Full wwPDB X-ray Structure Validation Report (i)

May 28, 2020 – 07:57 pm BST

PDB ID	:	1MF4
Title	:	Structure-based design of potent and selective inhibitors of phospholipase A2: Crystal structure of the complex formed between phosholipase A2 from Naja Naja sagittifera and a designed peptide inhibitor at 1.9 A resolution
Authors	:	Singh, R.K.; Vikram, P.; Paramsivam, M.; Jabeen, T.; Sharma, S.; Makker, J.; Dey, S.; Kaur, P.; Srinivasan, A.; Singh, T.P.
Deposited on	:	2002-08-09
Resolution	:	1.90 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

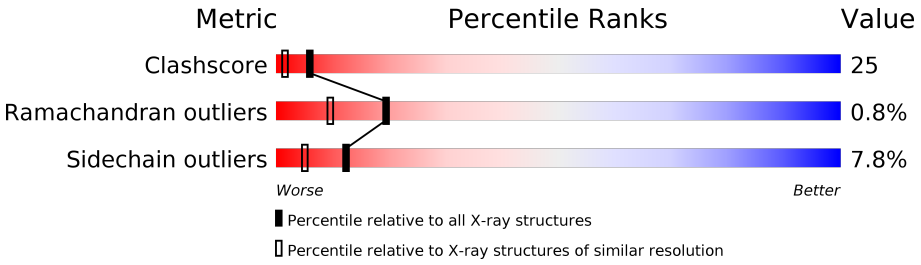
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 1.90 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	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)

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 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	119	79% 18%
2	B	5	40% 60%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 1056 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 Phospholipase A2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	119	Total	C	N	O	S	0	0	0
			909	553	157	184	15			

- Molecule 2 is a protein called VAL-ALA-PHE-ARG-SER.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	5	Total	C	N	O	0	0	0
			41	26	8	7			

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

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

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	104	Total	O	0	0
			104	104		
4	B	1	Total	O	0	0
			1	1		

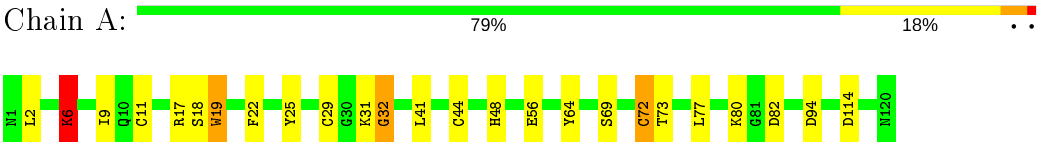
3 Residue-property plots (i)

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. 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: Phospholipase A2

Chain A:



- Molecule 2: VAL-ALA-PHE-ARG-SER

Chain B:

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α, β, γ	42.78Å 42.78Å 65.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.54 – 1.90	Depositor
% Data completeness (in resolution range)	100.0 (19.54-1.90)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.182 , 0.239	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1056	wwPDB-VP
Average B, all atoms (Å^2)	25.0	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: CA

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	0.53	0/928	0.98	5/1258 (0.4%)
2	B	1.06	0/41	2.46	3/52 (5.8%)
All	All	0.56	0/969	1.08	8/1310 (0.6%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	6	LYS	CG-CD-CE	10.30	142.80	111.90
2	B	3	PHE	CB-CA-C	-8.41	93.58	110.40
1	A	94	ASP	CB-CG-OD2	7.35	124.92	118.30
2	B	3	PHE	CB-CG-CD2	-6.13	116.51	120.80
1	A	6	LYS	CB-CA-C	5.90	122.21	110.40
1	A	19	TRP	CA-CB-CG	5.51	124.16	113.70
2	B	3	PHE	CB-CG-CD1	5.47	124.63	120.80
1	A	114	ASP	CB-CG-OD1	5.15	122.93	118.30

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	909	0	811	41	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	41	0	43	35	0
3	A	1	0	0	0	0
4	A	104	0	0	3	0
4	B	1	0	0	0	0
All	All	1056	0	854	45	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 25.

All (45) 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:9:ILE:CD1	2:B:5:SER:HA	1.70	1.22
1:A:9:ILE:HD12	2:B:5:SER:HA	1.16	1.11
1:A:72:CYS:SG	1:A:77:LEU:HD13	1.91	1.10
1:A:64:TYR:HE2	2:B:2:ALA:HB3	1.25	1.02
1:A:9:ILE:HD13	2:B:5:SER:CB	1.95	0.97
1:A:9:ILE:CD1	2:B:5:SER:CA	2.43	0.96
1:A:56:GLU:HG2	4:A:247:HOH:O	1.66	0.95
1:A:19:TRP:HB2	2:B:5:SER:C	1.87	0.94
1:A:22:PHE:HB2	2:B:5:SER:CB	1.97	0.94
1:A:64:TYR:CE2	2:B:2:ALA:HB3	2.06	0.90
1:A:31:LYS:HE3	2:B:1:VAL:HG21	1.58	0.85
1:A:6:LYS:HB2	2:B:5:SER:O	1.79	0.83
1:A:22:PHE:HB2	2:B:5:SER:HB2	1.60	0.81
1:A:9:ILE:HD12	2:B:5:SER:CA	2.04	0.80
1:A:6:LYS:HB2	2:B:5:SER:OXT	1.82	0.80
1:A:6:LYS:CB	2:B:5:SER:OXT	2.31	0.78
1:A:72:CYS:SG	1:A:77:LEU:CD1	2.72	0.77
2:B:2:ALA:O	2:B:3:PHE:HD1	1.67	0.77
1:A:6:LYS:HG3	2:B:5:SER:OXT	1.86	0.76
1:A:31:LYS:HG3	2:B:1:VAL:HB	1.68	0.76
1:A:22:PHE:HB2	2:B:5:SER:HB3	1.68	0.75
1:A:9:ILE:HG21	2:B:5:SER:OG	1.87	0.75
1:A:9:ILE:HG21	2:B:5:SER:HG	1.53	0.73
1:A:6:LYS:CB	2:B:5:SER:O	2.36	0.72
1:A:19:TRP:O	2:B:5:SER:HB3	1.90	0.71
1:A:6:LYS:CG	2:B:5:SER:OXT	2.40	0.69
2:B:2:ALA:C	2:B:3:PHE:HD1	2.00	0.64
1:A:9:ILE:HD13	2:B:5:SER:HB2	1.79	0.64
1:A:64:TYR:HE2	2:B:2:ALA:CB	2.09	0.62

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:9:ILE:HD13	2:B:5:SER:OG	1.99	0.62
1:A:9:ILE:HD13	2:B:5:SER:CA	2.19	0.61
2:B:2:ALA:O	2:B:3:PHE:CD1	2.54	0.59
1:A:82:ASP:N	1:A:82:ASP:OD1	2.43	0.51
1:A:48:HIS:HB3	2:B:4:ARG:HH21	1.76	0.51
1:A:6:LYS:HA	2:B:5:SER:O	2.13	0.48
1:A:69:SER:OG	1:A:80:LYS:HD2	2.13	0.48
1:A:22:PHE:CB	2:B:5:SER:HB2	2.37	0.48
1:A:19:TRP:HA	2:B:5:SER:OG	2.14	0.48
1:A:31:LYS:HD2	4:A:221:HOH:O	2.15	0.46
1:A:41:LEU:O	1:A:44:CYS:HB2	2.15	0.46
1:A:18:SER:HA	4:A:229:HOH:O	2.16	0.45
1:A:25:TYR:O	1:A:29:CYS:HB2	2.17	0.44
1:A:31:LYS:HG3	2:B:1:VAL:CB	2.44	0.43
2:B:2:ALA:C	2:B:3:PHE:CD1	2.88	0.43
1:A:31:LYS:O	1:A:32:GLY:C	2.56	0.41

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	117/119 (98%)	111 (95%)	5 (4%)	1 (1%)	17 7
2	B	3/5 (60%)	1 (33%)	2 (67%)	0	100 100
All	All	120/124 (97%)	112 (93%)	7 (6%)	1 (1%)	19 9

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	32	GLY

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	98/98 (100%)	92 (94%)	6 (6%)	18 9
2	B	4/4 (100%)	2 (50%)	2 (50%)	0 0
All	All	102/102 (100%)	94 (92%)	8 (8%)	12 5

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	LEU
1	A	6	LYS
1	A	11	CYS
1	A	17	ARG
1	A	72	CYS
1	A	73	THR
2	B	1	VAL
2	B	4	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	10	GLN
1	A	74	GLN
1	A	110	ASN
1	A	112	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is monoatomic - 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

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.