



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 04:45 PM GMT

PDB ID : 4FZH
Title : Structure of the Ulster Strain Newcastle Disease Virus Hemagglutinin-Neuraminidase Reveals Auto-Inhibitory Interactions Associated with Low Virulence
Authors : Yuan, P.; Paterson, R.G.; Leser, G.P.; Lamb, R.A.; Jardetzky, T.S.
Deposited on : 2012-07-06
Resolution : 3.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
<http://wwpdb.org/validation/2016/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 : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

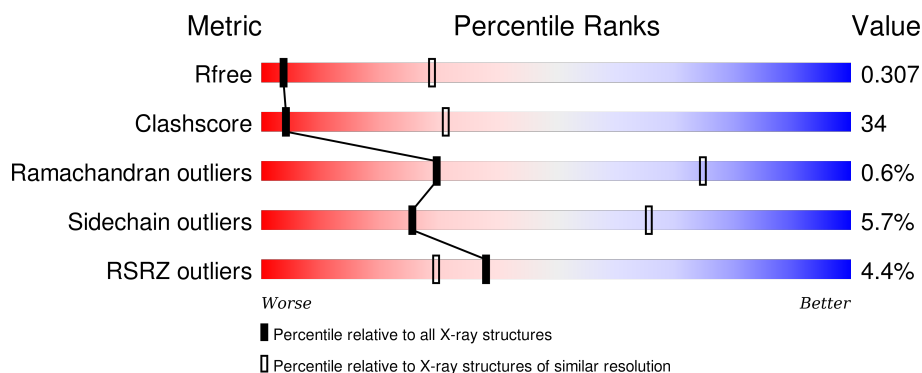
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.50 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}	91344	1051 (3.60-3.40)
Clashscore	102246	1157 (3.60-3.40)
Ramachandran outliers	100387	1120 (3.60-3.40)
Sidechain outliers	100360	1121 (3.60-3.40)
RSRZ outliers	91569	1058 (3.60-3.40)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	536	<div> <div>44%</div> <div>42%</div> <div>5%</div> <div>9%</div> </div>
1	B	536	<div> <div>45%</div> <div>42%</div> <div>•</div> <div>9%</div> </div>
1	C	536	<div> <div>4%</div> <div>40%</div> <div>47%</div> <div>•</div> <div>9%</div> </div>
1	D	536	<div> <div>11%</div> <div>42%</div> <div>46%</div> <div>•</div> <div>9%</div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 15242 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 Hemagglutinin-neuraminidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	486	Total	C	N	O	S	0	0	0
			3758	2368	638	732	20			
1	B	486	Total	C	N	O	S	0	0	0
			3758	2368	638	732	20			
1	C	486	Total	C	N	O	S	0	0	0
			3758	2368	638	732	20			
1	D	486	Total	C	N	O	S	0	0	0
			3758	2368	638	732	20			

There are 172 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	81	MET	-	EXPRESSION TAG	UNP P12558
A	82	GLY	-	EXPRESSION TAG	UNP P12558
A	83	ILE	-	EXPRESSION TAG	UNP P12558
A	84	LEU	-	EXPRESSION TAG	UNP P12558
A	85	PRO	-	EXPRESSION TAG	UNP P12558
A	86	SER	-	EXPRESSION TAG	UNP P12558
A	87	PRO	-	EXPRESSION TAG	UNP P12558
A	88	GLY	-	EXPRESSION TAG	UNP P12558
A	89	MET	-	EXPRESSION TAG	UNP P12558
A	90	PRO	-	EXPRESSION TAG	UNP P12558
A	91	ALA	-	EXPRESSION TAG	UNP P12558
A	92	LEU	-	EXPRESSION TAG	UNP P12558
A	93	LEU	-	EXPRESSION TAG	UNP P12558
A	94	SER	-	EXPRESSION TAG	UNP P12558
A	95	LEU	-	EXPRESSION TAG	UNP P12558
A	96	VAL	-	EXPRESSION TAG	UNP P12558
A	97	SER	-	EXPRESSION TAG	UNP P12558
A	98	LEU	-	EXPRESSION TAG	UNP P12558
A	99	LEU	-	EXPRESSION TAG	UNP P12558
A	100	SER	-	EXPRESSION TAG	UNP P12558
A	101	VAL	-	EXPRESSION TAG	UNP P12558

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Chain	Residue	Modelled	Actual	Comment	Reference
A	102	LEU	-	EXPRESSION TAG	UNP P12558
A	103	LEU	-	EXPRESSION TAG	UNP P12558
A	104	MET	-	EXPRESSION TAG	UNP P12558
A	105	GLY	-	EXPRESSION TAG	UNP P12558
A	106	CYS	-	EXPRESSION TAG	UNP P12558
A	107	VAL	-	EXPRESSION TAG	UNP P12558
A	108	ALA	-	EXPRESSION TAG	UNP P12558
A	109	GLU	-	EXPRESSION TAG	UNP P12558
A	110	THR	-	EXPRESSION TAG	UNP P12558
A	111	GLY	-	EXPRESSION TAG	UNP P12558
A	112	HIS	-	EXPRESSION TAG	UNP P12558
A	113	HIS	-	EXPRESSION TAG	UNP P12558
A	114	HIS	-	EXPRESSION TAG	UNP P12558
A	115	HIS	-	EXPRESSION TAG	UNP P12558
A	116	HIS	-	EXPRESSION TAG	UNP P12558
A	117	HIS	-	EXPRESSION TAG	UNP P12558
A	118	LEU	-	EXPRESSION TAG	UNP P12558
A	119	VAL	-	EXPRESSION TAG	UNP P12558
A	120	PRO	-	EXPRESSION TAG	UNP P12558
A	121	ARG	-	EXPRESSION TAG	UNP P12558
A	122	GLY	-	EXPRESSION TAG	UNP P12558
A	123	SER	-	EXPRESSION TAG	UNP P12558
B	81	MET	-	EXPRESSION TAG	UNP P12558
B	82	GLY	-	EXPRESSION TAG	UNP P12558
B	83	ILE	-	EXPRESSION TAG	UNP P12558
B	84	LEU	-	EXPRESSION TAG	UNP P12558
B	85	PRO	-	EXPRESSION TAG	UNP P12558
B	86	SER	-	EXPRESSION TAG	UNP P12558
B	87	PRO	-	EXPRESSION TAG	UNP P12558
B	88	GLY	-	EXPRESSION TAG	UNP P12558
B	89	MET	-	EXPRESSION TAG	UNP P12558
B	90	PRO	-	EXPRESSION TAG	UNP P12558
B	91	ALA	-	EXPRESSION TAG	UNP P12558
B	92	LEU	-	EXPRESSION TAG	UNP P12558
B	93	LEU	-	EXPRESSION TAG	UNP P12558
B	94	SER	-	EXPRESSION TAG	UNP P12558
B	95	LEU	-	EXPRESSION TAG	UNP P12558
B	96	VAL	-	EXPRESSION TAG	UNP P12558
B	97	SER	-	EXPRESSION TAG	UNP P12558
B	98	LEU	-	EXPRESSION TAG	UNP P12558
B	99	LEU	-	EXPRESSION TAG	UNP P12558
B	100	SER	-	EXPRESSION TAG	UNP P12558

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Chain	Residue	Modelled	Actual	Comment	Reference
B	101	VAL	-	EXPRESSION TAG	UNP P12558
B	102	LEU	-	EXPRESSION TAG	UNP P12558
B	103	LEU	-	EXPRESSION TAG	UNP P12558
B	104	MET	-	EXPRESSION TAG	UNP P12558
B	105	GLY	-	EXPRESSION TAG	UNP P12558
B	106	CYS	-	EXPRESSION TAG	UNP P12558
B	107	VAL	-	EXPRESSION TAG	UNP P12558
B	108	ALA	-	EXPRESSION TAG	UNP P12558
B	109	GLU	-	EXPRESSION TAG	UNP P12558
B	110	THR	-	EXPRESSION TAG	UNP P12558
B	111	GLY	-	EXPRESSION TAG	UNP P12558
B	112	HIS	-	EXPRESSION TAG	UNP P12558
B	113	HIS	-	EXPRESSION TAG	UNP P12558
B	114	HIS	-	EXPRESSION TAG	UNP P12558
B	115	HIS	-	EXPRESSION TAG	UNP P12558
B	116	HIS	-	EXPRESSION TAG	UNP P12558
B	117	HIS	-	EXPRESSION TAG	UNP P12558
B	118	LEU	-	EXPRESSION TAG	UNP P12558
B	119	VAL	-	EXPRESSION TAG	UNP P12558
B	120	PRO	-	EXPRESSION TAG	UNP P12558
B	121	ARG	-	EXPRESSION TAG	UNP P12558
B	122	GLY	-	EXPRESSION TAG	UNP P12558
B	123	SER	-	EXPRESSION TAG	UNP P12558
C	81	MET	-	EXPRESSION TAG	UNP P12558
C	82	GLY	-	EXPRESSION TAG	UNP P12558
C	83	ILE	-	EXPRESSION TAG	UNP P12558
C	84	LEU	-	EXPRESSION TAG	UNP P12558
C	85	PRO	-	EXPRESSION TAG	UNP P12558
C	86	SER	-	EXPRESSION TAG	UNP P12558
C	87	PRO	-	EXPRESSION TAG	UNP P12558
C	88	GLY	-	EXPRESSION TAG	UNP P12558
C	89	MET	-	EXPRESSION TAG	UNP P12558
C	90	PRO	-	EXPRESSION TAG	UNP P12558
C	91	ALA	-	EXPRESSION TAG	UNP P12558
C	92	LEU	-	EXPRESSION TAG	UNP P12558
C	93	LEU	-	EXPRESSION TAG	UNP P12558
C	94	SER	-	EXPRESSION TAG	UNP P12558
C	95	LEU	-	EXPRESSION TAG	UNP P12558
C	96	VAL	-	EXPRESSION TAG	UNP P12558
C	97	SER	-	EXPRESSION TAG	UNP P12558
C	98	LEU	-	EXPRESSION TAG	UNP P12558
C	99	LEU	-	EXPRESSION TAG	UNP P12558

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Chain	Residue	Modelled	Actual	Comment	Reference
C	100	SER	-	EXPRESSION TAG	UNP P12558
C	101	VAL	-	EXPRESSION TAG	UNP P12558
C	102	LEU	-	EXPRESSION TAG	UNP P12558
C	103	LEU	-	EXPRESSION TAG	UNP P12558
C	104	MET	-	EXPRESSION TAG	UNP P12558
C	105	GLY	-	EXPRESSION TAG	UNP P12558
C	106	CYS	-	EXPRESSION TAG	UNP P12558
C	107	VAL	-	EXPRESSION TAG	UNP P12558
C	108	ALA	-	EXPRESSION TAG	UNP P12558
C	109	GLU	-	EXPRESSION TAG	UNP P12558
C	110	THR	-	EXPRESSION TAG	UNP P12558
C	111	GLY	-	EXPRESSION TAG	UNP P12558
C	112	HIS	-	EXPRESSION TAG	UNP P12558
C	113	HIS	-	EXPRESSION TAG	UNP P12558
C	114	HIS	-	EXPRESSION TAG	UNP P12558
C	115	HIS	-	EXPRESSION TAG	UNP P12558
C	116	HIS	-	EXPRESSION TAG	UNP P12558
C	117	HIS	-	EXPRESSION TAG	UNP P12558
C	118	LEU	-	EXPRESSION TAG	UNP P12558
C	119	VAL	-	EXPRESSION TAG	UNP P12558
C	120	PRO	-	EXPRESSION TAG	UNP P12558
C	121	ARG	-	EXPRESSION TAG	UNP P12558
C	122	GLY	-	EXPRESSION TAG	UNP P12558
C	123	SER	-	EXPRESSION TAG	UNP P12558
D	81	MET	-	EXPRESSION TAG	UNP P12558
D	82	GLY	-	EXPRESSION TAG	UNP P12558
D	83	ILE	-	EXPRESSION TAG	UNP P12558
D	84	LEU	-	EXPRESSION TAG	UNP P12558
D	85	PRO	-	EXPRESSION TAG	UNP P12558
D	86	SER	-	EXPRESSION TAG	UNP P12558
D	87	PRO	-	EXPRESSION TAG	UNP P12558
D	88	GLY	-	EXPRESSION TAG	UNP P12558
D	89	MET	-	EXPRESSION TAG	UNP P12558
D	90	PRO	-	EXPRESSION TAG	UNP P12558
D	91	ALA	-	EXPRESSION TAG	UNP P12558
D	92	LEU	-	EXPRESSION TAG	UNP P12558
D	93	LEU	-	EXPRESSION TAG	UNP P12558
D	94	SER	-	EXPRESSION TAG	UNP P12558
D	95	LEU	-	EXPRESSION TAG	UNP P12558
D	96	VAL	-	EXPRESSION TAG	UNP P12558
D	97	SER	-	EXPRESSION TAG	UNP P12558
D	98	LEU	-	EXPRESSION TAG	UNP P12558

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Chain	Residue	Modelled	Actual	Comment	Reference
D	99	LEU	-	EXPRESSION TAG	UNP P12558
D	100	SER	-	EXPRESSION TAG	UNP P12558
D	101	VAL	-	EXPRESSION TAG	UNP P12558
D	102	LEU	-	EXPRESSION TAG	UNP P12558
D	103	LEU	-	EXPRESSION TAG	UNP P12558
D	104	MET	-	EXPRESSION TAG	UNP P12558
D	105	GLY	-	EXPRESSION TAG	UNP P12558
D	106	CYS	-	EXPRESSION TAG	UNP P12558
D	107	VAL	-	EXPRESSION TAG	UNP P12558
D	108	ALA	-	EXPRESSION TAG	UNP P12558
D	109	GLU	-	EXPRESSION TAG	UNP P12558
D	110	THR	-	EXPRESSION TAG	UNP P12558
D	111	GLY	-	EXPRESSION TAG	UNP P12558
D	112	HIS	-	EXPRESSION TAG	UNP P12558
D	113	HIS	-	EXPRESSION TAG	UNP P12558
D	114	HIS	-	EXPRESSION TAG	UNP P12558
D	115	HIS	-	EXPRESSION TAG	UNP P12558
D	116	HIS	-	EXPRESSION TAG	UNP P12558
D	117	HIS	-	EXPRESSION TAG	UNP P12558
D	118	LEU	-	EXPRESSION TAG	UNP P12558
D	119	VAL	-	EXPRESSION TAG	UNP P12558
D	120	PRO	-	EXPRESSION TAG	UNP P12558
D	121	ARG	-	EXPRESSION TAG	UNP P12558
D	122	GLY	-	EXPRESSION TAG	UNP P12558
D	123	SER	-	EXPRESSION TAG	UNP P12558

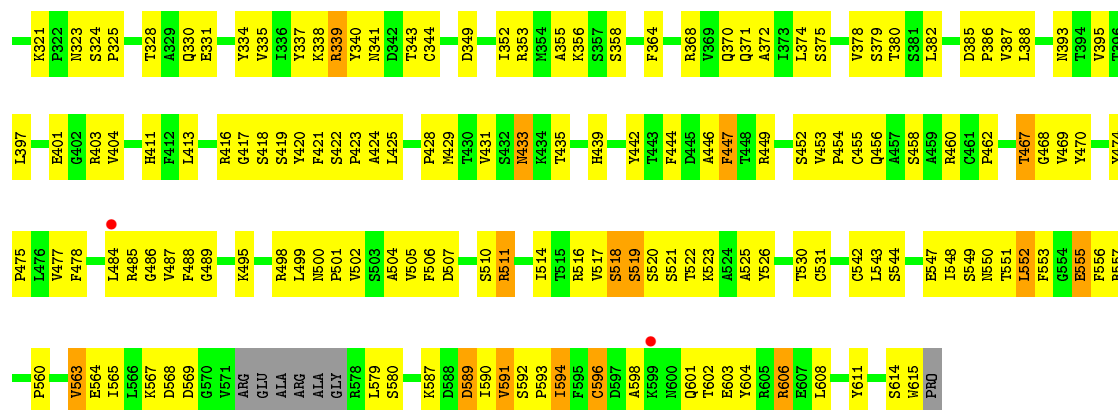
- Molecule 2 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



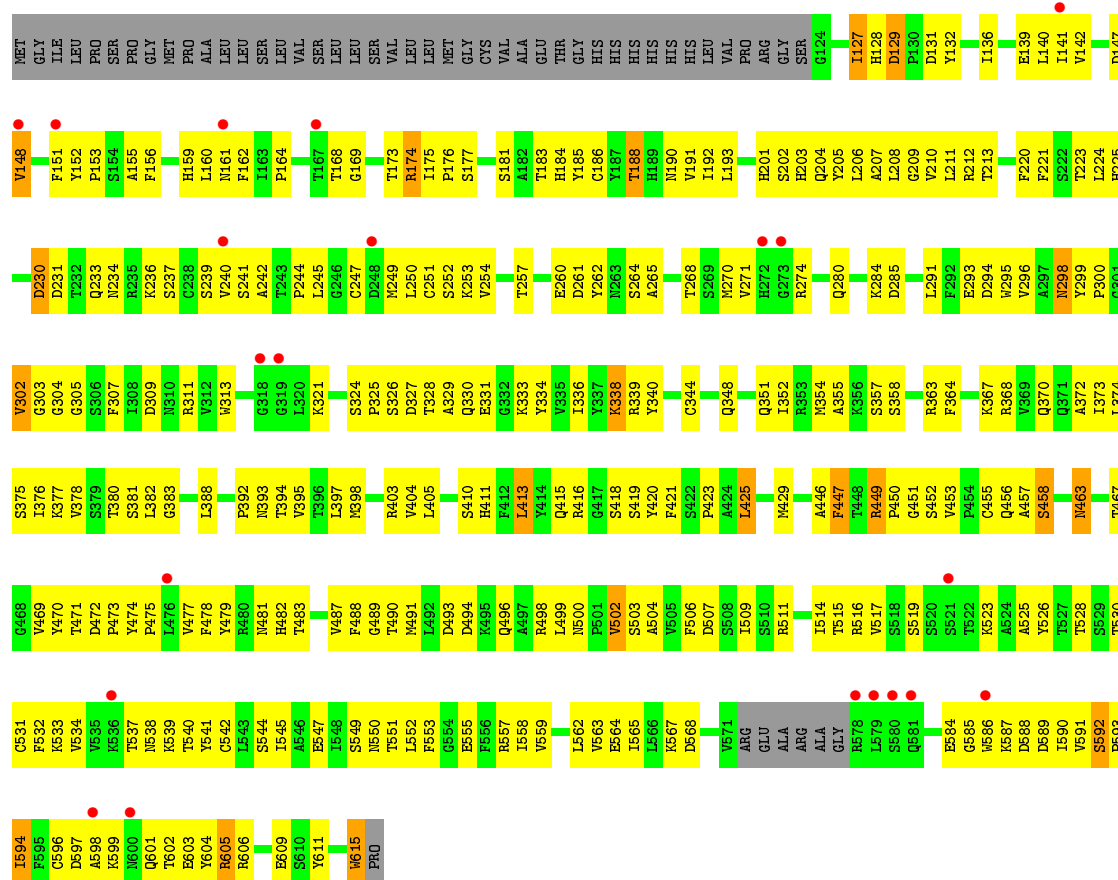
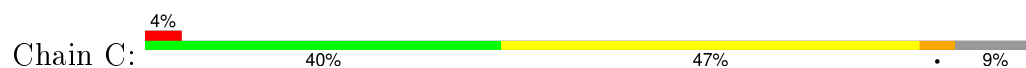
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is a polymer of unknown type called SUGAR (2-MER).

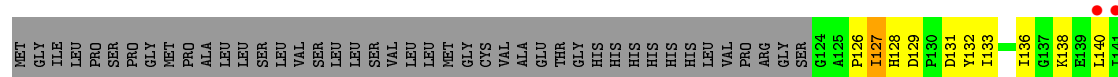
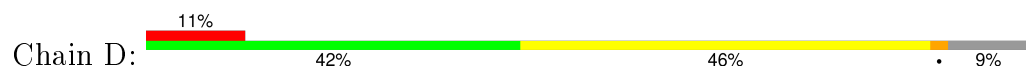
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	2	Total	C	N	O	0	0
			28	16	2	10		
3	B	2	Total	C	N	O	0	0
			28	16	2	10		
3	C	2	Total	C	N	O	0	0
			28	16	2	10		
3	D	2	Total	C	N	O	0	0
			28	16	2	10		

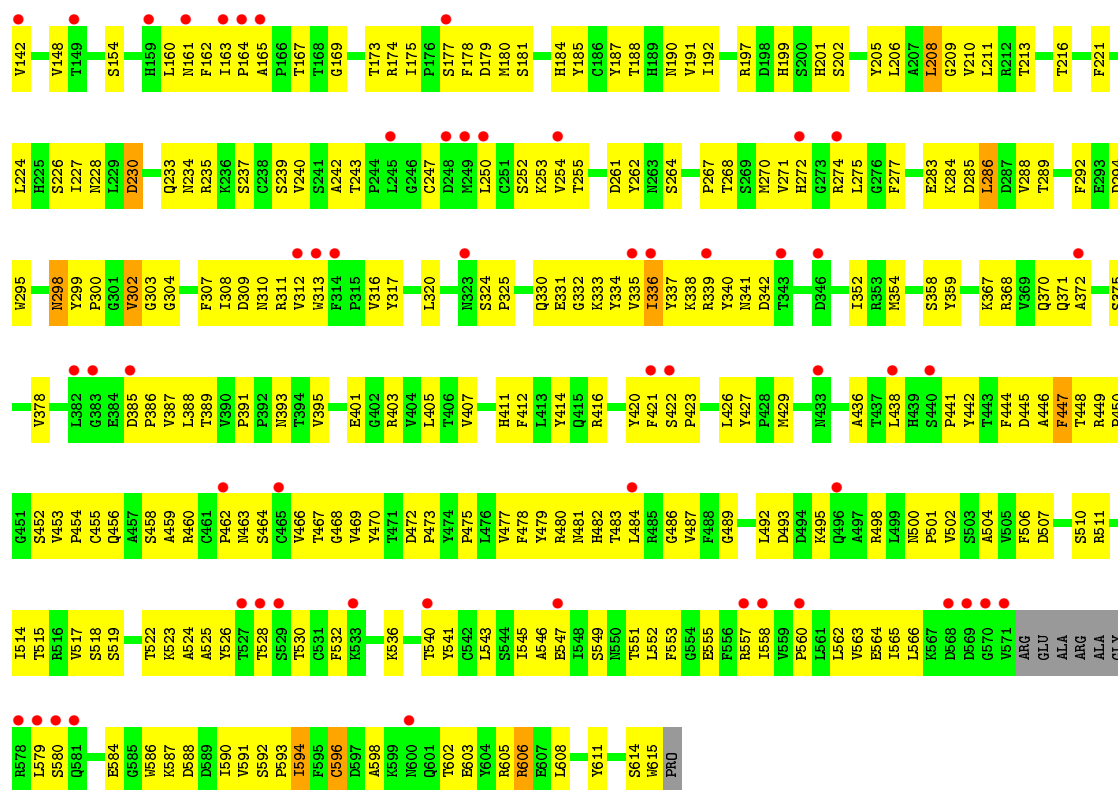


• Molecule 1: Hemagglutinin-neuraminidase



• Molecule 1: Hemagglutinin-neuraminidase





4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	124.61Å 124.61Å 284.91Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.91 – 3.50 47.49 – 3.50	Depositor EDS
% Data completeness (in resolution range)	99.1 (46.91-3.50) 98.5 (47.49-3.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.78 (at 3.48Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, R_{free}	0.236 , 0.304 0.240 , 0.307	Depositor DCC
R_{free} test set	1663 reflections (5.37%)	DCC
Wilson B-factor (Å ²)	117.9	Xtriage
Anisotropy	0.033	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.25 , 89.2	EDS
Estimated twinning fraction	0.031 for -h,-k,l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 32842 reflections	Xtriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	15242	wwPDB-VP
Average B, all atoms (Å ²)	157.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.43% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.39	0/3852	0.58	1/5243 (0.0%)
1	B	0.36	0/3852	0.56	0/5243
1	C	0.32	0/3852	0.52	0/5243
1	D	0.27	0/3852	0.49	0/5243
All	All	0.34	0/15408	0.54	1/20972 (0.0%)

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	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	594	ILE	N-CA-C	5.34	125.42	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	613	ALA	Peptide

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	3758	0	3594	255	1
1	B	3758	0	3594	245	1
1	C	3758	0	3595	288	1
1	D	3758	0	3594	256	0
2	A	28	0	26	0	0
2	B	28	0	26	0	0
2	C	14	0	13	0	0
2	D	28	0	26	0	0
3	A	28	0	25	0	0
3	B	28	0	25	0	0
3	C	28	0	25	0	0
3	D	28	0	25	0	0
All	All	15242	0	14568	1000	2

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 34.

The worst 5 of 1000 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:587:LYS:HD3	1:B:169:GLY:HA3	1.23	1.19
1:B:525:ALA:HB3	1:B:547:GLU:HB2	1.30	1.11
1:C:174:ARG:HH11	1:C:174:ARG:HB3	1.18	1.07
1:A:598:ALA:HA	1:B:596:CYS:HB3	1.33	1.07
1:A:190:ASN:HD21	1:A:202:SER:HB2	1.12	1.07

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:353:ARG:NH2	1:C:609:GLU:OE2[4_455]	2.14	0.06
1:A:353:ARG:NH2	1:A:609:GLU:OE2[4_555]	2.18	0.02

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	482/536 (90%)	437 (91%)	42 (9%)	3 (1%)	30	75
1	B	482/536 (90%)	439 (91%)	40 (8%)	3 (1%)	30	75
1	C	482/536 (90%)	438 (91%)	41 (8%)	3 (1%)	30	75
1	D	482/536 (90%)	441 (92%)	38 (8%)	3 (1%)	30	75
All	All	1928/2144 (90%)	1755 (91%)	161 (8%)	12 (1%)	30	75

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	594	ILE
1	B	594	ILE
1	C	594	ILE
1	D	302	VAL
1	D	594	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	418/464 (90%)	387 (93%)	31 (7%)	17	56
1	B	418/464 (90%)	394 (94%)	24 (6%)	25	66
1	C	418/464 (90%)	394 (94%)	24 (6%)	25	66
1	D	418/464 (90%)	402 (96%)	16 (4%)	40	76
All	All	1672/1856 (90%)	1577 (94%)	95 (6%)	25	66

5 of 95 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	511	ARG
1	B	596	CYS
1	D	336	ILE
1	B	519	SER
1	B	552	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	463	ASN
1	B	500	ASN
1	D	128	HIS
1	B	234	ASN
1	B	393	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 ⓘ

8 carbohydrates are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	NAG	A	703	1,3	14,14,15	0.55	0	15,19,21	0.73	0
3	NAG	A	704	3	14,14,15	0.49	0	15,19,21	0.65	0
3	NAG	B	703	1,3	14,14,15	0.51	0	15,19,21	0.67	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	B	704	3	14,14,15	0.50	0	15,19,21	0.64	0
3	NAG	C	702	1,3	14,14,15	0.51	0	15,19,21	0.75	0
3	NAG	C	703	3	14,14,15	0.50	0	15,19,21	0.61	0
3	NAG	D	703	1,3	14,14,15	0.53	0	15,19,21	0.61	0
3	NAG	D	704	3	14,14,15	0.51	0	15,19,21	0.61	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	703	1,3	-	0/6/23/26	0/1/1/1
3	NAG	A	704	3	-	0/6/23/26	0/1/1/1
3	NAG	B	703	1,3	-	0/6/23/26	0/1/1/1
3	NAG	B	704	3	-	0/6/23/26	0/1/1/1
3	NAG	C	702	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	703	3	-	0/6/23/26	0/1/1/1
3	NAG	D	703	1,3	-	0/6/23/26	0/1/1/1
3	NAG	D	704	3	-	0/6/23/26	0/1/1/1

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.

5.6 Ligand geometry

7 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	A	701	1	14,14,15	0.50	0	15,19,21	0.70	0
2	NAG	A	702	1	14,14,15	0.54	0	15,19,21	0.64	0
2	NAG	B	701	1	14,14,15	0.48	0	15,19,21	0.79	0
2	NAG	B	702	1	14,14,15	0.57	0	15,19,21	0.58	0
2	NAG	C	701	1	14,14,15	0.50	0	15,19,21	0.68	0
2	NAG	D	701	1	14,14,15	0.54	0	15,19,21	0.98	1 (6%)
2	NAG	D	702	1	14,14,15	0.51	0	15,19,21	0.56	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	A	701	1	-	0/6/23/26	0/1/1/1
2	NAG	A	702	1	-	0/6/23/26	0/1/1/1
2	NAG	B	701	1	-	0/6/23/26	0/1/1/1
2	NAG	B	702	1	-	0/6/23/26	0/1/1/1
2	NAG	C	701	1	-	0/6/23/26	0/1/1/1
2	NAG	D	701	1	-	0/6/23/26	0/1/1/1
2	NAG	D	702	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	701	NAG	C1-O5-C5	2.57	115.51	112.25

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	486/536 (90%)	-0.18	5 (1%) 84 76	80, 118, 161, 215	0
1	B	486/536 (90%)	-0.18	3 (0%) 90 85	85, 131, 178, 249	0
1	C	486/536 (90%)	0.03	21 (4%) 39 30	118, 155, 220, 274	0
1	D	486/536 (90%)	0.57	57 (11%) 6 6	144, 208, 259, 360	0
All	All	1944/2144 (90%)	0.06	86 (4%) 38 29	80, 146, 237, 360	0

The worst 5 of 86 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	571	VAL	13.3
1	D	570	GLY	8.4
1	D	336	ILE	5.7
1	D	421	PHE	5.2
1	D	528	THR	5.1

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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
3	NAG	A	704	14/15	0.78	0.59	-	195,205,213,214	0
3	NAG	C	703	14/15	0.72	0.38	-	196,203,205,205	0
3	NAG	D	703	14/15	0.81	0.21	-	149,165,171,183	0
3	NAG	A	703	14/15	0.69	0.24	-	144,163,172,183	0
3	NAG	B	703	14/15	0.86	0.27	-	138,148,153,163	0
3	NAG	D	704	14/15	0.56	0.61	-	197,207,217,218	0
3	NAG	C	702	14/15	0.80	0.33	-	158,168,178,187	0
3	NAG	B	704	14/15	0.69	0.42	-	173,181,190,192	0

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	NAG	C	701	14/15	0.77	0.19	-	140,152,163,164	0
2	NAG	A	702	14/15	0.74	0.45	-	157,170,174,176	0
2	NAG	D	701	14/15	0.31	0.50	-	198,215,218,219	0
2	NAG	B	702	14/15	0.61	0.48	-	168,177,181,182	0
2	NAG	B	701	14/15	0.87	0.17	-	137,143,151,151	0
2	NAG	D	702	14/15	0.47	0.42	-	173,180,182,183	0
2	NAG	A	701	14/15	0.82	0.30	-	148,159,161,163	0

6.5 Other polymers [i](#)

There are no such residues in this entry.