



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 13, 2026 – 08:24 AM UTC

PDB ID : 1S0F / pdb_00001s0f
Title : Crystal structure of botulinum neurotoxin type B at pH 7.0
Authors : Eswaramoorthy, S.; Kumaran, D.; Keller, J.; Swaminathan, S.
Deposited on : 2003-12-30
Resolution : 2.30 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 : 4-5-2 with Phenix2.0
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

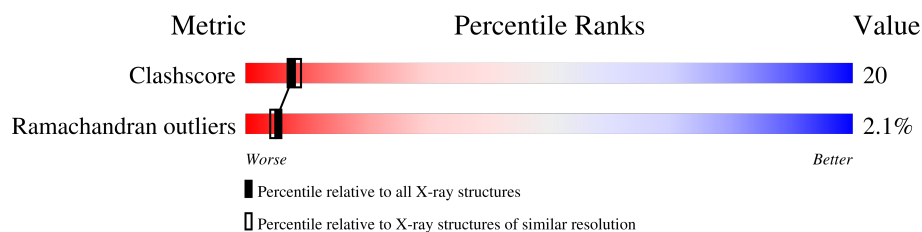
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)

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 $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	705	 65% 32% .

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10851 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 Botulinum neurotoxin type B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1276	Total	C	N	O	S	0	0	0
			10429	6719	1676	2001	33			

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Ca	0	0
			2	2		

- Molecule 4 is water.

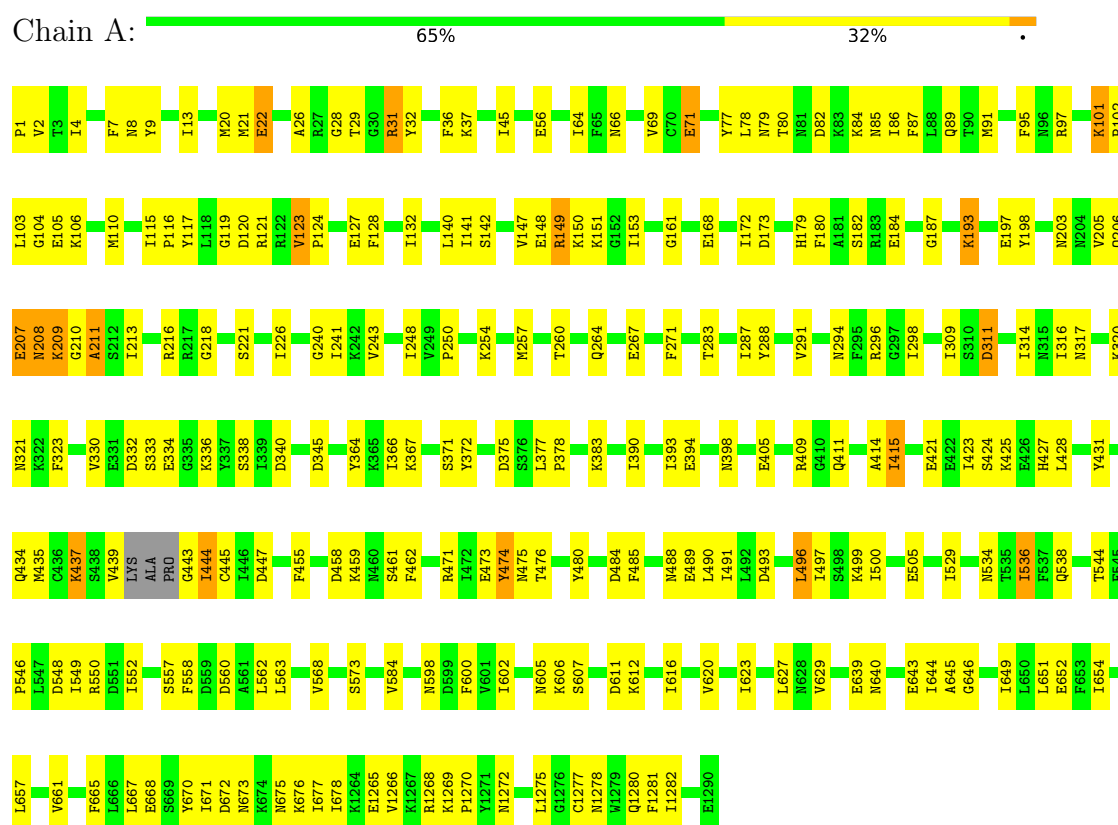
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	419	Total	O	0	0
			419	419		

3 Residue-property plots

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

Note EDS was not executed.

• Molecule 1: Botulinum neurotoxin type B



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	77.60 Å 122.85 Å 93.41 Å 90.00° 112.48° 90.00°	Depositor
Resolution (Å)	50.00 – 2.30	Depositor
% Data completeness (in resolution range)	80.8 (50.00-2.30)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.227 , 0.288	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	10851	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, CA

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	0.46	0/10653	0.96	49/14403 (0.3%)

There are no bond length outliers.

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	496	LEU	N-CA-C	-8.76	102.40	113.43
1	A	1258	ILE	N-CA-C	-8.64	97.54	109.46
1	A	661	VAL	N-CA-C	-7.58	97.33	108.54
1	A	193	LYS	N-CA-C	-7.28	97.37	109.24
1	A	804	ASN	N-CA-C	-7.14	104.56	113.55
1	A	123	VAL	N-CA-C	7.12	114.75	108.63
1	A	26	ALA	N-CA-C	-6.95	104.80	113.28
1	A	415	ILE	N-CA-C	6.76	118.10	111.67
1	A	187	GLY	N-CA-C	-6.70	102.89	112.81
1	A	22	GLU	CA-C-N	6.69	124.54	119.66
1	A	22	GLU	C-N-CA	6.69	124.54	119.66
1	A	71	GLU	N-CA-C	6.28	119.57	110.28
1	A	1109	ILE	N-CA-C	6.27	116.89	107.80
1	A	474	TYR	N-CA-C	-6.20	105.57	113.01
1	A	127	GLU	N-CA-C	6.14	119.55	109.85
1	A	172	ILE	N-CA-C	6.11	116.73	108.17
1	A	161	GLY	N-CA-C	-6.09	104.86	112.23
1	A	946	HIS	N-CA-C	-5.99	101.13	110.42
1	A	437	LYS	N-CA-C	-5.97	101.65	110.48
1	A	1231	THR	N-CA-C	-5.94	105.75	112.87
1	A	606	LYS	N-CA-C	-5.92	106.14	113.19
1	A	372	TYR	N-CA-C	-5.84	105.00	111.71
1	A	971	ILE	N-CA-C	5.78	117.06	108.46
1	A	1202	GLU	N-CA-C	-5.77	106.08	113.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	783	MET	N-CA-C	5.70	119.33	112.38
1	A	1253	LYS	N-CA-C	5.70	117.41	107.49
1	A	712	TYR	N-CA-C	-5.69	105.00	111.14
1	A	1197	ILE	N-CA-C	5.65	112.26	106.21
1	A	895	LYS	N-CA-C	-5.52	106.13	112.92
1	A	584	VAL	N-CA-C	5.48	115.50	108.82
1	A	311	ASP	CA-C-N	5.45	125.28	119.28
1	A	311	ASP	C-N-CA	5.45	125.28	119.28
1	A	1125	LYS	N-CA-C	5.40	115.67	108.38
1	A	31	ARG	N-CA-C	5.38	117.47	110.43
1	A	536	ILE	N-CA-C	5.28	116.64	110.62
1	A	149	ARG	N-CA-C	5.28	117.68	108.76
1	A	573	SER	N-CA-C	5.27	117.52	110.35
1	A	600	PHE	N-CA-C	-5.26	105.45	111.07
1	A	1129	ASN	N-CA-C	5.24	121.97	110.80
1	A	846	THR	N-CA-C	5.24	116.67	111.07
1	A	719	TYR	N-CA-C	-5.23	105.66	111.36
1	A	390	ILE	N-CA-C	5.21	116.12	111.90
1	A	1098	TYR	N-CA-C	-5.19	102.06	110.32
1	A	128	PHE	N-CA-C	-5.16	100.12	108.52
1	A	45	ILE	CA-C-N	5.11	126.23	119.84
1	A	45	ILE	C-N-CA	5.11	126.23	119.84
1	A	101	LYS	CA-C-N	5.01	124.45	119.24
1	A	101	LYS	C-N-CA	5.01	124.45	119.24
1	A	462	PHE	N-CA-C	5.01	118.24	110.17

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	10429	0	10182	420	0
2	A	1	0	0	0	0
3	A	2	0	0	0	0
4	A	419	0	0	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	10851	0	10182	420	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 20.

All (420) 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:1223:LEU:HB2	1:A:1236:LEU:HD23	1.28	1.10
1:A:834:ILE:HD11	1:A:917:ILE:HG13	1.44	0.99
1:A:946:HIS:O	1:A:947:ASN:HB2	1.65	0.96
1:A:1075:LYS:HE2	1:A:1215:GLN:HE22	1.31	0.95
1:A:142:SER:OG	1:A:148:GLU:HG2	1.68	0.93
1:A:309:ILE:HD13	1:A:309:ILE:H	1.36	0.91
1:A:367:LYS:H	1:A:411:GLN:HE22	0.91	0.90
1:A:1241:ARG:HH21	1:A:1252:TYR:H	1.15	0.90
1:A:367:LYS:H	1:A:411:GLN:NE2	1.71	0.89
1:A:142:SER:HB2	1:A:149:ARG:H	1.38	0.88
1:A:1192:LEU:HD21	1:A:1258:ILE:HB	1.55	0.88
1:A:1223:LEU:HB2	1:A:1236:LEU:CD2	2.03	0.88
1:A:826:LYS:HA	1:A:829:LYS:HE2	1.58	0.85
1:A:425:LYS:HD3	1:A:428:LEU:HD12	1.58	0.85
1:A:1115:SER:HB2	1:A:1116:PRO:HD2	1.60	0.84
1:A:1241:ARG:HH21	1:A:1252:TYR:N	1.76	0.83
1:A:1272:ASN:HD22	1:A:1275:LEU:HG	1.42	0.82
1:A:802:LYS:HE2	1:A:828:ASN:ND2	1.93	0.82
1:A:367:LYS:N	1:A:411:GLN:HE22	1.75	0.81
1:A:612:LYS:HB3	1:A:1076:ILE:HD13	1.62	0.81
1:A:640:ASN:HB2	4:A:1500:HOH:O	1.82	0.80
1:A:211:ALA:HB1	1:A:764:ASN:HD21	1.45	0.80
1:A:309:ILE:H	1:A:309:ILE:CD1	1.96	0.79
1:A:493:ASP:OD2	1:A:496:LEU:HB2	1.81	0.79
1:A:1106:ASN:ND2	1:A:1136:ARG:HE	1.82	0.78
1:A:140:LEU:HD11	1:A:147:VAL:HA	1.66	0.77
1:A:563:LEU:HG	4:A:1695:HOH:O	1.85	0.76
1:A:213:ILE:H	1:A:760:ASN:HD21	1.34	0.76
1:A:1241:ARG:HA	1:A:1254:ASP:HA	1.69	0.75
1:A:203:ASN:HB3	1:A:218:GLY:HA2	1.68	0.75
1:A:211:ALA:HB1	1:A:764:ASN:ND2	2.02	0.74
1:A:657:LEU:HD11	1:A:786:MET:HG2	1.68	0.74
1:A:977:ILE:HG21	1:A:1032:GLU:OE1	1.87	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1125:LYS:HD3	1:A:1136:ARG:NH1	2.03	0.74
1:A:550:ARG:HH11	1:A:550:ARG:HB2	1.52	0.74
1:A:435:MET:HG2	1:A:529:ILE:HD11	1.71	0.73
1:A:1192:LEU:HG	1:A:1256:PHE:O	1.90	0.72
1:A:919:ASN:C	1:A:921:VAL:H	1.95	0.72
1:A:976:ASP:OD2	1:A:980:LYS:HB3	1.90	0.71
1:A:670:TYR:CD2	1:A:676:LYS:HB3	2.25	0.71
1:A:1181:THR:O	1:A:1203:PHE:HB3	1.91	0.71
1:A:1243:TYR:O	1:A:1244:GLU:HG3	1.90	0.70
1:A:193:LYS:HD3	4:A:1404:HOH:O	1.89	0.70
1:A:1014:LYS:HE2	1:A:1024:ASN:ND2	2.07	0.70
1:A:802:LYS:HE3	1:A:828:ASN:HA	1.74	0.69
1:A:870:LYS:HG3	1:A:875:ILE:HD11	1.74	0.68
1:A:309:ILE:HD13	1:A:309:ILE:N	2.07	0.68
1:A:209:LYS:CB	1:A:218:GLY:H	2.07	0.67
1:A:1236:LEU:HD12	1:A:1262:TYR:CB	2.24	0.67
1:A:205:VAL:HA	4:A:1608:HOH:O	1.94	0.67
1:A:812:ASN:O	1:A:816:LEU:HG	1.95	0.67
1:A:4:ILE:HD12	1:A:95:PHE:HB3	1.76	0.67
1:A:32:TYR:OH	1:A:150:LYS:HE2	1.94	0.67
1:A:439:VAL:HB	1:A:443:GLY:HA2	1.77	0.67
1:A:330:VAL:HG23	1:A:338:SER:HB3	1.75	0.67
1:A:548:ASP:HA	4:A:1466:HOH:O	1.96	0.66
1:A:213:ILE:N	1:A:760:ASN:HD21	1.93	0.65
1:A:1115:SER:HB2	1:A:1116:PRO:CD	2.25	0.65
1:A:1197:ILE:HA	4:A:1354:HOH:O	1.94	0.65
1:A:802:LYS:HE2	1:A:828:ASN:CG	2.21	0.65
1:A:812:ASN:HB3	1:A:816:LEU:HG	1.79	0.65
1:A:394:GLU:HB3	4:A:1666:HOH:O	1.97	0.64
1:A:1126:TYR:CE1	1:A:1128:GLN:HB2	2.33	0.64
1:A:1107:SER:HB3	1:A:1120:ILE:CG2	2.28	0.64
1:A:670:TYR:CD2	1:A:676:LYS:HD3	2.33	0.63
1:A:437:LYS:HD2	1:A:444:ILE:HG23	1.80	0.63
1:A:85:ASN:ND2	1:A:89:GLN:HE21	1.97	0.63
1:A:471:ARG:HH11	1:A:471:ARG:HG3	1.64	0.62
1:A:825:SER:O	1:A:829:LYS:HG2	1.98	0.62
1:A:1142:GLU:HB2	1:A:1144:PHE:CE1	2.33	0.62
1:A:13:ILE:HD13	1:A:20:MET:HG2	1.82	0.62
1:A:920:SER:HG	1:A:922:PHE:HE1	1.47	0.62
1:A:550:ARG:HH11	1:A:550:ARG:CB	2.12	0.61
1:A:1126:TYR:CZ	1:A:1128:GLN:HB2	2.36	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:7:PHE:HZ	1:A:37:LYS:O	1.83	0.61
1:A:685:LEU:O	1:A:688:ARG:HB3	2.01	0.61
1:A:982:LYS:HG2	1:A:1030:ILE:HD11	1.83	0.61
1:A:1111:LEU:HD23	1:A:1172:ASN:ND2	2.14	0.61
1:A:845:ASP:O	1:A:849:ILE:HG12	2.01	0.61
1:A:946:HIS:O	1:A:947:ASN:CB	2.43	0.61
1:A:1086:PHE:HB2	1:A:1282:ILE:HG12	1.81	0.60
1:A:1117:VAL:HG22	4:A:1668:HOH:O	2.00	0.60
1:A:296:ARG:HH11	1:A:296:ARG:HG2	1.65	0.60
1:A:816:LEU:HB2	1:A:820:ALA:HB2	1.83	0.60
1:A:1241:ARG:NH2	1:A:1252:TYR:H	1.95	0.60
1:A:1:PRO:HB2	1:A:105:GLU:OE2	2.01	0.60
1:A:1236:LEU:HD12	1:A:1262:TYR:HB3	1.84	0.60
1:A:330:VAL:CG2	1:A:338:SER:HB3	2.32	0.60
1:A:646:GLY:O	1:A:649:ILE:HG12	2.01	0.60
1:A:667:LEU:HD11	1:A:805:LEU:HD23	1.84	0.60
1:A:206:GLN:HA	1:A:771:ASN:ND2	2.17	0.60
1:A:1185:PHE:C	1:A:1187:LYS:H	2.10	0.59
1:A:1189:GLU:N	1:A:1189:GLU:OE1	2.35	0.59
1:A:1268:ARG:HH11	1:A:1268:ARG:HG3	1.67	0.59
1:A:1111:LEU:HD13	1:A:1194:LEU:HD12	1.83	0.59
1:A:1148:ARG:NH2	1:A:1158:ASP:HB3	2.17	0.59
1:A:1183:LYS:HD2	1:A:1202:GLU:O	2.03	0.59
1:A:1255:TYR:C	1:A:1257:CYS:H	2.10	0.59
1:A:409:ARG:NH1	1:A:415:ILE:HD13	2.18	0.59
1:A:977:ILE:HD13	1:A:1032:GLU:HB3	1.84	0.59
1:A:1182:TYR:C	1:A:1182:TYR:CD2	2.81	0.59
1:A:1236:LEU:HD12	1:A:1262:TYR:HB2	1.84	0.59
1:A:817:ILE:HG22	1:A:818:GLY:H	1.68	0.58
1:A:1145:ILE:HD13	1:A:1147:ARG:NH2	2.18	0.58
1:A:1241:ARG:HB2	1:A:1254:ASP:OD2	2.04	0.58
1:A:921:VAL:O	1:A:922:PHE:HB3	2.02	0.58
1:A:1223:LEU:CB	1:A:1236:LEU:HD23	2.20	0.58
1:A:330:VAL:HG22	1:A:338:SER:O	2.04	0.58
1:A:1241:ARG:NH2	1:A:1251:GLU:HA	2.19	0.58
1:A:976:ASP:HB3	1:A:1030:ILE:HG23	1.86	0.57
1:A:826:LYS:HA	1:A:829:LYS:CE	2.33	0.57
1:A:243:VAL:CG2	1:A:287:ILE:HG23	2.34	0.57
1:A:645:ALA:HB3	1:A:649:ILE:HG23	1.87	0.57
1:A:213:ILE:H	1:A:760:ASN:ND2	2.00	0.57
1:A:670:TYR:HB2	1:A:677:ILE:HG13	1.87	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:899:LYS:HD2	1:A:1054:TRP:CZ2	2.40	0.57
1:A:645:ALA:HB3	1:A:649:ILE:CG2	2.35	0.56
1:A:1106:ASN:HD22	1:A:1136:ARG:HE	1.53	0.56
1:A:639:GLU:O	1:A:643:GLU:HG3	2.04	0.56
1:A:546:PRO:HB2	1:A:549:ILE:HG12	1.87	0.56
1:A:819:SER:O	1:A:822:TYR:HB3	2.05	0.56
1:A:1228:GLU:N	1:A:1228:GLU:OE1	2.38	0.56
1:A:101:LYS:HB2	1:A:364:TYR:CZ	2.40	0.56
1:A:332:ASP:OD2	1:A:336:LYS:HB3	2.06	0.56
1:A:670:TYR:CG	1:A:676:LYS:HB3	2.41	0.56
1:A:919:ASN:C	1:A:921:VAL:N	2.63	0.56
1:A:64:ILE:CD1	1:A:431:TYR:HB2	2.36	0.56
1:A:1230:SER:C	1:A:1232:ASP:N	2.62	0.56
1:A:1147:ARG:O	1:A:1166:ILE:HB	2.06	0.56
1:A:730:GLU:OE1	1:A:756:ASN:OD1	2.23	0.56
1:A:80:THR:O	1:A:84:LYS:HG3	2.07	0.55
1:A:840:SER:HB3	1:A:849:ILE:HD12	1.88	0.55
1:A:311:ASP:HB3	1:A:314:ILE:HG12	1.88	0.55
1:A:22:GLU:CD	1:A:28:GLY:HA2	2.32	0.55
1:A:909:ARG:HD2	4:A:1561:HOH:O	2.06	0.55
1:A:1181:THR:HG21	1:A:1258:ILE:HD13	1.88	0.55
1:A:499:LYS:O	1:A:500:ILE:HD13	2.07	0.55
1:A:892:LEU:HD23	1:A:898:PHE:HB3	1.89	0.55
1:A:1263:LEU:O	1:A:1266:VAL:HG22	2.06	0.54
1:A:1265:GLU:HA	1:A:1268:ARG:HH11	1.73	0.54
1:A:260:THR:HG21	1:A:455:PHE:HE1	1.72	0.54
1:A:787:ILE:HB	1:A:788:PRO:HD3	1.90	0.54
1:A:1227:ASP:C	1:A:1229:GLU:H	2.16	0.54
1:A:332:ASP:OD1	1:A:334:GLU:HB2	2.08	0.54
1:A:485:PHE:HE2	1:A:490:LEU:HB2	1.73	0.54
1:A:377:LEU:HB3	1:A:378:PRO:CD	2.38	0.54
1:A:698:LEU:O	1:A:702:GLN:HG3	2.08	0.54
1:A:1083:LEU:HD13	1:A:1209:ILE:CD1	2.38	0.54
1:A:692:TRP:CH2	1:A:834:ILE:HB	2.43	0.53
1:A:1208:GLN:OE1	1:A:1210:LYS:HD3	2.07	0.53
1:A:1199:ASP:O	1:A:1201:ASP:N	2.42	0.53
1:A:823:GLU:HA	1:A:826:LYS:HB2	1.89	0.53
1:A:1272:ASN:ND2	1:A:1275:LEU:HG	2.16	0.53
1:A:670:TYR:HD2	1:A:676:LYS:HD3	1.74	0.53
1:A:813:LYS:HG3	1:A:814:LEU:N	2.23	0.53
1:A:1268:ARG:HG3	1:A:1268:ARG:NH1	2.23	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:605:ASN:C	1:A:607:SER:H	2.15	0.53
1:A:887:TYR:HD1	1:A:907:LYS:HG3	1.73	0.53
1:A:1180:TYR:HB3	1:A:1204:TYR:O	2.08	0.53
1:A:1265:GLU:HA	1:A:1268:ARG:NH1	2.23	0.53
1:A:31:ARG:HG3	1:A:32:TYR:N	2.24	0.53
1:A:817:ILE:HG22	1:A:818:GLY:N	2.24	0.53
1:A:1086:PHE:CB	1:A:1282:ILE:HG12	2.40	0.53
1:A:296:ARG:HG2	1:A:296:ARG:NH1	2.23	0.52
1:A:221:SER:HB2	1:A:226:ILE:HD11	1.90	0.52
1:A:1014:LYS:HE2	1:A:1024:ASN:HD21	1.74	0.52
1:A:907:LYS:HA	1:A:1041:PHE:O	2.08	0.52
1:A:1125:LYS:HB3	1:A:1136:ARG:HH11	1.74	0.52
1:A:82:ASP:O	1:A:86:ILE:HG13	2.10	0.52
1:A:887:TYR:CD1	1:A:907:LYS:HG3	2.44	0.52
1:A:1066:SER:H	1:A:1069:ASN:HD22	1.57	0.52
1:A:1191:LYS:HG3	1:A:1242:PHE:HE1	1.74	0.52
1:A:972:TRP:CD2	1:A:1006:ILE:HG21	2.44	0.52
1:A:1163:GLU:OE1	1:A:1210:LYS:HD2	2.10	0.52
1:A:1179:VAL:HG22	1:A:1194:LEU:HD22	1.92	0.51
1:A:1182:TYR:O	1:A:1183:LYS:CB	2.58	0.51
1:A:64:ILE:HD11	1:A:431:TYR:CD1	2.45	0.51
1:A:864:ILE:HG21	1:A:916:ILE:HG21	1.91	0.51
1:A:405:GLU:C	1:A:405:GLU:OE1	2.54	0.51
1:A:241:ILE:HG22	1:A:291:VAL:HG13	1.91	0.51
1:A:102:PRO:O	1:A:106:LYS:HD2	2.10	0.51
1:A:932:ARG:HD3	1:A:1001:TRP:CD1	2.45	0.51
1:A:1010:LEU:HD13	1:A:1011:ASN:OD1	2.10	0.51
1:A:1230:SER:C	1:A:1232:ASP:H	2.17	0.51
1:A:665:PHE:CZ	1:A:687:LYS:HG3	2.46	0.51
1:A:338:SER:HB2	4:A:1557:HOH:O	2.10	0.51
1:A:32:TYR:N	1:A:32:TYR:CD1	2.78	0.51
1:A:925:PHE:HB2	1:A:1061:PHE:O	2.11	0.51
1:A:1241:ARG:HB2	1:A:1254:ASP:CG	2.35	0.51
1:A:1169:ASP:OD2	1:A:1176:GLU:OE2	2.29	0.50
1:A:1275:LEU:HD13	1:A:1277:CYS:SG	2.50	0.50
1:A:425:LYS:HB3	4:A:1468:HOH:O	2.11	0.50
1:A:826:LYS:CA	1:A:829:LYS:HE2	2.34	0.50
1:A:1262:TYR:O	1:A:1265:GLU:N	2.44	0.50
1:A:1272:ASN:HD22	1:A:1275:LEU:CG	2.20	0.50
1:A:444:ILE:O	1:A:444:ILE:HG13	2.11	0.50
1:A:819:SER:O	1:A:822:TYR:N	2.43	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:960:GLY:HA2	1:A:1034:ILE:O	2.11	0.50
1:A:627:LEU:HD11	1:A:718:MET:HG2	1.94	0.50
1:A:66:ASN:OD1	1:A:69:VAL:HG23	2.12	0.50
1:A:29:THR:O	1:A:29:THR:OG1	2.26	0.50
1:A:775:ASN:HB3	1:A:851:MET:HG2	1.93	0.50
1:A:1215:GLN:HE21	1:A:1215:GLN:HA	1.76	0.49
1:A:1112:LYS:HA	1:A:1119:GLU:OE2	2.11	0.49
1:A:1253:LYS:CB	1:A:1255:TYR:HE1	2.24	0.49
1:A:529:ILE:HD12	1:A:529:ILE:C	2.37	0.49
1:A:439:VAL:HG12	1:A:439:VAL:O	2.12	0.49
1:A:1269:LYS:HA	1:A:1270:PRO:C	2.37	0.49
1:A:817:ILE:CG2	1:A:818:GLY:H	2.25	0.49
1:A:976:ASP:HA	1:A:1032:GLU:O	2.12	0.49
1:A:142:SER:CB	1:A:148:GLU:HG2	2.42	0.49
1:A:989:ASN:HD22	1:A:992:GLU:HG3	1.77	0.49
1:A:1123:ARG:HG2	1:A:1140:ILE:HD11	1.94	0.49
1:A:686:THR:HA	1:A:689:ASN:HD22	1.78	0.49
1:A:1025:THR:HG22	1:A:1027:ILE:HG23	1.95	0.49
1:A:103:LEU:HB2	1:A:491:ILE:HD11	1.95	0.49
1:A:1220:CYS:C	1:A:1221:GLN:NE2	2.71	0.49
1:A:791:VAL:HB	1:A:915:ASN:HB3	1.94	0.48
1:A:870:LYS:O	1:A:871:ASP:C	2.56	0.48
1:A:71:GLU:HG2	1:A:168:GLU:OE2	2.12	0.48
1:A:952:ILE:HD12	1:A:963:ILE:HD12	1.95	0.48
1:A:980:LYS:HE2	1:A:1029:ASP:CG	2.38	0.48
1:A:1265:GLU:O	1:A:1268:ARG:HB2	2.13	0.48
1:A:383:LYS:HZ1	1:A:421:GLU:HG2	1.76	0.48
1:A:809:ILE:HG23	1:A:816:LEU:HD12	1.96	0.48
1:A:260:THR:CG2	1:A:455:PHE:HE1	2.27	0.48
1:A:425:LYS:C	1:A:427:HIS:N	2.71	0.48
1:A:1272:ASN:HB3	1:A:1275:LEU:HG	1.96	0.48
1:A:182:SER:O	1:A:240:GLY:HA2	2.14	0.48
1:A:1191:LYS:CG	1:A:1242:PHE:HE1	2.27	0.48
1:A:1257:CYS:O	1:A:1257:CYS:SG	2.72	0.48
1:A:678:ILE:HG12	1:A:823:GLU:OE1	2.14	0.48
1:A:730:GLU:O	1:A:734:LYS:HG3	2.14	0.48
1:A:1111:LEU:HD23	1:A:1172:ASN:HD22	1.76	0.48
1:A:1111:LEU:CD2	1:A:1172:ASN:HD22	2.26	0.48
1:A:950:THR:OG1	1:A:962:LYS:HD2	2.14	0.48
1:A:1200:SER:C	1:A:1202:GLU:H	2.21	0.48
1:A:678:ILE:HG22	1:A:682:ASP:OD2	2.14	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1132:TYR:N	1:A:1132:TYR:CD1	2.82	0.47
1:A:497:ILE:HD13	4:A:1710:HOH:O	2.13	0.47
1:A:612:LYS:HE3	4:A:1463:HOH:O	2.14	0.47
1:A:670:TYR:O	1:A:677:ILE:HD11	2.14	0.47
1:A:802:LYS:CE	1:A:828:ASN:HA	2.44	0.47
1:A:823:GLU:O	1:A:824:LYS:C	2.56	0.47
1:A:1120:ILE:HD12	1:A:1239:ILE:HD13	1.96	0.47
1:A:474:TYR:HB2	1:A:679:LYS:HB2	1.97	0.47
1:A:605:ASN:C	1:A:607:SER:N	2.72	0.47
1:A:645:ALA:CB	1:A:649:ILE:HG23	2.44	0.47
1:A:919:ASN:O	1:A:921:VAL:N	2.48	0.47
1:A:20:MET:HE2	1:A:31:ARG:HH21	1.80	0.47
1:A:203:ASN:N	1:A:203:ASN:HD22	2.12	0.47
1:A:458:ASP:OD2	1:A:459:LYS:N	2.47	0.47
1:A:704:LEU:O	1:A:709:THR:HG23	2.13	0.47
1:A:1147:ARG:HB2	1:A:1167:TYR:HB2	1.96	0.47
1:A:1182:TYR:O	1:A:1183:LYS:HB2	2.14	0.47
1:A:398:ASN:HD21	1:A:411:GLN:HE21	1.62	0.47
1:A:1082:TYR:HA	1:A:1161:ARG:HA	1.96	0.47
1:A:64:ILE:HD12	1:A:431:TYR:HB2	1.97	0.47
1:A:558:PHE:CZ	1:A:562:LEU:HD11	2.50	0.47
1:A:989:ASN:HD22	1:A:992:GLU:CG	2.28	0.47
1:A:1199:ASP:O	1:A:1199:ASP:OD1	2.33	0.47
1:A:21:MET:HG2	1:A:22:GLU:N	2.30	0.47
1:A:97:ARG:HG3	1:A:97:ARG:HH11	1.79	0.47
1:A:216:ARG:O	1:A:414:ALA:HB2	2.14	0.47
1:A:1100:PHE:HD2	1:A:1280:GLN:HB2	1.80	0.46
1:A:110:MET:HE3	1:A:110:MET:HB3	1.85	0.46
1:A:283:THR:HA	4:A:1638:HOH:O	2.15	0.46
1:A:1190:GLU:O	1:A:1258:ILE:HG22	2.16	0.46
1:A:1201:ASP:CG	1:A:1201:ASP:O	2.58	0.46
1:A:671:ILE:C	1:A:673:ASN:H	2.24	0.46
1:A:1185:PHE:C	1:A:1187:LYS:N	2.73	0.46
1:A:1220:CYS:SG	1:A:1281:PHE:HE1	2.39	0.46
1:A:85:ASN:HD21	1:A:89:GLN:HE21	1.64	0.46
1:A:434:GLN:HG2	1:A:445:CYS:HB3	1.97	0.46
1:A:552:ILE:HD12	1:A:568:VAL:HG21	1.98	0.46
1:A:892:LEU:HD23	1:A:898:PHE:CB	2.46	0.46
1:A:184:GLU:HA	1:A:294:ASN:ND2	2.31	0.46
1:A:377:LEU:HD23	1:A:377:LEU:N	2.29	0.46
1:A:921:VAL:O	1:A:922:PHE:CB	2.63	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1227:ASP:O	1:A:1229:GLU:N	2.49	0.46
1:A:629:VAL:HG23	1:A:652:GLU:OE1	2.15	0.45
1:A:437:LYS:HD2	1:A:444:ILE:CG2	2.45	0.45
1:A:873:ASN:ND2	1:A:874:LEU:H	2.14	0.45
1:A:1233:GLU:HB2	4:A:1706:HOH:O	2.16	0.45
1:A:557:SER:HB3	1:A:560:ASP:HB2	1.98	0.45
1:A:671:ILE:O	1:A:672:ASP:HB2	2.17	0.45
1:A:1240:HIS:N	1:A:1257:CYS:SG	2.89	0.45
1:A:97:ARG:HA	1:A:393:ILE:HG23	1.99	0.45
1:A:316:ILE:O	1:A:320:LYS:HG3	2.16	0.45
1:A:434:GLN:HG3	1:A:447:ASP:OD1	2.16	0.45
1:A:711:PHE:CE1	1:A:778:SER:HA	2.51	0.45
1:A:31:ARG:HG3	1:A:32:TYR:H	1.80	0.45
1:A:475:ASN:O	1:A:476:THR:C	2.60	0.45
1:A:955:MET:HE1	1:A:975:ILE:HD12	1.99	0.45
1:A:332:ASP:CG	1:A:336:LYS:HB3	2.41	0.45
1:A:1107:SER:HB3	1:A:1120:ILE:HG23	1.99	0.45
1:A:117:TYR:HA	1:A:323:PHE:CE2	2.52	0.45
1:A:141:ILE:CD1	1:A:151:LYS:HB2	2.47	0.45
1:A:317:ASN:O	1:A:321:ASN:ND2	2.47	0.44
1:A:651:LEU:HD12	1:A:654:ILE:HD13	1.99	0.44
1:A:1146:ILE:HG23	1:A:1166:ILE:HD12	1.99	0.44
1:A:22:GLU:OE2	1:A:28:GLY:HA2	2.17	0.44
1:A:85:ASN:HD21	1:A:89:GLN:NE2	2.14	0.44
1:A:119:GLY:HA2	1:A:132:ILE:HD13	1.98	0.44
1:A:153:ILE:HA	1:A:505:GLU:O	2.16	0.44
1:A:1185:PHE:CD2	1:A:1190:GLU:HG2	2.53	0.44
1:A:216:ARG:HG2	4:A:1590:HOH:O	2.16	0.44
1:A:473:GLU:HB3	1:A:670:TYR:OH	2.17	0.44
1:A:489:GLU:O	1:A:493:ASP:HB2	2.17	0.44
1:A:1083:LEU:HD13	1:A:1209:ILE:HD13	1.99	0.44
1:A:1:PRO:HB2	1:A:2:VAL:H	1.66	0.44
1:A:754:ASP:OD2	1:A:758:LYS:HE3	2.17	0.44
1:A:208:ASN:O	1:A:210:GLY:N	2.51	0.44
1:A:1215:GLN:HA	1:A:1215:GLN:NE2	2.33	0.44
1:A:1223:LEU:C	1:A:1223:LEU:HD23	2.42	0.44
1:A:9:TYR:H	1:A:85:ASN:HD22	1.64	0.44
1:A:1169:ASP:HB3	1:A:1176:GLU:HG2	2.00	0.44
1:A:670:TYR:HB2	1:A:677:ILE:CG1	2.47	0.44
1:A:948:GLU:O	1:A:948:GLU:HG3	2.17	0.44
1:A:925:PHE:HA	1:A:1063:THR:N	2.33	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1255:TYR:C	1:A:1257:CYS:N	2.76	0.43
1:A:198:TYR:HD2	1:A:423:ILE:HD11	1.83	0.43
1:A:544:THR:HG22	1:A:724:TYR:CE2	2.52	0.43
1:A:1145:ILE:O	1:A:1145:ILE:HG23	2.16	0.43
1:A:471:ARG:HH11	1:A:471:ARG:CG	2.30	0.43
1:A:550:ARG:CB	1:A:550:ARG:NH1	2.79	0.43
1:A:787:ILE:O	1:A:791:VAL:HG23	2.18	0.43
1:A:825:SER:O	1:A:826:LYS:C	2.61	0.43
1:A:963:ILE:HA	1:A:971:ILE:O	2.18	0.43
1:A:741:SER:OG	1:A:744:GLU:HG3	2.19	0.43
1:A:288:TYR:OH	1:A:345:ASP:OD1	2.32	0.43
1:A:864:ILE:CG2	1:A:1062:ASN:HD22	2.32	0.43
1:A:147:VAL:HG23	1:A:147:VAL:O	2.18	0.43
1:A:475:ASN:HD22	1:A:475:ASN:HA	1.53	0.43
1:A:813:LYS:HG3	1:A:814:LEU:H	1.82	0.43
1:A:1102:ALA:HB3	1:A:1278:ASN:HB2	2.01	0.43
1:A:97:ARG:NH2	1:A:366:ILE:HD11	2.34	0.43
1:A:243:VAL:HG21	1:A:287:ILE:HG23	1.99	0.43
1:A:271:PHE:CE2	1:A:371:SER:HA	2.53	0.43
1:A:1095:LYS:HD3	1:A:1097:TYR:OH	2.18	0.43
1:A:1108:TYR:HE2	1:A:1122:THR:O	2.01	0.43
1:A:667:LEU:HD11	1:A:805:LEU:CD2	2.48	0.43
1:A:977:ILE:CD1	1:A:1032:GLU:HB3	2.49	0.43
1:A:443:GLY:C	1:A:444:ILE:HG22	2.43	0.43
1:A:87:PHE:O	1:A:91:MET:HG2	2.19	0.43
1:A:711:PHE:O	1:A:715:LYS:HG3	2.18	0.43
1:A:735:TYR:O	1:A:739:ILE:HG12	2.19	0.43
1:A:777:CYS:O	1:A:780:SER:HB3	2.19	0.43
1:A:891:GLU:O	1:A:898:PHE:HA	2.19	0.43
1:A:1227:ASP:C	1:A:1229:GLU:N	2.77	0.43
1:A:330:VAL:HG11	1:A:340:ASP:HB2	2.01	0.42
1:A:488:ASN:HD22	1:A:488:ASN:HA	1.58	0.42
1:A:1083:LEU:HD22	1:A:1220:CYS:CB	2.48	0.42
1:A:943:ASN:O	1:A:946:HIS:O	2.37	0.42
1:A:1188:GLU:CD	1:A:1261:TRP:HB2	2.44	0.42
1:A:104:GLY:HA3	1:A:364:TYR:OH	2.20	0.42
1:A:123:VAL:HA	1:A:124:PRO:HD3	1.90	0.42
1:A:267:GLU:HB2	4:A:1529:HOH:O	2.19	0.42
1:A:1192:LEU:CD2	1:A:1258:ILE:HB	2.37	0.42
1:A:536:ILE:HA	1:A:627:LEU:O	2.19	0.42
1:A:809:ILE:HG23	1:A:816:LEU:CD1	2.49	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1014:LYS:HG2	1:A:1024:ASN:ND2	2.35	0.42
1:A:9:TYR:H	1:A:85:ASN:ND2	2.17	0.42
1:A:36:PHE:CD1	1:A:36:PHE:N	2.88	0.42
1:A:333:SER:O	1:A:334:GLU:HG2	2.20	0.42
1:A:732:ILE:O	1:A:736:ARG:HG2	2.19	0.42
1:A:1067:GLN:C	1:A:1067:GLN:CD	2.87	0.42
1:A:1083:LEU:HD22	1:A:1220:CYS:HB2	2.00	0.42
1:A:920:SER:OG	1:A:922:PHE:HE1	2.02	0.42
1:A:56:GLU:HG3	4:A:1609:HOH:O	2.19	0.42
1:A:115:ILE:HA	1:A:116:PRO:HD3	1.90	0.42
1:A:675:ASN:C	1:A:677:ILE:N	2.78	0.42
1:A:1262:TYR:O	1:A:1263:LEU:C	2.62	0.42
1:A:101:LYS:HB2	1:A:364:TYR:OH	2.20	0.42
1:A:1178:ARG:HB3	1:A:1180:TYR:CE2	2.55	0.42
1:A:1236:LEU:HB2	1:A:1262:TYR:CD2	2.55	0.42
1:A:1242:PHE:N	1:A:1242:PHE:CD2	2.86	0.42
1:A:117:TYR:HA	1:A:323:PHE:CZ	2.55	0.42
1:A:120:ASP:OD1	1:A:120:ASP:C	2.62	0.42
1:A:254:LYS:HB2	1:A:257:MET:HG3	2.02	0.42
1:A:620:VAL:CG1	1:A:623:ILE:HG13	2.49	0.42
1:A:675:ASN:C	1:A:677:ILE:H	2.27	0.42
1:A:1029:ASP:O	1:A:1030:ILE:C	2.63	0.42
1:A:1130:SER:HB3	1:A:1133:ILE:HG12	2.02	0.42
1:A:207:GLU:O	1:A:208:ASN:CB	2.67	0.41
1:A:250:PRO:HB3	1:A:455:PHE:CE1	2.55	0.41
1:A:79:ASN:OD1	1:A:80:THR:HG23	2.20	0.41
1:A:480:TYR:OH	1:A:690:GLU:HA	2.20	0.41
1:A:941:ILE:HD12	1:A:944:TYR:HB3	2.02	0.41
1:A:611:ASP:HB3	1:A:616:ILE:HB	2.01	0.41
1:A:644:ILE:HA	1:A:877:LEU:HD22	2.01	0.41
1:A:13:ILE:CD1	1:A:20:MET:HG2	2.50	0.41
1:A:248:ILE:HD13	1:A:461:SER:HB3	2.03	0.41
1:A:484:ASP:OD1	1:A:485:PHE:N	2.53	0.41
1:A:1136:ARG:O	1:A:1137:ASP:C	2.61	0.41
1:A:1182:TYR:O	1:A:1183:LYS:HG3	2.20	0.41
1:A:1189:GLU:HG3	1:A:1240:HIS:CD2	2.55	0.41
1:A:375:ASP:OD1	1:A:712:TYR:HE2	2.03	0.41
1:A:77:TYR:OH	1:A:197:GLU:OE1	2.24	0.41
1:A:264:GLN:O	1:A:267:GLU:HB3	2.20	0.41
1:A:424:SER:HB3	4:A:1423:HOH:O	2.21	0.41
1:A:898:PHE:CZ	1:A:1055:MET:HB3	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:425:LYS:C	1:A:427:HIS:H	2.28	0.41
1:A:598:ASN:O	1:A:602:ILE:HG13	2.21	0.41
1:A:173:ASP:HB2	1:A:182:SER:OG	2.22	0.40
1:A:260:THR:HG21	1:A:455:PHE:CE1	2.55	0.40
1:A:534:ASN:HA	1:A:538:GLN:HG2	2.03	0.40
1:A:8:ASN:O	1:A:9:TYR:C	2.63	0.40
1:A:141:ILE:O	1:A:142:SER:C	2.65	0.40
1:A:294:ASN:O	1:A:298:ILE:HG12	2.22	0.40
1:A:668:GLU:HB3	1:A:670:TYR:CE1	2.57	0.40
1:A:883:LYS:HB2	1:A:911:THR:HB	2.04	0.40
1:A:141:ILE:HD11	1:A:151:LYS:HB2	2.03	0.40
1:A:1109:ILE:HD13	1:A:1256:PHE:CE2	2.56	0.40
1:A:77:TYR:CD2	1:A:78:LEU:HG	2.55	0.40
1:A:121:ARG:HD3	1:A:179:HIS:CG	2.57	0.40
1:A:180:PHE:O	1:A:184:GLU:HG3	2.22	0.40
1:A:795:LEU:HD21	1:A:834:ILE:HG21	2.04	0.40
1:A:834:ILE:CD1	1:A:917:ILE:HG13	2.32	0.40
1:A:1111:LEU:CD2	1:A:1172:ASN:ND2	2.84	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	1176/705 (167%)	1038 (88%)	113 (10%)	25 (2%)	5 4

All (25) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	207	GLU
1	A	208	ASN
1	A	444	ILE

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Mol	Chain	Res	Type
1	A	922	PHE
1	A	1030	ILE
1	A	1183	LYS
1	A	209	LYS
1	A	211	ALA
1	A	947	ASN
1	A	1029	ASP
1	A	1126	TYR
1	A	1200	SER
1	A	1228	GLU
1	A	1252	TYR
1	A	817	ILE
1	A	920	SER
1	A	1191	LYS
1	A	871	ASP
1	A	923	LEU
1	A	979	GLY
1	A	1173	LEU
1	A	1256	PHE
1	A	921	VAL
1	A	1116	PRO
1	A	1196	PRO

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

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

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.