



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 12:51 pm GMT

PDB ID : 1B51  
Title : OLIGO-PEPTIDE BINDING PROTEIN (OPPA) COMPLEXED WITH KSK  
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Deposited on : 1999-01-11  
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](mailto: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.

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

MolProbity : 4.02b-467  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc28949

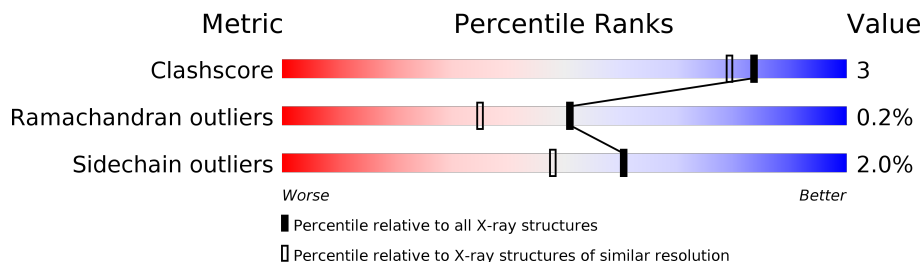
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 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	112137	5742 (1.80-1.80)
Ramachandran outliers	110173	5676 (1.80-1.80)
Sidechain outliers	110143	5675 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	517	 88%      10%
2	B	3	 100%

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4642 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.

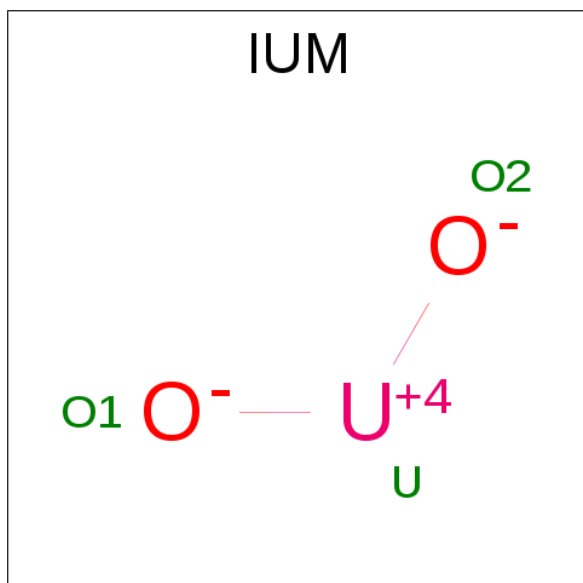
- Molecule 1 is a protein called PROTEIN (OLIGO-PEPTIDE BINDING PROTEIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	517	Total	C	N	O	S	21	4	0
			4175	2672	700	798	5			

- Molecule 2 is a protein called PROTEIN (LYS-SER-LYS).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	3	Total	C	N	O	0	0	0
			25	15	5	5			

- Molecule 3 is URANYL (VI) ION (three-letter code: IUM) (formula: O<sub>2</sub>U).



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
3	A	1	Total U 1 1	0	0

- Molecule 4 is water.

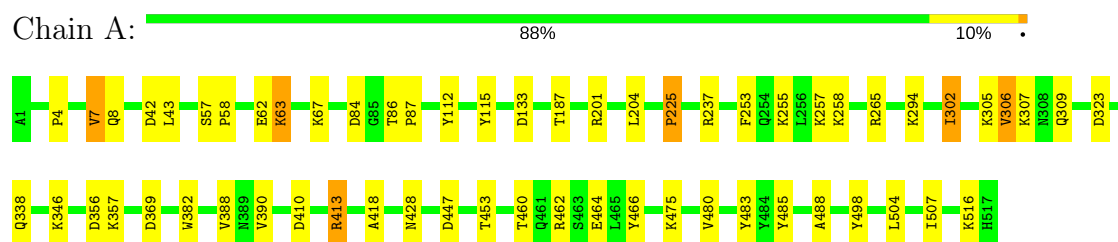
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	423	Total O 429 429	0	6
4	B	4	Total O 4 4	0	0

### 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 the various outlier classes 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.

Note EDS was not executed.

- Molecule 1: PROTEIN (OLIGO-PEPTIDE BINDING PROTEIN)



- Molecule 2: PROTEIN (LYS-SER-LYS)



There are no outlier residues recorded for this chain.

## 4 Data and refinement statistics

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, $\alpha$ , $\beta$ , $\gamma$	110.16 Å   76.06 Å   70.41 Å 90.00°   90.00°   90.00°	Depositor
Resolution (Å)	15.00 – 1.80	Depositor
% Data completeness (in resolution range)	94.6 (15.00-1.80)	Depositor
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.179 , 0.223	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4642	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	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

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	0.65	4/4304 (0.1%)	1.23	24/5870 (0.4%)
2	B	0.70	0/24	1.14	0/27
All	All	0.65	4/4328 (0.1%)	1.23	24/5897 (0.4%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	356	ASP	CA-CB	-13.27	1.24	1.53
1	A	305	LYS	CG-CD	-11.19	1.14	1.52
1	A	346	LYS	CE-NZ	11.14	1.76	1.49
1	A	67	LYS	CG-CD	-6.24	1.31	1.52

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	413	ARG	NE-CZ-NH2	-12.32	114.14	120.30
1	A	356	ASP	N-CA-CB	11.63	131.53	110.60
1	A	305	LYS	CB-CG-CD	10.19	138.10	111.60
1	A	410	ASP	CB-CG-OD1	7.59	125.13	118.30
1	A	357	LYS	CB-CG-CD	-7.34	92.52	111.60
1	A	133	ASP	CB-CG-OD1	7.13	124.72	118.30
1	A	410	ASP	CB-CG-OD2	-6.93	112.06	118.30
1	A	112	TYR	CB-CG-CD1	-6.79	116.93	121.00
1	A	201	ARG	NE-CZ-NH1	6.54	123.57	120.30
1	A	462	ARG	NE-CZ-NH2	-6.50	117.05	120.30
1	A	413	ARG	CA-CB-CG	6.40	127.49	113.40
1	A	485	TYR	CA-CB-CG	6.32	125.41	113.40
1	A	475	LYS	CA-CB-CG	6.30	127.25	113.40
1	A	356	ASP	CA-CB-CG	6.09	126.80	113.40
1	A	42	ASP	CB-CG-OD1	5.97	123.67	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	84	ASP	CB-CG-OD1	5.84	123.56	118.30
1	A	237	ARG	NE-CZ-NH2	5.75	123.18	120.30
1	A	112	TYR	CB-CG-CD2	5.46	124.28	121.00
1	A	369	ASP	CB-CG-OD2	-5.32	113.52	118.30
1	A	323	ASP	CB-CG-OD2	5.27	123.04	118.30
1	A	447	ASP	CB-CG-OD1	5.18	122.96	118.30
1	A	413	ARG	CG-CD-NE	-5.12	101.06	111.80
1	A	133	ASP	CB-CG-OD2	-5.05	113.75	118.30
1	A	413	ARG	N-CA-CB	-5.02	101.56	110.60

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	4175	0	4085	23	0
2	B	25	0	33	0	0
3	A	9	0	0	0	0
4	A	429	0	0	1	0
4	B	4	0	0	0	0
All	All	4642	0	4118	23	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 3.

All (23) 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:62:GLU:HG3	1:A:63:LYS:HD2	1.80	0.64
1:A:302:ILE:HA	1:A:306:VAL:HG13	1.89	0.54
1:A:4:PRO:O	1:A:7:VAL:HG13	2.08	0.54
1:A:418:ALA:HB3	1:A:504:LEU:HD22	1.90	0.53
1:A:382:TRP:HB3	1:A:388:VAL:CG2	2.39	0.52
1:A:253:PHE:CD2	1:A:309:GLN:HG2	2.46	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:294:LYS:HA	1:A:480:VAL:HG13	1.91	0.51
1:A:8:GLN:HB3	1:A:516:LYS:HZ3	1.78	0.49
1:A:43:LEU:O	1:A:187:THR:HB	2.14	0.47
1:A:57[B]:SER:HB2	1:A:58:PRO:CD	2.44	0.47
1:A:382:TRP:HB3	1:A:388:VAL:HG22	1.97	0.47
1:A:115:TYR:CE1	1:A:428:ASN:HB3	2.50	0.46
1:A:460:THR:O	1:A:464:GLU:HG3	2.15	0.46
1:A:307:LYS:HE3	1:A:483:TYR:OH	2.17	0.45
1:A:258:LYS:HA	1:A:258:LYS:HD3	1.79	0.44
1:A:498:TYR:HE1	1:A:507:ILE:HD11	1.81	0.44
1:A:43:LEU:HD21	1:A:204:LEU:HD22	2.00	0.43
1:A:57[A]:SER:HB3	1:A:58:PRO:CD	2.49	0.43
1:A:453:THR:HG21	1:A:466:TYR:CE1	2.53	0.42
1:A:255:LYS:HG3	4:A:690:HOH:O	2.19	0.42
1:A:86:THR:HA	1:A:87:PRO:HD3	1.91	0.42
1:A:57[B]:SER:HB2	1:A:58:PRO:HD2	2.00	0.42
1:A:265:ARG:O	1:A:488:ALA:HA	2.21	0.41

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	519/517 (100%)	502 (97%)	16 (3%)	1 (0%)	51	35
2	B	1/3 (33%)	1 (100%)	0	0	100	100
All	All	520/520 (100%)	503 (97%)	16 (3%)	1 (0%)	51	35

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%)	60	48
2	B	3/3 (100%)	3 (100%)	0	100	100
All	All	462/458 (101%)	453 (98%)	9 (2%)	60	50

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

Mol	Chain	Res	Type
1	A	7	VAL
1	A	63	LYS
1	A	225	PRO
1	A	257	LYS
1	A	302	ILE
1	A	306	VAL
1	A	338	GLN
1	A	390	VAL
1	A	413	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	55	HIS
1	A	195	ASN
1	A	199	ASN
1	A	304	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 9 are modelled with single atom - leaving 0 for Mogul analysis.

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.

## 5.7 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.