Full wwPDB X-ray Structure Validation Report ⓘ

Oct 23, 2021 – 11:39 AM EDT

PDB ID	:	1F0J
Title	:	CATALYTIC DOMAIN OF HUMAN PHOSPHODIESTERASE 4B2B
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Deposited on	:	2000-05-16
Resolution	:	1.77 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 following versions of software and data (see references ⓘ) were used in the production of this report:

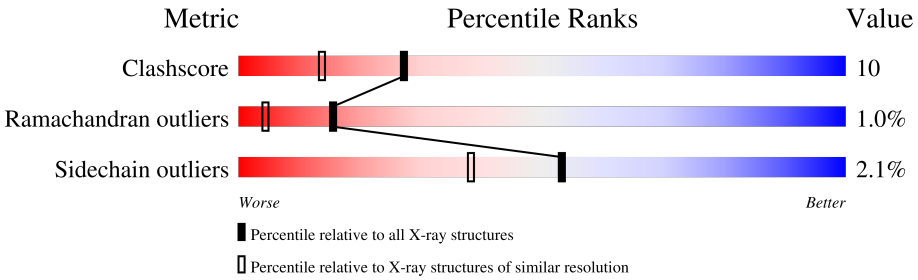
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

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 1.77 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	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)

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	377	77% 15% • 7%
1	B	377	69% 19% • 11%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 6318 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 PHOSPHODIESTERASE 4B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	351	Total	C	N	O	S	0	0	0
			2835	1787	482	545	21			
1	B	337	Total	C	N	O	S	0	0	0
			2719	1715	461	524	19			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	487	ALA	SER	engineered mutation	UNP Q07343
A	489	ALA	SER	engineered mutation	UNP Q07343
B	487	ALA	SER	engineered mutation	UNP Q07343
B	489	ALA	SER	engineered mutation	UNP Q07343

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		

- Molecule 4 is ARSENIC (three-letter code: ARS) (formula: As).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	3	Total As 3 3	0	0
4	B	2	Total As 2 2	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	415	Total O 415 415	0	0
5	B	340	Total O 340 340	0	0

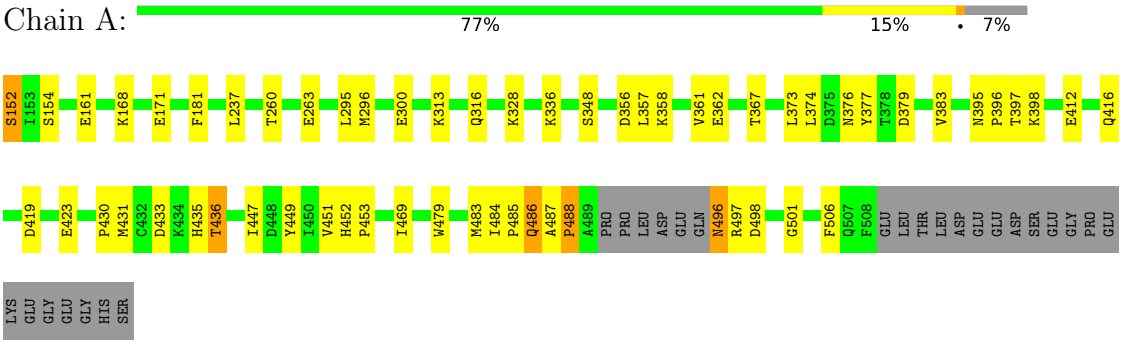
3 Residue-property plots (i)

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.

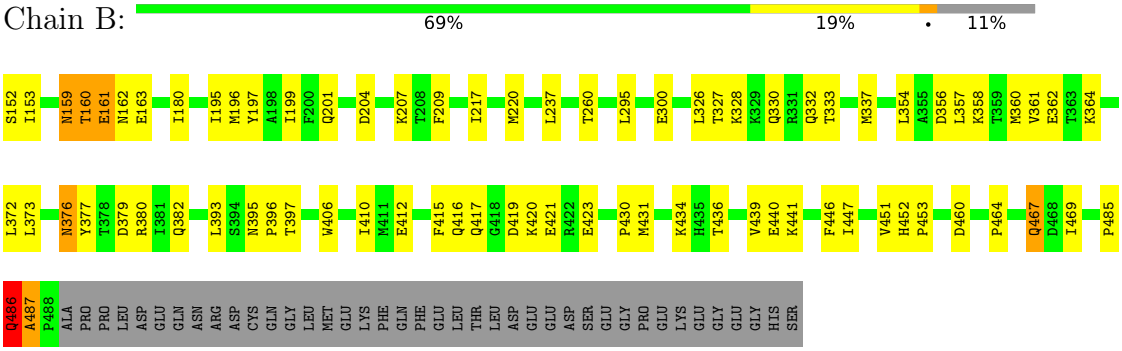
• Molecule 1: PHOSPHODIESTERASE 4B

Chain A:



• Molecule 1: PHOSPHODIESTERASE 4B

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	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	104.54Å 159.58Å 109.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	18.00 – 1.77	Depositor
% Data completeness (in resolution range)	95.3 (18.00-1.77)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 0.5	Depositor
R, R_{free}	0.204 , 0.223	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6318	wwPDB-VP
Average B, all atoms (Å^2)	28.0	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: ARS, ZN, MG

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	0.33	0/2893	0.54	0/3919
1	B	0.30	0/2776	0.54	0/3766
All	All	0.32	0/5669	0.54	0/7685

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	2835	0	2750	46	1
1	B	2719	0	2643	61	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	3	0	0	0	0
4	B	2	0	0	0	0
5	A	415	0	0	10	0
5	B	340	0	0	7	0
All	All	6318	0	5393	107	1

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 10.

All (107) 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:B:356:ASP:HB3	1:B:382:GLN:NE2	1.84	0.93
1:B:356:ASP:HB3	1:B:382:GLN:HE21	1.35	0.91
1:B:300:GLU:HG2	5:B:1548:HOH:O	1.80	0.80
1:A:295:LEU:HG	5:A:1349:HOH:O	1.86	0.74
1:B:376:ASN:HD22	1:B:376:ASN:H	1.33	0.74
1:A:487:ALA:HB1	1:A:488:PRO:CD	2.19	0.72
1:B:397:THR:HB	1:B:469:ILE:HG23	1.72	0.71
1:A:397:THR:HB	1:A:469:ILE:HG23	1.72	0.71
1:A:496:ASN:ND2	1:A:497:ARG:H	1.88	0.70
1:B:159:ASN:HD21	1:B:162:ASN:HD22	1.39	0.70
1:A:154:SER:HB2	5:A:1615:HOH:O	1.92	0.69
1:B:159:ASN:HD21	1:B:162:ASN:ND2	1.91	0.68
1:A:435:HIS:O	1:A:436:THR:HG23	1.96	0.65
1:B:419:ASP:O	1:B:423:GLU:HG3	1.96	0.65
1:A:487:ALA:HB1	1:A:488:PRO:HD2	1.80	0.64
1:A:300:GLU:HG2	5:A:1611:HOH:O	1.96	0.64
1:B:295:LEU:O	1:B:295:LEU:HD23	1.98	0.64
1:A:496:ASN:HB3	1:A:501:GLY:HA3	1.80	0.63
1:A:419:ASP:O	1:A:423:GLU:HG3	1.99	0.63
1:A:485:PRO:O	1:A:487:ALA:N	2.32	0.63
1:B:376:ASN:HD22	1:B:376:ASN:N	1.96	0.63
1:A:296:MET:HE3	5:A:1437:HOH:O	2.01	0.61
1:A:152:SER:HB3	5:A:1615:HOH:O	2.00	0.60
1:A:412:GLU:O	1:A:416:GLN:HG3	2.02	0.59
1:B:485:PRO:O	1:B:487:ALA:N	2.36	0.59
1:B:412:GLU:O	1:B:416:GLN:HG3	2.02	0.59
1:B:376:ASN:H	1:B:376:ASN:ND2	1.99	0.59
1:A:395:ASN:HB2	1:A:396:PRO:HD3	1.85	0.58
1:B:160:THR:O	1:B:163:GLU:HB2	2.04	0.58
1:B:152:SER:HB3	1:B:217:ILE:CD1	2.33	0.58
1:A:181:PHE:CD1	1:A:237:LEU:HD21	2.40	0.57
1:A:484:ILE:O	1:A:485:PRO:C	2.43	0.56
1:B:395:ASN:HB2	1:B:396:PRO:HD3	1.87	0.56
1:B:430:PRO:O	1:B:431:MET:HB2	2.06	0.56
1:B:159:ASN:O	1:B:161:GLU:N	2.39	0.55
1:A:367:THR:HG22	1:A:373:LEU:HD21	1.89	0.53
1:B:260:THR:HG23	5:B:1370:HOH:O	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:313:LYS:HE3	5:A:1277:HOH:O	2.09	0.53
1:A:376:ASN:ND2	1:A:379:ASP:OD2	2.43	0.52
1:B:204:ASP:OD1	1:B:207:LYS:HD2	2.09	0.52
1:B:197:TYR:CE2	1:B:201:GLN:OE1	2.63	0.51
1:A:376:ASN:HD21	1:A:379:ASP:CG	2.14	0.51
1:B:328:LYS:O	1:B:332:GLN:HG3	2.10	0.51
1:B:152:SER:HB3	1:B:217:ILE:HD12	1.90	0.51
1:A:313:LYS:NZ	1:A:316:GLN:HE22	2.09	0.51
1:A:168:LYS:O	1:A:171:GLU:HG3	2.11	0.50
1:B:152:SER:N	5:B:1551:HOH:O	2.45	0.50
1:B:295:LEU:HD23	1:B:295:LEU:C	2.32	0.50
1:A:430:PRO:O	1:A:431:MET:HB2	2.12	0.49
1:B:195:ILE:O	1:B:199:ILE:HG13	2.12	0.49
1:B:373:LEU:HD23	5:B:1414:HOH:O	2.11	0.49
1:A:336:LYS:HE3	1:A:377:TYR:CZ	2.48	0.49
1:B:417:GLN:O	1:B:421:GLU:HG3	2.12	0.48
1:A:447:ILE:HA	1:A:451:VAL:HB	1.95	0.48
1:B:431:MET:HE1	5:B:1486:HOH:O	2.14	0.48
1:B:452:HIS:HB3	1:B:453:PRO:HD3	1.94	0.48
1:B:486:GLN:NE2	1:B:487:ALA:H	2.12	0.48
1:A:348:SER:HA	1:A:497:ARG:HG2	1.96	0.48
1:B:467:GLN:HG2	5:B:1324:HOH:O	2.14	0.47
1:B:376:ASN:ND2	1:B:379:ASP:OD2	2.38	0.47
1:B:485:PRO:O	1:B:486:GLN:C	2.52	0.47
1:B:393:LEU:HD22	1:B:446:PHE:HZ	1.79	0.47
1:B:354:LEU:HG	1:B:358:LYS:HE3	1.96	0.46
1:B:161:GLU:H	1:B:161:GLU:HG3	1.47	0.46
1:A:452:HIS:HB3	1:A:453:PRO:HD3	1.98	0.46
1:A:433:ASP:HB3	1:A:436:THR:OG1	2.16	0.46
1:B:327:THR:OG1	1:B:330:GLN:HG3	2.14	0.46
1:B:440:GLU:HG2	1:B:441:LYS:N	2.30	0.46
1:A:358:LYS:O	1:A:362:GLU:HG3	2.15	0.46
1:B:358:LYS:O	1:B:362:GLU:HG3	2.16	0.46
1:A:168:LYS:HB3	1:A:168:LYS:HE2	1.65	0.45
1:B:439:VAL:HG13	1:B:440:GLU:N	2.32	0.45
1:A:496:ASN:ND2	1:A:497:ARG:N	2.60	0.45
1:B:159:ASN:ND2	1:B:162:ASN:ND2	2.61	0.44
1:B:486:GLN:O	1:B:487:ALA:HB3	2.17	0.44
1:B:357:LEU:O	1:B:360:MET:HB3	2.17	0.44
1:A:260:THR:OG1	1:A:263:GLU:HG3	2.18	0.44
1:A:398:LYS:HD2	5:A:1601:HOH:O	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:152:SER:HA	5:A:1336:HOH:O	2.18	0.44
1:A:357:LEU:O	1:A:361:VAL:HG23	2.17	0.44
1:A:181:PHE:CE1	1:A:237:LEU:HD21	2.52	0.44
1:B:160:THR:OG1	1:B:161:GLU:N	2.50	0.44
1:A:328:LYS:NZ	5:A:1610:HOH:O	2.36	0.43
1:B:415:PHE:CE2	1:B:434:LYS:HG2	2.53	0.43
1:B:440:GLU:HG2	1:B:441:LYS:H	1.82	0.43
1:A:449:TYR:CD2	1:A:506:PHE:HB3	2.54	0.43
1:B:364:LYS:HD2	1:B:372:LEU:HD21	2.00	0.43
1:A:435:HIS:O	1:A:436:THR:CG2	2.67	0.43
1:B:333:THR:O	1:B:337:MET:HG3	2.17	0.43
1:A:496:ASN:CG	1:A:497:ARG:H	2.22	0.42
1:A:152:SER:CA	5:A:1336:HOH:O	2.66	0.42
1:A:336:LYS:HE3	1:A:377:TYR:OH	2.20	0.42
1:A:374:LEU:HD11	1:A:383:VAL:HG21	2.01	0.42
1:B:180:ILE:HG23	1:B:237:LEU:HD11	2.01	0.42
1:B:196:MET:HG3	1:B:220:MET:CE	2.49	0.42
1:B:357:LEU:O	1:B:361:VAL:HG23	2.20	0.42
1:B:377:TYR:HA	1:B:380:ARG:HE	1.84	0.42
1:B:460:ASP:HA	5:B:1540:HOH:O	2.19	0.42
1:B:486:GLN:HE21	1:B:486:GLN:HB2	1.62	0.41
1:B:204:ASP:OD2	1:B:207:LYS:HD2	2.20	0.41
1:A:479:TRP:O	1:A:483:MET:HG2	2.21	0.41
1:B:416:GLN:O	1:B:420:LYS:HG3	2.21	0.41
1:B:447:ILE:HA	1:B:451:VAL:HB	2.02	0.41
1:A:313:LYS:HZ2	1:A:316:GLN:HE22	1.69	0.41
1:B:377:TYR:CA	1:B:380:ARG:HH21	2.34	0.41
1:B:209:PHE:CD1	1:B:326:LEU:HD22	2.56	0.40
1:B:406:TRP:O	1:B:410:ILE:HG13	2.21	0.40

All (1) 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:154:SER:OG	1:A:154:SER:OG[4_566]	2.16	0.04

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	347/377 (92%)	330 (95%)	14 (4%)	3 (1%)	17 5
1	B	335/377 (89%)	322 (96%)	9 (3%)	4 (1%)	13 3
All	All	682/754 (90%)	652 (96%)	23 (3%)	7 (1%)	15 4

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	486	GLN
1	A	488	PRO
1	B	160	THR
1	B	486	GLN
1	A	436	THR
1	B	153	ILE
1	B	487	ALA

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	317/340 (93%)	311 (98%)	6 (2%)	57 43
1	B	305/340 (90%)	298 (98%)	7 (2%)	50 34
All	All	622/680 (92%)	609 (98%)	13 (2%)	53 38

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	152	SER
1	A	161	GLU
1	A	356	ASP
1	A	486	GLN
1	A	496	ASN
1	A	498	ASP
1	B	159	ASN
1	B	161	GLU
1	B	376	ASN
1	B	436	THR
1	B	464	PRO
1	B	467	GLN
1	B	486	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	316	GLN
1	A	332	GLN
1	A	382	GLN
1	A	496	ASN
1	B	162	ASN
1	B	201	GLN
1	B	376	ASN
1	B	382	GLN
1	B	435	HIS
1	B	463	GLN
1	B	486	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry

Of 9 ligands modelled in this entry, 9 are 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.