



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 10:54 AM UTC

PDB ID : 1WAO / pdb\_00001wao  
Title : PP5 structure  
Authors : Barford, D.  
Deposited on : 2004-10-27  
Resolution : 2.90 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](mailto: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>.

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

MolProbity : 4-5-2 with Phenix2.0  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **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

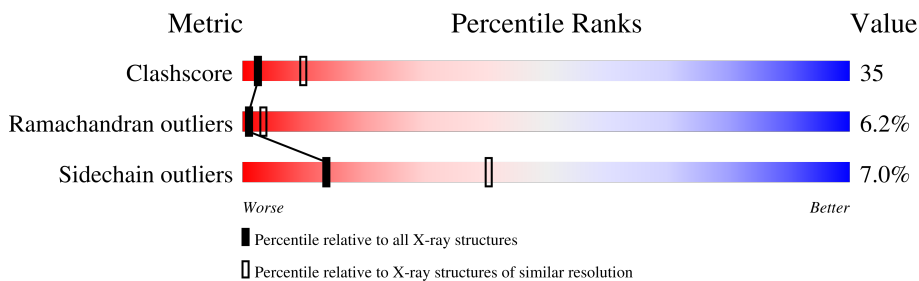
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)

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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	1	477	43% (green), 43% (yellow), 10% (orange), 4% (red), 0% (grey)
1	2	477	50% (green), 39% (yellow), 8% (orange), 2% (red), 0% (grey)
1	3	477	38% (green), 51% (yellow), 9% (orange), 2% (red), 0% (grey)
1	4	477	48% (green), 40% (yellow), 10% (orange), 2% (red), 0% (grey)

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 15082 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.

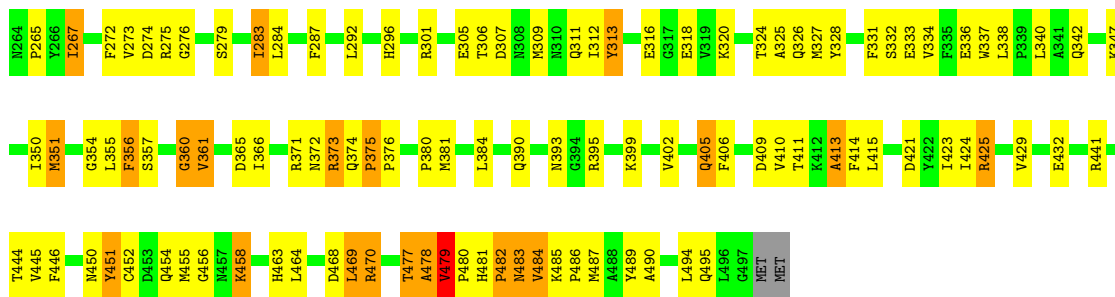
- Molecule 1 is a protein called SERINE/THREONINE PROTEIN PHOSPHATASE 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	1	471	3781	2407	641	712	21	0	0	0
1	2	469	3768	2399	639	710	20	0	0	0
1	3	471	3778	2405	641	712	20	0	0	0
1	4	466	3747	2386	635	706	20	0	0	0

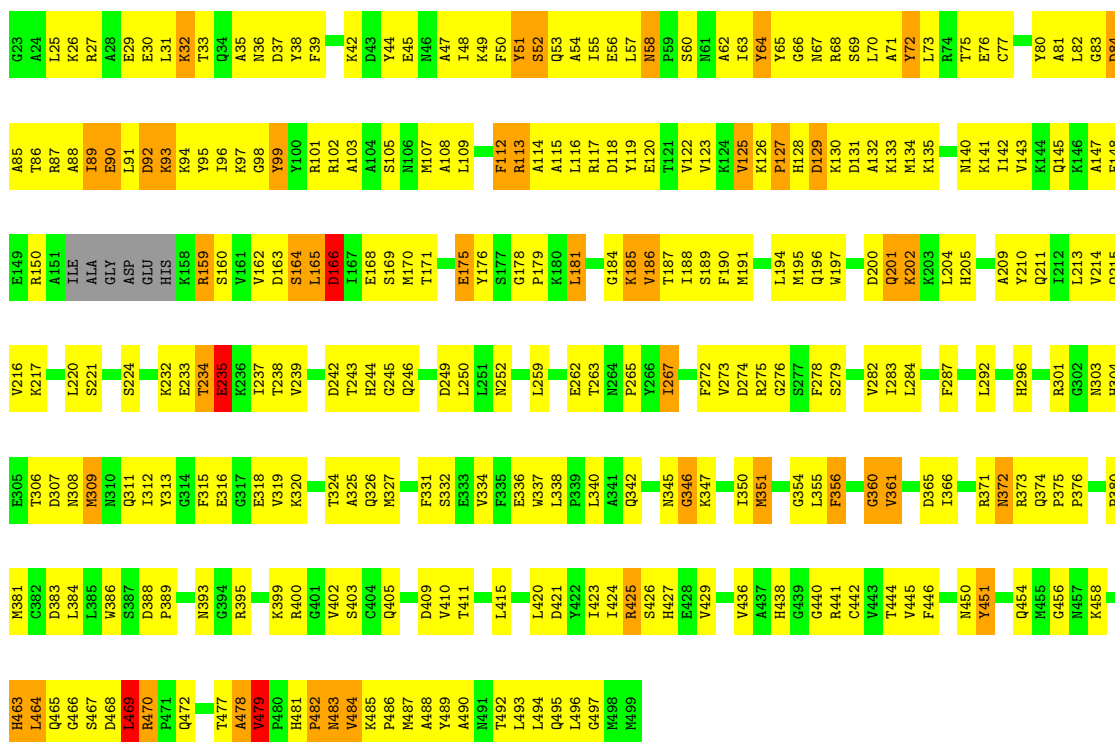
- Molecule 2 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	1	2	Total	Mn	0	0
			2	2		
2	2	2	Total	Mn	0	0
			2	2		
2	3	2	Total	Mn	0	0
			2	2		
2	4	2	Total	Mn	0	0
			2	2		

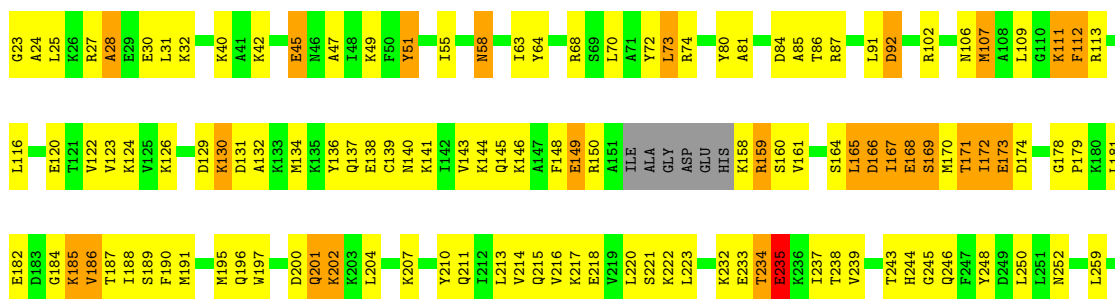




• Molecule 1: SERINE/THREONINE PROTEIN PHOSPHATASE 5



• Molecule 1: SERINE/THREONINE PROTEIN PHOSPHATASE 5



T263	T264	P265	Y266	I267	F272	R275	G276	S279	V282	I283	L284	T285	L286	F287	L292	L299	L300	R301	E305	T306	D307	N308	M309	N310	Q311	I312	Y313	E316	G317	E318	V319	K320	T324	A325	Q326	M327	Y328	F331	S332	E335	V334	F335	E336	W337	L338	F339	L340	A341	Q342		
C343	I344	N345	G346	K347	I350	M351	G354	L355	F356	G360	V361	D365	I366	I369	E370	R371	N372	R373	Q374	F375	P376	P380	M381	L384	Q390	N393	G394	R395	S396	V399	R400	K399	R400	G401	V402	Q405	D409	V410	T411	L415	L420	E336	W337	L338	F339	L340	A341	Q342			
H427	E428	V429	E432	R441	T444	V445	F446	N450	Y451	C452	D453	Q454	M455	G456	K457	K458	Y461	I462	H463	L464	Q465	G466	S467	D468	L469	R470	P471	Q472	T477	A478	V479	P480	H481	P482	M483	V484	K485	P486	M487	A488	Y489	A490	M491	T492	L493	L494	GLN	LEU	GLY	MET	MET

## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.74Å 117.54Å 200.41Å 90.00° 93.79° 90.00°	Depositor
Resolution (Å)	33.78 – 2.90	Depositor
% Data completeness (in resolution range)	99.0 (33.78-2.90)	Depositor
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.247 , 0.290	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	15082	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	98.0	wwPDB-VP

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

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	1	0.63	2/3864 (0.1%)	1.08	31/5211 (0.6%)
1	2	0.43	0/3850	0.96	17/5191 (0.3%)
1	3	0.41	0/3861	1.00	22/5208 (0.4%)
1	4	0.58	1/3830 (0.0%)	1.05	23/5166 (0.4%)
All	All	0.52	3/15405 (0.0%)	1.02	93/20776 (0.4%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	1	498	MET	SD-CE	9.89	2.04	1.79
1	1	498	MET	CG-SD	5.57	1.94	1.80
1	4	107	MET	SD-CE	5.32	1.92	1.79

The worst 5 of 93 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	35	ALA	N-CA-C	-10.71	102.41	114.62
1	1	356	PHE	N-CA-C	9.48	124.33	110.59
1	4	356	PHE	N-CA-C	8.94	123.69	110.46
1	3	356	PHE	N-CA-C	8.91	123.51	110.59
1	3	175	GLU	N-CA-C	-8.76	104.63	114.62

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	1	3781	0	3714	270	0
1	2	3768	0	3702	221	0
1	3	3778	0	3707	308	0
1	4	3747	0	3681	236	0
2	1	2	0	0	0	0
2	2	2	0	0	0	0
2	3	2	0	0	0	0
2	4	2	0	0	0	0
All	All	15082	0	14804	1035	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 35.

The worst 5 of 1035 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)
1:1:498:MET:SD	1:1:498:MET:CE	2.04	1.46
1:1:165:LEU:HG	1:1:168:GLU:HB2	1.21	1.18
1:4:185:LYS:HE3	1:4:185:LYS:HA	1.36	1.05
1:1:166:ASP:HA	1:1:170:MET:HG3	1.38	1.00
1:1:187:THR:HG22	1:1:189:SER:H	1.27	0.98

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	1	467/477 (98%)	390 (84%)	50 (11%)	27 (6%)	<b>1</b> <b>4</b>
1	2	463/477 (97%)	387 (84%)	48 (10%)	28 (6%)	<b>1</b> <b>4</b>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	3	467/477 (98%)	358 (77%)	77 (16%)	32 (7%)	1	2
1	4	462/477 (97%)	385 (83%)	49 (11%)	28 (6%)	1	4
All	All	1859/1908 (97%)	1520 (82%)	224 (12%)	115 (6%)	1	3

5 of 115 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	1	168	GLU
1	1	169	SER
1	1	172	ILE
1	1	361	VAL
1	1	372	ASN

### 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	1	407/413 (98%)	373 (92%)	34 (8%)	10	31
1	2	406/413 (98%)	382 (94%)	24 (6%)	18	48
1	3	406/413 (98%)	380 (94%)	26 (6%)	16	44
1	4	404/413 (98%)	374 (93%)	30 (7%)	13	38
All	All	1623/1652 (98%)	1509 (93%)	114 (7%)	14	40

5 of 114 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	2	477	THR
1	4	464	LEU
1	3	243	THR
1	4	463	HIS
1	4	243	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 60 such sidechains are listed below:

Mol	Chain	Res	Type
1	2	450	ASN
1	4	390	GLN
1	3	296	HIS
1	4	374	GLN
1	4	481	HIS

### 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 oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 8 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 [i](#)

There are no such residues in this entry.

### 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	2	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	2	185:LYS	C	186:VAL	N	2.86

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.