



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 28, 2020 – 09:47 pm BST

PDB ID : 2F4O  
Title : The Mouse PNGase-HR23 Complex Reveals a Complete Remodulation of the Protein-Protein Interface Compared to its Yeast Orthologs  
Authors : Zhao, G.; Zhou, X.; Wang, L.; Kisker, C.; Lennarz, W.J.; Schindelin, H.  
Deposited on : 2005-11-23  
Resolution : 2.26 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.

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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
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

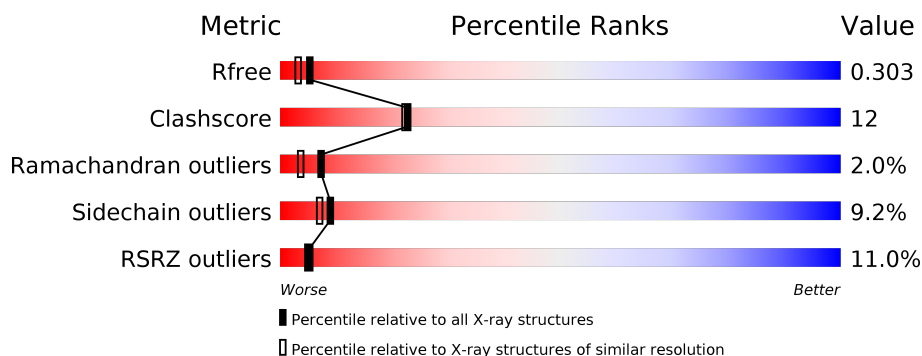
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.26 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))
$R_{free}$	130704	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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 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  $\leq 5\%$ . 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.

Mol	Chain	Length	Quality of chain
1	A	295	<div> <div>12%</div> <div> <div></div> <div>65%</div> <div>26%</div> <div>7%</div> <div></div> </div> </div>
2	B	61	<div> <div>8%</div> <div> <div></div> <div>64%</div> <div>31%</div> <div>5%</div> </div> </div>
3	I	5	<div> <div></div> <div> <div></div> <div>80%</div> <div>20%</div> </div> </div>

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 2966 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 peptide N-glycanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	290	Total	C	N	O	S	0	0	0
			2409	1520	433	441	15			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	451	LEU	-	CLONING ARTIFACT	GB 30517852
A	452	GLU	-	CLONING ARTIFACT	GB 30517852
A	453	HIS	-	EXPRESSION TAG	GB 30517852
A	454	HIS	-	EXPRESSION TAG	GB 30517852
A	455	HIS	-	EXPRESSION TAG	GB 30517852
A	456	HIS	-	EXPRESSION TAG	GB 30517852
A	457	HIS	-	EXPRESSION TAG	GB 30517852
A	458	HIS	-	EXPRESSION TAG	GB 30517852

- Molecule 2 is a protein called XP-C repair complementing complex 58 kDa protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	61	Total	C	N	O	S	0	0	0
			505	318	95	90	2			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	333	GLY	-	CLONING ARTIFACT	UNP P54728

- Molecule 3 is a protein called PHQ-VAL-ALA-ASP-CF0.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	I	5	Total	C	N	O	0	0	1
			31	21	3	7			

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total 2	Zn 2	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Cl 1	0	0

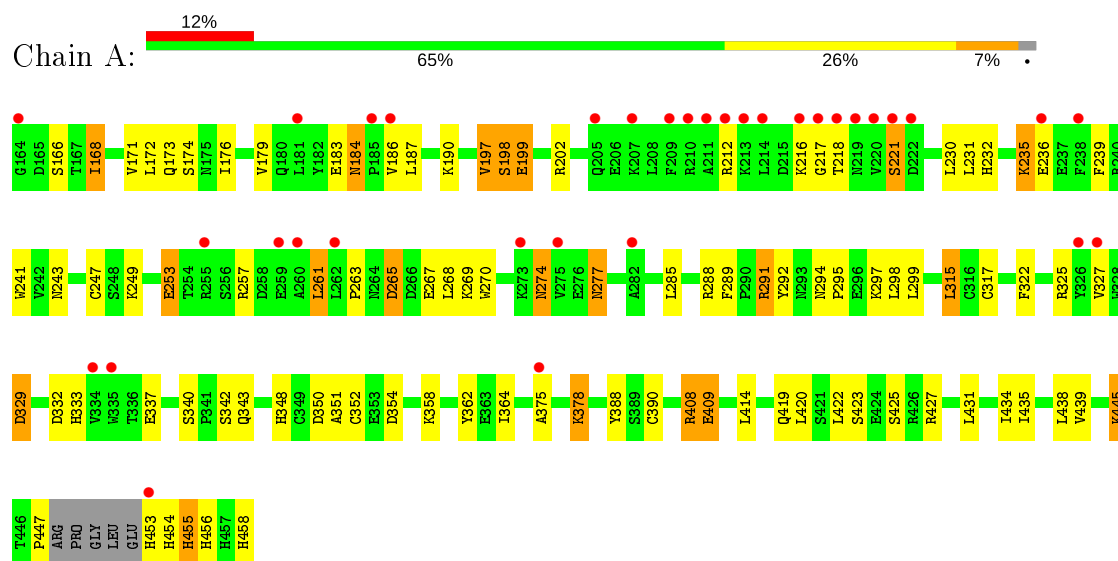
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	17	Total 17	O 17	0	0
6	B	1	Total 1	O 1	0	0

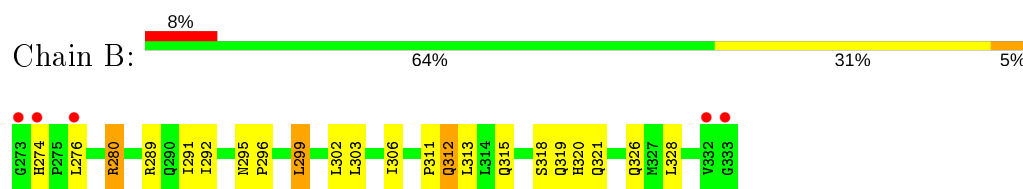
### 3 Residue-property plots [i](#)

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 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.

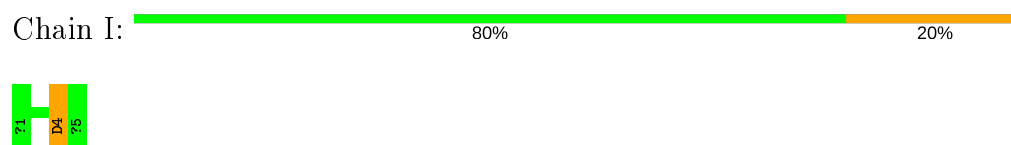
- Molecule 1: peptide N-glycanase



- Molecule 2: XP-C repair complementing complex 58 kDa protein



- Molecule 3: PHQ-VAL-ALA-ASP-CF0



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	96.96Å 52.10Å 80.85Å 90.00° 113.50° 90.00°	Depositor
Resolution (Å)	20.00 – 2.26 35.40 – 2.26	Depositor EDS
% Data completeness (in resolution range)	83.2 (20.00-2.26) 83.1 (35.40-2.26)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.59 (at 2.27Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.220 , 0.293 0.230 , 0.303	Depositor DCC
$R_{free}$ test set	740 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	44.8	Xtriage
Anisotropy	0.451	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 76.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	2966	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.35% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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: PHQ, ZN, CF0, CL

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	0.81	2/2465 (0.1%)	0.85	4/3329 (0.1%)
2	B	0.67	0/516	0.83	2/698 (0.3%)
3	I	0.91	0/19	2.05	1/25 (4.0%)
All	All	0.79	2/3000 (0.1%)	0.86	7/4052 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	199	GLU	CD-OE2	8.15	1.34	1.25
1	A	425	SER	CB-OG	5.92	1.50	1.42

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	291	ARG	NE-CZ-NH2	-7.63	116.48	120.30
2	B	280	ARG	NE-CZ-NH1	7.25	123.93	120.30
1	A	291	ARG	NE-CZ-NH1	7.25	123.92	120.30
2	B	280	ARG	NE-CZ-NH2	-6.67	116.96	120.30
3	I	4	ASP	CB-CG-OD2	6.65	124.29	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	455	HIS	Peptide

## 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	2409	0	2355	57	0
2	B	505	0	501	12	0
3	I	31	0	24	1	0
4	A	2	0	0	0	0
5	A	1	0	0	1	0
6	A	17	0	0	1	0
6	B	1	0	0	0	0
All	All	2966	0	2880	67	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 12.

The worst 5 of 67 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:176:ILE:HD11	1:A:414:LEU:HD13	1.47	0.96
1:A:176:ILE:CD1	1:A:414:LEU:HD13	2.16	0.76
1:A:327:VAL:HG21	1:A:337:GLU:HG3	1.70	0.73
1:A:184:ASN:N	1:A:184:ASN:HD22	1.87	0.72
1:A:187:LEU:HG	1:A:315:LEU:HD11	1.74	0.69

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	286/295 (97%)	258 (90%)	21 (7%)	7 (2%)	6	3
2	B	59/61 (97%)	57 (97%)	2 (3%)	0	100	100
3	I	1/5 (20%)	1 (100%)	0	0	100	100
All	All	346/361 (96%)	316 (91%)	23 (7%)	7 (2%)	7	4

5 of 7 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	217	GLY
1	A	265	ASP
1	A	454	HIS
1	A	198	SER
1	A	221	SER

### 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	268/272 (98%)	242 (90%)	26 (10%)	8	6
2	B	57/57 (100%)	53 (93%)	4 (7%)	15	13
3	I	2/2 (100%)	2 (100%)	0	100	100
All	All	327/331 (99%)	297 (91%)	30 (9%)	9	7

5 of 30 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	243	ASN
1	A	261	LEU
2	B	276	LEU
1	A	257	ARG
1	A	274	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	348	HIS
1	A	456	HIS
2	B	304	GLN
1	A	294	ASN
2	B	295	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 3 ligands modelled in this entry, 3 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 ⓘ

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	290/295 (98%)	0.82	34 (11%) 4 4	56, 64, 78, 87	0
2	B	61/61 (100%)	0.47	5 (8%) 11 12	60, 64, 73, 81	0
3	I	3/5 (60%)	0.25	0 100 100	54, 54, 55, 56	0
All	All	354/361 (98%)	0.75	39 (11%) 5 5	54, 64, 77, 87	0

The worst 5 of 39 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	209	PHE	5.7
2	B	274	HIS	5.2
1	A	218	THR	4.9
1	A	211	ALA	4.7
1	A	216	LYS	4.6

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

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

### 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	CL	A	1	1/1	0.93	0.18	80,80,80,80	0
4	ZN	A	501	1/1	0.97	0.08	68,68,68,68	0
4	ZN	A	502	1/1	0.98	0.16	62,62,62,62	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.