



wwPDB X-ray Structure Validation Summary Report

Feb 28, 2014 – 11:23 AM GMT

PDB ID : 1RV0
Title : 1930 Swine H1 Hemagglutinin complexed with LSTA
Authors : Skehel, J.J.; Gamblin, S.J.; Haire, L.F.; Russell, R.J.; Stevens, D.J.; Xiao, B.;
Ha, Y.; Vasisht, N.; Steinhauer, D.A.; Daniels, R.S.
Deposited on : 2003-12-12
Resolution : 2.50 Å(reported)

This is a wwPDB 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/ValidationPDFNotes.html>

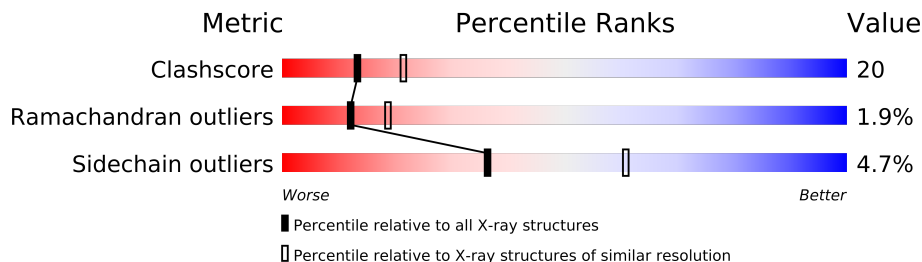
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 21963
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.50 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))
Clashscore	79885	3562 (2.50-2.50)
Ramachandran outliers	78287	3480 (2.50-2.50)
Sidechain outliers	78261	3482 (2.50-2.50)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	H	328	
1	J	328	
1	L	328	
2	I	160	
2	K	160	
2	M	160	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11997 atoms, of which 0 are hydrogen and 0 are deuterium.

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.

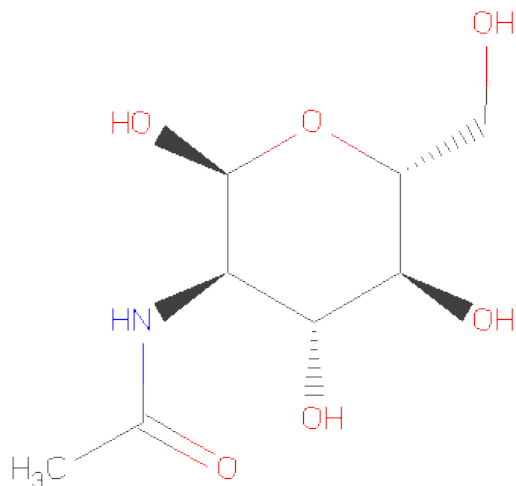
- Molecule 1 is a protein called hemagglutinin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	H	324	Total	C	N	O	S	0	0	0
			2511	1580	436	484	11			
1	J	324	Total	C	N	O	S	0	0	0
			2511	1580	436	484	11			
1	L	324	Total	C	N	O	S	0	0	0
			2511	1580	436	484	11			

- Molecule 2 is a protein called hemagglutinin.

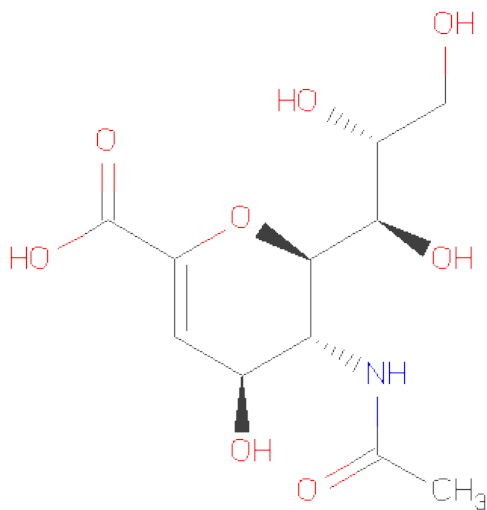
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	I	160	Total	C	N	O	S	0	0	0
			1281	801	223	252	5			
2	K	160	Total	C	N	O	S	0	0	0
			1281	801	223	252	5			
2	M	160	Total	C	N	O	S	0	0	0
			1281	801	223	252	5			

- Molecule 3 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NDG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	J	1	Total	C	N	O	0	0
			15	8	1	6		
3	H	1	Total	C	N	O	0	0
			15	8	1	6		
3	L	1	Total	C	N	O	0	0
			15	8	1	6		

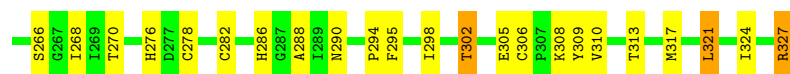
- Molecule 4 is 2-DEOXY-2,3-DEHYDRO-N-ACETYL-NEURAMINICACID (three-letter code: DAN) (formula: C₁₁H₁₇NO₈).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	L	1	Total	C	N	O	0	0
			20	11	1	8		

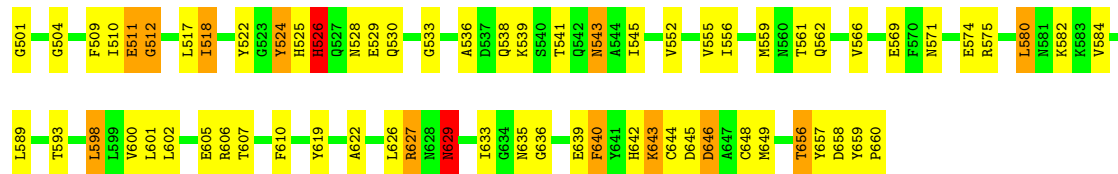
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	H	115	Total	O	0	0
			115	115		
5	I	32	Total	O	0	0
			32	32		
5	J	136	Total	O	0	0
			136	136		
5	K	45	Total	O	0	0
			45	45		
5	L	179	Total	O	0	0
			179	179		
5	M	49	Total	O	0	0
			49	49		



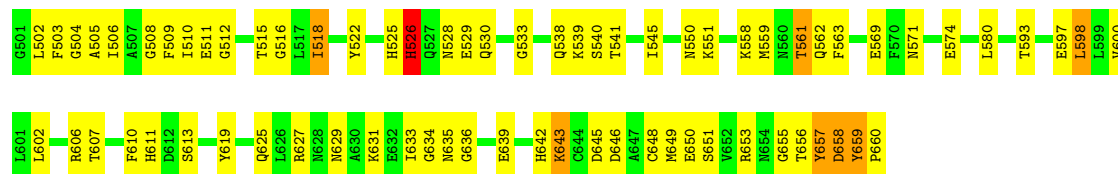
• Molecule 2: hemagglutinin

Chain I:



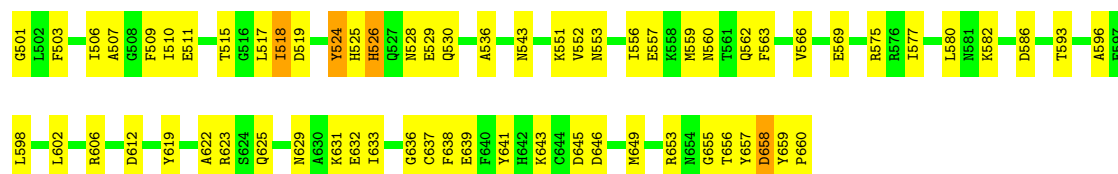
• Molecule 2: hemagglutinin

Chain K:



• Molecule 2: hemagglutinin

Chain M:



4 Data and refinement statistics

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	202.04Å 82.94Å 176.88Å 90.00° 105.86° 90.00°	Depositor
Resolution (Å)	20.00 – 2.50	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.50)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.214 , 0.254	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	11997	wwPDB-VP
Average B, all atoms (Å ²)	51.0	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: DAN, NDG

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	H	0.35	0/2574	0.61	0/3507
1	J	0.35	0/2574	0.63	0/3507
1	L	0.38	0/2574	0.65	0/3507
2	I	0.32	0/1307	0.50	0/1761
2	K	0.33	0/1307	0.54	0/1761
2	M	0.35	0/1307	0.56	0/1761
All	All	0.35	0/11643	0.60	0/15804

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	H	2511	0	2437	102	0
1	J	2511	0	2437	92	0
1	L	2511	0	2437	107	0
2	I	1281	0	1201	67	0
2	K	1281	0	1201	66	0
2	M	1281	0	1201	76	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	15	0	15	12	0
3	J	15	0	15	8	0
3	L	15	0	15	10	0
4	L	20	0	16	1	0
5	H	115	0	0	4	0
5	I	32	0	0	2	0
5	J	136	0	0	0	0
5	K	45	0	0	6	0
5	L	179	0	0	9	0
5	M	49	0	0	10	0
All	All	11997	0	10975	458	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 20.

The worst 5 of 458 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:L:58:LYS:HE2	1:L:58:LYS:H	0.95	1.10
1:J:58:LYS:H	1:J:58:LYS:HD3	1.13	1.05
1:J:91:ASN:HD21	3:J:640:NDG:H3	1.24	1.03
1:H:224:ARG:HH22	3:H:642:NDG:H2	1.21	1.02
1:L:224:ARG:NH2	3:L:644:NDG:H2	1.76	1.01

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	H	322/328 (98%)	298 (92%)	20 (6%)	4 (1%)	19	32
1	J	322/328 (98%)	300 (93%)	20 (6%)	2 (1%)	33	55
1	L	322/328 (98%)	307 (95%)	14 (4%)	1 (0%)	50	73
2	I	158/160 (99%)	129 (82%)	19 (12%)	10 (6%)	2	1

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	K	158/160 (99%)	135 (85%)	16 (10%)	7 (4%)	4	4
2	M	158/160 (99%)	140 (89%)	15 (10%)	3 (2%)	12	19
All	All	1440/1464 (98%)	1309 (91%)	104 (7%)	27 (2%)	12	19

5 of 27 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	J	264	SER
2	K	511	GLU
2	K	657	TYR
2	K	658	ASP
2	K	659	TYR

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	H	279/281 (99%)	267 (96%)	12 (4%)	40	65
1	J	279/281 (99%)	268 (96%)	11 (4%)	43	70
1	L	279/281 (99%)	263 (94%)	16 (6%)	29	50
2	I	134/134 (100%)	124 (92%)	10 (8%)	19	34
2	K	134/134 (100%)	129 (96%)	5 (4%)	45	72
2	M	134/134 (100%)	130 (97%)	4 (3%)	53	80
All	All	1239/1245 (100%)	1181 (95%)	58 (5%)	36	61

5 of 58 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	J	115	PHE
1	J	327	ARG
1	L	327	ARG
1	J	152	LEU
1	J	302	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 38 such

sidechains are listed below:

Mol	Chain	Res	Type
1	J	191	GLN
2	K	530	GLN
2	M	562	GLN
1	J	250	ASN
2	K	625	GLN

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

4 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	$\# Z > 2$
3	NDG	H	642	-	15,15,15	0.33	0	21,21,21	0.74	1 (4%)
3	NDG	J	640	-	15,15,15	0.33	0	21,21,21	0.46	0
3	NDG	L	644	-	15,15,15	0.40	0	21,21,21	0.69	0
4	DAN	L	701	-	20,20,20	4.08	9 (45%)	28,28,28	3.02	3 (10%)

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	NDG	H	642	-	-	0/6/26/26	0/1/1/1
3	NDG	J	640	-	-	0/6/26/26	0/1/1/1
3	NDG	L	644	-	-	0/6/26/26	0/1/1/1
4	DAN	L	701	-	-	0/18/34/34	0/1/1/1

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	L	701	DAN	C3-C2	14.44	1.61	1.33
4	L	701	DAN	C4-C3	5.88	1.58	1.50
4	L	701	DAN	C2-C1	4.68	1.60	1.48
4	L	701	DAN	C6-C5	4.03	1.59	1.53
4	L	701	DAN	C7-C6	3.54	1.57	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	L	701	DAN	O6-C2-C3	-12.03	108.75	124.33
4	L	701	DAN	C4-C3-C2	-7.00	109.96	121.82
4	L	701	DAN	C3-C2-C1	-6.08	112.14	124.12
3	H	642	NDG	C1-C2-N2	-2.06	108.46	110.85

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

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 will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.