



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 15, 2024 – 08:55 PM EST

PDB ID : 3R4Q  
Title : Crystal structure of Lactoylglutathione lyase from *Agrobacterium tumefaciens*  
Authors : Agarwal, R.; Almo, S.C.; Swaminathan, S.; New York Structural Genomics Research Consortium (NYSGRC)  
Deposited on : 2011-03-17  
Resolution : 2.51 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](mailto: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>.

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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

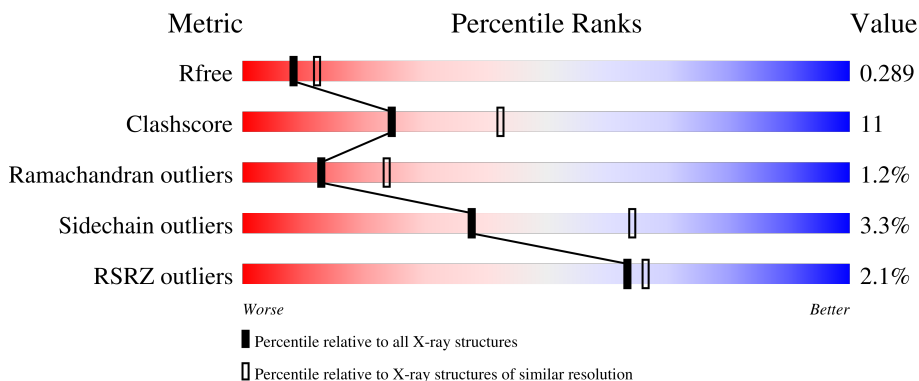
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.51 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	160	 63% 21% 14%
1	B	160	 65% 17% 16%
1	C	160	 65% 16% 16%
1	D	160	 64% 19% 16%
1	E	160	 57% 24% 17%

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:

<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
3	IPA	A	4572	-	-	-	X
3	IPA	B	4571	-	-	-	X

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 5510 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 Lactoylglutathione lyase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	138	1088	698	183	202	5	0	0	0
1	B	134	1068	686	179	198	5	0	0	0
1	C	134	1068	686	179	198	5	0	0	0
1	D	134	1062	684	178	195	5	0	0	0
1	E	133	1058	682	176	195	5	0	0	0

There are 120 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP Q7CXA0
A	2	VAL	-	expression tag	UNP Q7CXA0
A	139	ALA	-	expression tag	UNP Q7CXA0
A	140	GLU	-	expression tag	UNP Q7CXA0
A	141	ASN	-	expression tag	UNP Q7CXA0
A	142	LEU	-	expression tag	UNP Q7CXA0
A	143	TYR	-	expression tag	UNP Q7CXA0
A	144	PHE	-	expression tag	UNP Q7CXA0
A	145	GLN	-	expression tag	UNP Q7CXA0
A	146	SER	-	expression tag	UNP Q7CXA0
A	147	HIS	-	expression tag	UNP Q7CXA0
A	148	HIS	-	expression tag	UNP Q7CXA0
A	149	HIS	-	expression tag	UNP Q7CXA0
A	150	HIS	-	expression tag	UNP Q7CXA0
A	151	HIS	-	expression tag	UNP Q7CXA0
A	152	HIS	-	expression tag	UNP Q7CXA0
A	153	TRP	-	expression tag	UNP Q7CXA0
A	154	SER	-	expression tag	UNP Q7CXA0
A	155	HIS	-	expression tag	UNP Q7CXA0

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Chain	Residue	Modelled	Actual	Comment	Reference
A	156	PRO	-	expression tag	UNP Q7CXA0
A	157	GLN	-	expression tag	UNP Q7CXA0
A	158	PHE	-	expression tag	UNP Q7CXA0
A	159	GLU	-	expression tag	UNP Q7CXA0
A	160	LYS	-	expression tag	UNP Q7CXA0
B	1	MET	-	expression tag	UNP Q7CXA0
B	2	VAL	-	expression tag	UNP Q7CXA0
B	139	ALA	-	expression tag	UNP Q7CXA0
B	140	GLU	-	expression tag	UNP Q7CXA0
B	141	ASN	-	expression tag	UNP Q7CXA0
B	142	LEU	-	expression tag	UNP Q7CXA0
B	143	TYR	-	expression tag	UNP Q7CXA0
B	144	PHE	-	expression tag	UNP Q7CXA0
B	145	GLN	-	expression tag	UNP Q7CXA0
B	146	SER	-	expression tag	UNP Q7CXA0
B	147	HIS	-	expression tag	UNP Q7CXA0
B	148	HIS	-	expression tag	UNP Q7CXA0
B	149	HIS	-	expression tag	UNP Q7CXA0
B	150	HIS	-	expression tag	UNP Q7CXA0
B	151	HIS	-	expression tag	UNP Q7CXA0
B	152	HIS	-	expression tag	UNP Q7CXA0
B	153	TRP	-	expression tag	UNP Q7CXA0
B	154	SER	-	expression tag	UNP Q7CXA0
B	155	HIS	-	expression tag	UNP Q7CXA0
B	156	PRO	-	expression tag	UNP Q7CXA0
B	157	GLN	-	expression tag	UNP Q7CXA0
B	158	PHE	-	expression tag	UNP Q7CXA0
B	159	GLU	-	expression tag	UNP Q7CXA0
B	160	LYS	-	expression tag	UNP Q7CXA0
C	1	MET	-	expression tag	UNP Q7CXA0
C	2	VAL	-	expression tag	UNP Q7CXA0
C	139	ALA	-	expression tag	UNP Q7CXA0
C	140	GLU	-	expression tag	UNP Q7CXA0
C	141	ASN	-	expression tag	UNP Q7CXA0
C	142	LEU	-	expression tag	UNP Q7CXA0
C	143	TYR	-	expression tag	UNP Q7CXA0
C	144	PHE	-	expression tag	UNP Q7CXA0
C	145	GLN	-	expression tag	UNP Q7CXA0
C	146	SER	-	expression tag	UNP Q7CXA0
C	147	HIS	-	expression tag	UNP Q7CXA0
C	148	HIS	-	expression tag	UNP Q7CXA0
C	149	HIS	-	expression tag	UNP Q7CXA0

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Chain	Residue	Modelled	Actual	Comment	Reference
C	150	HIS	-	expression tag	UNP Q7CXA0
C	151	HIS	-	expression tag	UNP Q7CXA0
C	152	HIS	-	expression tag	UNP Q7CXA0
C	153	TRP	-	expression tag	UNP Q7CXA0
C	154	SER	-	expression tag	UNP Q7CXA0
C	155	HIS	-	expression tag	UNP Q7CXA0
C	156	PRO	-	expression tag	UNP Q7CXA0
C	157	GLN	-	expression tag	UNP Q7CXA0
C	158	PHE	-	expression tag	UNP Q7CXA0
C	159	GLU	-	expression tag	UNP Q7CXA0
C	160	LYS	-	expression tag	UNP Q7CXA0
D	1	MET	-	expression tag	UNP Q7CXA0
D	2	VAL	-	expression tag	UNP Q7CXA0
D	139	ALA	-	expression tag	UNP Q7CXA0
D	140	GLU	-	expression tag	UNP Q7CXA0
D	141	ASN	-	expression tag	UNP Q7CXA0
D	142	LEU	-	expression tag	UNP Q7CXA0
D	143	TYR	-	expression tag	UNP Q7CXA0
D	144	PHE	-	expression tag	UNP Q7CXA0
D	145	GLN	-	expression tag	UNP Q7CXA0
D	146	SER	-	expression tag	UNP Q7CXA0
D	147	HIS	-	expression tag	UNP Q7CXA0
D	148	HIS	-	expression tag	UNP Q7CXA0
D	149	HIS	-	expression tag	UNP Q7CXA0
D	150	HIS	-	expression tag	UNP Q7CXA0
D	151	HIS	-	expression tag	UNP Q7CXA0
D	152	HIS	-	expression tag	UNP Q7CXA0
D	153	TRP	-	expression tag	UNP Q7CXA0
D	154	SER	-	expression tag	UNP Q7CXA0
D	155	HIS	-	expression tag	UNP Q7CXA0
D	156	PRO	-	expression tag	UNP Q7CXA0
D	157	GLN	-	expression tag	UNP Q7CXA0
D	158	PHE	-	expression tag	UNP Q7CXA0
D	159	GLU	-	expression tag	UNP Q7CXA0
D	160	LYS	-	expression tag	UNP Q7CXA0
E	1	MET	-	expression tag	UNP Q7CXA0
E	2	VAL	-	expression tag	UNP Q7CXA0
E	139	ALA	-	expression tag	UNP Q7CXA0
E	140	GLU	-	expression tag	UNP Q7CXA0
E	141	ASN	-	expression tag	UNP Q7CXA0
E	142	LEU	-	expression tag	UNP Q7CXA0
E	143	TYR	-	expression tag	UNP Q7CXA0

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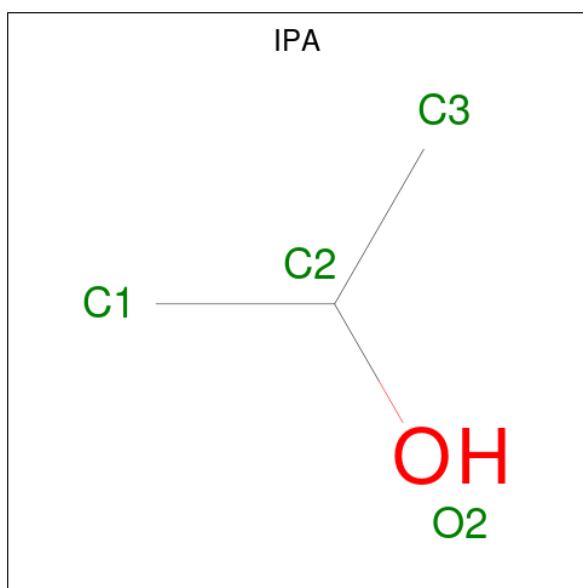
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Chain	Residue	Modelled	Actual	Comment	Reference
E	144	PHE	-	expression tag	UNP Q7CXA0
E	145	GLN	-	expression tag	UNP Q7CXA0
E	146	SER	-	expression tag	UNP Q7CXA0
E	147	HIS	-	expression tag	UNP Q7CXA0
E	148	HIS	-	expression tag	UNP Q7CXA0
E	149	HIS	-	expression tag	UNP Q7CXA0
E	150	HIS	-	expression tag	UNP Q7CXA0
E	151	HIS	-	expression tag	UNP Q7CXA0
E	152	HIS	-	expression tag	UNP Q7CXA0
E	153	TRP	-	expression tag	UNP Q7CXA0
E	154	SER	-	expression tag	UNP Q7CXA0
E	155	HIS	-	expression tag	UNP Q7CXA0
E	156	PRO	-	expression tag	UNP Q7CXA0
E	157	GLN	-	expression tag	UNP Q7CXA0
E	158	PHE	-	expression tag	UNP Q7CXA0
E	159	GLU	-	expression tag	UNP Q7CXA0
E	160	LYS	-	expression tag	UNP Q7CXA0

- Molecule 2 is COBALT (II) ION (three-letter code: CO) (formula: Co).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Co 1 1	0	0

- Molecule 3 is ISOPROPYL ALCOHOL (three-letter code: IPA) (formula: C<sub>3</sub>H<sub>8</sub>O).



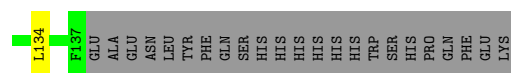
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	3	1		
3	B	1	Total	C	O	0	0
			4	3	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	38	Total	O	0	0
			38	38		
4	B	32	Total	O	0	0
			32	32		
4	C	36	Total	O	0	0
			36	36		
4	D	42	Total	O	0	0
			42	42		
4	E	9	Total	O	0	0
			9	9		







- Molecule 1: Lactoylglutathione lyase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	72.53Å 202.52Å 50.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.42 – 2.51 49.42 – 2.51	Depositor EDS
% Data completeness (in resolution range)	97.5 (49.42-2.51) 97.6 (49.42-2.51)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	9.60 (at 2.51Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.230 , 0.296 0.224 , 0.289	Depositor DCC
$R_{free}$ test set	744 reflections (2.81%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.6	Xtrriage
Anisotropy	0.448	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 37.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	5510	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.41% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: CO, IPA

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	0.43	0/1121	0.69	1/1523 (0.1%)
1	B	0.47	0/1101	0.77	2/1494 (0.1%)
1	C	0.44	0/1101	0.71	0/1495
1	D	0.50	0/1095	0.76	1/1487 (0.1%)
1	E	0.53	0/1090	0.76	0/1476
All	All	0.48	0/5508	0.74	4/7475 (0.1%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	65	ALA	N-CA-C	-7.85	89.79	111.00
1	B	56	ASP	N-CA-C	-5.54	96.03	111.00
1	A	56	ASP	N-CA-C	-5.31	96.67	111.00
1	D	56	ASP	N-CA-C	-5.14	97.12	111.00

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	1088	0	1011	30	0
1	B	1068	0	1001	21	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1068	0	1000	26	0
1	D	1062	0	994	28	0
1	E	1058	0	993	28	0
2	A	1	0	0	0	0
3	A	4	0	8	0	0
3	B	4	0	8	0	0
4	A	38	0	0	0	0
4	B	32	0	0	0	0
4	C	36	0	0	0	0
4	D	42	0	0	1	0
4	E	9	0	0	2	0
All	All	5510	0	5015	113	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 11.

All (113) 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:C:78:GLY:H	1:C:125:ASN:HD22	1.14	0.96
1:B:78:GLY:H	1:B:125:ASN:HD22	1.13	0.94
1:A:78:GLY:H	1:A:125:ASN:HD22	1.15	0.91
1:D:112:ASN:HD22	1:D:112:ASN:H	1.25	0.82
1:D:114:SER:HB3	1:D:134:LEU:HD12	1.67	0.77
1:C:78:GLY:H	1:C:125:ASN:ND2	1.81	0.76
1:D:112:ASN:HD22	1:D:112:ASN:N	1.84	0.75
1:A:63:ALA:HA	1:A:71:ARG:HD3	1.70	0.74
1:C:50:GLN:HE22	1:D:50:GLN:HE21	1.36	0.73
1:A:78:GLY:H	1:A:125:ASN:ND2	1.88	0.71
1:B:60:SER:HB2	1:B:72:HIS:O	1.90	0.70
1:C:78:GLY:N	1:C:125:ASN:HD22	1.88	0.69
1:A:9:ILE:H	1:B:50:GLN:NE2	1.92	0.68
1:B:78:GLY:H	1:B:125:ASN:ND2	1.89	0.67
1:B:65:ALA:O	1:B:66:ASN:HB2	1.95	0.65
1:A:8:ALA:HB1	1:B:50:GLN:HE22	1.61	0.64
1:C:90:VAL:HG13	1:C:117:VAL:HG22	1.79	0.64
1:A:36:LEU:HD12	1:E:37:LYS:O	1.98	0.64
1:E:114:SER:HB3	1:E:134:LEU:HD12	1.79	0.64
1:E:137:PHE:O	1:E:138:GLU:HB2	1.99	0.63
1:C:50:GLN:HE22	1:D:50:GLN:NE2	1.96	0.63
1:A:81:CYS:HB3	1:B:11:GLU:HB2	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:15:TYR:HB3	1:E:57:PRO:HD3	1.82	0.62
1:D:15:TYR:HB3	1:D:57:PRO:HD3	1.83	0.61
1:E:89:GLU:O	1:E:92:GLU:HB2	2.00	0.61
1:A:78:GLY:N	1:A:125:ASN:HD22	1.95	0.60
1:A:37:LYS:HD3	1:A:43:VAL:HG22	1.83	0.60
1:A:9:ILE:H	1:B:50:GLN:HE21	1.49	0.59
1:D:112:ASN:H	1:D:112:ASN:ND2	1.99	0.59
1:A:90:VAL:HG13	1:A:117:VAL:HG22	1.85	0.59
1:E:63:ALA:O	1:E:65:ALA:N	2.36	0.59
1:C:14:LEU:HD12	1:C:52:LEU:HD11	1.83	0.59
1:A:100:LEU:O	1:A:101:GLU:HB2	2.03	0.57
1:C:74:ALA:HB1	1:D:74:ALA:HB1	1.85	0.57
1:E:96:ARG:HH11	1:E:96:ARG:HG3	1.69	0.57
1:C:11:GLU:HB2	1:D:81:CYS:HB3	1.86	0.56
1:C:57:PRO:O	1:C:61:SER:HB2	2.05	0.56
1:C:117:VAL:HG23	1:C:129:VAL:HB	1.88	0.56
1:A:42:LEU:HD22	1:A:44:PHE:CZ	2.41	0.55
1:E:92:GLU:O	1:E:95:THR:HB	2.07	0.55
1:C:23:GLU:OE1	1:C:34:MET:HE1	2.07	0.53
1:A:117:VAL:HG23	1:A:129:VAL:HB	1.90	0.53
1:E:78:GLY:H	1:E:125:ASN:HD22	1.55	0.53
1:D:102:ILE:HG22	1:D:119:ILE:HD12	1.92	0.52
1:B:53:LEU:HB3	1:B:55:PHE:CE1	2.45	0.52
1:D:26:TYR:HB3	1:D:32:LEU:HD12	1.90	0.52
1:C:50:GLN:NE2	1:D:50:GLN:HE21	2.06	0.52
1:E:134:LEU:HD22	4:E:170:HOH:O	2.11	0.51
1:E:15:TYR:CE1	1:E:73:GLY:HA2	2.45	0.51
1:B:78:GLY:N	1:B:125:ASN:HD22	1.96	0.50
1:C:56:ASP:OD1	1:C:58:GLN:HG2	2.11	0.50
1:A:106:HIS:CE1	1:B:68:PRO:HB2	2.46	0.50
1:C:131:GLU:O	1:C:134:LEU:HB2	2.12	0.50
1:A:88:ALA:O	1:A:92:GLU:HG3	2.12	0.50
1:A:94:LYS:HB2	1:A:117:VAL:HG11	1.94	0.49
1:E:96:ARG:CZ	1:E:100:LEU:HD11	2.44	0.48
1:C:50:GLN:HG3	1:D:9:ILE:HG12	1.93	0.48
1:D:84:ALA:O	1:D:131:GLU:HA	2.13	0.48
1:A:114:SER:HB2	1:A:134:LEU:HD12	1.95	0.48
1:C:68:PRO:HB2	1:D:106:HIS:CE1	2.48	0.48
1:A:36:LEU:HD13	1:E:39:PRO:HD2	1.96	0.48
1:B:61:SER:O	1:B:71:ARG:HD2	2.13	0.47
1:B:36:LEU:HD23	1:B:37:LYS:N	2.29	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:79:HIS:HB2	1:E:126:SER:HB3	1.97	0.47
1:E:61:SER:O	1:E:71:ARG:HD2	2.14	0.47
1:E:132:GLY:O	1:E:137:PHE:HB2	2.15	0.47
1:E:26:TYR:CD2	1:E:54:LEU:HD11	2.50	0.46
1:E:105:GLU:CD	1:E:120:ARG:HE	2.19	0.46
1:E:78:GLY:H	1:E:125:ASN:ND2	2.14	0.46
1:A:14:LEU:HD11	1:A:80:PHE:CD2	2.50	0.45
1:C:14:LEU:HD11	1:C:80:PHE:CE1	2.50	0.45
1:D:14:LEU:HD11	1:D:80:PHE:CE2	2.52	0.45
1:E:15:TYR:CD1	1:E:55:PHE:HB2	2.52	0.45
1:D:112:ASN:N	1:D:112:ASN:ND2	2.57	0.45
1:A:15:TYR:HB3	1:A:57:PRO:HD3	1.99	0.44
1:A:105:GLU:HG2	1:B:70:PRO:HG3	1.99	0.44
1:E:49:ARG:HG3	1:E:49:ARG:HH11	1.81	0.44
1:E:62:ARG:O	1:E:63:ALA:C	2.56	0.44
1:B:94:LYS:HB2	1:B:117:VAL:HG11	2.00	0.44
1:C:112:ASN:O	1:C:133:LYS:HE3	2.17	0.44
1:A:66:ASN:H	1:A:66:ASN:HD22	1.66	0.44
1:C:86:ASP:HA	1:C:131:GLU:HG2	2.00	0.44
1:E:96:ARG:HG3	1:E:96:ARG:NH1	2.32	0.44
1:E:36:LEU:HD23	1:E:37:LYS:N	2.32	0.43
1:D:28:ASP:HB2	4:D:190:HOH:O	2.19	0.43
1:D:14:LEU:HD11	1:D:80:PHE:CD2	2.53	0.42
1:D:114:SER:CB	1:D:134:LEU:HD12	2.44	0.42
1:D:9:ILE:O	1:D:50:GLN:HG2	2.18	0.42
1:C:107:TYR:HD1	1:C:117:VAL:HG13	1.84	0.42
1:A:11:GLU:HB2	1:B:81:CYS:HB3	2.00	0.42
1:C:33:GLU:HG2	1:C:46:LYS:HB3	2.00	0.42
1:A:140:GLU:O	1:A:141:ASN:CB	2.67	0.42
1:A:83:TYR:HB2	1:B:10:MET:HB2	2.02	0.42
1:A:84:ALA:O	1:A:131:GLU:HA	2.19	0.42
1:D:128:GLU:HG2	1:D:129:VAL:N	2.35	0.42
1:A:96:ARG:HG3	1:A:96:ARG:HH11	1.85	0.41
1:E:58:GLN:O	1:E:62:ARG:HB2	2.20	0.41
1:B:88:ALA:O	1:B:92:GLU:HG3	2.21	0.41
1:C:81:CYS:HB3	1:D:11:GLU:HG3	2.02	0.41
1:E:87:LYS:HE2	1:E:115:TYR:CD1	2.55	0.41
1:E:23:GLU:CD	1:E:37:LYS:HZ2	2.23	0.41
1:A:63:ALA:HB2	1:A:71:ARG:NH1	2.35	0.41
1:B:65:ALA:O	1:B:66:ASN:CB	2.65	0.41
1:C:106:HIS:NE2	1:D:68:PRO:HB2	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:66:ASN:HD22	1:A:66:ASN:N	2.18	0.41
1:B:42:LEU:HD13	1:B:44:PHE:CE1	2.56	0.41
1:C:50:GLN:HE21	1:D:9:ILE:HB	1.85	0.41
1:D:87:LYS:HG2	1:D:91:ASP:OD2	2.20	0.41
1:C:104:VAL:HA	1:C:119:ILE:HG22	2.03	0.40
1:D:23:GLU:HG3	1:D:43:VAL:HG11	2.02	0.40
1:E:101:GLU:HG3	4:E:169:HOH:O	2.22	0.40
1:B:107:TYR:HD1	1:B:117:VAL:HG12	1.85	0.40
1:D:42:LEU:HD13	1:D:44:PHE:CE1	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	136/160 (85%)	131 (96%)	4 (3%)	1 (1%)	22	39
1	B	132/160 (82%)	127 (96%)	2 (2%)	3 (2%)	6	10
1	C	132/160 (82%)	127 (96%)	5 (4%)	0	100	100
1	D	132/160 (82%)	126 (96%)	6 (4%)	0	100	100
1	E	129/160 (81%)	111 (86%)	14 (11%)	4 (3%)	4	5
All	All	661/800 (83%)	622 (94%)	31 (5%)	8 (1%)	13	24

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	64	ASP
1	B	65	ALA
1	B	66	ASN
1	E	64	ASP
1	E	114	SER

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Mol	Chain	Res	Type
1	A	140	GLU
1	E	119	ILE
1	E	95	THR

### 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	109/135 (81%)	107 (98%)	2 (2%)	59	81
1	B	109/135 (81%)	105 (96%)	4 (4%)	34	60
1	C	109/135 (81%)	105 (96%)	4 (4%)	34	60
1	D	107/135 (79%)	104 (97%)	3 (3%)	43	70
1	E	107/135 (79%)	102 (95%)	5 (5%)	26	49
All	All	541/675 (80%)	523 (97%)	18 (3%)	38	64

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	ASN
1	A	117	VAL
1	B	60	SER
1	B	67	ASN
1	B	93	TRP
1	B	101	GLU
1	C	50	GLN
1	C	61	SER
1	C	117	VAL
1	C	134	LEU
1	D	58	GLN
1	D	67	ASN
1	D	112	ASN
1	E	41	GLN
1	E	53	LEU
1	E	93	TRP

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Mol	Chain	Res	Type
1	E	106	HIS
1	E	138	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	66	ASN
1	A	125	ASN
1	B	50	GLN
1	B	67	ASN
1	B	125	ASN
1	C	50	GLN
1	C	58	GLN
1	C	106	HIS
1	C	125	ASN
1	D	67	ASN
1	D	72	HIS
1	D	112	ASN
1	E	41	GLN
1	E	112	ASN
1	E	125	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 [i](#)

Of 3 ligands modelled in this entry, 1 is monoatomic - leaving 2 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	$\# Z  > 2$
3	IPA	B	4571	-	3,3,3	0.60	0	3,3,3	0.36	0
3	IPA	A	4572	-	3,3,3	0.64	0	3,3,3	0.35	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.

No monomer is involved in short contacts.

## 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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	138/160 (86%)	-0.19	0 <b>100</b> <b>100</b>	15, 22, 36, 42	0
1	B	134/160 (83%)	-0.12	2 (1%) 73 75	13, 22, 33, 53	0
1	C	134/160 (83%)	-0.13	0 <b>100</b> <b>100</b>	14, 23, 35, 39	0
1	D	134/160 (83%)	-0.14	2 (1%) 73 75	15, 22, 39, 54	0
1	E	133/160 (83%)	0.69	10 (7%) 14 14	23, 42, 52, 57	0
All	All	673/800 (84%)	0.02	14 (2%) 63 66	13, 24, 48, 57	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	75	VAL	3.2
1	E	85	ASP	3.2
1	D	65	ALA	3.1
1	E	58	GLN	3.1
1	B	65	ALA	2.9
1	E	63	ALA	2.7
1	D	66	ASN	2.7
1	E	90	VAL	2.6
1	E	65	ALA	2.5
1	E	110	TRP	2.2
1	B	66	ASN	2.2
1	E	133	LYS	2.1
1	E	97	PHE	2.1
1	E	103	PRO	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, 95<sup>th</sup> 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( $\text{\AA}^2$ )	Q<0.9
3	IPA	A	4572	4/4	0.46	0.59	39,40,40,41	4
2	CO	A	161	1/1	0.71	0.30	49,49,49,49	1
3	IPA	B	4571	4/4	0.74	0.45	22,22,22,23	4

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

There are no such residues in this entry.