wwPDB X-ray Structure Validation Summary Report (i)

Feb 3, 2024 – 11:07 AM EST

PDB ID	:	1LKT
Title	:	CRYSTAL STRUCTURE OF THE HEAD-BINDING DOMAIN OF PHAGE P22 TAILSPIKE PROTEIN
Authors	:	Steinbacher, S.
Deposited on	:	1997-10-17
Resolution	:	2.60 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
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

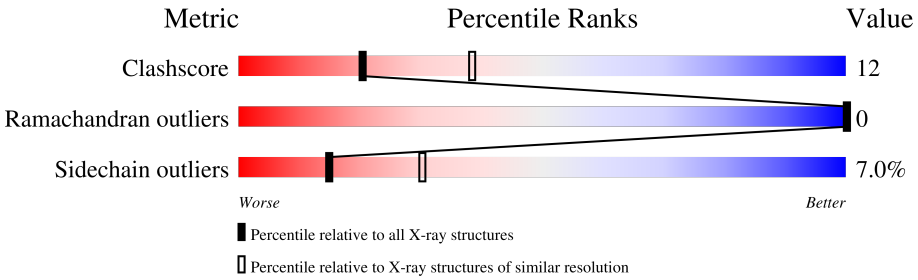
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	104	69% 27% .
1	B	104	74% 23% .
1	C	104	68% 30% .
1	D	104	67% 28% 5%
1	E	104	70% 28% .
1	F	104	66% 32% .

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 7140 atoms, of which 1926 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 TAILSPIKE PROTEIN.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	104	Total	C	H	N	O	S	0	0	0
			974	507	177	136	153	1			
1	B	104	Total	C	H	N	O	S	0	0	0
			974	507	177	136	153	1			
1	C	104	Total	C	H	N	O	S	0	0	0
			974	507	177	136	153	1			
1	D	104	Total	C	H	N	O	S	0	0	0
			974	507	177	136	153	1			
1	E	104	Total	C	H	N	O	S	0	0	0
			974	507	177	136	153	1			
1	F	104	Total	C	H	N	O	S	0	0	0
			974	507	177	136	153	1			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	75	Total	H	O		0	0
			225	150	75			
2	B	82	Total	H	O		0	0
			246	164	82			
2	C	40	Total	H	O		0	0
			120	80	40			
2	D	103	Total	H	O		0	0
			309	206	103			
2	E	99	Total	H	O		0	0
			297	198	99			
2	F	33	Total	H	O		0	0
			99	66	33			

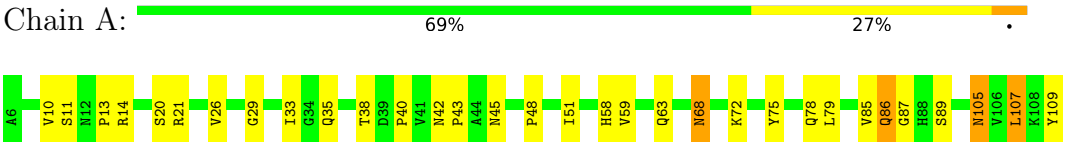
3 Residue-property plots (i)

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. 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.

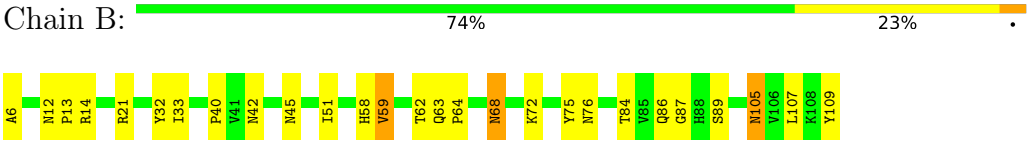
• Molecule 1: TAILSPIKE PROTEIN

Chain A:



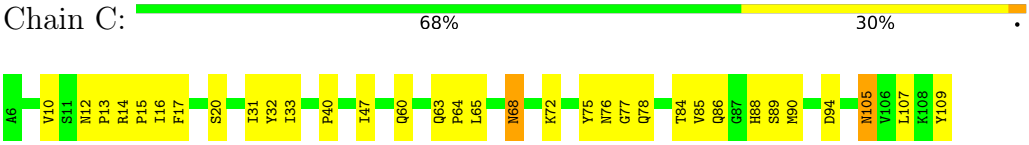
• Molecule 1: TAILSPIKE PROTEIN

Chain B:



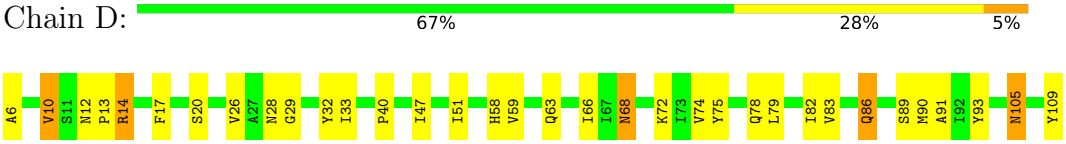
• Molecule 1: TAILSPIKE PROTEIN

Chain C:



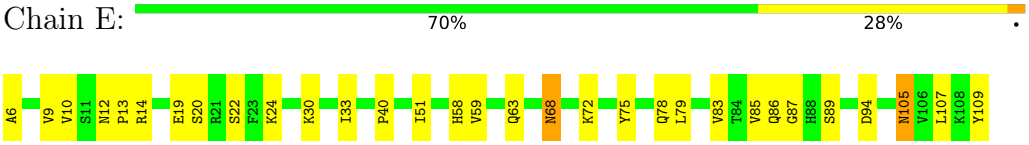
• Molecule 1: TAILSPIKE PROTEIN

Chain D:



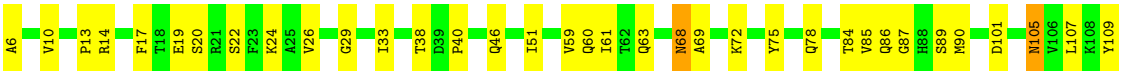
• Molecule 1: TAILSPIKE PROTEIN

Chain E:



• Molecule 1: TAILSPIKE PROTEIN

Chain F:


A6
V10
P13
R14
F17
T18
E19
S20
R21
S22
F23
K24
A25
V26
G29
I33
T38
D39
P40
Q46
I51
V59
Q60
I61
T62
Q63
N68
A69
K72
Y75
Q78
T84
V85
Q86
G87
H88
S89
M90
D101
N105
V106
L107
K108
Y109

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	57.30Å 82.10Å 73.80Å 90.00° 90.90° 90.00°	Depositor
Resolution (Å)	8.00 – 2.60	Depositor
% Data completeness (in resolution range)	96.5 (8.00-2.60)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.199 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7140	wwPDB-VP
Average B, all atoms (Å^2)	16.0	wwPDB-VP

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	0.46	0/812	0.65	0/1109
1	B	0.45	0/812	0.66	0/1109
1	C	0.44	0/812	0.68	0/1109
1	D	0.47	0/812	0.68	0/1109
1	E	0.46	0/812	0.68	0/1109
1	F	0.45	0/812	0.68	0/1109
All	All	0.45	0/4872	0.67	0/6654

There are no bond length outliers.

There are no bond angle outliers.

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	797	177	798	24	3
1	B	797	177	798	19	1
1	C	797	177	798	18	10
1	D	797	177	798	30	2
1	E	797	177	798	24	3
1	F	797	177	798	23	6
2	A	75	150	0	4	5
2	B	82	164	0	1	1
2	C	40	80	0	1	0
2	D	103	206	0	5	3

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	99	198	0	5	2
2	F	33	66	0	1	0
All	All	5214	1926	4788	119	18

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 12.

The worst 5 of 119 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:E:87:GLY:HA3	1:E:107:LEU:HD22	1.74	0.69
1:E:85:VAL:HA	1:F:6:ALA:HA	1.73	0.69
1:A:33:ILE:H	1:A:63:GLN:NE2	1.90	0.69
1:D:90:MET:SD	2:E:114:HOH:O	2.50	0.68
1:B:40:PRO:HG3	1:B:89:SER:OG	1.94	0.67

The worst 5 of 18 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:A:86:GLN:HE21	1:C:60:GLN:OE1[2_747]	1.08	0.52
1:B:21:ARG:HH11	2:E:174:HOH:H2[2_656]	1.13	0.47
1:A:86:GLN:NE2	1:C:60:GLN:OE1[2_747]	1.77	0.43
1:C:85:VAL:H	2:A:125:HOH:O[2_757]	1.17	0.43
1:C:60:GLN:HE21	2:A:145:HOH:H2[2_757]	1.26	0.34

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	102/104 (98%)	101 (99%)	1 (1%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	102/104 (98%)	101 (99%)	1 (1%)	0	100	100
1	C	102/104 (98%)	101 (99%)	1 (1%)	0	100	100
1	D	102/104 (98%)	101 (99%)	1 (1%)	0	100	100
1	E	102/104 (98%)	101 (99%)	1 (1%)	0	100	100
1	F	102/104 (98%)	101 (99%)	1 (1%)	0	100	100
All	All	612/624 (98%)	606 (99%)	6 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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	88/88 (100%)	81 (92%)	7 (8%)	12	24
1	B	88/88 (100%)	81 (92%)	7 (8%)	12	24
1	C	88/88 (100%)	82 (93%)	6 (7%)	16	32
1	D	88/88 (100%)	81 (92%)	7 (8%)	12	24
1	E	88/88 (100%)	83 (94%)	5 (6%)	20	41
1	F	88/88 (100%)	83 (94%)	5 (6%)	20	41
All	All	528/528 (100%)	491 (93%)	37 (7%)	15	30

5 of 37 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	20	SER
1	F	86	GLN
1	E	68	ASN
1	F	10	VAL
1	B	86	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 42 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	12	ASN
1	F	7	ASN
1	E	45	ASN
1	E	63	GLN
1	F	46	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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.