



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 21, 2024 – 03:47 pm BST

PDB ID : 3ZZF
Title : Crystal structure of the amino acid kinase domain from *Saccharomyces cerevisiae* acetylglutamate kinase complexed with its substrate N- acetylglutamate
Authors : de Cima, S.; Gil-Ortiz, F.; Crabeel, M.; Fita, I.; Rubio, V.
Deposited on : 2011-09-01
Resolution : 2.20 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 : 2.36.2
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) : 2.36.2

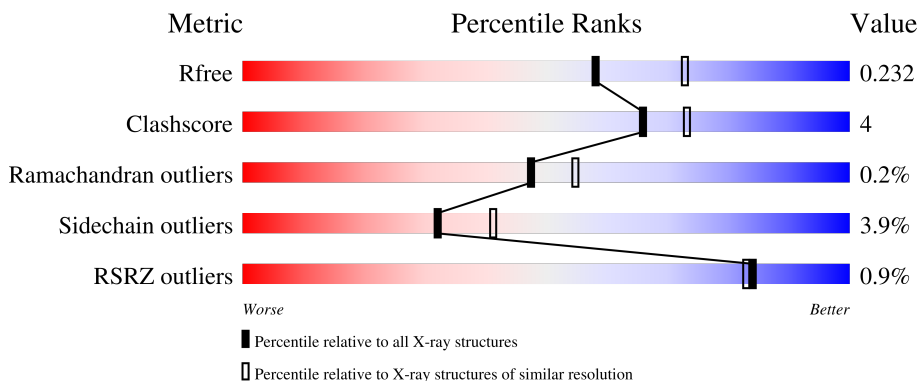
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	307	 85% 8% • 5%
1	B	307	 84% 9% • 6%
1	C	307	 84% 10% • 5%
1	D	307	 88% 6% • 6%

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
2	EDO	B	1354	-	-	X	X
4	HG	A	1358	-	-	X	-
4	HG	C	1356	-	-	X	-
6	CL	A	1361	-	-	X	-

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 9683 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 ACETYLGLUTAMATE KINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	291	2291	1453	387	443	8	0	5	0
1	B	289	2272	1442	383	439	8	0	4	0
1	C	291	2263	1437	383	436	7	0	2	0
1	D	290	2281	1449	385	438	9	0	4	0

There are 32 discrepancies between the modelled and reference sequences:

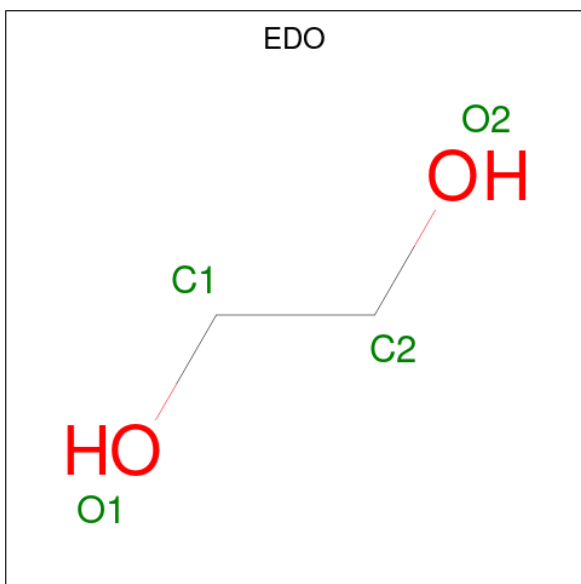
Chain	Residue	Modelled	Actual	Comment	Reference
A	50	MET	-	expression tag	UNP Q01217
A	51	GLY	-	expression tag	UNP Q01217
A	52	HIS	-	expression tag	UNP Q01217
A	53	HIS	-	expression tag	UNP Q01217
A	54	HIS	-	expression tag	UNP Q01217
A	55	HIS	-	expression tag	UNP Q01217
A	56	HIS	-	expression tag	UNP Q01217
A	57	HIS	-	expression tag	UNP Q01217
B	50	MET	-	expression tag	UNP Q01217
B	51	GLY	-	expression tag	UNP Q01217
B	52	HIS	-	expression tag	UNP Q01217
B	53	HIS	-	expression tag	UNP Q01217
B	54	HIS	-	expression tag	UNP Q01217
B	55	HIS	-	expression tag	UNP Q01217
B	56	HIS	-	expression tag	UNP Q01217
B	57	HIS	-	expression tag	UNP Q01217
C	50	MET	-	expression tag	UNP Q01217
C	51	GLY	-	expression tag	UNP Q01217
C	52	HIS	-	expression tag	UNP Q01217
C	53	HIS	-	expression tag	UNP Q01217
C	54	HIS	-	expression tag	UNP Q01217

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Chain	Residue	Modelled	Actual	Comment	Reference
C	55	HIS	-	expression tag	UNP Q01217
C	56	HIS	-	expression tag	UNP Q01217
C	57	HIS	-	expression tag	UNP Q01217
D	50	MET	-	expression tag	UNP Q01217
D	51	GLY	-	expression tag	UNP Q01217
D	52	HIS	-	expression tag	UNP Q01217
D	53	HIS	-	expression tag	UNP Q01217
D	54	HIS	-	expression tag	UNP Q01217
D	55	HIS	-	expression tag	UNP Q01217
D	56	HIS	-	expression tag	UNP Q01217
D	57	HIS	-	expression tag	UNP Q01217

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



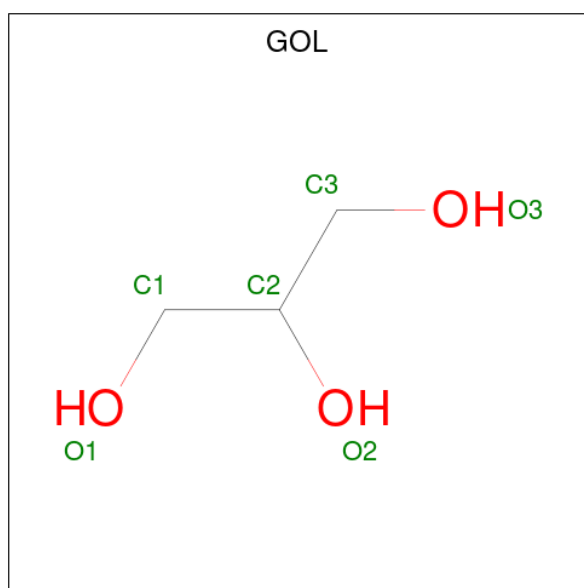
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		

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

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

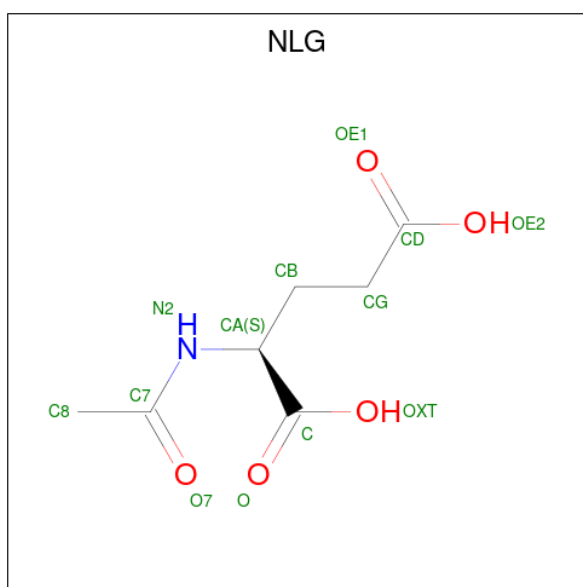


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 6 3 3	0	0
3	B	1	Total C O 6 3 3	0	0
3	C	1	Total C O 6 3 3	0	0
3	D	1	Total C O 6 3 3	0	0

- Molecule 4 is MERCURY (II) ION (three-letter code: HG) (formula: Hg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	2	Total Hg 2 2	0	0
4	B	2	Total Hg 3 3	0	1
4	C	2	Total Hg 2 2	0	0
4	D	2	Total Hg 4 4	0	2

- Molecule 5 is N-ACETYL-L-GLUTAMATE (three-letter code: NLG) (formula: C₇H₁₁NO₅).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C N O 13 7 1 5	0	0
5	B	1	Total C N O 13 7 1 5	0	0
5	C	1	Total C N O 13 7 1 5	0	0
5	D	1	Total C N O 13 7 1 5	0	0

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	2	Total Cl 2 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	3	Total Cl 3 3	0	0
6	C	1	Total Cl 1 1	0	0
6	D	1	Total Cl 1 1	0	0


- Molecule 7 is water.

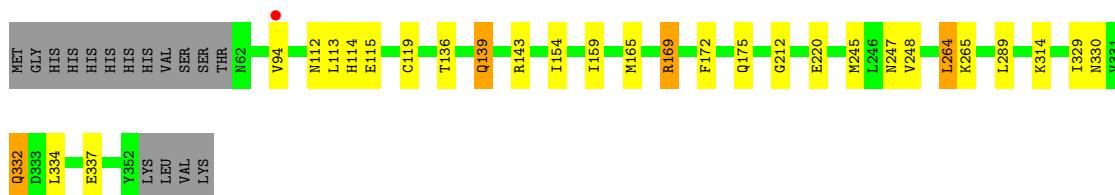
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	86	Total O 86 86	0	0
7	B	130	Total O 130 130	0	0
7	C	78	Total O 78 78	0	0
7	D	136	Total O 136 136	0	0

3 Residue-property plots [i](#)


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

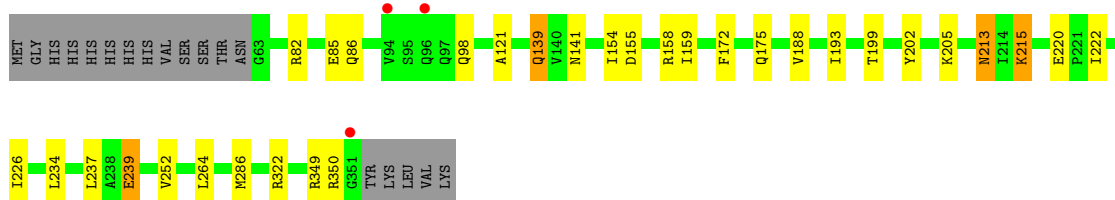
- Molecule 1: ACETYLGLUTAMATE KINASE

Chain A: 




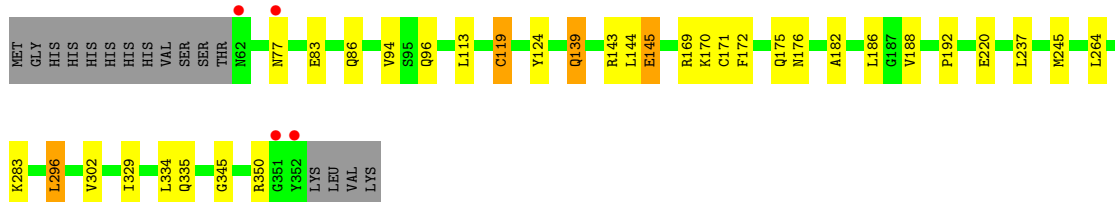
- Molecule 1: ACETYLGLUTAMATE KINASE

Chain B: 

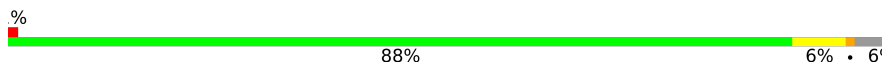


- Molecule 1: ACETYLGLUTAMATE KINASE

Chain C: 



- Molecule 1: ACETYLGLUTAMATE KINASE

Chain D: 



VAL
LYS

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	69.70Å 99.30Å 190.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.20 68.77 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (20.00-2.20) 99.9 (68.77-2.20)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.07 (at 2.20Å)	Xtrriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.179 , 0.218 0.195 , 0.232	Depositor DCC
R_{free} test set	3434 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	24.5	Xtrriage
Anisotropy	0.064	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 35.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	9683	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.87% 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: GOL, HG, CL, EDO, NLG

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	0.40	0/2323	0.54	0/3140
1	B	0.38	0/2304	0.54	0/3114
1	C	0.44	3/2295 (0.1%)	0.58	2/3103 (0.1%)
1	D	0.38	0/2314	0.52	0/3127
All	All	0.40	3/9236 (0.0%)	0.54	2/12484 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	170	LYS	C-N	-7.74	1.16	1.34
1	C	119	CYS	CB-SG	5.88	1.92	1.82
1	C	171	CYS	C-N	-5.49	1.21	1.34

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	171	CYS	O-C-N	-8.59	108.95	122.70
1	C	171	CYS	CA-C-N	6.18	130.80	117.20

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	2291	0	2331	21	0
1	B	2272	0	2319	23	0
1	C	2263	0	2302	19	0
1	D	2281	0	2328	12	0
2	A	16	0	24	5	0
2	B	24	0	36	9	0
2	C	8	0	12	0	0
2	D	4	0	6	0	0
3	A	6	0	8	0	0
3	B	6	0	8	0	0
3	C	6	0	8	0	0
3	D	6	0	8	0	0
4	A	2	0	0	3	0
4	B	3	0	0	0	0
4	C	2	0	0	2	0
4	D	4	0	0	1	0
5	A	13	0	9	0	0
5	B	13	0	9	0	0
5	C	13	0	9	0	0
5	D	13	0	9	0	0
6	A	2	0	0	3	0
6	B	3	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	86	0	0	0	0
7	B	130	0	0	0	0
7	C	78	0	0	1	0
7	D	136	0	0	0	0
All	All	9683	0	9426	75	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 (75) 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:119[A]:CYS:SG	4:A:1358:HG:HG	1.67	1.12
1:C:119:CYS:SG	4:C:1356:HG:HG	1.71	1.06
1:A:248:VAL:HG13	2:A:1353:EDO:H12	1.40	1.00
4:A:1359:HG:HG	6:A:1361:CL:CL	1.89	0.88
1:C:113:LEU:HD11	1:C:182:ALA:HB2	1.57	0.86
1:B:86:GLN:HE21	2:B:1354:EDO:H22	1.43	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:169:ARG:HD3	1:C:245:MET:HE1	1.67	0.76
1:A:119[A]:CYS:HG	4:A:1358:HG:HG	1.35	0.69
1:B:139:GLN:HG3	1:B:175:GLN:NE2	2.10	0.67
1:C:113:LEU:HD11	1:C:182:ALA:CB	2.26	0.65
1:C:329:ILE:HG22	1:C:345:GLY:HA3	1.78	0.64
1:C:139:GLN:HG3	1:C:175:GLN:NE2	2.12	0.64
1:C:329:ILE:HD11	1:C:334:LEU:HD13	1.81	0.63
1:B:264:LEU:HD21	2:B:1354:EDO:H21	1.82	0.62
1:D:119[A]:CYS:SG	4:D:1355[A]:HG:HG	2.17	0.62
1:B:193:ILE:HB	1:B:234:LEU:HD22	1.81	0.62
1:D:139:GLN:HE21	1:D:139:GLN:H	1.46	0.60
1:C:119:CYS:HG	4:C:1356:HG:HG	1.41	0.60
1:C:83:GLU:HA	1:C:86:GLN:HE21	1.67	0.60
1:C:302:VAL:HG23	1:C:302:VAL:O	2.02	0.59
1:C:237:LEU:HD13	1:C:245:MET:HE1	1.84	0.59
1:B:154:ILE:HG13	1:B:159:ILE:HD11	1.86	0.56
1:B:202:TYR:CE1	2:B:1353:EDO:H22	2.40	0.56
1:D:154:ILE:HG13	1:D:159:ILE:HD11	1.87	0.56
1:A:112:ASN:HA	2:A:1356:EDO:H22	1.89	0.55
1:A:165:MET:HE1	1:A:247:ASN:HB2	1.90	0.54
1:B:202:TYR:HE1	2:B:1353:EDO:H22	1.71	0.54
1:D:252:VAL:HG22	1:D:312:GLU:HG3	1.90	0.53
1:C:237:LEU:HD13	1:C:245:MET:CE	2.38	0.53
1:B:86:GLN:NE2	2:B:1354:EDO:H22	2.18	0.53
1:B:252:VAL:HG21	2:B:1352:EDO:H21	1.90	0.53
1:B:226:ILE:HD13	2:B:1356:EDO:O2	2.10	0.52
1:A:143:ARG:HG2	6:A:1361:CL:CL	2.47	0.52
1:A:94:VAL:O	1:A:94:VAL:HG12	2.10	0.52
1:A:329:ILE:HD12	1:A:337:GLU:HG3	1.91	0.51
1:A:139:GLN:HG3	1:A:175:GLN:NE2	2.26	0.50
1:C:145[A]:GLU:HA	1:C:145[A]:GLU:OE1	2.12	0.50
1:D:154:ILE:CD1	1:D:159:ILE:HD11	2.43	0.49
1:A:245:MET:HE2	1:B:239:GLU:HG2	1.96	0.48
1:D:252:VAL:HA	1:D:312:GLU:HG3	1.96	0.48
1:B:213:ASN:C	1:B:213:ASN:HD22	2.17	0.47
1:C:94:VAL:HG12	1:C:94:VAL:O	2.13	0.47
1:A:154:ILE:HD11	1:A:159:ILE:HD11	1.96	0.47
1:B:220[B]:GLU:O	1:B:220[B]:GLU:OE1	2.33	0.47
1:B:154:ILE:HG22	1:B:155:ASP:OD2	2.15	0.47
1:B:98:GLN:NE2	2:B:1356:EDO:O2	2.41	0.46
1:A:114:HIS:HB2	2:A:1356:EDO:H11	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:119[A]:CYS:SG	1:A:334:LEU:HD23	2.55	0.46
1:A:289:LEU:HD13	1:A:314:LYS:HA	1.98	0.46
1:B:154:ILE:CD1	1:B:159:ILE:HD11	2.46	0.46
1:A:330:ASN:OD1	1:A:332:GLN:HG2	2.16	0.46
1:D:119[B]:CYS:SG	1:D:334:LEU:HD23	2.56	0.46
1:A:169:ARG:NE	1:A:245:MET:SD	2.89	0.45
1:D:143:ARG:NH1	1:D:147:GLN:HE21	2.15	0.45
1:D:90:TYR:CE2	1:D:264:LEU:HD22	2.52	0.45
1:D:154:ILE:CG1	1:D:159:ILE:HD11	2.47	0.44
1:A:119[A]:CYS:SG	6:A:1362:CL:CL	3.13	0.43
1:A:248:VAL:CG1	2:A:1353:EDO:H12	2.29	0.43
1:B:121:ALA:HA	1:B:188:VAL:HG21	2.00	0.43
1:C:176:ASN:HD21	1:C:192:PRO:HB3	1.83	0.43
1:A:212:GLY:O	2:A:1353:EDO:H21	2.18	0.43
1:B:202:TYR:CD2	1:B:205:LYS:HG2	2.54	0.43
1:B:264:LEU:CD2	2:B:1354:EDO:H21	2.48	0.41
1:A:112:ASN:ND2	1:A:115:GLU:OE1	2.53	0.41
1:B:141:ASN:ND2	1:B:158:ARG:HH12	2.18	0.41
1:C:124:TYR:CG	1:C:188:VAL:HG13	2.56	0.41
1:A:264:LEU:HD13	1:A:265:LYS:HE2	2.01	0.41
1:C:245:MET:HE3	1:C:245:MET:HB3	1.90	0.41
1:B:199:THR:HG22	1:B:215:LYS:HD2	2.03	0.41
1:D:290:ASP:OD2	1:D:322:ARG:NH2	2.53	0.41
1:B:154:ILE:CG1	1:B:159:ILE:HD11	2.51	0.40
1:B:222:ILE:HD11	1:B:234:LEU:HD11	2.03	0.40
1:C:296:LEU:O	1:C:302:VAL:HG21	2.21	0.40
1:D:73[B]:GLN:NE2	1:D:73[B]:GLN:HA	2.36	0.40
1:C:335:GLN:NE2	7:C:2004:HOH:O	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	294/307 (96%)	286 (97%)	7 (2%)	1 (0%)	41	46
1	B	291/307 (95%)	281 (97%)	10 (3%)	0	100	100
1	C	291/307 (95%)	282 (97%)	9 (3%)	0	100	100
1	D	292/307 (95%)	284 (97%)	7 (2%)	1 (0%)	41	46
All	All	1168/1228 (95%)	1133 (97%)	33 (3%)	2 (0%)	47	55

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	136	THR
1	D	343	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	250/262 (95%)	242 (97%)	8 (3%)	39	50
1	B	249/262 (95%)	237 (95%)	12 (5%)	25	32
1	C	246/262 (94%)	232 (94%)	14 (6%)	20	24
1	D	250/262 (95%)	244 (98%)	6 (2%)	49	62
All	All	995/1048 (95%)	955 (96%)	40 (4%)	32	40

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	113	LEU
1	A	139	GLN
1	A	169	ARG
1	A	172	PHE
1	A	220[A]	GLU
1	A	220[B]	GLU
1	A	264	LEU
1	A	332	GLN
1	B	82	ARG

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Mol	Chain	Res	Type
1	B	85	GLU
1	B	139	GLN
1	B	172	PHE
1	B	213	ASN
1	B	215	LYS
1	B	237	LEU
1	B	239	GLU
1	B	286	MET
1	B	322	ARG
1	B	349	ARG
1	B	350	ARG
1	C	77	ASN
1	C	96	GLN
1	C	139	GLN
1	C	143	ARG
1	C	144	LEU
1	C	145[A]	GLU
1	C	145[B]	GLU
1	C	172	PHE
1	C	186	LEU
1	C	220	GLU
1	C	264	LEU
1	C	283	LYS
1	C	296	LEU
1	C	350	ARG
1	D	96	GLN
1	D	139	GLN
1	D	143	ARG
1	D	172	PHE
1	D	206	ASP
1	D	237	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	98	GLN
1	A	112	ASN
1	A	125	HIS
1	A	175	GLN
1	A	213	ASN
1	A	332	GLN
1	B	86	GLN

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Mol	Chain	Res	Type
1	B	98	GLN
1	B	139	GLN
1	B	141	ASN
1	B	213	ASN
1	B	332	GLN
1	C	86	GLN
1	C	96	GLN
1	C	175	GLN
1	C	176	ASN
1	C	299	GLN
1	C	335	GLN
1	D	97	GLN
1	D	139	GLN
1	D	332	GLN

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 [i](#)

Of 39 ligands modelled in this entry, 18 are monoatomic - leaving 21 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
5	NLG	D	1357	-	12,12,12	1.70	1 (8%)	15,15,15	1.12	1 (6%)
2	EDO	B	1356	-	3,3,3	0.34	0	2,2,2	0.43	0
5	NLG	A	1360	-	12,12,12	1.70	1 (8%)	15,15,15	1.24	1 (6%)
5	NLG	B	1361	-	12,12,12	1.85	1 (8%)	15,15,15	1.20	2 (13%)
2	EDO	B	1357	-	3,3,3	0.53	0	2,2,2	0.29	0
2	EDO	D	1353	-	3,3,3	0.61	0	2,2,2	0.24	0
2	EDO	A	1356	-	3,3,3	0.57	0	2,2,2	0.16	0
3	GOL	A	1357	-	5,5,5	0.36	0	5,5,5	0.34	0
3	GOL	D	1354	-	5,5,5	0.43	0	5,5,5	0.15	0
3	GOL	B	1358	-	5,5,5	0.43	0	5,5,5	0.29	0
2	EDO	C	1354	-	3,3,3	0.58	0	2,2,2	0.12	0
3	GOL	C	1355	-	5,5,5	0.40	0	5,5,5	0.15	0
2	EDO	C	1353	-	3,3,3	0.56	0	2,2,2	0.28	0
2	EDO	B	1352	-	3,3,3	0.67	0	2,2,2	0.23	0
2	EDO	B	1354	-	3,3,3	0.49	0	2,2,2	0.24	0
2	EDO	A	1355	-	3,3,3	0.59	0	2,2,2	0.26	0
5	NLG	C	1358	-	12,12,12	1.77	1 (8%)	15,15,15	1.24	1 (6%)
2	EDO	B	1353	-	3,3,3	0.48	0	2,2,2	0.28	0
2	EDO	A	1354	-	3,3,3	0.49	0	2,2,2	0.35	0
2	EDO	B	1355	-	3,3,3	0.53	0	2,2,2	0.24	0
2	EDO	A	1353	-	3,3,3	0.58	0	2,2,2	0.12	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
5	NLG	D	1357	-	-	0/13/13/13	-
2	EDO	B	1356	-	-	1/1/1/1	-
5	NLG	A	1360	-	-	1/13/13/13	-
5	NLG	B	1361	-	-	2/13/13/13	-
2	EDO	B	1357	-	-	0/1/1/1	-
2	EDO	D	1353	-	-	1/1/1/1	-
2	EDO	A	1356	-	-	1/1/1/1	-
3	GOL	A	1357	-	-	4/4/4/4	-
3	GOL	D	1354	-	-	2/4/4/4	-
3	GOL	B	1358	-	-	2/4/4/4	-
2	EDO	C	1354	-	-	1/1/1/1	-
3	GOL	C	1355	-	-	2/4/4/4	-
2	EDO	C	1353	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	B	1352	-	-	1/1/1/1	-
2	EDO	B	1354	-	-	1/1/1/1	-
2	EDO	A	1355	-	-	1/1/1/1	-
5	NLG	C	1358	-	-	0/13/13/13	-
2	EDO	B	1353	-	-	1/1/1/1	-
2	EDO	A	1354	-	-	1/1/1/1	-
2	EDO	B	1355	-	-	1/1/1/1	-
2	EDO	A	1353	-	-	1/1/1/1	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	1361	NLG	C8-C7	-5.30	1.39	1.50
5	C	1358	NLG	C8-C7	-5.22	1.39	1.50
5	D	1357	NLG	C8-C7	-5.03	1.40	1.50
5	A	1360	NLG	C8-C7	-5.00	1.40	1.50

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1360	NLG	OE1-CD-CG	-2.42	115.31	123.08
5	C	1358	NLG	OE1-CD-CG	-2.20	116.00	123.08
5	B	1361	NLG	OE1-CD-CG	-2.19	116.05	123.08
5	B	1361	NLG	O7-C7-C8	-2.12	118.11	122.06
5	D	1357	NLG	O7-C7-C8	-2.01	118.32	122.06

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	1358	GOL	C1-C2-C3-O3
3	C	1355	GOL	C1-C2-C3-O3
3	D	1354	GOL	O1-C1-C2-C3
3	A	1357	GOL	O1-C1-C2-C3
3	A	1357	GOL	C1-C2-C3-O3
3	C	1355	GOL	O2-C2-C3-O3
3	D	1354	GOL	O1-C1-C2-O2
2	A	1354	EDO	O1-C1-C2-O2
2	B	1355	EDO	O1-C1-C2-O2
2	D	1353	EDO	O1-C1-C2-O2
3	A	1357	GOL	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
3	B	1358	GOL	O2-C2-C3-O3
2	A	1353	EDO	O1-C1-C2-O2
2	B	1354	EDO	O1-C1-C2-O2
2	B	1356	EDO	O1-C1-C2-O2
2	C	1353	EDO	O1-C1-C2-O2
3	A	1357	GOL	O2-C2-C3-O3
2	A	1355	EDO	O1-C1-C2-O2
2	A	1356	EDO	O1-C1-C2-O2
2	B	1353	EDO	O1-C1-C2-O2
2	C	1354	EDO	O1-C1-C2-O2
2	B	1352	EDO	O1-C1-C2-O2
5	B	1361	NLG	OE2-CD-CG-CB
5	B	1361	NLG	OE1-CD-CG-CB
5	A	1360	NLG	OE2-CD-CG-CB

There are no ring outliers.

6 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1356	EDO	2	0
2	A	1356	EDO	2	0
2	B	1352	EDO	1	0
2	B	1354	EDO	4	0
2	B	1353	EDO	2	0
2	A	1353	EDO	3	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	C	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	170:LYS	C	171:CYS	N	1.16

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	291/307 (94%)	-0.30	1 (0%) 94 93	12, 26, 42, 53	0
1	B	289/307 (94%)	-0.34	3 (1%) 82 81	11, 22, 39, 48	0
1	C	291/307 (94%)	-0.30	4 (1%) 75 73	14, 28, 50, 83	0
1	D	290/307 (94%)	-0.39	3 (1%) 82 81	12, 21, 39, 54	0
All	All	1161/1228 (94%)	-0.33	11 (0%) 84 83	11, 24, 44, 83	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	77	ASN	3.8
1	C	352	TYR	3.7
1	B	94	VAL	3.3
1	D	206	ASP	3.1
1	B	351	GLY	3.0
1	C	62	ASN	2.8
1	D	94	VAL	2.7
1	A	94	VAL	2.6
1	B	96	GLN	2.5
1	C	351	GLY	2.5
1	D	319	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 monosaccharides in this entry.

6.4 Ligands

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	EDO	B	1357	4/4	0.44	0.24	59,59,60,60	0
2	EDO	A	1355	4/4	0.69	0.15	54,54,54,54	0
3	GOL	C	1355	6/6	0.69	0.23	74,74,74,74	0
2	EDO	C	1353	4/4	0.72	0.34	47,48,48,49	0
2	EDO	B	1354	4/4	0.73	0.44	57,58,59,59	0
2	EDO	D	1353	4/4	0.73	0.17	46,46,46,47	0
2	EDO	A	1353	4/4	0.73	0.27	39,41,41,43	0
2	EDO	B	1353	4/4	0.79	0.23	44,45,45,45	0
2	EDO	A	1354	4/4	0.81	0.21	47,48,49,49	0
3	GOL	D	1354	6/6	0.81	0.23	59,59,60,60	0
6	CL	C	1359	1/1	0.82	0.09	70,70,70,70	0
2	EDO	A	1356	4/4	0.84	0.27	59,60,60,60	0
2	EDO	B	1352	4/4	0.84	0.14	34,36,36,37	0
2	EDO	B	1355	4/4	0.84	0.28	48,49,49,49	0
3	GOL	A	1357	6/6	0.86	0.13	44,45,45,45	0
3	GOL	B	1358	6/6	0.87	0.16	41,41,42,42	6
2	EDO	C	1354	4/4	0.87	0.17	37,38,39,39	0
5	NLG	A	1360	13/13	0.91	0.12	21,24,26,27	0
6	CL	A	1362	1/1	0.92	0.17	61,61,61,61	0
2	EDO	B	1356	4/4	0.94	0.39	44,45,45,45	0
5	NLG	C	1358	13/13	0.94	0.11	23,24,25,25	0
5	NLG	D	1357	13/13	0.94	0.13	19,21,22,22	0
4	HG	B	1359[A]	1/1	0.94	0.06	44,44,44,44	1
6	CL	B	1362	1/1	0.94	0.11	30,30,30,30	0
4	HG	B	1359[B]	1/1	0.94	0.06	39,39,39,39	1
4	HG	C	1357	1/1	0.95	0.09	52,52,52,52	1
4	HG	D	1356[A]	1/1	0.95	0.05	52,52,52,52	1
4	HG	D	1356[B]	1/1	0.95	0.05	51,51,51,51	1
6	CL	D	1358	1/1	0.95	0.06	39,39,39,39	0
4	HG	D	1355[B]	1/1	0.96	0.09	45,45,45,45	1
4	HG	D	1355[A]	1/1	0.96	0.09	42,42,42,42	1
5	NLG	B	1361	13/13	0.97	0.10	17,21,22,22	0
6	CL	B	1364	1/1	0.97	0.09	40,40,40,40	0
6	CL	A	1361	1/1	0.98	0.08	31,31,31,31	0
4	HG	A	1359	1/1	0.98	0.05	41,41,41,41	1
4	HG	A	1358	1/1	0.98	0.08	33,33,33,33	1
4	HG	B	1360	1/1	0.99	0.04	39,39,39,39	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	HG	C	1356	1/1	0.99	0.07	36,36,36,36	1
6	CL	B	1363	1/1	0.99	0.21	10,10,10,10	0

6.5 Other polymers [i](#)

There are no such residues in this entry.