



Full wwPDB X-ray Structure Validation Report

Feb 26, 2014 – 07:45 PM GMT

PDB ID : 3KEA
Title : Structure function studies of vaccinia virus host-range protein K1 reveal a novel ankyrin repeat interaction surface for K1s function
Authors : Li, Y.
Deposited on : 2009-10-25
Resolution : 2.30 Å(reported)

This is a full wwPDB validation 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>

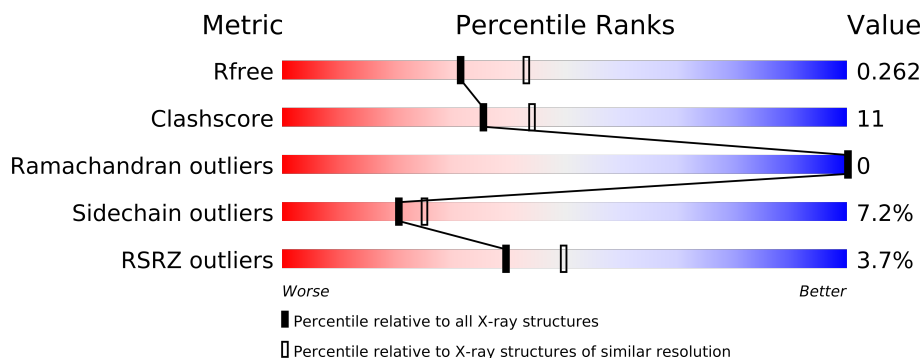
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
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 2.30 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}	66092	2929 (2.30-2.30)
Clashscore	79885	3679 (2.30-2.30)
Ramachandran outliers	78287	3642 (2.30-2.30)
Sidechain outliers	78261	3641 (2.30-2.30)
RSRZ outliers	66119	2930 (2.30-2.30)

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.

Mol	Chain	Length	Quality of chain
1	A	285	
1	B	285	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4762 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 K1L.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	283	Total	C	N	O	S	Se	72	0	0
			2268	1459	366	430	3	10			
1	B	283	Total	C	N	O	S	Se	68	0	0
			2268	1459	366	430	3	10			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	EXPRESSION TAG	UNP Q6IV60
B	0	GLY	-	EXPRESSION TAG	UNP Q6IV60

- Molecule 2 is water.

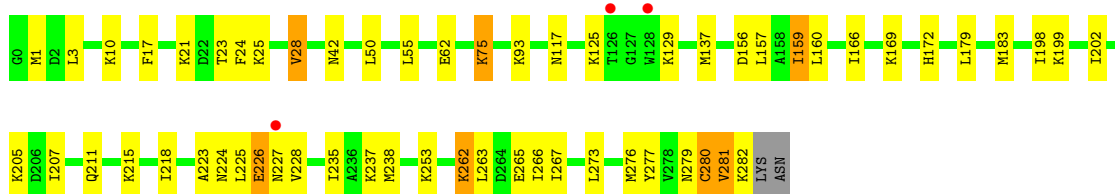
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	132	Total	O	0	0
			132	132		
2	B	94	Total	O	0	0
			94	94		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

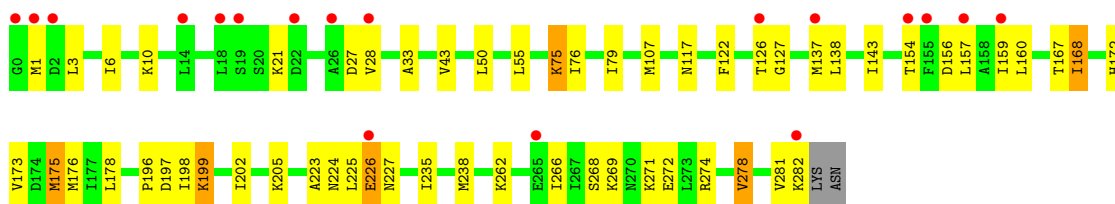
● Molecule 1: K1L

Chain A: 



● Molecule 1: K1L

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2	Depositor
Cell constants a, b, c, α , β , γ	95.11Å 110.26Å 86.26Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.28 – 2.30 39.28 – 2.30	Depositor EDS
% Data completeness (in resolution range)	90.5 (39.28-2.30) 90.5 (39.28-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.82 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.210 , 0.254 0.223 , 0.262	Depositor DCC
R_{free} test set	1884 reflections (5.35%)	DCC
Wilson B-factor (Å ²)	38.7	Xtriage
Anisotropy	0.167	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 28.4	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	6 of 37088 reflections (0.016%)	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4762	wwPDB-VP
Average B, all atoms (Å ²)	32.0	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 45.11 % 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 1.3862e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

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	0.80	2/2298 (0.1%)	0.72	1/3088 (0.0%)
1	B	0.67	0/2298	0.70	0/3088
All	All	0.74	2/4596 (0.0%)	0.71	1/6176 (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
1	B	0	1
All	All	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	25	LYS	CD-CE	5.68	1.65	1.51
1	A	280	CYS	CB-SG	-5.29	1.73	1.81

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	157	LEU	CA-CB-CG	5.32	127.54	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	280	CYS	Peptide
1	B	281	VAL	Peptide

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	A	2268	0	2300	44	0
1	B	2268	0	2300	49	0
2	A	132	0	0	5	0
2	B	94	0	0	5	0
All	All	4762	0	4600	92	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 11.

All (92) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:226:GLU:OE1	1:A:262:LYS:HB2	1.44	1.18
1:B:175:MSE:CE	1:B:178:LEU:HD12	1.77	1.15
1:B:175:MSE:SE	2:B:352:HOH:O	2.21	1.08
1:B:168:ILE:HG12	1:B:176:MSE:HE3	1.34	1.08
1:B:168:ILE:HG12	1:B:176:MSE:CE	1.89	1.01
1:B:226:GLU:OE1	1:B:262:LYS:HB2	1.70	0.90
1:A:1:MSE:CE	1:A:17:PHE:HE1	1.86	0.89
1:B:157:LEU:HD21	1:B:159:ILE:HG12	1.58	0.86
1:B:175:MSE:HE1	1:B:178:LEU:HD12	1.58	0.84
1:A:273:LEU:HA	1:A:276:MSE:HE3	1.61	0.82
1:B:175:MSE:HE3	1:B:178:LEU:HD12	1.63	0.80
1:B:175:MSE:HE3	1:B:175:MSE:HA	1.64	0.78
1:B:157:LEU:CD2	1:B:159:ILE:HG12	2.14	0.77
1:A:172:HIS:HD2	2:B:288:HOH:O	1.67	0.76
1:B:157:LEU:HD21	1:B:159:ILE:CG1	2.17	0.73
1:A:1:MSE:HE2	1:A:3:LEU:HD21	1.69	0.73
1:A:226:GLU:OE1	1:A:262:LYS:CB	2.33	0.72
1:B:167:THR:HG22	1:B:176:MSE:HE2	1.73	0.71
1:B:168:ILE:CG1	1:B:176:MSE:HE3	2.18	0.71
1:A:1:MSE:CE	1:A:17:PHE:CE1	2.73	0.71
1:B:167:THR:CG2	1:B:176:MSE:HE2	2.23	0.68
1:A:159:ILE:O	1:A:159:ILE:CG2	2.42	0.67
1:A:1:MSE:HE3	1:A:17:PHE:HE1	1.60	0.66

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:175:MSE:CE	1:B:175:MSE:HA	2.27	0.64
2:A:288:HOH:O	1:B:172:HIS:HD2	1.82	0.63
1:B:137:MSE:HE3	2:B:365:HOH:O	1.98	0.63
1:B:235:ILE:HA	1:B:238:MSE:HE3	1.81	0.63
1:A:273:LEU:HA	1:A:276:MSE:CE	2.30	0.62
1:B:205:LYS:HG3	1:B:235:ILE:HD11	1.80	0.62
1:B:268:SER:O	1:B:274:ARG:NH1	2.34	0.60
1:A:223:ALA:HB3	1:A:225:LEU:HG	1.83	0.60
1:B:168:ILE:HG12	1:B:176:MSE:HE1	1.76	0.60
1:B:137:MSE:CE	2:B:365:HOH:O	2.50	0.59
1:A:1:MSE:O	1:A:28:VAL:HG22	2.03	0.59
1:B:274:ARG:O	1:B:278:VAL:HG12	2.02	0.58
1:A:1:MSE:HE1	1:A:17:PHE:HE1	1.67	0.58
1:A:172:HIS:HE1	2:A:332:HOH:O	1.88	0.56
1:A:205:LYS:HG3	1:A:235:ILE:HD11	1.87	0.56
1:A:160:LEU:HD21	1:A:183:MSE:HG2	1.87	0.55
1:A:159:ILE:O	1:A:159:ILE:HG23	2.06	0.55
1:A:226:GLU:HG2	1:A:227:ASN:H	1.72	0.55
1:B:224:ASN:HB3	1:B:227:ASN:ND2	2.23	0.54
1:A:62:GLU:HG2	2:A:374:HOH:O	2.06	0.54
1:B:50:LEU:HD22	1:B:55:LEU:HG	1.88	0.54
1:A:207:ILE:HD13	1:B:138:LEU:HB3	1.90	0.54
1:B:75:LYS:O	1:B:79:ILE:HG12	2.08	0.54
1:B:175:MSE:CE	1:B:178:LEU:CD1	2.69	0.53
1:B:197:ASP:HA	1:B:199:LYS:HE2	1.90	0.53
1:B:175:MSE:HE1	1:B:178:LEU:CD1	2.32	0.53
1:A:226:GLU:HG2	1:A:227:ASN:N	2.23	0.52
1:A:23:THR:HG23	1:A:24:PHE:CD2	2.44	0.52
1:A:238:MSE:HE3	2:A:378:HOH:O	2.09	0.52
1:B:223:ALA:HB3	1:B:225:LEU:HG	1.91	0.52
1:A:50:LEU:HD22	1:A:55:LEU:HG	1.92	0.52
1:B:156:ASP:OD1	1:B:156:ASP:O	2.29	0.51
1:B:122:PHE:CE2	1:B:159:ILE:HD11	2.46	0.50
1:A:156:ASP:O	1:A:156:ASP:OD1	2.29	0.50
1:A:281:VAL:CG1	1:A:281:VAL:O	2.58	0.49
1:A:277:TYR:CD2	1:A:277:TYR:C	2.86	0.48
1:B:224:ASN:HA	1:B:226:GLU:OE2	2.14	0.48
1:A:159:ILE:HA	2:A:331:HOH:O	2.14	0.48
1:B:1:MSE:O	1:B:28:VAL:HG22	2.14	0.48
1:A:1:MSE:HE1	1:A:17:PHE:CE1	2.47	0.47
1:A:93:LYS:O	1:A:129:LYS:HE2	2.16	0.46
1:A:267:ILE:HG21	1:A:277:TYR:CD1	2.51	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:156:ASP:N	1:A:156:ASP:OD1	2.44	0.45
1:A:1:MSE:HE3	1:A:17:PHE:CE1	2.48	0.45
1:A:179:LEU:O	1:A:183:MSE:HG3	2.17	0.45
1:B:196:PRO:O	1:B:199:LYS:HD3	2.17	0.45
1:B:235:ILE:HA	1:B:238:MSE:CE	2.46	0.44
1:B:117:ASN:HA	2:B:300:HOH:O	2.17	0.44
1:B:197:ASP:HA	1:B:199:LYS:HD3	1.99	0.44
1:B:43:VAL:HG22	1:B:76:ILE:HD11	2.00	0.44
1:B:198:ILE:O	1:B:202:ILE:HG12	2.17	0.44
1:B:235:ILE:HG12	1:B:238:MSE:CE	2.48	0.44
1:B:126:THR:HG22	1:B:127:GLY:N	2.32	0.44
1:B:157:LEU:HD22	1:B:160:LEU:N	2.33	0.43
1:A:237:LYS:HG3	1:A:237:LYS:O	2.18	0.43
1:A:224:ASN:O	1:A:227:ASN:HB2	2.19	0.43
1:B:157:LEU:HD21	1:B:159:ILE:HG13	1.99	0.43
1:B:122:PHE:CD2	1:B:159:ILE:HD11	2.54	0.42
1:A:263:LEU:O	1:A:267:ILE:HG12	2.20	0.42
1:B:107:MSE:HE1	1:B:143:ILE:HA	2.02	0.42
1:A:226:GLU:HB2	1:A:266:ILE:HG13	2.02	0.42
1:A:202:ILE:HD12	1:A:235:ILE:HG21	2.02	0.41
1:B:3:LEU:HG	1:B:27:ASP:HB3	2.02	0.41
1:A:159:ILE:O	1:A:159:ILE:HG22	2.19	0.41
1:A:281:VAL:O	1:A:281:VAL:HG13	2.20	0.41
1:A:75:LYS:HB2	1:A:75:LYS:NZ	2.36	0.41
1:A:211:GLN:O	1:A:215:LYS:HG3	2.21	0.40
1:A:277:TYR:CE2	1:A:281:VAL:HG21	2.56	0.40
1:B:6:ILE:HD13	1:B:33:ALA:HB1	2.02	0.40

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	A	281/285 (99%)	268 (95%)	13 (5%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	281/285 (99%)	271 (96%)	10 (4%)	0	100	100
All	All	562/570 (99%)	539 (96%)	23 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	257/249 (103%)	235 (91%)	22 (9%)	15	17
1	B	257/249 (103%)	242 (94%)	15 (6%)	28	36
All	All	514/498 (103%)	477 (93%)	37 (7%)	21	25

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	LYS
1	A	21	LYS
1	A	28	VAL
1	A	42	ASN
1	A	75	LYS
1	A	117	ASN
1	A	125	LYS
1	A	137	MSE
1	A	159	ILE
1	A	166	ILE
1	A	169	LYS
1	A	198	ILE
1	A	199	LYS
1	A	218	ILE
1	A	226	GLU
1	A	228	VAL
1	A	253	LYS
1	A	262	LYS
1	A	265	GLU
1	A	279	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	281	VAL
1	A	282	LYS
1	B	10	LYS
1	B	21	LYS
1	B	75	LYS
1	B	154	THR
1	B	168	ILE
1	B	173	VAL
1	B	175	MSE
1	B	199	LYS
1	B	226	GLU
1	B	266	ILE
1	B	269	LYS
1	B	271	LYS
1	B	272	GLU
1	B	278	VAL
1	B	282	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	ASN
1	A	117	ASN
1	A	170	ASN
1	A	172	HIS
1	A	189	ASN
1	A	270	ASN
1	B	13	GLN
1	B	89	GLN
1	B	106	ASN
1	B	165	HIS
1	B	170	ASN
1	B	172	HIS
1	B	227	ASN

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 ⓘ

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 ⓘ

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	283/285 (99%)	0.21	3 (1%) 77 85	14, 30, 51, 61	29 (10%)
1	B	283/285 (99%)	0.36	18 (6%) 19 27	15, 31, 49, 59	27 (9%)
All	All	566/570 (99%)	0.29	21 (3%) 39 50	14, 31, 51, 61	56 (9%)

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1	MSE	4.3
1	B	28	VAL	3.7
1	B	154	THR	3.7
1	B	159	ILE	3.3
1	B	155	PHE	3.1
1	A	126	THR	3.0
1	B	157	LEU	2.7
1	B	265	GLU	2.7
1	B	19	SER	2.6
1	A	128	TRP	2.5
1	B	26	ALA	2.5
1	B	126	THR	2.4
1	B	282	LYS	2.3
1	B	18	LEU	2.3
1	B	22	ASP	2.3
1	B	226	GLU	2.2
1	B	14	LEU	2.2
1	B	0	GLY	2.1
1	B	137	MSE	2.1
1	B	2	ASP	2.1
1	A	227	ASN	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.