN	2.8
1	C	406	GLN	2.8
1	C	144	ARG	2.8
1	A	185	ARG	2.8
2	D	150	ARG	2.7
1	A	304	GLU	2.7
2	D	159	GLY	2.6
1	A	144	ARG	2.5
2	B	154	GLU	2.5
1	C	116	VAL	2.5
2	D	154	GLU	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	136	PHE	2.4
1	C	334	ASN	2.4
1	A	116	VAL	2.4
2	D	1	MET	2.4
1	C	115	ASP	2.3
2	B	83	GLN	2.3
1	C	357	HIS	2.3
1	C	333	GLY	2.1
2	B	150	ARG	2.1
1	A	233	TYR	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
4	LYS	C	701	10/10	0.69	0.25	3.38	63,64,64,64	0
3	THR	D	201	8/8	0.98	0.14	0.06	33,35,35,36	0
3	THR	B	201	8/8	0.98	0.13	-0.10	36,37,38,38	0
4	LYS	C	601	10/10	0.96	0.13	-0.44	39,40,40,41	0
3	THR	A	501	8/8	0.95	0.13	-0.46	37,38,38,38	0
4	LYS	A	601	10/10	0.94	0.12	-0.85	37,41,41,41	0
3	THR	C	501	8/8	0.96	0.11	-1.14	39,40,40,40	0

6.5 Other polymers [i](#)

There are no such residues in this entry.