



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 30, 2021 – 08:42 PM EST

PDB ID : 3N6J
Title : Crystal structure of Mandelate racemase/muconate lactonizing protein from *Actinobacillus succinogenes* 130Z
Authors : Malashkevich, V.N.; Toro, R.; Sauder, J.M.; Burley, S.K.; Almo, S.C.; New York Structural GenomiX Research Consortium (NYSGXRC); New York SGX Research Center for Structural Genomics (NYSGXRC)
Deposited on : 2010-05-25
Resolution : 2.40 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 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	:	2.16
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)	:	2.16

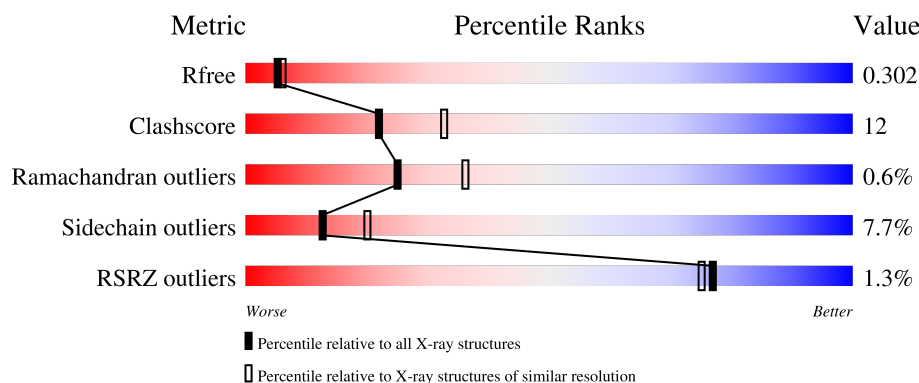
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	455	<div> <div>72%</div> <div>22%</div> <div>• •</div> </div>
1	B	455	<div> <div>71%</div> <div>21%</div> <div>• 5%</div> </div>
1	C	455	<div> <div>66%</div> <div>28%</div> <div>• •</div> </div>
1	D	455	<div> <div>67%</div> <div>27%</div> <div>• •</div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 14084 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 Mandelate racemase/muconate lactonizing protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	442	Total	C	N	O	S	Se	0	1	0
			3456	2200	596	640	6	14			
1	B	432	Total	C	N	O	S	Se	0	1	0
			3379	2150	585	624	6	14			
1	C	442	Total	C	N	O	S	Se	0	2	0
			3462	2205	597	640	6	14			
1	D	440	Total	C	N	O	S	Se	0	1	0
			3441	2192	593	636	6	14			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	-	expression tag	UNP A6VQF6
A	2	SER	-	expression tag	UNP A6VQF6
A	3	LEU	-	expression tag	UNP A6VQF6
A	448	GLU	-	expression tag	UNP A6VQF6
A	449	GLY	-	expression tag	UNP A6VQF6
A	450	HIS	-	expression tag	UNP A6VQF6
A	451	HIS	-	expression tag	UNP A6VQF6
A	452	HIS	-	expression tag	UNP A6VQF6
A	453	HIS	-	expression tag	UNP A6VQF6
A	454	HIS	-	expression tag	UNP A6VQF6
A	455	HIS	-	expression tag	UNP A6VQF6
B	1	MSE	-	expression tag	UNP A6VQF6
B	2	SER	-	expression tag	UNP A6VQF6
B	3	LEU	-	expression tag	UNP A6VQF6
B	448	GLU	-	expression tag	UNP A6VQF6
B	449	GLY	-	expression tag	UNP A6VQF6
B	450	HIS	-	expression tag	UNP A6VQF6
B	451	HIS	-	expression tag	UNP A6VQF6
B	452	HIS	-	expression tag	UNP A6VQF6
B	453	HIS	-	expression tag	UNP A6VQF6
B	454	HIS	-	expression tag	UNP A6VQF6

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Chain	Residue	Modelled	Actual	Comment	Reference
B	455	HIS	-	expression tag	UNP A6VQF6
C	1	MSE	-	expression tag	UNP A6VQF6
C	2	SER	-	expression tag	UNP A6VQF6
C	3	LEU	-	expression tag	UNP A6VQF6
C	448	GLU	-	expression tag	UNP A6VQF6
C	449	GLY	-	expression tag	UNP A6VQF6
C	450	HIS	-	expression tag	UNP A6VQF6
C	451	HIS	-	expression tag	UNP A6VQF6
C	452	HIS	-	expression tag	UNP A6VQF6
C	453	HIS	-	expression tag	UNP A6VQF6
C	454	HIS	-	expression tag	UNP A6VQF6
C	455	HIS	-	expression tag	UNP A6VQF6
D	1	MSE	-	expression tag	UNP A6VQF6
D	2	SER	-	expression tag	UNP A6VQF6
D	3	LEU	-	expression tag	UNP A6VQF6
D	448	GLU	-	expression tag	UNP A6VQF6
D	449	GLY	-	expression tag	UNP A6VQF6
D	450	HIS	-	expression tag	UNP A6VQF6
D	451	HIS	-	expression tag	UNP A6VQF6
D	452	HIS	-	expression tag	UNP A6VQF6
D	453	HIS	-	expression tag	UNP A6VQF6
D	454	HIS	-	expression tag	UNP A6VQF6
D	455	HIS	-	expression tag	UNP A6VQF6

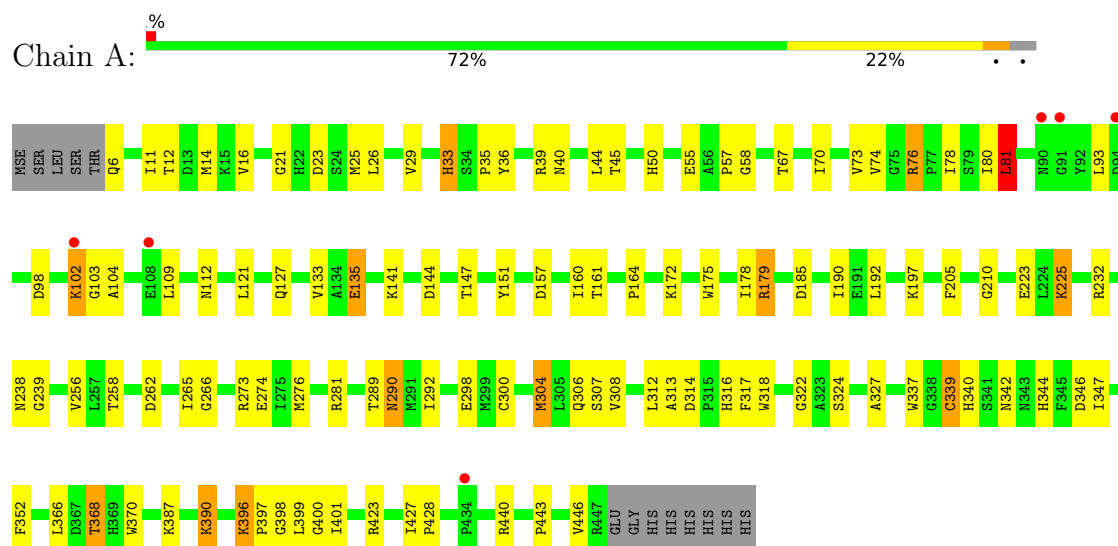
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	144	Total O 144 144	0	0
2	B	109	Total O 109 109	0	0
2	C	67	Total O 67 67	0	0
2	D	26	Total O 26 26	0	0

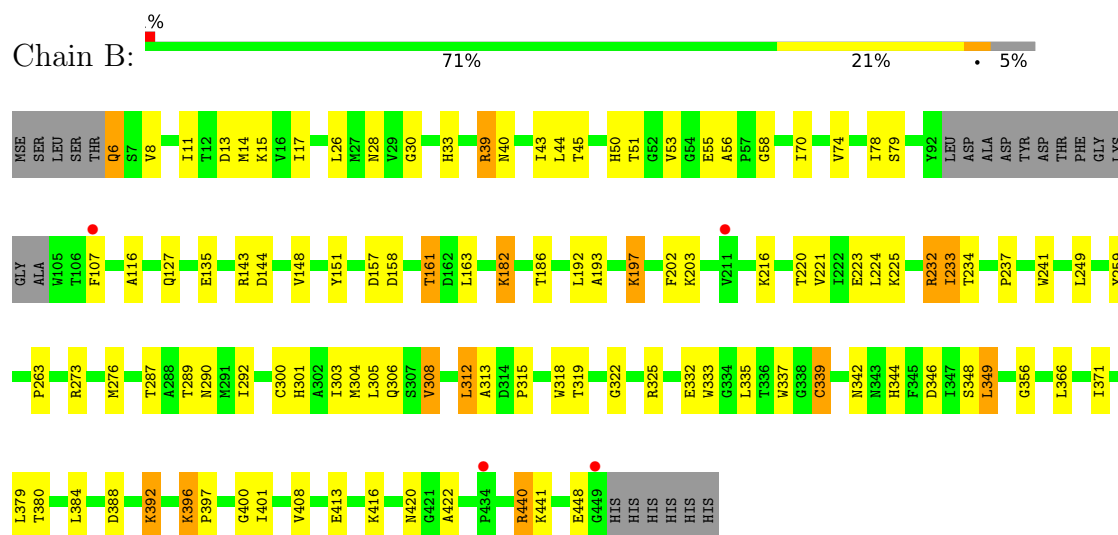
3 Residue-property plots [i](#)

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: Mandelate racemase/muconate lactonizing protein

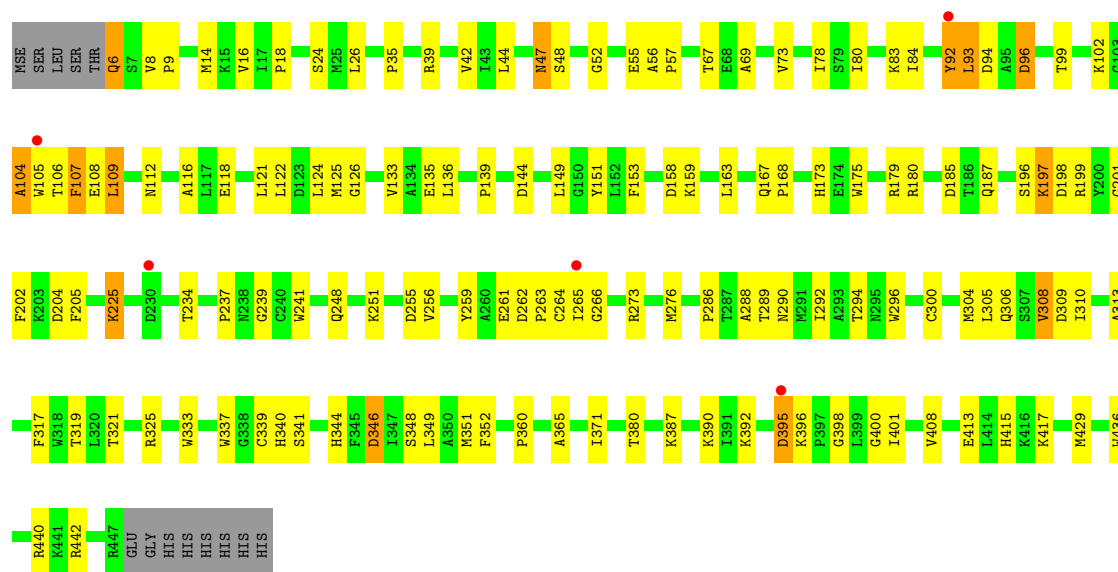


- Molecule 1: Mandelate racemase/muconate lactonizing protein

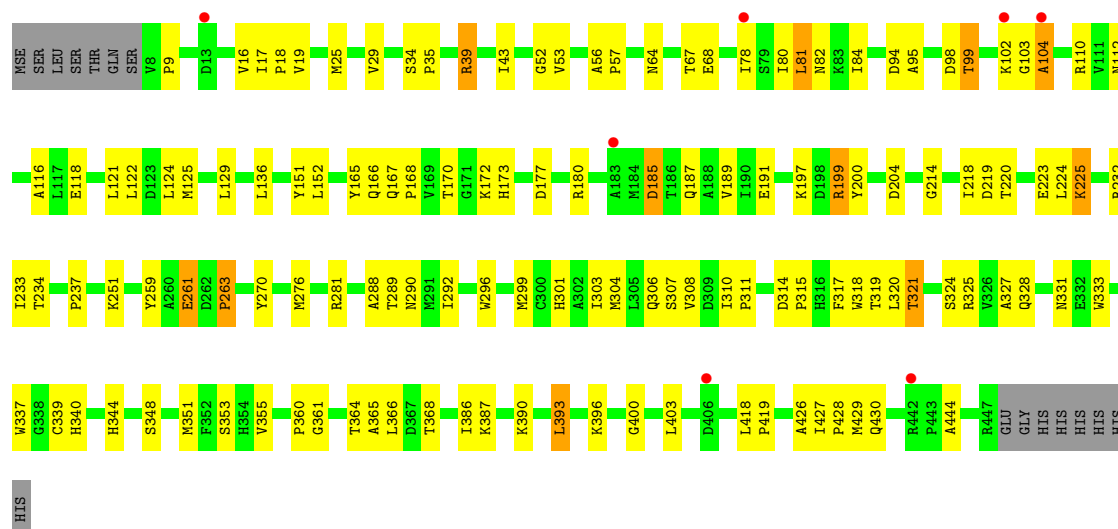


- Molecule 1: Mandelate racemase/muconate lactonizing protein





• Molecule 1: Mandelate racemase/muconate lactonizing protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	90.78Å 84.35Å 113.47Å 90.00° 97.92° 90.00°	Depositor
Resolution (Å)	19.95 – 2.40 39.67 – 2.40	Depositor EDS
% Data completeness (in resolution range)	68.5 (19.95-2.40) 68.3 (39.67-2.40)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.50 (at 2.39Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.217 , 0.304 0.218 , 0.302	Depositor DCC
R_{free} test set	2313 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	28.7	Xtriage
Anisotropy	0.068	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 30.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	14084	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.66% 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	0.53	0/3532	0.66	1/4774 (0.0%)
1	B	0.50	0/3452	0.63	0/4664
1	C	0.49	0/3541	0.61	0/4785
1	D	0.43	0/3517	0.57	0/4754
All	All	0.49	0/14042	0.62	1/18977 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	81	LEU	CA-CB-CG	6.36	129.93	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	3456	0	3394	78	0
1	B	3379	0	3323	83	0
1	C	3462	0	3407	98	0
1	D	3441	0	3381	80	0
2	A	144	0	0	4	0
2	B	109	0	0	4	0
2	C	67	0	0	5	0
2	D	26	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	14084	0	13505	321	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 12.

All (321) 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:306:GLN:HG3	1:C:306:GLN:HG3	1.19	1.12
1:B:232:ARG:HG3	1:B:232:ARG:HH11	1.15	1.05
1:D:103:GLY:HA3	1:D:104:ALA:HB2	1.08	1.05
1:D:103:GLY:HA3	1:D:104:ALA:CB	1.85	1.03
1:A:339:CYS:HB2	1:A:366:LEU:HD22	1.37	1.01
1:C:107:PHE:O	1:C:107:PHE:HD2	1.52	0.92
1:C:289:THR:HG22	1:C:308:VAL:HG11	1.54	0.89
1:B:339:CYS:HB2	1:B:366:LEU:HD22	1.55	0.89
1:D:263:PRO:HD2	1:D:276:MSE:SE	2.24	0.88
1:D:103:GLY:CA	1:D:104:ALA:HB2	2.02	0.85
1:A:265:ILE:CG2	1:A:266:GLY:H	1.92	0.82
1:C:35:PRO:HD3	1:C:163:LEU:HD23	1.62	0.82
1:C:263:PRO:HD2	1:C:276:MSE:SE	2.29	0.82
1:A:239:GLY:HA3	1:A:265:ILE:HD12	1.64	0.79
1:C:107:PHE:CD2	1:C:107:PHE:O	2.35	0.78
1:B:232:ARG:HG3	1:B:232:ARG:NH1	1.90	0.77
1:C:173:HIS:HE1	1:C:198:ASP:OD2	1.68	0.77
1:A:81:LEU:HD12	1:A:121:LEU:HB3	1.67	0.76
1:D:427:ILE:HB	1:D:428:PRO:HD3	1.65	0.76
1:A:317:PHE:HB3	2:A:507:HOH:O	1.84	0.75
1:D:191[A]:GLU:HA	1:D:191[A]:GLU:OE2	1.85	0.75
1:A:11:ILE:HG21	1:A:73:VAL:HG12	1.68	0.75
1:B:313:ALA:HB3	1:B:337:TRP:HE1	1.54	0.72
1:A:304:MSE:HE1	1:D:281:ARG:HH22	1.55	0.71
1:B:11:ILE:CD1	1:B:78:ILE:HG22	2.20	0.71
1:A:265:ILE:CG2	1:A:266:GLY:N	2.51	0.71
1:B:233:ILE:HG13	1:B:234:THR:N	2.06	0.71
1:A:265:ILE:HG23	1:A:266:GLY:H	1.55	0.70
1:C:69:ALA:O	1:C:73:VAL:HG23	1.92	0.69
1:A:39:ARG:HD2	1:A:344:HIS:HA	1.74	0.68
1:B:303:ILE:O	1:B:306:GLN:NE2	2.25	0.68
1:C:241:TRP:O	1:C:264:CYS:HB3	1.93	0.68
1:D:314:ASP:HB2	1:D:340:HIS:HB3	1.76	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:186:THR:HG23	1:B:220:THR:HA	1.76	0.67
1:C:265:ILE:CG1	1:C:266:GLY:H	2.07	0.67
1:C:139:PRO:HG3	1:C:360:PRO:HG3	1.76	0.67
1:A:103:GLY:HA3	1:A:104:ALA:HB2	1.77	0.66
1:D:168:PRO:HB3	1:D:177:ASP:O	1.94	0.66
1:A:265:ILE:HG22	1:A:266:GLY:N	2.11	0.66
1:A:11:ILE:HD11	1:A:121:LEU:HD21	1.77	0.66
1:D:53:VAL:HG11	1:D:403:LEU:HD13	1.78	0.66
1:B:40:ASN:ND2	1:B:58:GLY:HA2	2.11	0.65
1:A:306:GLN:CG	1:C:306:GLN:HG3	2.10	0.65
1:C:35:PRO:CD	1:C:163:LEU:HD23	2.26	0.65
1:D:81:LEU:HB2	1:D:121:LEU:HD13	1.78	0.65
1:A:135:GLU:HG3	1:A:141:LYS:H	1.62	0.64
1:B:237:PRO:HG2	1:B:263:PRO:HA	1.79	0.64
1:A:175:TRP:O	1:A:179:ARG:HG2	1.98	0.63
1:C:173:HIS:CD2	1:C:175:TRP:H	2.16	0.63
1:B:14:MSE:HB3	1:B:70:ILE:HG23	1.81	0.62
1:C:6:GLN:HA	1:C:6:GLN:HE21	1.64	0.62
1:B:11:ILE:HD11	1:B:78:ILE:HG22	1.79	0.62
1:A:427:ILE:HB	1:A:428:PRO:HD3	1.82	0.62
1:C:333:TRP:CH2	1:D:303:ILE:HD12	2.33	0.62
1:A:29:VAL:HG21	1:A:238:ASN:HB2	1.82	0.62
1:D:64:ASN:O	1:D:68:GLU:HG3	2.00	0.62
1:B:17:ILE:HD12	1:B:43:ILE:HD13	1.81	0.61
1:C:107:PHE:CD2	1:C:107:PHE:C	2.74	0.61
1:B:161:THR:CG2	1:B:163:LEU:H	2.14	0.61
1:B:26:LEU:H	1:B:33:HIS:HB2	1.66	0.61
1:D:237:PRO:HG2	1:D:263:PRO:HA	1.83	0.61
1:C:255:ASP:HB2	2:C:606:HOH:O	2.01	0.61
1:B:344:HIS:HB2	1:B:348:SER:HB2	1.83	0.60
1:C:289:THR:CG2	1:C:308:VAL:HG11	2.29	0.60
1:B:396:LYS:HB2	1:B:400:GLY:HA2	1.84	0.60
1:D:325:ARG:HA	1:D:328:GLN:HE21	1.66	0.60
1:C:135:GLU:HG2	1:D:80:ILE:HG22	1.84	0.60
1:B:342:ASN:O	1:B:344:HIS:HD2	1.85	0.60
1:C:126:GLY:HA3	1:C:398:GLY:HA2	1.84	0.60
1:C:333:TRP:HH2	1:D:303:ILE:HD12	1.67	0.60
1:D:78:ILE:HG22	1:D:125:MSE:HE2	1.84	0.59
1:A:29:VAL:HG22	1:A:210:GLY:HA3	1.84	0.59
1:C:185:ASP:OD2	1:C:187:GLN:HB3	2.01	0.59
1:C:92:TYR:H	1:C:92:TYR:HD2	1.47	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:127:GLN:HA	1:B:397:PRO:HB2	1.84	0.59
1:D:52:GLY:HA3	1:D:124:LEU:HG	1.84	0.59
1:C:107:PHE:C	1:C:107:PHE:HD2	2.07	0.59
1:A:313:ALA:HB3	1:A:337:TRP:HE1	1.66	0.58
1:C:300:CYS:O	1:C:304:MSE:HG2	2.03	0.58
1:B:11:ILE:HD12	1:B:78:ILE:HG22	1.84	0.58
1:D:327:ALA:HA	1:D:337:TRP:CD1	2.39	0.58
1:A:57:PRO:HD2	1:A:112:ASN:HB3	1.84	0.58
1:A:314:ASP:OD1	1:A:340:HIS:ND1	2.31	0.57
1:A:127:GLN:HA	1:A:397:PRO:HB2	1.86	0.57
1:C:273:ARG:HA	1:C:292:ILE:HD12	1.87	0.57
1:B:107:PHE:HB3	2:B:498:HOH:O	2.05	0.56
1:C:237:PRO:HG2	1:C:263:PRO:HA	1.86	0.56
1:A:178:ILE:HG23	1:A:192:LEU:HD23	1.87	0.56
1:C:265:ILE:HG12	1:C:266:GLY:H	1.70	0.56
1:C:413:GLU:O	1:C:417:LYS:HG2	2.05	0.56
1:B:39:ARG:HD2	1:B:344:HIS:HA	1.86	0.56
1:D:219:ASP:O	1:D:223:GLU:HG2	2.05	0.56
1:D:35:PRO:HB3	1:D:165:TYR:HA	1.86	0.56
1:A:289:THR:OG1	1:A:292:ILE:HG12	2.06	0.55
1:A:26:LEU:H	1:A:33:HIS:HB2	1.71	0.55
1:C:99:THR:HA	1:C:102:LYS:HB2	1.88	0.55
1:B:232:ARG:CG	1:B:232:ARG:HH11	2.03	0.55
1:B:379:LEU:HD22	1:B:408:VAL:HG22	1.88	0.55
1:B:221:VAL:HG22	1:B:233:ILE:HD11	1.89	0.54
1:B:346:ASP:HA	1:B:349:LEU:HB2	1.89	0.54
1:C:239:GLY:N	1:C:262:ASP:O	2.40	0.54
1:C:52:GLY:HA3	1:C:124:LEU:HG	1.88	0.54
1:C:149:LEU:HD23	1:C:365:ALA:O	2.07	0.54
1:C:337:TRP:CH2	1:C:339:CYS:SG	3.01	0.54
1:B:440:ARG:HG2	1:B:441:LYS:HG2	1.89	0.54
1:B:233:ILE:HG13	1:B:234:THR:H	1.73	0.53
1:C:173:HIS:HD2	1:C:175:TRP:H	1.54	0.53
1:C:18:PRO:HB2	1:C:415:HIS:CE1	2.43	0.53
1:B:144:ASP:HB3	1:B:392:LYS:HE2	1.90	0.53
1:C:39:ARG:HD2	1:C:344:HIS:HA	1.88	0.53
1:B:28:ASN:OD1	1:B:30:GLY:N	2.33	0.53
1:C:261:GLU:HA	1:C:288:ALA:O	2.07	0.53
1:B:158:ASP:O	1:B:161:THR:HB	2.09	0.53
1:C:133:VAL:HA	1:C:136:LEU:HD12	1.91	0.53
1:A:135:GLU:HG2	2:B:491:HOH:O	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:17:ILE:HD12	1:D:43:ILE:HD12	1.91	0.53
1:D:95:ALA:O	1:D:99:THR:HG22	2.09	0.52
1:C:234:THR:HG21	1:C:259:TYR:CE1	2.43	0.52
1:D:396:LYS:HB3	1:D:400:GLY:HA2	1.89	0.52
1:D:261:GLU:HB3	1:D:288:ALA:HB3	1.92	0.52
1:C:396:LYS:HB3	1:C:400:GLY:HA2	1.92	0.52
1:B:203:LYS:HB3	1:B:232:ARG:HH12	1.75	0.52
1:D:234:THR:HG21	1:D:259:TYR:CE1	2.44	0.52
1:D:315:PRO:HG3	1:D:355:VAL:HG21	1.91	0.52
1:B:318:TRP:O	1:B:319:THR:OG1	2.17	0.51
1:B:335:LEU:HD23	1:D:281:ARG:HD3	1.92	0.51
1:A:147:THR:HA	1:A:390:LYS:HG3	1.92	0.51
1:A:399:LEU:HB3	1:A:401:ILE:HD12	1.91	0.51
1:B:413:GLU:HA	1:B:416:LYS:HD3	1.93	0.51
1:C:290:ASN:O	1:C:294:THR:HG22	2.11	0.51
1:D:288:ALA:HB2	1:D:310:ILE:HB	1.92	0.51
1:C:346:ASP:N	1:C:346:ASP:OD2	2.41	0.51
1:D:234:THR:HG22	1:D:259:TYR:H	1.73	0.51
1:A:29:VAL:HG23	1:A:238:ASN:HD22	1.76	0.51
1:A:112:ASN:HA	1:A:316:HIS:O	2.10	0.51
1:C:429:MSE:HG2	1:C:436:TRP:CD2	2.46	0.51
1:A:74:VAL:O	1:A:76:ARG:NH2	2.44	0.51
1:A:35:PRO:HG3	1:A:164:PRO:HD2	1.93	0.51
1:D:429:MSE:HE2	1:D:444:ALA:HB1	1.93	0.51
1:C:107:PHE:CE2	1:C:109:LEU:HD22	2.46	0.51
1:B:148:VAL:HG12	1:B:366:LEU:HB2	1.93	0.50
1:B:157:ASP:HA	1:B:182:LYS:HB3	1.94	0.50
1:D:81:LEU:HD23	1:D:82:ASN:N	2.26	0.50
1:C:276:MSE:HG3	1:C:292:ILE:HD13	1.93	0.50
1:A:265:ILE:HG22	1:A:266:GLY:H	1.70	0.50
1:B:39:ARG:HH21	1:B:55:GLU:HG2	1.76	0.50
1:A:157:ASP:HB3	1:A:160:ILE:HD12	1.94	0.50
1:A:161:THR:HG21	2:A:500:HOH:O	2.11	0.50
1:B:8:VAL:HG11	1:B:79:SER:HB2	1.94	0.50
1:B:13:ASP:HB3	1:B:45:THR:OG1	2.12	0.49
1:B:234:THR:HG21	1:B:259:TYR:CZ	2.47	0.49
1:D:166:GLN:HG2	1:D:167:GLN:N	2.27	0.49
1:D:331:ASN:ND2	1:D:360:PRO:HB2	2.27	0.49
1:B:161:THR:HG22	1:B:163:LEU:H	1.76	0.49
1:C:39:ARG:HD3	1:C:55:GLU:OE2	2.11	0.49
1:D:81:LEU:HA	1:D:84:ILE:HD12	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:315:PRO:HD2	1:B:339:CYS:SG	2.53	0.49
1:A:232:ARG:HG2	1:A:258:THR:HG21	1.95	0.49
1:A:55:GLU:OE1	1:A:347:ILE:HB	2.12	0.49
1:B:420:ASN:HD21	1:B:422:ALA:HB3	1.78	0.49
1:B:186:THR:HG21	1:B:223:GLU:HG3	1.94	0.48
1:A:6:GLN:HA	1:B:6:GLN:CD	2.34	0.48
1:A:98:ASP:O	1:A:102:LYS:HB2	2.12	0.48
1:C:348:SER:HA	1:C:351:MSE:SE	2.64	0.48
1:D:57:PRO:HD2	1:D:112:ASN:HB3	1.94	0.48
1:C:237:PRO:HD2	1:C:261:GLU:O	2.13	0.48
1:A:290:ASN:HB3	1:A:312:LEU:HD12	1.95	0.48
1:D:118:GLU:HG2	1:D:122:LEU:HD12	1.96	0.48
1:C:296:TRP:O	1:D:333:TRP:NE1	2.46	0.47
1:C:395:ASP:N	1:C:395:ASP:OD2	2.42	0.47
1:A:81:LEU:HB2	1:A:121:LEU:HD13	1.95	0.47
1:C:96:ASP:HB3	1:C:108:GLU:HB2	1.96	0.47
1:C:265:ILE:CG1	1:C:266:GLY:N	2.75	0.47
1:A:344:HIS:NE2	1:A:368:THR:HG22	2.28	0.47
1:B:202:PHE:CZ	1:B:371:ILE:HG21	2.48	0.47
1:D:39:ARG:HD2	1:D:344:HIS:HA	1.96	0.47
1:A:428:PRO:HB3	2:A:500:HOH:O	2.13	0.47
1:D:314:ASP:HB3	1:D:317:PHE:CE2	2.50	0.47
1:B:11:ILE:HG22	1:B:74:VAL:HA	1.97	0.47
1:B:448:GLU:CD	1:B:448:GLU:H	2.18	0.47
1:C:173:HIS:HD2	1:C:175:TRP:HB3	1.80	0.47
1:A:274:GLU:HG2	1:D:301:HIS:CD2	2.49	0.47
1:B:289:THR:HG22	1:B:308:VAL:HG11	1.96	0.47
1:B:289:THR:O	1:B:312:LEU:HB2	2.15	0.47
1:C:196:SER:HB2	1:C:202:PHE:HE2	1.80	0.47
1:D:426:ALA:O	1:D:430:GLN:HG2	2.15	0.47
1:A:178:ILE:CG2	1:A:192:LEU:HD23	2.44	0.46
1:D:173:HIS:CE1	1:D:199:ARG:HB2	2.50	0.46
1:B:161:THR:HG23	1:B:163:LEU:H	1.79	0.46
1:B:273:ARG:HB3	1:B:305:LEU:HD12	1.97	0.46
1:D:418:LEU:HD23	1:D:419:PRO:HD2	1.98	0.46
1:B:157:ASP:HB2	1:B:182:LYS:HD3	1.97	0.46
1:C:56:ALA:HB2	1:C:116:ALA:HB2	1.96	0.46
1:A:11:ILE:HG22	1:A:74:VAL:HA	1.97	0.46
1:C:325:ARG:NH1	2:C:569:HOH:O	2.49	0.46
1:A:80:ILE:HG22	1:B:135:GLU:HG2	1.98	0.46
1:A:23:ASP:OD2	1:A:33:HIS:HD2	1.99	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:122:LEU:O	1:C:126:GLY:N	2.49	0.46
1:B:193:ALA:O	1:B:197:LYS:HB2	2.16	0.46
1:C:118:GLU:HA	1:C:121:LEU:HD12	1.98	0.46
1:C:197:LYS:HB2	1:C:205:PHE:HZ	1.80	0.46
1:C:313:ALA:HB3	1:C:337:TRP:HE1	1.81	0.46
1:B:233:ILE:CG1	1:B:234:THR:N	2.77	0.46
1:B:17:ILE:HD12	1:B:43:ILE:CD1	2.46	0.45
1:C:44:LEU:HB2	1:C:124:LEU:HD11	1.97	0.45
1:C:241:TRP:O	1:C:264:CYS:CB	2.63	0.45
1:A:14:MSE:SE	1:A:70:ILE:HA	2.66	0.45
1:A:225:LYS:HG3	1:A:256:VAL:HA	1.99	0.45
1:B:202:PHE:HZ	1:B:371:ILE:HG21	1.80	0.45
1:B:380:THR:HG22	1:B:401:ILE:HG23	1.97	0.45
1:C:173:HIS:HD2	1:C:175:TRP:CB	2.30	0.45
1:A:298:GLU:HG2	1:D:270:TYR:CE1	2.52	0.45
1:A:21:GLY:O	1:A:36:TYR:HA	2.16	0.45
1:A:304:MSE:HE1	1:D:281:ARG:NH2	2.26	0.45
1:B:234:THR:HG21	1:B:259:TYR:CE1	2.52	0.45
1:C:80:ILE:O	1:C:84:ILE:HD12	2.16	0.45
1:A:396:LYS:HB3	1:A:400:GLY:HA2	1.97	0.45
1:B:39:ARG:CD	1:B:55:GLU:OE2	2.64	0.45
1:D:351:MSE:O	1:D:355:VAL:HG23	2.17	0.45
1:D:261:GLU:HA	1:D:288:ALA:O	2.17	0.45
1:D:339:CYS:HB2	1:D:366:LEU:HG	1.98	0.45
1:A:239:GLY:N	1:A:262:ASP:O	2.50	0.44
1:B:44:LEU:O	1:B:51:THR:HA	2.16	0.44
1:C:93:LEU:HD13	1:C:94:ASP:N	2.32	0.44
1:C:288:ALA:HA	1:C:310:ILE:O	2.18	0.44
1:D:168:PRO:HG3	1:D:180:ARG:HB2	1.99	0.44
1:D:17:ILE:HA	1:D:18:PRO:HD2	1.82	0.44
1:D:348:SER:HA	1:D:351:MSE:SE	2.67	0.44
1:B:304:MSE:HE2	1:B:304:MSE:HA	1.98	0.44
1:D:56:ALA:HB2	1:D:116:ALA:HB2	1.98	0.44
1:C:18:PRO:HB2	1:C:415:HIS:NE2	2.33	0.44
1:C:442:ARG:HD3	2:C:575:HOH:O	2.17	0.44
1:D:320:LEU:H	1:D:320:LEU:HD12	1.83	0.44
1:A:368:THR:HG21	1:A:370:TRP:HB2	1.99	0.44
1:A:443:PRO:HB2	1:A:446:VAL:HG23	1.99	0.44
1:C:104:ALA:C	1:C:106:THR:H	2.21	0.44
1:D:152:LEU:HD22	1:D:189:VAL:HG13	1.99	0.44
1:D:364:THR:HG23	1:D:365:ALA:O	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:241:TRP:HB2	1:B:263:PRO:O	2.17	0.43
1:C:144:ASP:O	1:C:392:LYS:HA	2.18	0.43
1:B:305:LEU:HD21	1:C:305:LEU:HG	2.00	0.43
1:A:133:VAL:HG23	1:A:398:GLY:C	2.39	0.43
1:C:80:ILE:HG22	1:C:83:LYS:HB3	1.99	0.43
1:D:225:LYS:HG2	1:D:233:ILE:HD13	1.99	0.43
1:D:299:MSE:HE1	1:D:311:PRO:HB3	1.99	0.43
1:A:352:PHE:CE2	1:A:368:THR:HG23	2.53	0.43
1:A:427:ILE:CB	1:A:428:PRO:HD3	2.49	0.43
1:C:204:ASP:OD2	1:C:365:ALA:HB2	2.18	0.43
1:C:225:LYS:HB2	1:C:256:VAL:HG13	2.01	0.43
1:C:57:PRO:HD2	1:C:112:ASN:HB3	2.00	0.43
1:D:237:PRO:CG	1:D:263:PRO:HA	2.46	0.43
1:D:289:THR:OG1	1:D:292:ILE:HG12	2.19	0.43
1:C:197:LYS:O	1:C:201:GLY:N	2.47	0.43
1:D:353:SER:HB3	1:D:393:LEU:HD22	2.00	0.43
1:A:25:MSE:HE3	2:A:500:HOH:O	2.17	0.43
1:D:331:ASN:OD1	1:D:361:GLY:HA3	2.19	0.43
1:A:197:LYS:HB2	1:A:205:PHE:HZ	1.84	0.43
1:A:318:TRP:O	1:A:322:GLY:HA3	2.19	0.43
1:C:14:MSE:HE3	1:C:42:VAL:HG13	2.01	0.43
1:D:25:MSE:HB2	1:D:165:TYR:CE2	2.53	0.43
1:D:9:PRO:HB2	1:D:78:ILE:HD12	2.01	0.43
1:A:265:ILE:HG22	1:A:440:ARG:NH2	2.34	0.42
1:B:318:TRP:O	1:B:322:GLY:HA3	2.18	0.42
1:B:55:GLU:CD	1:B:348:SER:OG	2.56	0.42
1:D:185:ASP:OD2	1:D:187:GLN:HG3	2.19	0.42
1:A:39:ARG:HD3	1:A:55:GLU:OE2	2.19	0.42
1:A:40:ASN:ND2	1:A:58:GLY:HA2	2.34	0.42
1:C:133:VAL:HG23	1:C:398:GLY:C	2.39	0.42
1:D:204:ASP:OD1	1:D:232:ARG:HB2	2.18	0.42
1:B:313:ALA:HB3	1:B:337:TRP:NE1	2.26	0.42
1:B:440:ARG:HD2	2:B:512:HOH:O	2.18	0.42
1:C:14:MSE:SE	1:C:73:VAL:HG21	2.69	0.42
1:C:167:GLN:HB3	1:C:168:PRO:CD	2.49	0.42
1:D:118:GLU:OE1	1:D:321:THR:HB	2.20	0.42
1:B:344:HIS:HB2	1:B:348:SER:CB	2.48	0.42
1:C:26:LEU:HB3	1:C:153:PHE:CD1	2.54	0.42
1:A:14:MSE:HG3	1:A:44:LEU:CD2	2.50	0.42
1:B:342:ASN:O	1:B:344:HIS:CD2	2.70	0.42
1:D:296:TRP:CE2	1:D:318:TRP:HZ3	2.38	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:384:LEU:HA	2:B:472:HOH:O	2.20	0.42
1:D:81:LEU:HD23	1:D:82:ASN:H	1.85	0.42
1:D:259:TYR:CD1	1:D:310:ILE:HD13	2.55	0.42
1:B:143:ARG:NH2	1:B:356:GLY:O	2.50	0.42
1:B:273:ARG:HD2	1:B:301:HIS:HB2	2.02	0.41
1:D:214:GLY:O	1:D:218:ILE:HG12	2.19	0.41
1:A:324:SER:O	1:A:327:ALA:HB3	2.19	0.41
1:C:173:HIS:CE1	1:C:198:ASP:OD2	2.59	0.41
1:C:265:ILE:HG13	1:C:266:GLY:H	1.84	0.41
1:D:261:GLU:CB	1:D:288:ALA:HB3	2.50	0.41
1:C:309:ASP:HA	2:C:470:HOH:O	2.21	0.41
1:D:200:TYR:HB3	1:D:386:ILE:CG2	2.50	0.41
1:A:190:ILE:HD11	1:A:223:GLU:HB3	2.00	0.41
1:A:276:MSE:HG3	1:A:292:ILE:HG21	2.02	0.41
1:B:300:CYS:O	1:B:304:MSE:HG2	2.21	0.41
1:B:39:ARG:HD3	1:B:55:GLU:OE2	2.20	0.41
1:C:80:ILE:HG22	1:C:80:ILE:O	2.20	0.41
1:D:324:SER:O	1:D:328:GLN:HG3	2.20	0.41
1:B:304:MSE:HG3	2:C:479:HOH:O	2.19	0.41
1:C:380:THR:CG2	1:C:401:ILE:HG23	2.51	0.41
1:B:45:THR:HA	1:B:50:HIS:O	2.21	0.41
1:C:179:ARG:NH1	1:C:371:ILE:O	2.47	0.41
1:A:273:ARG:O	1:A:307:SER:OG	2.36	0.41
1:A:45:THR:HA	1:A:50:HIS:O	2.21	0.41
1:C:333:TRP:HH2	1:D:303:ILE:CD1	2.33	0.41
1:A:29:VAL:CG2	1:A:238:ASN:HB2	2.49	0.41
1:B:276:MSE:HG3	1:B:292:ILE:HD13	2.02	0.41
1:A:300:CYS:HB2	1:B:333:TRP:CD1	2.56	0.41
1:B:346:ASP:N	1:B:346:ASP:OD2	2.47	0.41
1:C:9:PRO:HA	1:C:47:ASN:OD1	2.20	0.41
1:A:342:ASN:O	1:A:344:HIS:HD2	2.04	0.41
1:C:24:SER:OG	1:C:180:ARG:HD3	2.20	0.41
1:C:340:HIS:CG	1:C:341:SER:N	2.89	0.41
1:C:8:VAL:HG21	1:D:129:LEU:HA	2.03	0.41
1:A:11:ILE:HD13	1:A:73:VAL:HG13	2.03	0.40
1:C:122:LEU:HA	1:C:125:MSE:HB3	2.03	0.40
1:D:81:LEU:HD12	1:D:121:LEU:HB3	2.03	0.40
1:B:56:ALA:HB2	1:B:116:ALA:HB2	2.02	0.40
1:C:8:VAL:HG21	1:D:129:LEU:O	2.22	0.40
1:C:286:PRO:HA	1:C:309:ASP:OD1	2.21	0.40
1:C:349:LEU:HA	1:C:352:PHE:CE2	2.57	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:129:LEU:HD12	1:D:136:LEU:HD21	2.03	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	441/455 (97%)	420 (95%)	21 (5%)	0	100	100
1	B	429/455 (94%)	404 (94%)	25 (6%)	0	100	100
1	C	442/455 (97%)	407 (92%)	29 (7%)	6 (1%)	11	15
1	D	439/455 (96%)	409 (93%)	26 (6%)	4 (1%)	17	25
All	All	1751/1820 (96%)	1640 (94%)	101 (6%)	10 (1%)	25	36

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	104	ALA
1	D	251	LYS
1	C	47	ASN
1	C	104	ALA
1	C	251	LYS
1	D	319	THR
1	C	105	TRP
1	C	319	THR
1	D	263	PRO
1	C	408	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	365/361 (101%)	337 (92%)	28 (8%)	13	20
1	B	358/361 (99%)	331 (92%)	27 (8%)	13	21
1	C	366/361 (101%)	340 (93%)	26 (7%)	14	23
1	D	363/361 (101%)	331 (91%)	32 (9%)	10	15
All	All	1452/1444 (101%)	1339 (92%)	113 (8%)	13	19

All (113) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	12	THR
1	A	16	VAL
1	A	33	HIS
1	A	67	THR
1	A	76	ARG
1	A	78	ILE
1	A	81	LEU
1	A	93	LEU
1	A	102	LYS
1	A	109	LEU
1	A	135	GLU
1	A	144	ASP
1	A	151	TYR
1	A	172	LYS
1	A	179	ARG
1	A	185	ASP
1	A	225	LYS
1	A	281	ARG
1	A	290	ASN
1	A	304	MSE
1	A	308	VAL
1	A	339	CYS
1	A	346	ASP
1	A	368	THR

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Mol	Chain	Res	Type
1	A	387	LYS
1	A	390	LYS
1	A	396	LYS
1	A	423	ARG
1	B	6	GLN
1	B	15	LYS
1	B	39	ARG
1	B	53	VAL
1	B	151	TYR
1	B	161	THR
1	B	182	LYS
1	B	192	LEU
1	B	197	LYS
1	B	216	LYS
1	B	224	LEU
1	B	225	LYS
1	B	232	ARG
1	B	233	ILE
1	B	249	LEU
1	B	287	THR
1	B	290	ASN
1	B	308	VAL
1	B	312	LEU
1	B	325	ARG
1	B	332	GLU
1	B	339	CYS
1	B	349	LEU
1	B	388	ASP
1	B	392	LYS
1	B	396	LYS
1	B	440	ARG
1	C	6	GLN
1	C	16	VAL
1	C	48	SER
1	C	67	THR
1	C	78	ILE
1	C	92	TYR
1	C	93	LEU
1	C	96	ASP
1	C	107	PHE
1	C	109	LEU
1	C	151	TYR

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Mol	Chain	Res	Type
1	C	158	ASP
1	C	159[A]	LYS
1	C	159[B]	LYS
1	C	197	LYS
1	C	199	ARG
1	C	225	LYS
1	C	248	GLN
1	C	308	VAL
1	C	317	PHE
1	C	321	THR
1	C	346	ASP
1	C	387	LYS
1	C	390	LYS
1	C	395	ASP
1	C	440	ARG
1	D	16	VAL
1	D	19	VAL
1	D	29	VAL
1	D	34	SER
1	D	39	ARG
1	D	67	THR
1	D	81	LEU
1	D	94	ASP
1	D	98	ASP
1	D	99	THR
1	D	102	LYS
1	D	110	ARG
1	D	151	TYR
1	D	170	THR
1	D	172	LYS
1	D	185	ASP
1	D	197	LYS
1	D	199	ARG
1	D	220	THR
1	D	224	LEU
1	D	225	LYS
1	D	261	GLU
1	D	290	ASN
1	D	304	MSE
1	D	306	GLN
1	D	307	SER
1	D	308	VAL

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Mol	Chain	Res	Type
1	D	321	THR
1	D	368	THR
1	D	387	LYS
1	D	390	LYS
1	D	393	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	33	HIS
1	A	238	ASN
1	A	268	ASN
1	A	290	ASN
1	B	40	ASN
1	B	142	GLN
1	B	254	ASN
1	B	342	ASN
1	B	344	HIS
1	B	415	HIS
1	C	6	GLN
1	C	50	HIS
1	C	112	ASN
1	C	173	HIS
1	D	112	ASN
1	D	248	GLN
1	D	254	ASN
1	D	268	ASN
1	D	328	GLN
1	D	407	ASN

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 [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	428/455 (94%)	-0.30	6 (1%) 75 73	7, 23, 53, 71	0
1	B	418/455 (91%)	-0.33	4 (0%) 82 80	8, 26, 49, 60	0
1	C	428/455 (94%)	-0.07	5 (1%) 79 77	20, 36, 65, 76	0
1	D	426/455 (93%)	0.17	7 (1%) 72 70	23, 47, 66, 80	0
All	All	1700/1820 (93%)	-0.13	22 (1%) 77 75	7, 34, 63, 80	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	449	GLY	3.5
1	D	102	LYS	3.5
1	A	434	PRO	3.1
1	C	92	TYR	2.9
1	C	105	TRP	2.8
1	A	90	ASN	2.7
1	A	91	GLY	2.7
1	B	107	PHE	2.7
1	C	395	ASP	2.6
1	D	183	ALA	2.5
1	C	265	ILE	2.4
1	A	94	ASP	2.4
1	B	211	VAL	2.4
1	A	108	GLU	2.3
1	B	434	PRO	2.2
1	D	78	ILE	2.2
1	D	104	ALA	2.2
1	C	230	ASP	2.2
1	D	13	ASP	2.1
1	D	406	ASP	2.1
1	D	442	ARG	2.0
1	A	102	LYS	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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.