Full wwPDB X-ray Structure Validation Report ⓘ

Dec 8, 2023 – 12:55 am GMT

PDB ID	:	1QKB
Title	:	OLIGO-PEPTIDE BINDING PROTEIN (OPPA) COMPLEXED WITH KVK
Authors	:	Tame, J.R.H.; Sleigh, S.H.; Wilkinson, A.J.
Deposited on	:	1999-07-14
Resolution	:	1.80 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 ⓘ 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:

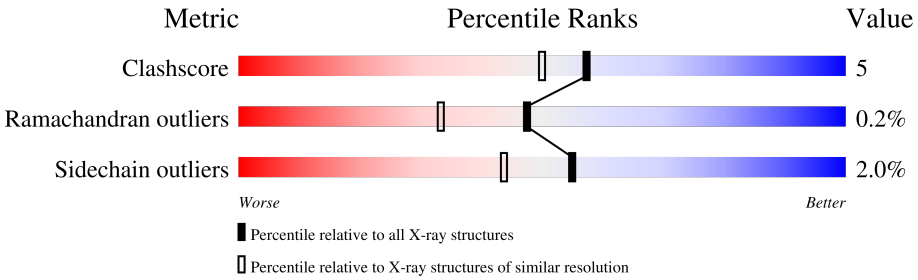
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation 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 1.80 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	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)

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	517	88% 11%
2	B	3	100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	ACT	A	610	-	-	X	-
4	ACT	A	611	-	-	X	-
4	ACT	A	612	-	-	X	-
4	ACT	A	613	-	-	X	-

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	ACT	A	614	-	-	X	-
4	ACT	A	615	-	-	X	-

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 4704 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.

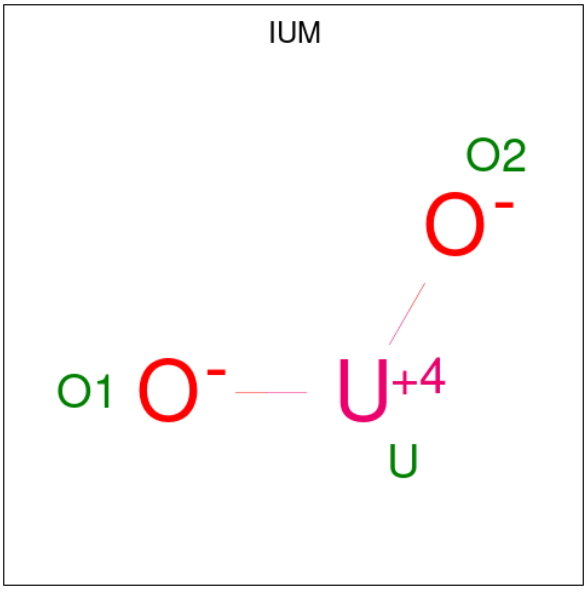
- Molecule 1 is a protein called PERIPLASMIC OLIGOPEPTIDE-BINDING PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	517	Total	C	N	O	S	0	4	0
			4176	2674	700	797	5			

- Molecule 2 is a protein called PEPTIDE LYS-VAL-LYS.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	3	Total	C	N	O	0	1	0
			28	19	5	4			

- Molecule 3 is URANYL (VI) ION (three-letter code: IUM) (formula: O_2U).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	U	0	0
			1	1		
3	A	1	Total	U	0	0
			1	1		

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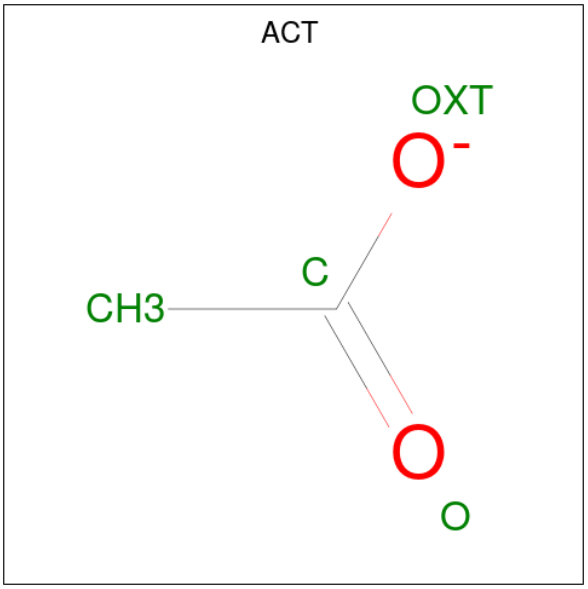
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total U 1 1	0	0
3	A	1	Total U 1 1	0	0
3	A	1	Total U 1 1	0	0
3	A	1	Total U 1 1	0	0
3	A	1	Total U 1 1	0	0
3	A	1	Total U 1 1	0	0

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	462	Total O 462 462	0	0
5	B	2	Total O 2 2	0	0

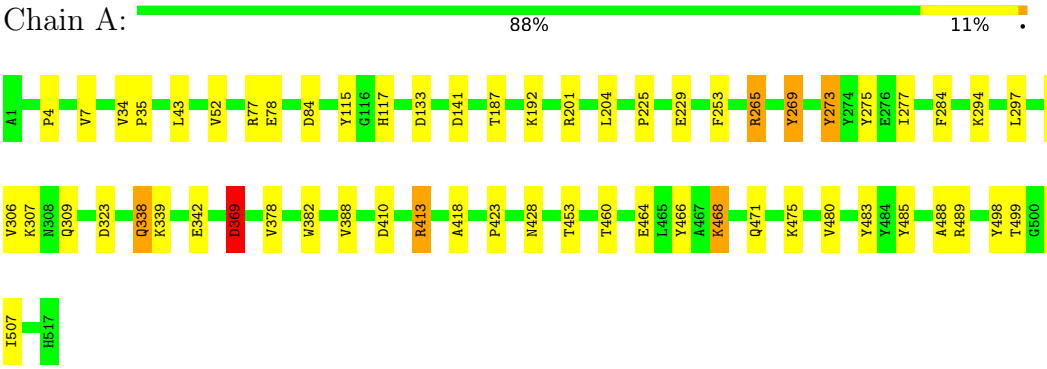
3 Residue-property plots (i)

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. 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.

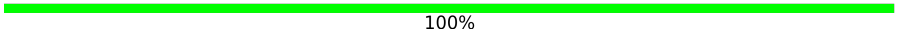
• Molecule 1: PERIPLASMIC OLIGOPEPTIDE-BINDING PROTEIN

Chain A:



• Molecule 2: PEPTIDE LYS-VAL-LYS

Chain B:



There are no outlier residues recorded for this chain.

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	109.73Å 75.78Å 70.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 1.80	Depositor
% Data completeness (in resolution range)	99.5 (15.00-1.80)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.181 , 0.215	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4704	wwPDB-VP
Average B, all atoms (Å^2)	17.0	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: IUM, ACT

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	0.54	0/4306	1.12	16/5872 (0.3%)
2	B	0.72	0/32	1.27	0/39
All	All	0.54	0/4338	1.12	16/5911 (0.3%)

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	413	ARG	NE-CZ-NH1	7.57	124.09	120.30
1	A	201	ARG	NE-CZ-NH1	7.20	123.90	120.30
1	A	410	ASP	CB-CG-OD2	-7.03	111.97	118.30
1	A	369	ASP	CB-CG-OD2	-6.98	112.02	118.30
1	A	413	ARG	NE-CZ-NH2	-6.97	116.81	120.30
1	A	84	ASP	CB-CG-OD1	6.44	124.09	118.30
1	A	273	TYR	CB-CG-CD2	-6.09	117.35	121.00
1	A	485	TYR	CA-CB-CG	5.98	124.76	113.40
1	A	269	TYR	CB-CG-CD2	-5.92	117.45	121.00
1	A	265	ARG	NE-CZ-NH1	5.89	123.25	120.30
1	A	269	TYR	CB-CG-CD1	5.81	124.48	121.00
1	A	275	TYR	CB-CG-CD1	-5.54	117.67	121.00
1	A	77	ARG	NE-CZ-NH1	5.48	123.04	120.30
1	A	133	ASP	CB-CG-OD2	-5.48	113.37	118.30
1	A	141	ASP	CB-CG-OD1	5.21	122.98	118.30
1	A	192	LYS	CA-CB-CG	5.17	124.79	113.40

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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	4176	0	4091	28	0
2	B	28	0	42	0	0
3	A	8	0	0	0	0
4	A	28	0	21	13	0
5	A	462	0	0	1	0
5	B	2	0	0	0	0
All	All	4704	0	4154	41	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 5.

All (41) 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)
4:A:614:ACT:H3	4:A:615:ACT:H2	1.63	0.80
1:A:301:ILE:HA	1:A:305:LYS:HG3	1.66	0.76
4:A:610:ACT:H3	4:A:611:ACT:H2	1.69	0.74
1:A:297[B]:LEU:HD11	1:A:378:VAL:HG22	1.77	0.66
4:A:610:ACT:H2	4:A:611:ACT:H3	1.79	0.64
4:A:612:ACT:H3	4:A:613:ACT:H2	1.80	0.63
4:A:612:ACT:H2	4:A:613:ACT:H3	1.82	0.61
1:A:273:TYR:CZ	1:A:413:ARG:HD3	2.41	0.55
4:A:610:ACT:CH3	4:A:611:ACT:CH3	2.84	0.55
4:A:612:ACT:H3	4:A:613:ACT:CH3	2.36	0.54
4:A:614:ACT:H3	4:A:615:ACT:CH3	2.37	0.54
1:A:418:ALA:HB3	1:A:504:LEU:HD22	1.90	0.53
4:A:612:ACT:CH3	4:A:613:ACT:H3	2.38	0.52
1:A:453:THR:HG21	1:A:466:TYR:CE1	2.45	0.51
1:A:382:TRP:HB3	1:A:388:VAL:CG2	2.41	0.51
1:A:460:THR:O	1:A:464:GLU:HG3	2.12	0.50
1:A:4:PRO:O	1:A:7:VAL:HG13	2.12	0.49
1:A:43:LEU:O	1:A:187:THR:HB	2.13	0.49
1:A:338:GLN:HG3	1:A:339:LYS:N	2.27	0.49
4:A:612:ACT:CH3	4:A:613:ACT:CH3	2.91	0.48
1:A:115:TYR:CE1	1:A:428:ASN:HB3	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:468:LYS:HD3	1:A:471:GLN:OE1	2.14	0.47
1:A:294:LYS:HA	1:A:480:VAL:HG13	1.97	0.47
1:A:499:THR:OG1	1:A:501:LYS:HB2	2.15	0.47
4:A:610:ACT:CH3	4:A:611:ACT:H3	2.44	0.46
1:A:338:GLN:OE1	1:A:342:GLU:OE2	2.35	0.44
1:A:323:ASP:O	1:A:423:PRO:HD3	2.18	0.44
1:A:498:TYR:HE1	1:A:507:ILE:HD11	1.82	0.43
4:A:610:ACT:H3	4:A:611:ACT:CH3	2.38	0.43
1:A:43:LEU:HD21	1:A:204:LEU:HD22	2.00	0.43
1:A:265:ARG:O	1:A:488:ALA:HA	2.19	0.43
1:A:277:ILE:CG2	1:A:284:PHE:HB3	2.48	0.43
1:A:253:PHE:CD2	1:A:309:GLN:HG2	2.53	0.43
4:A:614:ACT:CH3	4:A:615:ACT:CH3	2.97	0.43
1:A:229:GLU:OE1	1:A:369:ASP:HB2	2.19	0.42
1:A:34:VAL:HB	1:A:35:PRO:HD3	2.01	0.42
1:A:117:HIS:HE1	5:A:1095:HOH:O	2.02	0.41
1:A:302:ILE:HA	1:A:306:VAL:HG13	2.03	0.41
1:A:307:LYS:HE3	1:A:483:TYR:OH	2.21	0.41
1:A:464:GLU:O	1:A:468:LYS:HG2	2.20	0.41
1:A:418:ALA:HB3	1:A:504:LEU:CD2	2.51	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	519/517 (100%)	503 (97%)	15 (3%)	1 (0%)	47 33
2	B	2/3 (67%)	2 (100%)	0	0	100 100
All	All	521/520 (100%)	505 (97%)	15 (3%)	1 (0%)	47 33

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	225	PRO

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	459/455 (101%)	450 (98%)	9 (2%)	55 44
2	B	4/3 (133%)	4 (100%)	0	100 100
All	All	463/458 (101%)	454 (98%)	9 (2%)	55 46

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	52	VAL
1	A	78	GLU
1	A	269	TYR
1	A	305	LYS
1	A	338	GLN
1	A	369	ASP
1	A	468	LYS
1	A	475	LYS
1	A	489	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	117	HIS
1	A	195	ASN
1	A	280	GLN
1	A	338	GLN
1	A	440	HIS
1	A	517	HIS

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

Of 15 ligands modelled in this entry, 8 are modelled with single atom - leaving 7 for Mogul analysis.

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	$\#\|Z\| > 2$
4	ACT	A	611	3	3,3,3	0.67	0	3,3,3	0.87	0
4	ACT	A	615	3	3,3,3	0.71	0	3,3,3	0.70	0
4	ACT	A	614	3	3,3,3	0.89	0	3,3,3	0.69	0
4	ACT	A	613	3	3,3,3	1.17	0	3,3,3	2.51	1 (33%)
4	ACT	A	610	3	3,3,3	0.94	0	3,3,3	1.45	1 (33%)
4	ACT	A	612	3	3,3,3	0.76	0	3,3,3	0.67	0
4	ACT	A	609	3	3,3,3	0.86	0	3,3,3	0.64	0

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	613	ACT	OXT-C-O	3.67	135.58	122.05
4	A	610	ACT	OXT-C-O	2.11	129.83	122.05

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	611	ACT	5	0
4	A	615	ACT	3	0
4	A	614	ACT	3	0
4	A	613	ACT	5	0
4	A	610	ACT	5	0
4	A	612	ACT	5	0

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

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.