wwPDB X-ray Structure Validation Summary Report (i)

Mar 12, 2026 – 08:36 PM UTC

PDB ID	:	1QZ0 / pdb_00001qz0
Title	:	Crystal Structure of the Yersinia Pestis Phosphatase YopH in Complex with a Phosphotyrosyl Mimetic-Containing Hexapeptide
Authors	:	Phan, J.; Lee, K.; Cherry, S.; Tropea, J.E.; Burke Jr, T.R.; Waugh, D.S.
Deposited on	:	2003-09-15
Resolution	:	1.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

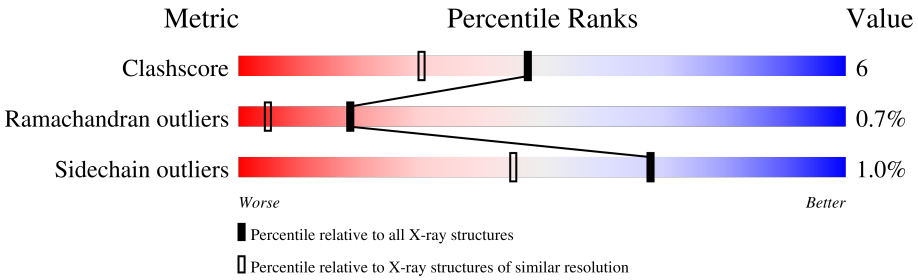
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	NOT EXECUTED
Xtriage (Phenix)	:	2.0
EDS	:	NOT EXECUTED
Buster-report	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

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 1.50 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	190562	4235 (1.50-1.50)
Ramachandran outliers	187476	4153 (1.50-1.50)
Sidechain outliers	187428	4150 (1.50-1.50)

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	306	82% 9% • 8%
1	B	306	82% 9% • 8%
2	C	7	57% 14% 29%
2	D	7	71% 29%
2	E	7	43% 29% 29%
2	F	7	71% 29%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 5137 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-tyrosine phosphatase yopH.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	282	Total	C	N	O	S	0	0	0
			2166	1323	402	425	16			
1	B	282	Total	C	N	O	S	0	0	0
			2166	1323	402	425	16			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	163	MET	-	initiating methionine	GB 16082755
A	235	ARG	CYS	engineered mutation	GB 16082755
A	392	ALA	GLY	engineered mutation	GB 16082755
B	163	MET	-	initiating methionine	GB 16082755
B	235	ARG	CYS	engineered mutation	GB 16082755
B	392	ALA	GLY	engineered mutation	GB 16082755

- Molecule 2 is a protein called ASP-ALA-ASP-GLU-FTY-LEU-NH2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	C	5	Total	C	F	N	O	P	0	0	1
			44	25	2	5	11	1			
2	D	7	Total	C	F	N	O	P	0	0	1
			57	32	2	7	15	1			
2	E	5	Total	C	F	N	O	P	0	0	1
			44	25	2	5	11	1			
2	F	7	Total	C	F	N	O	P	0	0	1
			57	32	2	7	15	1			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	265	Total	O	0	0
			265	265		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	297	Total O 297 297	0	0
3	C	2	Total O 2 2	0	0
3	D	21	Total O 21 21	0	0
3	E	5	Total O 5 5	0	0
3	F	13	Total O 13 13	0	0

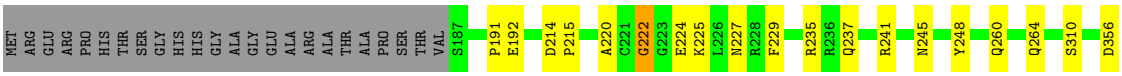
3 Residue-property plots (i)

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.

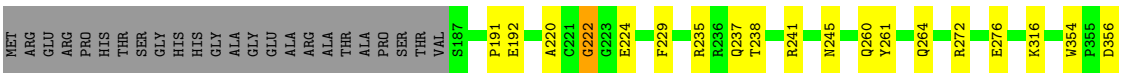
• Molecule 1: Protein-tyrosine phosphatase yopH

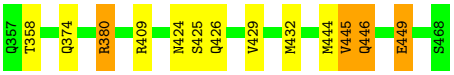
Chain A:



• Molecule 1: Protein-tyrosine phosphatase yopH

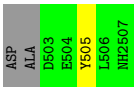
Chain B:





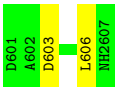
• Molecule 2: ASP-ALA-ASP-GLU-FTY-LEU-NH2

Chain C:



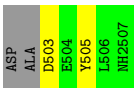
• Molecule 2: ASP-ALA-ASP-GLU-FTY-LEU-NH2

Chain D:



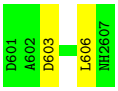
• Molecule 2: ASP-ALA-ASP-GLU-FTY-LEU-NH2

Chain E:



• Molecule 2: ASP-ALA-ASP-GLU-FTY-LEU-NH2

Chain F:



4 Data and refinement statistics (i)

EDS was not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	47.29Å 53.45Å 69.07Å 109.61° 104.75° 89.98°	Depositor
Resolution (Å)	25.00 – 1.50	Depositor
% Data completeness (in resolution range)	76.0 (25.00-1.50)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.04	Depositor
$< I/\sigma(I) >$ [1]	1.54 (at 1.50Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.188 , 0.209	Depositor
Wilson B-factor (Å^2)	13.2	Xtriage
Anisotropy	0.696	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5137	wwPDB-VP
Average B, all atoms (Å^2)	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.71% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NH2, FTY

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	0.39	0/2193	0.85	2/2962 (0.1%)
1	B	0.39	0/2193	0.84	3/2962 (0.1%)
2	C	0.37	0/23	0.20	0/28
2	D	0.34	0/36	0.69	0/46
2	E	0.37	0/23	0.20	0/28
2	F	0.36	0/36	0.64	0/46
All	All	0.39	0/4504	0.84	5/6072 (0.1%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	424	ASN	N-CA-C	5.89	119.21	112.97
1	B	424	ASN	N-CA-C	5.60	118.90	112.57
1	B	261	TYR	N-CA-C	-5.11	101.99	109.50
1	A	248	TYR	N-CA-C	-5.04	102.24	110.20
1	B	446	GLN	N-CA-C	5.00	116.58	111.03

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	2166	0	2167	24	0
1	B	2166	0	2167	24	0
2	C	44	0	27	1	0
2	D	57	0	36	1	0
2	E	44	0	27	2	0
2	F	57	0	36	1	0
3	A	265	0	0	2	0
3	B	297	0	0	3	0
3	C	2	0	0	0	0
3	D	21	0	0	0	0
3	E	5	0	0	1	0
3	F	13	0	0	0	0
All	All	5137	0	4460	50	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 6.

The worst 5 of 50 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:380:ARG:HH11	1:B:380:ARG:HB3	1.39	0.88
1:A:380:ARG:HG2	1:A:380:ARG:HH11	1.44	0.81
1:B:235:ARG:HE	1:B:237:GLN:HE21	1.38	0.69
1:B:380:ARG:HH11	1:B:380:ARG:CB	2.07	0.68
1:A:235:ARG:HE	1:A:237:GLN:HE21	1.40	0.67

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	280/306 (92%)	269 (96%)	9 (3%)	2 (1%)	18 5

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	280/306 (92%)	269 (96%)	9 (3%)	2 (1%)	18 5
2	C	2/7 (29%)	2 (100%)	0	0	100 100
2	D	4/7 (57%)	4 (100%)	0	0	100 100
2	E	2/7 (29%)	2 (100%)	0	0	100 100
2	F	4/7 (57%)	4 (100%)	0	0	100 100
All	All	572/640 (89%)	550 (96%)	18 (3%)	4 (1%)	18 5

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	222	GLY
1	A	445	VAL
1	B	445	VAL
1	B	222	GLY

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	238/255 (93%)	236 (99%)	2 (1%)	73 54
1	B	238/255 (93%)	235 (99%)	3 (1%)	61 35
2	C	3/4 (75%)	3 (100%)	0	100 100
2	D	4/4 (100%)	4 (100%)	0	100 100
2	E	3/4 (75%)	3 (100%)	0	100 100
2	F	4/4 (100%)	4 (100%)	0	100 100
All	All	490/526 (93%)	485 (99%)	5 (1%)	68 45

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	446	GLN
1	A	449	GLU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	380	ARG
1	B	446	GLN
1	B	449	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	213	ASN
1	B	237	GLN
1	B	467	ASN
1	B	341	GLN
1	B	446	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

Mogul was not executed - this section is therefore empty.

5.5 Carbohydrates

Mogul was not executed - this section is therefore empty.

5.6 Ligand geometry

Mogul was not executed - this section is therefore empty.

5.7 Other polymers

Mogul was not executed - this section is therefore empty.

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.