



# wwPDB X-ray Structure Validation Summary Report i

Mar 18, 2025 – 08:41 PM EDT

PDB ID : 1NBF  
Title : Crystal structure of a UBP-family deubiquitinating enzyme in isolation and in complex with ubiquitin aldehyde  
Authors : Hu, M.; Li, P.; Li, M.; Li, W.; Yao, T.; Wu, J.-W.; Gu, W.; Cohen, R.E.; Shi, Y.  
Deposited on : 2002-12-02  
Resolution : 2.30 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 i 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](#) i) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriaage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.41.4

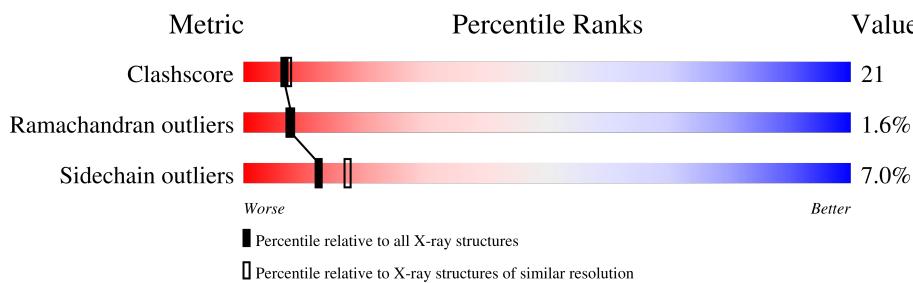
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 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	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)

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.



## 2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 9976 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 Ubiquitin carboxyl-terminal hydrolase 7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	347	Total	C	N	O	S	0	0	0
			2820	1781	482	541	16			
1	B	347	Total	C	N	O	S	0	0	0
			2820	1781	482	541	16			
1	E	340	Total	C	N	O	S	0	0	0
			2760	1745	473	526	16			

- Molecule 2 is a protein called Ubiquitin aldehyde.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	76	Total	C	N	O	S	10	0	0
			601	378	105	117	1			
2	D	76	Total	C	N	O	S	10	0	0
			601	378	105	117	1			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	376	GLZ	GLY	modified residue	UNP P62988
D	376	GLZ	GLY	modified residue	UNP P62988

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	142	Total	O	0	0
			142	142		
3	B	139	Total	O	0	0
			139	139		
3	C	31	Total	O	0	0
			31	31		
3	D	22	Total	O	0	0
			22	22		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	40	Total    O 40    40	0	0

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

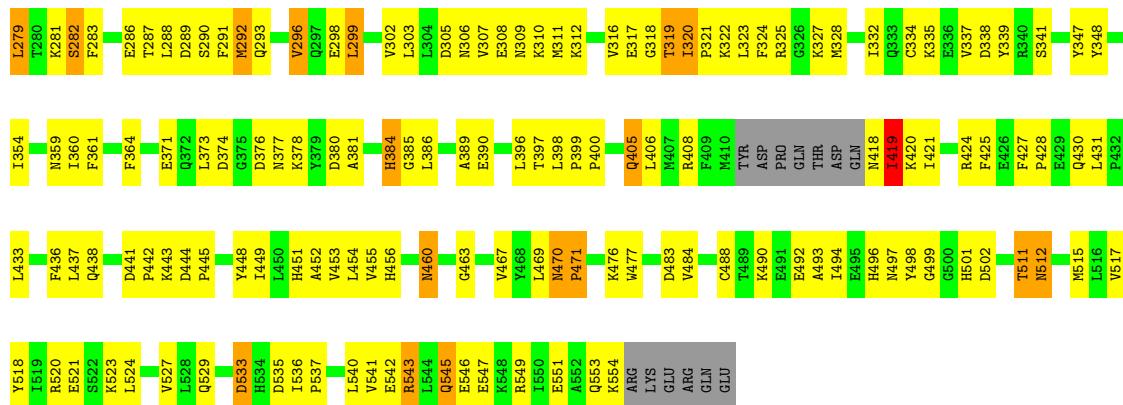
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

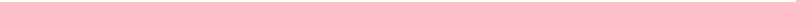
- Molecule 1: Ubiquitin carboxyl-terminal hydrolase 7

- Molecule 1: Ubiquitin carboxyl-terminal hydrolase 7

- Molecule 1: Ubiquitin carboxyl-terminal hydrolase 7



- Molecule 2: Ubiquitin aldehyde

Chain C:  75% 22% •



- Molecule 2: Ubiquitin aldehyde

Chain D:  71% 26%



## 4 Data and refinement statistics i

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

Property	Value			Source
Space group	P 21 21 21			Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	99.73 $\text{\AA}$ 90.00°	101.17 $\text{\AA}$ 90.00°	141.13 $\text{\AA}$ 90.00°	Depositor
Resolution ( $\text{\AA}$ )	20.00 – 2.30			Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.30)			Depositor
$R_{\text{merge}}$	(Not available)			Depositor
$R_{\text{sym}}$	(Not available)			Depositor
Refinement program	CNS			Depositor
$R$ , $R_{\text{free}}$	0.218 , 0.262			Depositor
Estimated twinning fraction	No twinning to report.			Xtriaze
Total number of atoms	9976			wwPDB-VP
Average B, all atoms ( $\text{\AA}^2$ )	50.0			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: GLZ

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	0.42	0/2880	0.71	4/3885 (0.1%)
1	B	0.42	0/2880	0.70	4/3885 (0.1%)
1	E	0.34	0/2817	0.61	2/3796 (0.1%)
2	C	0.39	0/603	0.67	0/811
2	D	0.37	0/603	0.67	0/811
All	All	0.39	0/9783	0.67	10/13188 (0.1%)

There are no bond length outliers.

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	554	LYS	N-CA-C	-8.61	87.74	111.00
1	B	384	HIS	N-CA-C	-7.53	90.67	111.00
1	A	505	LEU	CA-CB-CG	6.55	130.37	115.30
1	B	382	GLY	N-CA-C	-6.51	96.83	113.10
1	E	419	ILE	N-CA-C	5.99	127.17	111.00

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	A	2820	0	2753	104	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	2820	0	2753	83	0
1	E	2760	0	2706	202	0
2	C	601	0	626	15	0
2	D	601	0	626	16	0
3	A	142	0	0	7	0
3	B	139	0	0	8	0
3	C	31	0	0	2	0
3	D	22	0	0	2	0
3	E	40	0	0	13	0
All	All	9976	0	9464	402	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 21.

The worst 5 of 402 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:E:332:ILE:HB	1:E:341:SER:HB3	1.38	1.05
1:E:451:HIS:HA	1:E:470:ASN:HD21	1.27	0.96
1:A:417:GLN:HE22	1:A:461:HIS:CE1	1.83	0.95
1:E:449:ILE:HD12	1:E:524:LEU:HD11	1.45	0.95
1:A:552:ALA:C	1:A:554:LYS:H	1.70	0.94

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	345/353 (98%)	323 (94%)	18 (5%)	4 (1%)	11 12
1	B	345/353 (98%)	322 (93%)	20 (6%)	3 (1%)	14 17

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	E	336/353 (95%)	278 (83%)	46 (14%)	12 (4%)	3 1
2	C	74/76 (97%)	72 (97%)	2 (3%)	0	100 100
2	D	74/76 (97%)	73 (99%)	1 (1%)	0	100 100
All	All	1174/1211 (97%)	1068 (91%)	87 (7%)	19 (2%)	8 7

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	375	GLY
1	A	415	THR
1	B	211	THR
1	E	252	SER
1	B	375	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	314/320 (98%)	287 (91%)	27 (9%)	8 11
1	B	314/320 (98%)	290 (92%)	24 (8%)	11 14
1	E	307/320 (96%)	290 (94%)	17 (6%)	18 26
2	C	68/68 (100%)	64 (94%)	4 (6%)	16 23
2	D	68/68 (100%)	65 (96%)	3 (4%)	24 35
All	All	1071/1096 (98%)	996 (93%)	75 (7%)	12 17

5 of 75 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	371	LEU
1	E	512	ASN
1	E	211	THR
1	E	405	GLN
1	A	549	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 51 such sidechains are listed below:

Mol	Chain	Res	Type
2	C	360	ASN
1	E	269	HIS
1	E	539	GLN
2	D	340	GLN
1	E	226	ASN

### 5.3.3 RNA [\(i\)](#)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GLZ	C	376	2,1	3,3,3	2.33	1 (33%)	1,2,2	1.23	0
2	GLZ	D	376	2,1	3,3,3	2.43	1 (33%)	1,2,2	0.82	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GLZ	C	376	2,1	-	0/0/1/1	-
2	GLZ	D	376	2,1	-	0/0/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	376	GLZ	O-C	4.17	1.43	1.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	376	GLZ	O-C	4.02	1.42	1.20

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.

## 5.5 Carbohydrates [\(i\)](#)

There are no oligosaccharides in this entry.

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

There are no ligands in this entry.

## 5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

## 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.