



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 07:15 AM UTC

PDB ID : 1UUP / pdb_00001uup
Title : Crystal Structure of A Dimeric Form of Streptococcal Pyrogenic Exotoxin A (SpeA1).
Authors : Baker, M.D.; Gendlina, I.; Collins, C.M.; Acharya, K.R.
Deposited on : 2004-01-08
Resolution : 2.60 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

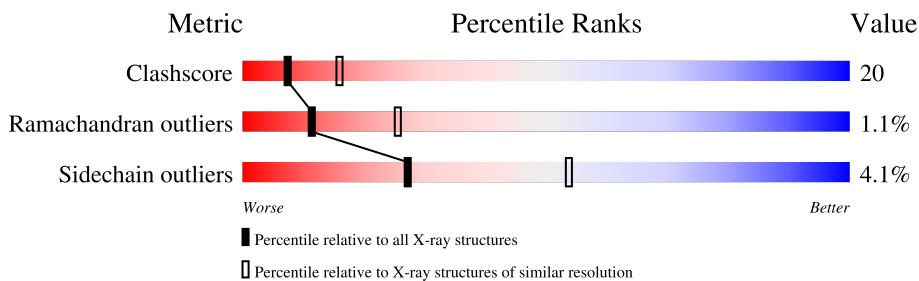
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)

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	221	60% 35% 5%
1	B	221	66% 29% 5%
1	C	221	64% 31% 5%
1	D	221	63% 33% .

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 7388 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 EXOTOXIN TYPE A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	221	Total	C	N	O	S	0	0	0
			1812	1158	291	357	6			
1	B	221	Total	C	N	O	S	0	0	0
			1812	1158	291	357	6			
1	C	221	Total	C	N	O	S	0	0	0
			1812	1158	291	357	6			
1	D	221	Total	C	N	O	S	0	0	0
			1812	1158	291	357	6			

- 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		
2	B	1	Total	Zn	0	0
			1	1		
2	C	1	Total	Zn	0	0
			1	1		
2	D	1	Total	Zn	0	0
			1	1		

- Molecule 3 is water.

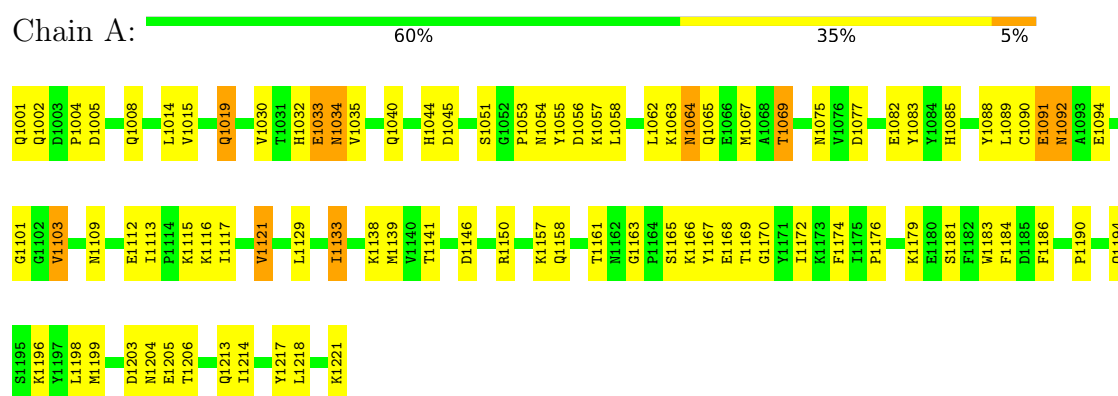
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	36	Total	O	0	0
			36	36		
3	B	27	Total	O	0	0
			27	27		
3	C	37	Total	O	0	0
			37	37		
3	D	36	Total	O	0	0
			36	36		

3 Residue-property plots

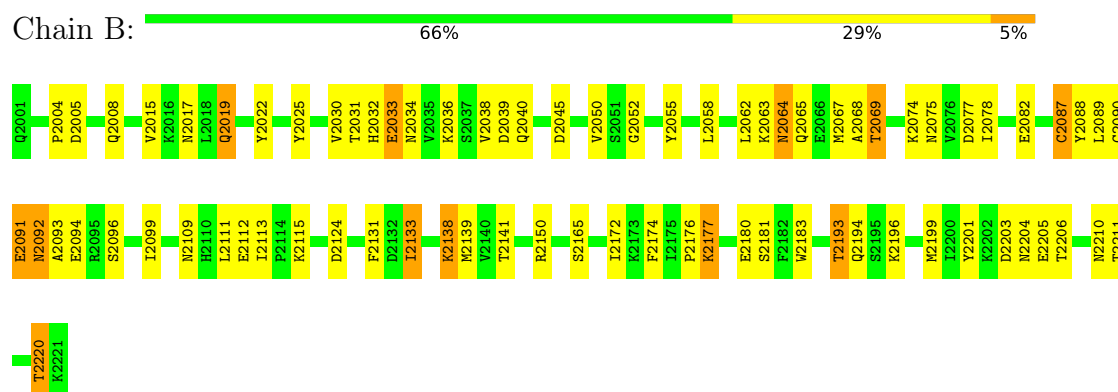
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

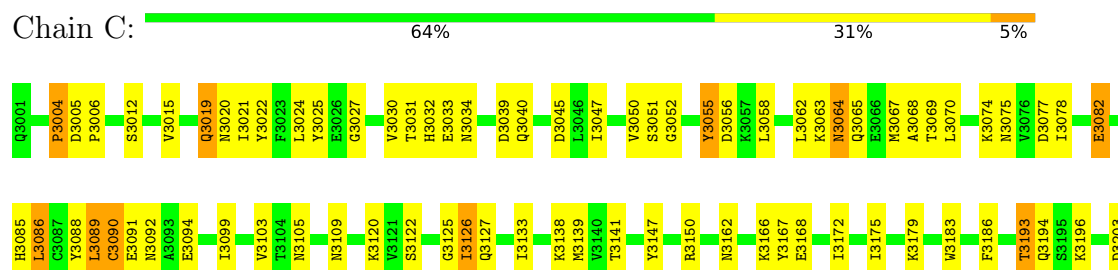
• Molecule 1: EXOTOXIN TYPE A

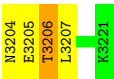


• Molecule 1: EXOTOXIN TYPE A

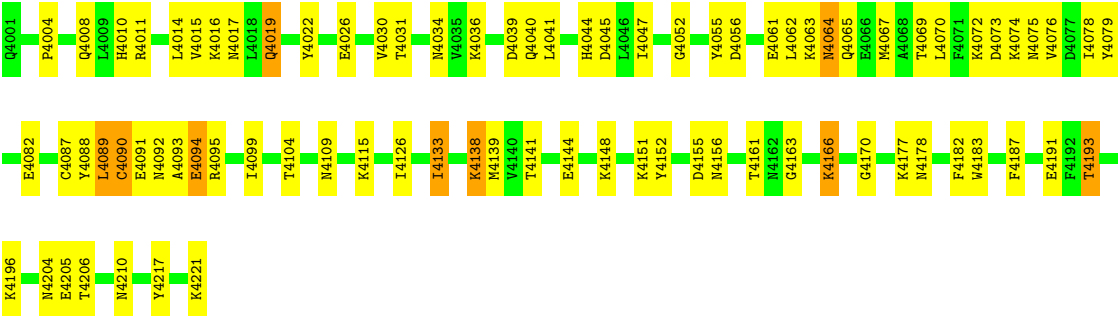


• Molecule 1: EXOTOXIN TYPE A





● Molecule 1: EXOTOXIN TYPE A



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	53.30Å 127.20Å 148.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.60	Depositor
% Data completeness (in resolution range)	89.0 (20.00-2.60)	Depositor
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.215 , 0.282	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7388	wwPDB-VP
Average B, all atoms (Å ²)	25.0	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

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	0.44	0/1854	0.95	6/2510 (0.2%)
1	B	0.42	0/1854	0.92	3/2510 (0.1%)
1	C	0.44	0/1854	0.96	12/2510 (0.5%)
1	D	0.40	0/1854	0.91	5/2510 (0.2%)
All	All	0.43	0/7416	0.94	26/10040 (0.3%)

There are no bond length outliers.

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1033	GLU	N-CA-C	8.02	123.46	111.04
1	B	2138	LYS	N-CA-C	-7.48	103.06	111.14
1	C	3015	VAL	N-CA-C	6.54	118.10	109.21
1	A	1138	LYS	N-CA-C	-6.50	104.11	111.07
1	C	3091	GLU	N-CA-C	-6.45	104.56	112.88
1	C	3056	ASP	N-CA-C	-6.33	106.09	113.88
1	A	1103	VAL	N-CA-C	6.14	117.32	108.48
1	D	4094	GLU	N-CA-C	5.87	118.46	111.71
1	C	3021	ILE	N-CA-C	-5.84	104.63	111.00
1	C	3005	ASP	CA-C-N	5.83	127.12	119.84
1	C	3005	ASP	C-N-CA	5.83	127.12	119.84
1	D	4138	LYS	N-CA-C	-5.69	105.16	111.36
1	B	2015	VAL	N-CA-C	5.62	117.42	108.87
1	A	1082	GLU	N-CA-C	5.54	119.13	110.32
1	C	3082	GLU	N-CA-C	5.53	118.70	110.52
1	C	3162	ASN	N-CA-C	-5.53	102.14	110.70
1	C	3055	TYR	N-CA-C	5.51	117.44	109.07
1	A	1121	VAL	N-CA-C	5.37	115.63	108.11
1	D	4091	GLU	N-CA-C	-5.31	107.34	112.97
1	D	4126	ILE	N-CA-C	5.27	115.18	108.12

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1035	VAL	N-CA-C	5.27	117.45	108.86
1	B	2033	GLU	N-CA-C	5.23	121.93	110.80
1	D	4015	VAL	N-CA-C	5.19	116.06	108.58
1	C	3103	VAL	N-CA-C	5.14	115.53	108.12
1	C	3051	SER	N-CA-C	5.05	117.35	109.52
1	C	3133	ILE	N-CA-C	-5.04	101.44	108.80

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	1812	0	1752	79	0
1	B	1812	0	1752	71	0
1	C	1812	0	1752	66	0
1	D	1812	0	1752	83	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	36	0	0	9	0
3	B	27	0	0	2	0
3	C	37	0	0	7	0
3	D	36	0	0	0	0
All	All	7388	0	7008	291	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 (291) 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:B:2063:LYS:H	1:B:2067:MET:HE2	1.07	1.20
1:A:1063:LYS:H	1:A:1067:MET:HE2	1.04	1.11

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2115:LYS:HE2	1:B:2210:ASN:HA	1.43	1.00
1:D:4063:LYS:H	1:D:4067:MET:HE2	1.25	0.98
1:C:3063:LYS:H	1:C:3067:MET:HE2	1.31	0.94
1:B:2092:ASN:HD22	1:B:2092:ASN:H	1.16	0.93
1:B:2088:TYR:HE1	1:B:2090:CYS:HB3	1.31	0.92
1:B:2063:LYS:N	1:B:2067:MET:HE2	1.86	0.90
1:A:1063:LYS:N	1:A:1067:MET:HE2	1.86	0.90
1:C:3062:LEU:HB3	1:C:3067:MET:HE2	1.54	0.90
1:B:2109:ASN:HD21	1:B:2139:MET:H	1.13	0.90
1:A:1109:ASN:HD21	1:A:1139:MET:H	1.20	0.88
1:D:4193:THR:HG22	1:D:4196:LYS:H	1.38	0.86
3:A:2003:HOH:O	1:D:4094:GLU:HG3	1.75	0.86
1:D:4062:LEU:HB3	1:D:4067:MET:HE2	1.58	0.85
1:D:4011:ARG:HB2	1:D:4014:LEU:HD13	1.55	0.85
1:A:1062:LEU:HD22	1:A:1067:MET:HE3	1.57	0.84
1:D:4063:LYS:H	1:D:4067:MET:CE	1.94	0.80
1:B:2193:THR:HG22	1:B:2196:LYS:H	1.46	0.79
1:A:1103:VAL:H	1:A:1204:ASN:HD21	1.29	0.79
1:D:4062:LEU:HD22	1:D:4067:MET:HE3	1.62	0.79
1:C:3019:GLN:H	1:C:3019:GLN:HE21	1.32	0.78
1:A:1034:ASN:ND2	1:A:1075:ASN:HB3	1.98	0.78
1:C:3033:GLU:HG2	3:C:2005:HOH:O	1.84	0.78
1:B:2089:LEU:HG	1:D:4088:TYR:OH	1.87	0.75
1:D:4017:ASN:HA	1:D:4019:GLN:HE22	1.52	0.74
1:D:4063:LYS:N	1:D:4067:MET:HE2	2.02	0.74
1:C:3109:ASN:HD21	1:C:3139:MET:H	1.36	0.73
1:C:3019:GLN:H	1:C:3019:GLN:NE2	1.86	0.73
1:C:3062:LEU:HD22	1:C:3067:MET:HE3	1.71	0.73
1:D:4019:GLN:H	1:D:4019:GLN:NE2	1.89	0.71
1:D:4088:TYR:HD1	1:D:4090:CYS:H	1.39	0.70
1:C:3069:THR:HG23	3:C:2006:HOH:O	1.91	0.70
1:D:4010:HIS:HD2	1:D:4187:PHE:O	1.73	0.70
1:B:2019:GLN:H	1:B:2019:GLN:NE2	1.89	0.70
1:A:1005:ASP:HB3	1:A:1008:GLN:HB2	1.74	0.69
1:A:1116:LYS:HE2	3:A:2024:HOH:O	1.92	0.69
1:A:1069:THR:HG21	3:A:2012:HOH:O	1.91	0.69
1:A:1019:GLN:H	1:A:1019:GLN:NE2	1.91	0.69
1:B:2065:GLN:O	1:B:2069:THR:HG23	1.92	0.68
1:A:1121:VAL:HB	1:A:1129:LEU:HB3	1.75	0.68
1:D:4133:ILE:HD12	1:D:4148:LYS:HB3	1.76	0.68
1:B:2091:GLU:CD	1:B:2091:GLU:H	2.00	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3193:THR:HG21	3:C:2030:HOH:O	1.93	0.67
1:D:4089:LEU:O	1:D:4090:CYS:HB2	1.93	0.67
1:C:3120:LYS:HD3	1:C:3127:GLN:HE22	1.60	0.67
1:D:4040:GLN:HG3	1:D:4045:ASP:O	1.96	0.66
1:C:3090:CYS:HB3	1:C:3092:ASN:OD1	1.96	0.65
1:C:3085:HIS:O	1:C:3086:LEU:HB2	1.95	0.65
1:D:4089:LEU:HD12	1:D:4089:LEU:N	2.12	0.65
1:B:2019:GLN:H	1:B:2019:GLN:HE21	1.44	0.64
1:C:3109:ASN:ND2	1:C:3138:LYS:HB2	2.12	0.64
1:B:2092:ASN:HD22	1:B:2092:ASN:N	1.88	0.64
1:A:1062:LEU:CD2	1:A:1067:MET:HE3	2.28	0.64
1:D:4030:VAL:HG13	1:D:4055:TYR:OH	1.97	0.64
1:A:1067:MET:HE1	1:A:1204:ASN:HB2	1.80	0.64
1:B:2063:LYS:H	1:B:2067:MET:CE	1.98	0.64
1:C:3089:LEU:HD12	1:C:3089:LEU:N	2.12	0.64
1:B:2040:GLN:HG3	1:B:2045:ASP:O	1.98	0.63
1:B:2196:LYS:HA	1:B:2199:MET:HE3	1.81	0.63
1:A:1088:TYR:HE1	1:A:1090:CYS:HB2	1.64	0.63
1:C:3206:THR:HG21	3:C:2015:HOH:O	1.98	0.63
1:D:4017:ASN:HA	1:D:4019:GLN:NE2	2.14	0.63
1:D:4193:THR:CG2	1:D:4196:LYS:H	2.12	0.63
1:A:1019:GLN:H	1:A:1019:GLN:HE21	1.47	0.62
1:A:1033:GLU:O	1:A:1077:ASP:OD1	2.16	0.62
1:C:3175:ILE:HD12	1:C:3175:ILE:N	2.14	0.62
1:C:3193:THR:HG22	1:C:3196:LYS:H	1.64	0.62
1:B:2082:GLU:HA	1:B:2099:ILE:HG22	1.82	0.62
1:C:3125:GLY:O	1:C:3126:ILE:HG13	2.00	0.61
1:A:1139:MET:HG3	3:A:2033:HOH:O	1.99	0.61
1:B:2033:GLU:O	1:B:2077:ASP:OD1	2.17	0.61
1:D:4109:ASN:HD21	1:D:4139:MET:H	1.47	0.61
1:A:1030:VAL:HG11	1:A:1058:LEU:HD22	1.82	0.61
1:C:3063:LYS:N	1:C:3067:MET:HE2	2.11	0.61
1:D:4141:THR:HA	1:D:4206:THR:HA	1.82	0.61
1:D:4062:LEU:HB3	1:D:4067:MET:CE	2.29	0.61
1:D:4016:LYS:HD2	1:D:4191:GLU:OE1	2.01	0.61
1:A:1062:LEU:HD23	1:A:1101:GLY:HA2	1.83	0.60
1:A:1064:ASN:ND2	1:A:1067:MET:H	1.98	0.60
1:A:1109:ASN:ND2	1:A:1139:MET:H	1.98	0.60
1:C:3062:LEU:HB3	1:C:3067:MET:CE	2.27	0.60
1:A:1170:GLY:HA2	1:A:1217:TYR:O	2.01	0.60
1:C:3063:LYS:H	1:C:3067:MET:CE	2.12	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3089:LEU:O	1:C:3090:CYS:HB2	2.00	0.59
1:D:4004:PRO:HA	1:D:4008:GLN:OE1	2.02	0.59
1:B:2088:TYR:CE1	1:B:2090:CYS:HB3	2.24	0.59
1:A:1205:GLU:OE2	1:A:1205:GLU:HA	2.03	0.58
1:C:3004:PRO:HB3	1:C:3183:TRP:CZ2	2.38	0.58
1:A:1085:HIS:ND1	1:D:4094:GLU:OE1	2.37	0.58
1:B:2005:ASP:N	1:B:2008:GLN:OE1	2.36	0.58
1:A:1030:VAL:HG13	1:A:1055:TYR:OH	2.03	0.57
1:B:2094:GLU:OE2	1:C:3085:HIS:HD2	1.87	0.57
1:C:3030:VAL:HG13	1:C:3055:TYR:OH	2.05	0.57
1:B:2177:LYS:HB3	3:B:3018:HOH:O	2.03	0.57
1:B:2092:ASN:H	1:B:2092:ASN:ND2	1.96	0.56
1:A:1064:ASN:C	1:A:1064:ASN:HD22	2.12	0.56
1:C:3062:LEU:HD12	1:C:3068:ALA:HA	1.87	0.56
1:B:2124:ASP:OD2	1:B:2220:THR:HG23	2.06	0.56
1:D:4089:LEU:O	1:D:4090:CYS:CB	2.53	0.56
1:B:2131:PHE:HE1	1:B:2133:ILE:HD13	1.70	0.56
1:C:3012:SER:HB3	3:C:2037:HOH:O	2.05	0.56
1:A:1067:MET:CE	1:A:1204:ASN:HB2	2.35	0.56
1:B:2062:LEU:HB3	1:B:2067:MET:HG2	1.87	0.56
1:C:3082:GLU:HA	1:C:3099:ILE:HG22	1.88	0.56
1:D:4151:LYS:HE3	1:D:4155:ASP:OD1	2.06	0.56
1:B:2141:THR:HA	1:B:2206:THR:HA	1.87	0.55
1:C:3034:ASN:ND2	1:C:3075:ASN:HB3	2.22	0.55
1:B:2091:GLU:OE2	1:B:2091:GLU:N	2.28	0.55
1:D:4019:GLN:H	1:D:4019:GLN:HE21	1.52	0.55
1:A:1051:SER:CB	1:A:1056:ASP:HA	2.36	0.55
1:B:2194:GLN:HG3	1:C:3094:GLU:OE1	2.07	0.54
1:A:1001:GLN:HG3	1:A:1002:GLN:H	1.73	0.54
1:A:1062:LEU:HB3	1:A:1067:MET:HE2	1.89	0.54
1:D:4089:LEU:N	1:D:4089:LEU:CD1	2.71	0.54
1:D:4166:LYS:O	1:D:4166:LYS:HD3	2.08	0.54
1:D:4064:ASN:C	1:D:4064:ASN:HD22	2.16	0.54
1:C:3019:GLN:O	1:C:3022:TYR:HB3	2.08	0.53
1:C:3064:ASN:C	1:C:3064:ASN:HD22	2.15	0.53
1:C:3141:THR:HA	1:C:3206:THR:HA	1.91	0.53
1:D:4036:LYS:NZ	1:D:4073:ASP:O	2.38	0.53
1:D:4182:PHE:CZ	1:D:4205:GLU:HG2	2.43	0.53
1:D:4087:CYS:O	1:D:4088:TYR:HB3	2.09	0.53
1:D:4065:GLN:O	1:D:4069:THR:HG23	2.09	0.53
1:D:4026:GLU:OE2	1:D:4026:GLU:HA	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2141:THR:HG22	1:B:2206:THR:HG22	1.91	0.52
1:D:4115:LYS:HE2	1:D:4210:ASN:HA	1.91	0.52
1:D:4047:ILE:HD13	1:D:4089:LEU:HD23	1.90	0.52
1:D:4052:GLY:HA3	1:D:4055:TYR:CE2	2.43	0.52
1:A:1062:LEU:HB3	1:A:1067:MET:CE	2.40	0.52
1:A:1088:TYR:CE1	1:A:1090:CYS:HB2	2.43	0.52
1:A:1213:GLN:C	1:A:1214:ILE:HD13	2.34	0.52
1:D:4193:THR:HG22	1:D:4196:LYS:N	2.18	0.52
1:D:4010:HIS:CD2	1:D:4187:PHE:O	2.60	0.52
1:A:1176:PRO:HG2	1:A:1179:LYS:O	2.10	0.51
1:D:4070:LEU:O	1:D:4074:LYS:HD2	2.10	0.51
1:B:2088:TYR:HE1	1:B:2090:CYS:CB	2.12	0.50
1:B:2177:LYS:N	3:B:3017:HOH:O	2.45	0.50
1:B:2203:ASP:CG	1:B:2205:GLU:HG2	2.36	0.50
1:A:1054:ASN:N	1:A:1054:ASN:HD22	2.07	0.50
1:D:4141:THR:HG22	1:D:4206:THR:HG22	1.92	0.50
1:C:3168:GLU:OE2	1:C:3168:GLU:HA	2.12	0.50
1:B:2174:PHE:O	1:B:2181:SER:HB2	2.12	0.50
1:C:3172:ILE:HB	1:C:3186:PHE:CE2	2.47	0.50
1:D:4088:TYR:HD1	1:D:4090:CYS:N	2.07	0.50
1:B:2034:ASN:ND2	1:B:2075:ASN:HB3	2.27	0.50
1:D:4011:ARG:NH2	1:D:4014:LEU:HD11	2.27	0.50
1:A:1065:GLN:O	1:A:1069:THR:HG23	2.12	0.49
1:A:1092:ASN:C	1:A:1092:ASN:ND2	2.70	0.49
1:A:1141:THR:HA	1:A:1206:THR:HA	1.94	0.49
1:D:4221:LYS:OXT	1:D:4221:LYS:HG2	2.12	0.49
1:D:4088:TYR:C	1:D:4089:LEU:HD12	2.37	0.49
1:D:4170:GLY:HA2	1:D:4217:TYR:O	2.13	0.49
1:C:3088:TYR:HD2	1:C:3090:CYS:O	1.96	0.49
1:B:2088:TYR:CD1	1:B:2093:ALA:HB3	2.47	0.49
1:D:4082:GLU:HA	1:D:4099:ILE:HG22	1.94	0.49
1:B:2090:CYS:HB3	1:B:2092:ASN:ND2	2.28	0.49
1:B:2090:CYS:HB3	1:B:2092:ASN:HD21	1.76	0.49
1:D:4044:HIS:HD2	1:D:4061:GLU:HG3	1.77	0.49
1:B:2004:PRO:HB3	1:B:2183:TRP:CZ2	2.48	0.49
1:A:1165:SER:O	1:A:1221:LYS:HE3	2.13	0.49
1:B:2094:GLU:OE1	1:C:3194:GLN:HG3	2.13	0.49
1:B:2111:LEU:HD21	1:B:2138:LYS:HG2	1.95	0.49
1:C:3020:ASN:O	1:C:3024:LEU:HG	2.12	0.49
1:A:1051:SER:HB3	1:A:1056:ASP:HA	1.95	0.48
1:B:2172:ILE:O	1:B:2172:ILE:HG23	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3040:GLN:HG3	1:C:3045:ASP:O	2.13	0.48
1:D:4056:ASP:OD1	1:D:4095:ARG:HB2	2.12	0.48
1:B:2177:LYS:HD3	1:B:2211:THR:OG1	2.12	0.48
1:C:3089:LEU:N	1:C:3089:LEU:CD1	2.75	0.48
1:A:1089:LEU:HB3	1:C:3088:TYR:OH	2.13	0.48
1:C:3052:GLY:HA3	1:C:3055:TYR:CE2	2.47	0.48
1:C:3074:LYS:HD3	1:C:3105:ASN:OD1	2.14	0.48
1:B:2017:ASN:HA	1:B:2019:GLN:NE2	2.29	0.48
1:C:3166:LYS:HD2	1:C:3167:TYR:CZ	2.47	0.48
1:D:4109:ASN:ND2	1:D:4138:LYS:HB2	2.28	0.48
1:C:3064:ASN:ND2	1:C:3067:MET:H	2.11	0.48
1:C:3141:THR:HG23	3:C:2020:HOH:O	2.12	0.48
1:B:2112:GLU:HG3	1:B:2113:ILE:HG13	1.95	0.48
1:A:1034:ASN:HD21	1:A:1075:ASN:HB3	1.71	0.48
1:D:4109:ASN:HD21	1:D:4139:MET:N	2.11	0.48
1:A:1129:LEU:HD22	1:A:1157:LYS:HE3	1.96	0.48
1:A:1146:ASP:O	1:A:1150:ARG:HG3	2.14	0.47
1:B:2093:ALA:HB1	1:B:2096:SER:OG	2.14	0.47
1:A:1103:VAL:H	1:A:1204:ASN:ND2	2.06	0.47
1:B:2082:GLU:CA	1:B:2099:ILE:HG22	2.43	0.47
1:B:2032:HIS:CD2	1:B:2050:VAL:HG21	2.48	0.47
1:C:3065:GLN:HB2	3:C:2006:HOH:O	2.15	0.47
1:B:2052:GLY:HA3	1:B:2055:TYR:CE2	2.48	0.47
1:B:2131:PHE:CE1	1:B:2133:ILE:HD13	2.48	0.47
1:B:2176:PRO:HD3	1:B:2181:SER:HA	1.96	0.47
1:C:3031:THR:HA	1:C:3078:ILE:O	2.15	0.47
1:D:4034:ASN:ND2	1:D:4075:ASN:HB3	2.30	0.47
1:C:3025:TYR:CE2	1:C:3150:ARG:HD2	2.50	0.47
1:C:3019:GLN:HE21	1:C:3019:GLN:N	2.07	0.47
1:B:2036:LYS:HE3	1:B:2075:ASN:OD1	2.16	0.46
1:D:4204:ASN:O	1:D:4206:THR:HG23	2.16	0.46
1:A:1166:LYS:HD2	1:A:1167:TYR:CZ	2.50	0.46
1:D:4031:THR:HA	1:D:4078:ILE:O	2.15	0.46
1:D:4076:VAL:HB	1:D:4104:THR:O	2.15	0.46
1:A:1005:ASP:HB3	1:A:1008:GLN:CB	2.42	0.46
1:A:1117:ILE:HB	1:A:1133:ILE:HG22	1.98	0.46
1:D:4004:PRO:HD3	1:D:4183:TRP:CE2	2.51	0.46
1:C:3027:GLY:O	1:C:3147:TYR:OH	2.31	0.46
1:D:4039:ASP:CG	1:D:4040:GLN:H	2.23	0.46
1:D:4133:ILE:HD13	1:D:4133:ILE:HA	1.79	0.46
1:A:1053:PRO:O	1:A:1054:ASN:HB2	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1194:GLN:HG3	1:D:4094:GLU:OE2	2.16	0.46
1:A:1196:LYS:O	1:A:1199:MET:HG3	2.15	0.46
1:B:2017:ASN:HA	1:B:2019:GLN:HE22	1.81	0.46
1:D:4019:GLN:O	1:D:4022:TYR:HB3	2.16	0.46
1:A:1053:PRO:O	3:A:2009:HOH:O	2.21	0.45
1:C:3126:ILE:O	1:C:3127:GLN:C	2.57	0.45
1:C:3067:MET:HE1	1:C:3204:ASN:HB2	1.98	0.45
1:B:2088:TYR:CD1	1:B:2088:TYR:C	2.94	0.45
1:D:4090:CYS:C	1:D:4092:ASN:H	2.24	0.45
1:C:3030:VAL:HG11	1:C:3058:LEU:HD22	1.98	0.45
1:A:1094:GLU:OE1	1:D:4193:THR:HA	2.17	0.45
1:B:2176:PRO:CD	1:B:2181:SER:HA	2.47	0.45
1:C:3039:ASP:HB3	1:C:3047:ILE:HB	1.99	0.45
1:C:3064:ASN:HD22	1:C:3067:MET:H	1.63	0.45
1:C:3082:GLU:CA	1:C:3099:ILE:HG22	2.47	0.45
1:D:4152:TYR:CE1	1:D:4156:ASN:ND2	2.85	0.45
1:C:3203:ASP:OD2	1:C:3205:GLU:HB2	2.17	0.44
1:A:1112:GLU:HG3	1:A:1113:ILE:HG13	1.98	0.44
1:A:1203:ASP:OD1	1:A:1203:ASP:C	2.60	0.44
1:C:3033:GLU:HA	1:C:3077:ASP:OD1	2.18	0.44
1:A:1054:ASN:N	1:A:1054:ASN:ND2	2.65	0.44
1:B:2030:VAL:HG11	1:B:2058:LEU:HD22	1.98	0.44
1:B:2039:ASP:CG	1:B:2040:GLN:H	2.25	0.44
1:C:3032:HIS:CD2	1:C:3050:VAL:HB	2.52	0.44
1:A:1170:GLY:HA3	1:A:1218:LEU:HD23	2.00	0.44
1:A:1069:THR:HG22	3:A:2006:HOH:O	2.17	0.44
1:A:1206:THR:HG21	3:A:2022:HOH:O	2.18	0.44
1:D:4062:LEU:CB	1:D:4067:MET:HE2	2.40	0.44
1:D:4067:MET:CE	1:D:4204:ASN:HB2	2.47	0.44
1:B:2091:GLU:CD	1:B:2091:GLU:N	2.74	0.44
1:D:4161:THR:O	1:D:4163:GLY:N	2.50	0.44
1:B:2019:GLN:O	1:B:2022:TYR:HB3	2.18	0.43
1:D:4079:TYR:CD2	1:D:4144:GLU:HG3	2.53	0.43
1:A:1203:ASP:OD1	1:A:1205:GLU:N	2.45	0.43
1:D:4193:THR:HG22	1:D:4196:LYS:HG2	2.00	0.43
1:A:1161:THR:C	1:A:1163:GLY:H	2.26	0.43
1:B:2087:CYS:SG	1:B:2088:TYR:N	2.90	0.43
1:D:4193:THR:CG2	1:D:4196:LYS:HG2	2.48	0.43
1:A:1089:LEU:O	1:A:1090:CYS:SG	2.77	0.43
1:A:1172:ILE:HB	1:A:1186:PHE:CE2	2.53	0.43
1:B:2067:MET:CE	1:B:2204:ASN:HB2	2.48	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3147:TYR:CD2	1:C:3147:TYR:C	2.97	0.43
1:A:1169:THR:HA	3:A:2026:HOH:O	2.19	0.42
1:B:2064:ASN:C	1:B:2064:ASN:HD22	2.27	0.42
1:C:3032:HIS:NE2	1:C:3050:VAL:HB	2.34	0.42
1:D:4030:VAL:HG23	1:D:4082:GLU:OE2	2.19	0.42
1:A:1168:GLU:OE2	1:A:1168:GLU:HA	2.18	0.42
1:A:1015:VAL:HA	1:A:1190:PRO:HA	2.01	0.42
1:A:1157:LYS:O	1:A:1158:GLN:HB2	2.20	0.42
1:A:1040:GLN:HG3	1:A:1045:ASP:O	2.19	0.42
1:B:2180:GLU:OE2	1:B:2180:GLU:HA	2.20	0.42
1:D:4011:ARG:HH21	1:D:4014:LEU:HD11	1.83	0.42
1:A:1032:HIS:HE1	1:A:1055:TYR:OH	2.02	0.42
1:C:3067:MET:CE	1:C:3204:ASN:HB2	2.49	0.42
1:C:3085:HIS:CE1	1:C:3086:LEU:HD13	2.55	0.42
1:D:4011:ARG:NE	1:D:4014:LEU:HD11	2.35	0.42
1:D:4019:GLN:HE21	1:D:4019:GLN:N	2.16	0.42
1:D:4089:LEU:H	1:D:4093:ALA:CB	2.33	0.42
1:A:1174:PHE:CE2	1:A:1214:ILE:HD12	2.55	0.42
1:B:2025:TYR:CE2	1:B:2150:ARG:HD2	2.55	0.42
1:B:2062:LEU:HD12	1:B:2068:ALA:HA	2.01	0.42
1:D:4079:TYR:CG	1:D:4144:GLU:HG3	2.55	0.42
1:D:4082:GLU:CA	1:D:4099:ILE:HG22	2.49	0.42
1:A:1083:TYR:CD2	1:A:1198:LEU:HD12	2.55	0.42
1:D:4177:LYS:HG3	1:D:4178:ASN:ND2	2.34	0.42
1:C:3109:ASN:HA	1:C:3138:LYS:HD2	2.01	0.41
1:A:1161:THR:C	1:A:1163:GLY:N	2.79	0.41
1:A:1213:GLN:O	1:A:1214:ILE:HD13	2.20	0.41
1:B:2039:ASP:CG	1:B:2040:GLN:N	2.78	0.41
1:A:1172:ILE:HG22	1:A:1184:PHE:HB2	2.02	0.41
1:B:2004:PRO:HD3	1:B:2183:TRP:CD1	2.56	0.41
1:B:2193:THR:HG22	1:B:2196:LYS:HG2	2.02	0.41
1:D:4041:LEU:HB3	1:D:4045:ASP:OD2	2.21	0.41
1:B:2034:ASN:HD21	1:B:2075:ASN:HB3	1.85	0.41
1:A:1067:MET:HE1	1:A:1204:ASN:CB	2.48	0.41
1:B:2199:MET:C	1:B:2201:TYR:H	2.29	0.41
1:D:4072:LYS:C	1:D:4074:LYS:H	2.29	0.41
1:A:1139:MET:HE3	3:A:2033:HOH:O	2.21	0.40
1:A:1176:PRO:HD2	1:A:1181:SER:HA	2.03	0.40
1:D:4079:TYR:CD1	1:D:4144:GLU:HG3	2.56	0.40
1:A:1004:PRO:HB3	1:A:1183:TRP:CZ2	2.56	0.40
1:B:2031:THR:HA	1:B:2078:ILE:O	2.22	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3070:LEU:O	1:C:3074:LYS:NZ	2.45	0.40
1:A:1044:HIS:CD2	1:A:1044:HIS:C	2.99	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	219/221 (99%)	200 (91%)	18 (8%)	1 (0%)	24	46
1	B	219/221 (99%)	200 (91%)	16 (7%)	3 (1%)	9	19
1	C	219/221 (99%)	203 (93%)	11 (5%)	5 (2%)	5	9
1	D	219/221 (99%)	204 (93%)	14 (6%)	1 (0%)	24	46
All	All	876/884 (99%)	807 (92%)	59 (7%)	10 (1%)	11	25

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1091	GLU
1	C	3090	CYS
1	D	4090	CYS
1	B	2087	CYS
1	B	2091	GLU
1	C	3179	LYS
1	B	2177	LYS
1	C	3006	PRO
1	C	3004	PRO
1	C	3126	ILE

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	206/208 (99%)	196 (95%)	10 (5%)	22	47
1	B	206/208 (99%)	196 (95%)	10 (5%)	22	47
1	C	206/208 (99%)	198 (96%)	8 (4%)	28	55
1	D	206/208 (99%)	200 (97%)	6 (3%)	37	65
All	All	824/832 (99%)	790 (96%)	34 (4%)	27	54

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1014	LEU
1	A	1019	GLN
1	A	1034	ASN
1	A	1057	LYS
1	A	1064	ASN
1	A	1069	THR
1	A	1091	GLU
1	A	1092	ASN
1	A	1115	LYS
1	A	1133	ILE
1	B	2019	GLN
1	B	2038	VAL
1	B	2064	ASN
1	B	2069	THR
1	B	2074	LYS
1	B	2092	ASN
1	B	2133	ILE
1	B	2165	SER
1	B	2193	THR
1	B	2220	THR
1	C	3019	GLN
1	C	3064	ASN
1	C	3086	LEU
1	C	3089	LEU

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Mol	Chain	Res	Type
1	C	3122	SER
1	C	3193	THR
1	C	3206	THR
1	C	3207	LEU
1	D	4019	GLN
1	D	4064	ASN
1	D	4089	LEU
1	D	4133	ILE
1	D	4166	LYS
1	D	4193	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (47) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1001	GLN
1	A	1019	GLN
1	A	1032	HIS
1	A	1034	ASN
1	A	1054	ASN
1	A	1064	ASN
1	A	1065	GLN
1	A	1075	ASN
1	A	1092	ASN
1	A	1109	ASN
1	A	1127	GLN
1	A	1136	ASN
1	A	1156	ASN
1	A	1178	ASN
1	A	1204	ASN
1	B	2001	GLN
1	B	2019	GLN
1	B	2032	HIS
1	B	2034	ASN
1	B	2044	HIS
1	B	2064	ASN
1	B	2065	GLN
1	B	2092	ASN
1	B	2109	ASN
1	B	2110	HIS
1	B	2158	GLN
1	B	2178	ASN
1	C	3001	GLN

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Mol	Chain	Res	Type
1	C	3019	GLN
1	C	3032	HIS
1	C	3034	ASN
1	C	3049	ASN
1	C	3054	ASN
1	C	3064	ASN
1	C	3065	GLN
1	C	3075	ASN
1	C	3109	ASN
1	C	3156	ASN
1	D	4010	HIS
1	D	4019	GLN
1	D	4034	ASN
1	D	4054	ASN
1	D	4064	ASN
1	D	4065	GLN
1	D	4109	ASN
1	D	4178	ASN
1	D	4210	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 4 ligands modelled in this entry, 4 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.