



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:24 AM UTC

PDB ID : 1F6P / pdb_00001f6p
Title : CRYSTAL STRUCTURE ANALYSIS OF N-ACETYLNEURAMINATE
LYASE FROM HAEMOPHILUS INFLUENZAE: CRYSTAL FORM III
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Deposited on : 2000-06-22
Resolution : 2.25 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

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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)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

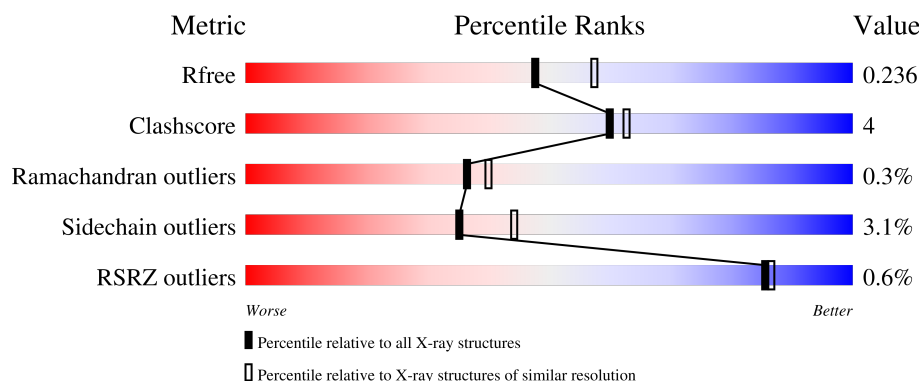
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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}	180053	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	293	74% 23% .
1	B	293	76% 19% .
1	C	293	78% 19% .
1	D	293	77% 19% .

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9760 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 N-ACETYL NEURAMINATE LYASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	293	Total	C	N	O	S	0	0	0
			2290	1476	373	431	10			
1	B	293	Total	C	N	O	S	0	0	0
			2290	1476	373	431	10			
1	C	293	Total	C	N	O	S	0	0	0
			2290	1476	373	431	10			
1	D	293	Total	C	N	O	S	0	1	0
			2293	1477	373	433	10			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	131	SER	ASN	SEE REMARK 999	UNP P44539
A	229	LYS	ALA	SEE REMARK 999	UNP P44539
A	278	ALA	GLU	SEE REMARK 999	UNP P44539
A	281	VAL	LEU	SEE REMARK 999	UNP P44539
B	131	SER	ASN	SEE REMARK 999	UNP P44539
B	229	LYS	ALA	SEE REMARK 999	UNP P44539
B	278	ALA	GLU	SEE REMARK 999	UNP P44539
B	281	VAL	LEU	SEE REMARK 999	UNP P44539
C	131	SER	ASN	SEE REMARK 999	UNP P44539
C	229	LYS	ALA	SEE REMARK 999	UNP P44539
C	278	ALA	GLU	SEE REMARK 999	UNP P44539
C	281	VAL	LEU	SEE REMARK 999	UNP P44539
D	131	SER	ASN	SEE REMARK 999	UNP P44539
D	229	LYS	ALA	SEE REMARK 999	UNP P44539
D	278	ALA	GLU	SEE REMARK 999	UNP P44539
D	281	VAL	LEU	SEE REMARK 999	UNP P44539

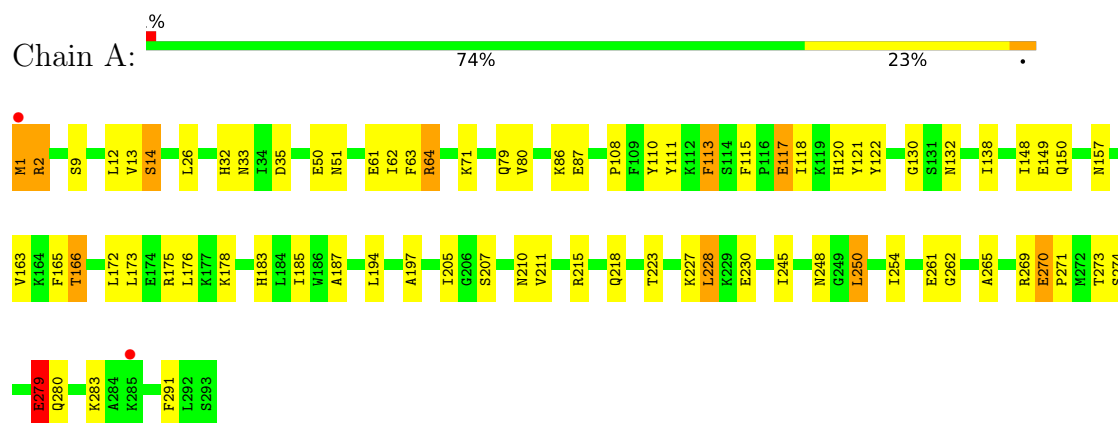
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	118	Total 118	O 118	0	0
2	B	151	Total 151	O 151	0	0
2	C	174	Total 174	O 174	0	0
2	D	154	Total 154	O 154	0	0

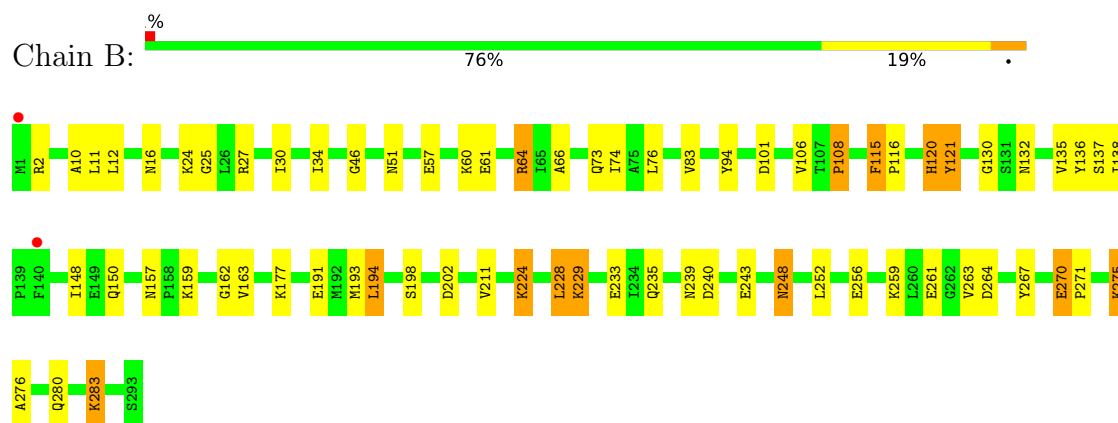
3 Residue-property plots [i](#)

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.

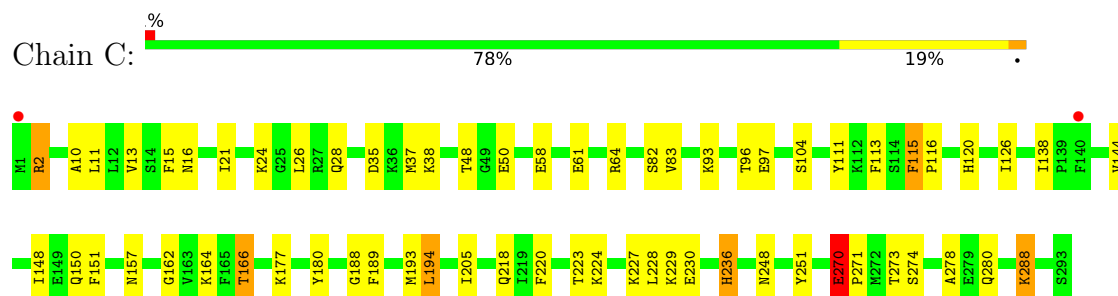
• Molecule 1: N-ACETYL NEURAMINATE LYASE



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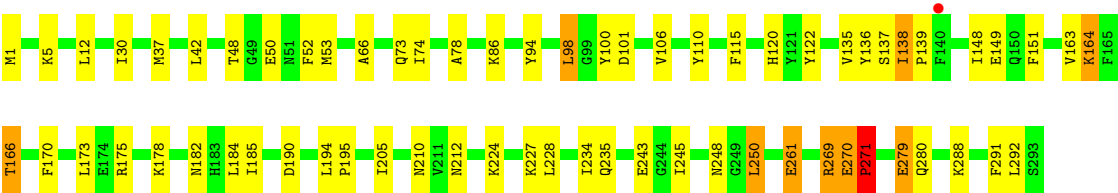


● Molecule 1: N-ACETYL NEURAMINATE LYASE

Chain D:

77%

19%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	81.10Å 116.81Å 129.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.25 20.00 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.0 (20.00-2.25) 96.9 (20.00-2.25)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.35 (at 2.26Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.188 , 0.261 0.173 , 0.236	Depositor DCC
R_{free} test set	2025 reflections (3.48%)	wwPDB-VP
Wilson B-factor (Å ²)	16.2	Xtriage
Anisotropy	0.099	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 50.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9760	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 20.94 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 7.8012e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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

5.1 Standard geometry

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	0.83	1/2330 (0.0%)	1.99	53/3135 (1.7%)
1	B	0.85	0/2330	1.91	55/3135 (1.8%)
1	C	0.84	0/2330	1.92	55/3135 (1.8%)
1	D	0.84	0/2338	1.92	49/3146 (1.6%)
All	All	0.84	1/9328 (0.0%)	1.94	212/12551 (1.7%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	2
1	C	0	2
1	D	0	2
All	All	0	8

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	271	PRO	N-CA	-5.28	1.43	1.47

All (212) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	64	ARG	CD-NE-CZ	24.92	159.28	124.40
1	C	270	GLU	CA-C-O	-17.36	102.30	119.49
1	B	270	GLU	CA-C-O	-17.35	102.45	119.80
1	D	270	GLU	CA-C-O	-16.81	103.95	119.75
1	A	270	GLU	CA-C-O	-16.80	103.05	119.51
1	B	271	PRO	N-CA-CB	11.40	115.22	103.25
1	A	271	PRO	N-CA-CB	10.99	112.98	101.88

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	271	PRO	N-CA-CB	10.67	114.45	103.25
1	D	270	GLU	CA-C-N	10.31	132.73	119.84
1	D	270	GLU	C-N-CA	10.31	132.73	119.84
1	C	2	ARG	CD-NE-CZ	10.24	138.74	124.40
1	B	73	GLN	OE1-CD-NE2	-9.43	113.17	122.60
1	D	271	PRO	N-CA-CB	8.90	112.59	103.25
1	B	64	ARG	CD-NE-CZ	8.76	136.67	124.40
1	A	262	GLY	CA-C-O	8.76	127.00	118.77
1	B	270	GLU	O-C-N	8.70	129.98	121.28
1	B	270	GLU	CA-C-N	8.52	130.50	119.84
1	B	270	GLU	C-N-CA	8.52	130.50	119.84
1	B	108	PRO	CB-CA-C	8.37	122.19	111.56
1	C	227	LYS	CA-C-N	8.12	131.51	120.38
1	C	227	LYS	C-N-CA	8.12	131.51	120.38
1	C	271	PRO	CA-N-CD	-8.12	100.64	112.00
1	D	271	PRO	CA-N-CD	-8.08	100.69	112.00
1	D	73	GLN	OE1-CD-NE2	-8.06	114.54	122.60
1	B	27	ARG	NE-CZ-NH2	-8.03	111.97	119.20
1	A	250	LEU	N-CA-C	7.92	120.69	111.02
1	B	271	PRO	CA-N-CD	-7.87	100.99	112.00
1	B	261	GLU	N-CA-C	-7.65	103.01	112.88
1	B	115	PHE	CA-CB-CG	-7.59	106.21	113.80
1	C	151	PHE	CA-CB-CG	-7.56	106.24	113.80
1	D	115	PHE	CA-CB-CG	-7.49	106.31	113.80
1	D	120	HIS	CA-C-O	7.48	128.48	120.55
1	D	137	SER	CB-CA-C	-7.45	96.96	109.48
1	D	170	PHE	CA-CB-CG	-7.44	106.36	113.80
1	D	137	SER	N-CA-CB	7.22	122.43	110.52
1	D	120	HIS	CA-CB-CG	-7.17	106.63	113.80
1	B	248	ASN	CA-CB-CG	7.12	119.72	112.60
1	A	215	ARG	CA-C-O	-7.08	113.04	120.55
1	A	211	VAL	CB-CA-C	-7.08	103.98	110.63
1	B	239	ASN	CA-CB-CG	-7.06	105.54	112.60
1	A	271	PRO	CA-N-CD	-7.05	102.13	112.00
1	B	101	ASP	CA-CB-CG	-6.99	105.61	112.60
1	B	239	ASN	CA-C-O	-6.94	111.99	119.97
1	B	243	GLU	CA-C-N	6.86	127.55	119.94
1	B	243	GLU	C-N-CA	6.86	127.55	119.94
1	A	108	PRO	CB-CA-C	6.81	120.25	111.46
1	A	35	ASP	N-CA-C	6.73	118.40	111.14
1	B	163	VAL	N-CA-C	6.72	118.40	108.45
1	A	9	SER	CA-C-O	-6.71	113.40	121.05

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	184	LEU	CA-C-O	6.70	129.72	121.81
1	D	52	PHE	CA-CB-CG	-6.64	107.16	113.80
1	B	202	ASP	CA-CB-CG	-6.64	105.96	112.60
1	D	234	ILE	CA-C-O	-6.63	113.82	120.85
1	B	211	VAL	CB-CA-C	-6.63	104.39	110.63
1	A	51	ASN	N-CA-C	6.63	118.16	111.07
1	D	101	ASP	CA-CB-CG	-6.61	105.99	112.60
1	D	269	ARG	NE-CZ-NH2	-6.56	113.30	119.20
1	D	243	GLU	CA-C-O	-6.56	113.88	120.90
1	B	64	ARG	NE-CZ-NH1	6.56	128.06	121.50
1	B	51	ASN	OD1-CG-ND2	6.54	129.14	122.60
1	C	115	PHE	CA-CB-CG	-6.54	107.26	113.80
1	B	11	LEU	N-CA-C	6.54	119.84	110.10
1	A	113	PHE	CA-CB-CG	-6.51	107.29	113.80
1	C	270	GLU	N-CA-C	6.50	121.21	109.44
1	C	228	LEU	N-CA-C	6.45	119.14	111.33
1	B	235	GLN	CA-C-N	6.43	129.23	120.54
1	B	235	GLN	C-N-CA	6.43	129.23	120.54
1	C	83	VAL	N-CA-C	-6.26	103.80	112.50
1	A	218	GLN	OE1-CD-NE2	-6.25	116.35	122.60
1	A	117	GLU	N-CA-C	-6.24	104.56	111.36
1	C	288	LYS	CA-C-O	-6.21	114.30	120.70
1	C	120	HIS	CA-CB-CG	-6.20	107.60	113.80
1	C	104	SER	CA-CB-OG	-6.19	98.71	111.10
1	C	97	GLU	O-C-N	-6.15	115.03	122.22
1	B	120	HIS	O-C-N	-6.13	115.62	122.12
1	A	157	ASN	OD1-CG-ND2	6.11	128.71	122.60
1	C	189	PHE	O-C-N	-6.11	115.36	122.87
1	D	235	GLN	CA-C-N	6.08	128.35	120.44
1	D	235	GLN	C-N-CA	6.08	128.35	120.44
1	D	50	GLU	CA-C-N	6.07	128.74	120.54
1	D	50	GLU	C-N-CA	6.07	128.74	120.54
1	B	193	MET	CA-C-O	6.01	127.33	120.90
1	C	10	ALA	N-CA-C	-6.00	99.37	108.67
1	B	132	ASN	CA-CB-CG	-5.99	106.61	112.60
1	D	120	HIS	O-C-N	-5.98	115.78	122.12
1	C	218	GLN	OE1-CD-NE2	-5.97	116.63	122.60
1	B	150	GLN	CA-CB-CG	-5.97	102.16	114.10
1	A	14	SER	CA-C-O	-5.96	113.75	120.43
1	A	228	LEU	CA-C-O	-5.96	114.24	120.55
1	C	35	ASP	N-CA-C	5.94	119.00	111.69
1	A	273	THR	CA-C-O	-5.94	114.39	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	87	GLU	CA-C-O	-5.93	114.13	120.42
1	C	223	THR	CA-C-O	-5.91	114.16	120.42
1	B	270	GLU	N-CA-C	5.87	118.14	109.50
1	A	165	PHE	CA-CB-CG	5.86	119.66	113.80
1	B	240	ASP	CA-CB-CG	-5.85	106.75	112.60
1	A	130	GLY	N-CA-C	-5.82	107.21	115.30
1	B	57	GLU	O-C-N	5.82	128.29	122.12
1	D	261	GLU	N-CA-C	-5.82	105.77	112.92
1	C	126	ILE	O-C-N	5.79	127.92	121.90
1	B	228	LEU	N-CA-C	5.79	117.59	111.28
1	B	138	ILE	CA-C-N	5.77	125.46	119.05
1	B	138	ILE	C-N-CA	5.77	125.46	119.05
1	D	292	LEU	N-CA-C	5.76	119.51	111.56
1	A	163	VAL	N-CA-C	5.75	116.96	108.45
1	D	270	GLU	O-C-N	5.74	126.41	121.30
1	C	144	VAL	N-CA-C	5.69	116.30	107.99
1	B	83	VAL	N-CA-C	-5.68	104.60	112.50
1	C	113	PHE	CA-CB-CG	-5.67	108.13	113.80
1	D	227	LYS	CA-C-N	5.63	127.77	120.44
1	D	227	LYS	C-N-CA	5.63	127.77	120.44
1	D	151	PHE	CA-CB-CG	-5.63	108.17	113.80
1	C	120	HIS	CA-C-O	5.62	126.46	120.10
1	D	5	LYS	CB-CG-CD	5.62	124.22	111.30
1	C	274	SER	CA-C-O	-5.62	113.16	119.79
1	C	96	THR	CA-C-N	5.61	128.36	120.28
1	C	96	THR	C-N-CA	5.61	128.36	120.28
1	A	172	LEU	CA-C-O	5.59	126.48	120.55
1	A	175	ARG	CA-C-O	-5.57	114.65	120.55
1	A	132	ASN	CA-CB-CG	-5.57	107.03	112.60
1	A	274	SER	CA-C-O	-5.55	113.24	119.79
1	B	191	GLU	CG-CD-OE1	5.54	131.15	118.40
1	A	2	ARG	CD-NE-CZ	5.51	132.12	124.40
1	A	26	LEU	CA-C-N	5.47	127.61	120.28
1	A	26	LEU	C-N-CA	5.47	127.61	120.28
1	B	120	HIS	CA-CB-CG	-5.46	108.33	113.80
1	C	223	THR	O-C-N	5.46	128.37	122.15
1	D	250	LEU	N-CA-C	5.46	117.68	111.02
1	C	48	THR	N-CA-C	5.45	117.98	111.71
1	A	291	PHE	CB-CG-CD1	-5.45	111.44	120.70
1	B	73	GLN	CB-CG-CD	5.43	121.84	112.60
1	C	50	GLU	CA-C-N	5.43	127.56	120.28
1	C	50	GLU	C-N-CA	5.43	127.56	120.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	121	TYR	CA-CB-CG	5.43	123.67	113.90
1	A	12	LEU	N-CA-CB	5.40	119.11	110.46
1	D	224	LYS	CA-CB-CG	5.40	124.90	114.10
1	A	187	ALA	CA-C-O	-5.40	115.11	121.16
1	C	162	GLY	CA-C-N	-5.39	115.44	122.94
1	C	162	GLY	C-N-CA	-5.39	115.44	122.94
1	C	16	ASN	CA-C-N	5.39	127.50	120.28
1	C	16	ASN	C-N-CA	5.39	127.50	120.28
1	D	269	ARG	NE-CZ-NH1	5.38	126.89	121.50
1	A	210	ASN	OD1-CG-ND2	-5.38	117.22	122.60
1	C	193	MET	CB-CA-C	-5.38	102.44	110.88
1	C	236	HIS	CA-C-O	-5.37	114.86	120.55
1	B	115	PHE	CA-C-O	5.37	123.57	118.63
1	C	111	TYR	CA-C-O	-5.35	115.73	121.56
1	A	291	PHE	N-CA-CB	-5.35	103.23	110.67
1	A	50	GLU	CA-C-N	5.33	127.37	120.44
1	A	50	GLU	C-N-CA	5.33	127.37	120.44
1	A	254	ILE	N-CA-CB	5.31	118.55	110.58
1	A	207	SER	CA-CB-OG	-5.31	100.49	111.10
1	C	15	PHE	CA-CB-CG	-5.31	108.49	113.80
1	D	73	GLN	CB-CG-CD	5.31	121.62	112.60
1	B	130	GLY	O-C-N	-5.30	115.78	122.41
1	A	183	HIS	CA-CB-CG	-5.29	108.50	113.80
1	C	157	ASN	CA-C-O	5.29	123.54	119.46
1	B	264	ASP	CA-CB-CG	-5.29	107.31	112.60
1	C	138	ILE	CA-C-N	5.29	125.36	119.32
1	C	138	ILE	C-N-CA	5.29	125.36	119.32
1	D	182	ASN	OD1-CG-ND2	5.29	127.89	122.60
1	A	205	ILE	CA-C-O	-5.27	114.91	120.39
1	D	166	THR	CA-C-N	5.27	131.18	121.85
1	D	166	THR	C-N-CA	5.27	131.18	121.85
1	A	33	ASN	O-C-N	5.26	127.78	122.09
1	C	228	LEU	CA-C-O	-5.26	114.95	120.63
1	D	122	TYR	CA-CB-CG	-5.26	104.44	113.90
1	C	97	GLU	CB-CG-CD	5.25	121.53	112.60
1	B	10	ALA	N-CA-C	-5.25	100.53	108.67
1	D	212	ASN	CA-C-N	5.24	125.90	120.03
1	D	212	ASN	C-N-CA	5.24	125.90	120.03
1	D	210	ASN	CA-C-O	-5.23	114.19	120.10
1	B	248	ASN	N-CA-C	5.22	119.65	113.28
1	A	71	LYS	CB-CA-C	-5.22	110.14	117.23
1	C	271	PRO	N-CD-CG	5.21	111.02	103.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	98	LEU	CA-C-O	-5.20	112.29	119.05
1	D	164	LYS	N-CA-CB	5.19	118.09	110.35
1	B	76	LEU	O-C-N	5.19	129.38	123.31
1	B	193	MET	N-CA-C	5.19	117.34	111.11
1	C	28	GLN	OE1-CD-NE2	-5.17	117.43	122.60
1	C	180	TYR	CA-C-N	5.17	124.84	119.56
1	C	180	TYR	C-N-CA	5.17	124.84	119.56
1	A	63	PHE	N-CA-CB	5.17	117.72	110.12
1	D	269	ARG	CD-NE-CZ	5.17	131.64	124.40
1	D	138	ILE	CA-C-O	5.17	126.87	119.95
1	A	35	ASP	CA-CB-CG	-5.16	107.44	112.60
1	B	157	ASN	CA-C-O	5.16	123.43	119.46
1	B	137	SER	N-CA-C	5.15	117.01	108.20
1	A	227	LYS	CA-C-N	5.15	127.18	120.28
1	A	227	LYS	C-N-CA	5.15	127.18	120.28
1	C	82	SER	N-CA-CB	-5.14	103.75	111.56
1	C	11	LEU	N-CA-C	5.14	117.76	110.10
1	C	16	ASN	OD1-CG-ND2	5.14	127.74	122.60
1	B	16	ASN	CA-CB-CG	-5.13	107.47	112.60
1	C	278	ALA	CA-C-N	5.13	127.58	120.29
1	C	278	ALA	C-N-CA	5.13	127.58	120.29
1	D	234	ILE	O-C-N	5.13	127.12	121.83
1	C	115	PHE	CA-C-N	5.13	124.75	119.05
1	C	115	PHE	C-N-CA	5.13	124.75	119.05
1	A	79	GLN	CA-C-O	-5.13	114.54	120.49
1	D	291	PHE	N-CA-CB	-5.07	104.16	110.90
1	A	120	HIS	CB-CG-CD2	5.06	137.78	131.20
1	A	122	TYR	N-CA-CB	5.04	117.33	110.01
1	D	149	GLU	CA-C-N	5.04	127.03	120.28
1	D	149	GLU	C-N-CA	5.04	127.03	120.28
1	A	157	ASN	CA-CB-CG	-5.03	107.57	112.60
1	B	2	ARG	CA-C-O	-5.03	116.04	121.87
1	A	80	VAL	CA-C-O	5.03	124.54	119.97
1	B	198	SER	O-C-N	-5.02	116.09	122.27
1	B	25	GLY	CA-C-O	-5.02	115.34	120.66
1	B	46	GLY	O-C-N	-5.01	118.50	122.81
1	A	279	GLU	CA-CB-CG	5.00	124.11	114.10

There are no chirality outliers.

All (8) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	270	GLU	Peptide,Mainchain
1	B	270	GLU	Peptide,Mainchain
1	C	270	GLU	Peptide,Mainchain
1	D	270	GLU	Peptide,Mainchain

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	2290	0	2332	22	0
1	B	2290	0	2332	23	0
1	C	2290	0	2332	16	0
1	D	2293	0	2332	27	0
2	A	118	0	0	0	0
2	B	151	0	0	0	0
2	C	174	0	0	2	0
2	D	154	0	0	0	0
All	All	9760	0	9328	80	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (80) 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:248:ASN:HD21	1:C:280:GLN:HA	1.58	0.67
1:A:61:GLU:CD	1:A:64:ARG:HH21	2.03	0.67
1:B:229:LYS:O	1:B:233:GLU:HG3	1.95	0.67
1:B:267:TYR:HE2	1:B:275:LYS:HE2	1.61	0.65
1:C:61:GLU:OE1	1:C:64:ARG:NH2	2.27	0.63
1:A:113:PHE:CE1	1:D:271:PRO:HG2	2.35	0.61
1:B:248:ASN:HD21	1:B:280:GLN:HA	1.65	0.61
1:A:248:ASN:HD21	1:A:280:GLN:HA	1.66	0.60
1:B:115:PHE:HB3	1:B:116:PRO:HD3	1.84	0.59
1:D:53:MET:SD	1:D:271:PRO:HD2	2.41	0.59
1:A:13:VAL:HG21	1:A:62:ILE:HD13	1.84	0.59
1:D:248:ASN:HD21	1:D:280:GLN:HA	1.69	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:173:LEU:HD11	1:D:185:ILE:HG21	1.86	0.57
1:D:279:GLU:H	1:D:279:GLU:CD	2.14	0.56
1:C:166:THR:HG23	1:C:188:GLY:HA3	1.88	0.56
1:B:34:ILE:HG12	1:B:74:ILE:HD13	1.88	0.55
1:B:228:LEU:HD11	1:D:228:LEU:HD21	1.90	0.54
1:A:248:ASN:HB2	1:A:283:LYS:HE2	1.89	0.54
1:B:228:LEU:HD21	1:D:228:LEU:HD11	1.91	0.53
1:C:37:MET:HA	1:C:37:MET:HE2	1.92	0.52
1:D:261:GLU:OE2	1:D:288:LYS:HE2	2.10	0.51
1:D:135:VAL:HG23	1:D:163:VAL:HG23	1.93	0.51
1:C:251:TYR:HD1	2:C:433:HOH:O	1.94	0.50
1:A:32:HIS:CE1	1:A:261:GLU:HG3	2.46	0.50
1:C:220:PHE:CZ	1:C:224:LYS:HD2	2.47	0.50
1:D:42:LEU:HG	1:D:74:ILE:CD1	2.42	0.49
1:B:30:ILE:HD13	1:B:66:ALA:HA	1.94	0.49
1:C:194:LEU:C	1:C:194:LEU:HD12	2.37	0.49
1:B:194:LEU:C	1:B:194:LEU:HD12	2.38	0.48
1:C:24:LYS:HD3	2:C:446:HOH:O	2.12	0.48
1:D:42:LEU:HG	1:D:74:ILE:HD12	1.96	0.48
1:B:106:VAL:HA	1:B:136:TYR:HB3	1.96	0.48
1:B:61:GLU:CD	1:B:64:ARG:HH21	2.22	0.48
1:D:12:LEU:HG	1:D:48:THR:HG22	1.95	0.47
1:B:252:LEU:HD13	1:B:276:ALA:HA	1.96	0.47
1:B:248:ASN:HB2	1:B:283:LYS:HE2	1.98	0.46
1:B:252:LEU:O	1:B:256:GLU:HG2	2.16	0.46
1:A:111:TYR:HB2	1:A:113:PHE:CE2	2.52	0.45
1:D:194:LEU:N	1:D:195:PRO:HD2	2.31	0.45
1:D:245:ILE:CG2	1:D:250:LEU:HD12	2.46	0.45
1:A:115:PHE:CE1	1:A:150:GLN:HB3	2.52	0.45
1:A:173:LEU:CD1	1:A:185:ILE:HD13	2.46	0.45
1:D:106:VAL:HA	1:D:136:TYR:HB3	1.98	0.45
1:A:14:SER:HA	1:A:265:ALA:O	2.17	0.45
1:D:94:TYR:CE2	1:D:98:LEU:HD11	2.53	0.44
1:D:138:ILE:N	1:D:139:PRO:HD3	2.33	0.44
1:B:224:LYS:HA	1:B:224:LYS:HD2	1.87	0.43
1:B:61:GLU:OE1	1:B:64:ARG:NH2	2.44	0.43
1:C:21:ILE:HD11	1:C:58:GLU:HB3	2.01	0.43
1:A:197:ALA:HB3	1:A:223:THR:HG21	1.99	0.43
1:A:269:ARG:NH2	1:D:86:LYS:HD2	2.34	0.43
1:B:259:LYS:HA	1:B:263:VAL:O	2.18	0.43
1:A:1:MET:HE3	1:A:2:ARG:N	2.34	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:175:ARG:NH2	1:D:178:LYS:HG2	2.33	0.42
1:B:120:HIS:HE1	1:C:270:GLU:OE1	2.01	0.42
1:A:86:LYS:HD2	1:D:269:ARG:NH2	2.34	0.42
1:A:245:ILE:CG2	1:A:250:LEU:HD12	2.50	0.42
1:D:135:VAL:CG2	1:D:163:VAL:HB	2.50	0.42
1:A:118:ILE:O	1:A:121:TYR:HB3	2.20	0.42
1:D:30:ILE:HD13	1:D:66:ALA:HA	2.01	0.42
1:D:37:MET:HA	1:D:37:MET:HE2	2.01	0.41
1:C:115:PHE:N	1:C:116:PRO:CD	2.84	0.41
1:A:1:MET:HE3	1:A:2:ARG:H	1.86	0.41
1:B:108:PRO:HD3	1:B:121:TYR:CE1	2.55	0.41
1:B:135:VAL:HG22	1:B:162:GLY:O	2.20	0.41
1:A:138:ILE:HD12	1:A:166:THR:HG21	2.03	0.41
1:A:148:ILE:HD11	1:A:176:LEU:N	2.36	0.41
1:A:178:LYS:HB2	1:C:236:HIS:ND1	2.36	0.41
1:A:279:GLU:H	1:A:279:GLU:CD	2.29	0.41
1:D:78:ALA:HB2	1:D:100:TYR:CD2	2.55	0.41
1:B:148:ILE:HD13	1:B:148:ILE:HA	1.92	0.41
1:C:164:LYS:HE3	1:C:205:ILE:CG2	2.51	0.40
1:C:13:VAL:HA	1:C:26:LEU:HD13	2.02	0.40
1:D:148:ILE:HD12	1:D:148:ILE:HG23	1.77	0.40
1:B:60:LYS:HB3	1:B:94:TYR:CE2	2.56	0.40
1:A:117:GLU:HB3	1:D:271:PRO:O	2.21	0.40
1:C:115:PHE:CG	1:C:150:GLN:NE2	2.90	0.40
1:B:115:PHE:N	1:B:116:PRO:CD	2.85	0.40
1:C:148:ILE:HD13	1:C:148:ILE:HA	1.94	0.40
1:D:164:LYS:HG3	1:D:205:ILE:HD12	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	291/293 (99%)	283 (97%)	7 (2%)	1 (0%)	36	40
1	B	291/293 (99%)	283 (97%)	8 (3%)	0	100	100
1	C	291/293 (99%)	284 (98%)	7 (2%)	0	100	100
1	D	292/293 (100%)	287 (98%)	3 (1%)	2 (1%)	18	17
All	All	1165/1172 (99%)	1137 (98%)	25 (2%)	3 (0%)	36	40

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	110	TYR
1	D	110	TYR
1	D	271	PRO

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	242/242 (100%)	235 (97%)	7 (3%)	37	47
1	B	242/242 (100%)	233 (96%)	9 (4%)	30	37
1	C	242/242 (100%)	232 (96%)	10 (4%)	27	33
1	D	243/242 (100%)	239 (98%)	4 (2%)	55	66
All	All	969/968 (100%)	939 (97%)	30 (3%)	35	44

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	149	GLU
1	A	166	THR
1	A	194	LEU
1	A	228	LEU
1	A	230	GLU
1	A	279	GLU
1	B	12	LEU

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Mol	Chain	Res	Type
1	B	24	LYS
1	B	159	LYS
1	B	177	LYS
1	B	194	LEU
1	B	224	LYS
1	B	229	LYS
1	B	275	LYS
1	B	283	LYS
1	C	2	ARG
1	C	38	LYS
1	C	93	LYS
1	C	166	THR
1	C	177	LYS
1	C	194	LEU
1	C	229	LYS
1	C	230	GLU
1	C	273	THR
1	C	288	LYS
1	D	1	MET
1	D	166	THR
1	D	190	ASP
1	D	279	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	51	ASN
1	A	73	GLN
1	A	248	ASN
1	B	51	ASN
1	B	120	HIS
1	B	248	ASN
1	C	51	ASN
1	C	150	GLN
1	C	248	ASN
1	D	120	HIS
1	D	145	ASN
1	D	248	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 oligosaccharides 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 [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	293/293 (100%)	-0.41	2 (0%) 84 85	13, 23, 36, 59	0
1	B	293/293 (100%)	-0.56	2 (0%) 84 85	11, 19, 34, 59	0
1	C	293/293 (100%)	-0.58	2 (0%) 84 85	12, 20, 34, 62	0
1	D	293/293 (100%)	-0.58	1 (0%) 90 90	12, 20, 32, 48	1 (0%)
All	All	1172/1172 (100%)	-0.53	7 (0%) 85 86	11, 20, 35, 62	1 (0%)

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	4.2
1	C	1	MET	4.0
1	A	285	LYS	3.1
1	B	1	MET	2.8
1	D	140	PHE	2.5
1	B	140	PHE	2.4
1	C	140	PHE	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 oligosaccharides 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.