wwPDB X-ray Structure Validation Summary Report (i)

Oct 11, 2021 – 12:33 AM EDT

PDB ID	:	2QJ0
Title	:	Structure of the yeast U-box-containing ubiquitin ligase Ufd2p
Authors	:	Tu, D.; Brunger, A.T.
Deposited on	:	2007-07-06
Resolution	:	2.65 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 following versions of software and data (see references (1)) were used in the production of this report:

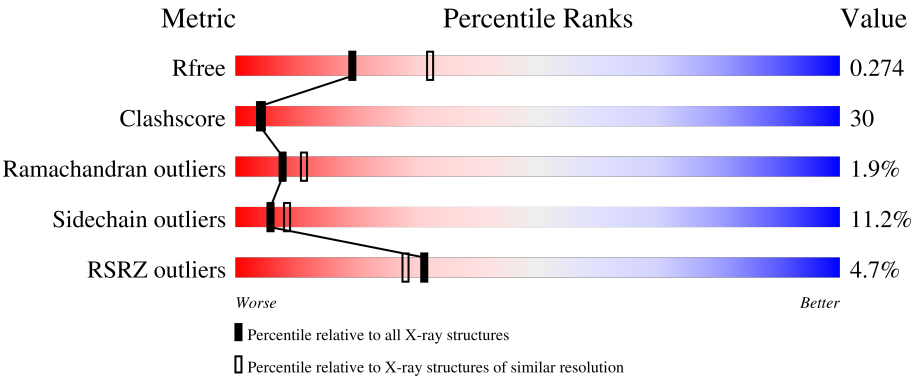
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.23.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

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 2.65 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	1332 (2.68-2.64)
Clashscore	141614	1374 (2.68-2.64)
Ramachandran outliers	138981	1349 (2.68-2.64)
Sidechain outliers	138945	1349 (2.68-2.64)
RSRZ outliers	127900	1318 (2.68-2.64)

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% 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	982	4% 49% 39% 7% 5%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 7661 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 conjugation factor E4.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	937	7567	4867	1247	1425	10	18	0	0	0

There are 41 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	GLY	-	expression tag	UNP P54860
A	-19	SER	-	expression tag	UNP P54860
A	-18	HIS	-	expression tag	UNP P54860
A	-17	MSE	-	expression tag	UNP P54860
A	-16	ALA	-	expression tag	UNP P54860
A	-15	SER	-	expression tag	UNP P54860
A	-14	MSE	-	expression tag	UNP P54860
A	-13	THR	-	expression tag	UNP P54860
A	-12	GLY	-	expression tag	UNP P54860
A	-11	GLY	-	expression tag	UNP P54860
A	-10	GLN	-	expression tag	UNP P54860
A	-9	GLN	-	expression tag	UNP P54860
A	-8	MSE	-	expression tag	UNP P54860
A	-7	GLY	-	expression tag	UNP P54860
A	-6	ARG	-	expression tag	UNP P54860
A	-5	GLY	-	expression tag	UNP P54860
A	-4	SER	-	expression tag	UNP P54860
A	-3	GLU	-	expression tag	UNP P54860
A	-2	PHE	-	expression tag	UNP P54860
A	-1	ARG	-	expression tag	UNP P54860
A	0	SER	-	expression tag	UNP P54860
A	1	MSE	MET	modified residue	UNP P54860
A	102	LEU	SER	engineered mutation	UNP P54860
A	109	MSE	MET	modified residue	UNP P54860
A	248	MSE	MET	modified residue	UNP P54860
A	282	MSE	MET	modified residue	UNP P54860
A	312	MSE	MET	modified residue	UNP P54860

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Chain	Residue	Modelled	Actual	Comment	Reference
A	407	MSE	MET	modified residue	UNP P54860
A	442	MSE	MET	modified residue	UNP P54860
A	564	MSE	MET	modified residue	UNP P54860
A	590	MSE	MET	modified residue	UNP P54860
A	600	MSE	MET	modified residue	UNP P54860
A	601	MSE	MET	modified residue	UNP P54860
A	677	VAL	ASP	engineered mutation	UNP P54860
A	680	MSE	MET	modified residue	UNP P54860
A	745	MSE	MET	modified residue	UNP P54860
A	771	MSE	MET	modified residue	UNP P54860
A	890	MSE	MET	modified residue	UNP P54860
A	894	MSE	MET	modified residue	UNP P54860
A	905	MSE	MET	modified residue	UNP P54860
A	927	MSE	MET	modified residue	UNP P54860

- Molecule 2 is water.

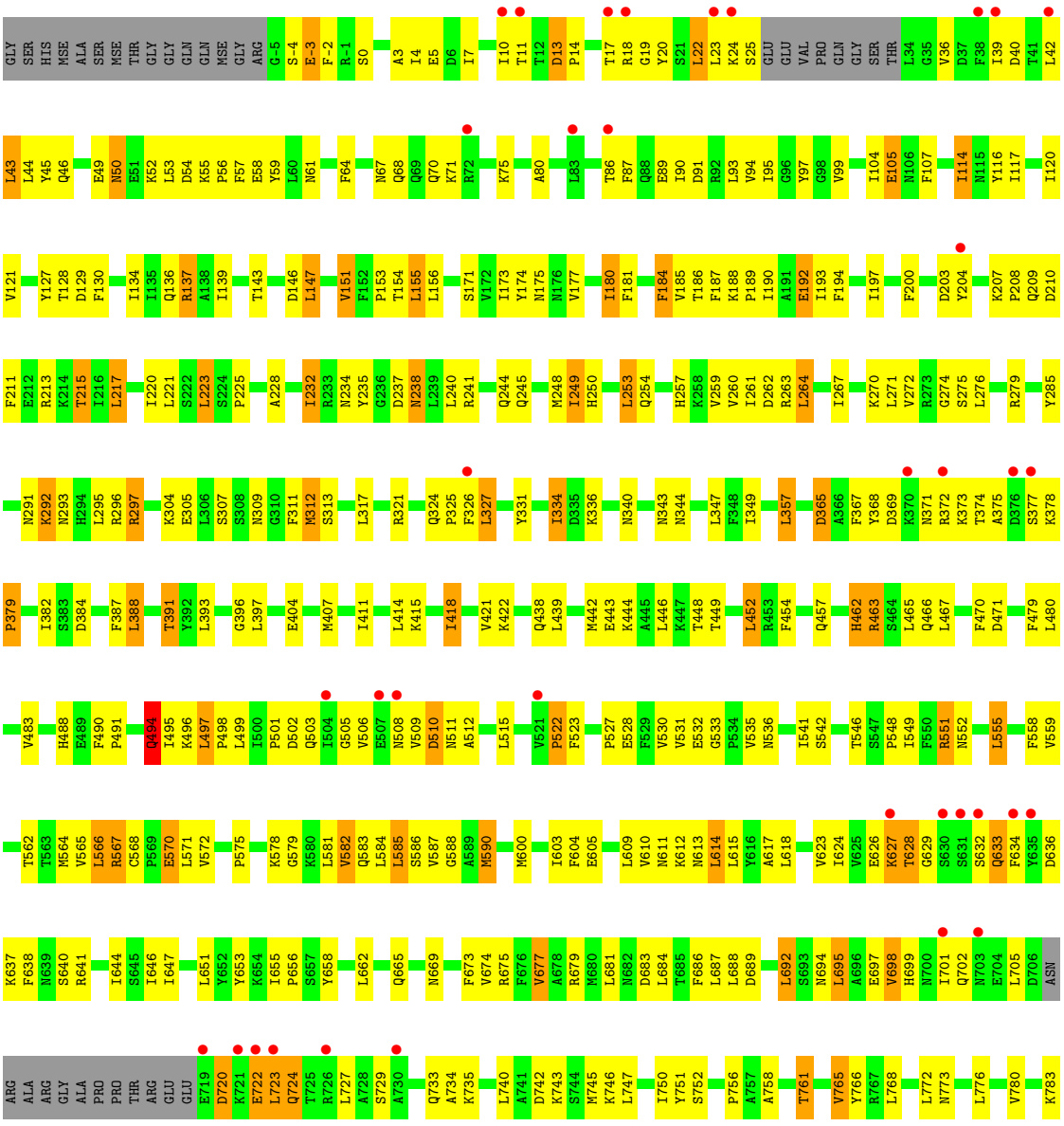
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	94	Total O 94 94	0	0

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 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: Ubiquitin conjugation factor E4

Chain A:




E786
L787
K788
V789
K790
D791
P792
Q793
S794
Y795
N798
L802
A805
L806
V809
Y810
L813
Q816
I820
S821
N833
V836
R837
A838
V839
D840
I841
L842
G843
R844
K845
T846
G847
L848
A849
S850
P851
E852
F853
I854
E855
K856
L857
L858
E866
E873
F885
M890
Y891
T892
I893
M894
K895
D896
P897
V898
I899
L900
S903
K904
M905
N906
I907
D908
R909
S910
T911
I912
K913
A914
H915
L916
D919
S920
T921
D922
P923
F924
N925
R926
N927
P928
L929
K930
L931
E932
D933
V934
T935
P936
N937
L940
R941
Q942
K943
I944
L945
C946
F947
K948
K949
Q950
K951
LYS
GLU
GLU
ALA
LYS
HIS
LYS
ALA
SER
GLU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	65.80Å 122.80Å 178.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.65 48.66 – 2.65	Depositor EDS
% Data completeness (in resolution range)	87.4 (50.00-2.65) 84.4 (48.66-2.65)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$< I/\sigma(I) >$ [1]	2.24 (at 2.65Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.234 , 0.269 0.238 , 0.274	Depositor DCC
R_{free} test set	7381 reflections (9.96%)	wwPDB-VP
Wilson B-factor (Å^2)	59.9	Xtriage
Anisotropy	0.334	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 36.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	7661	wwPDB-VP
Average B, all atoms (Å^2)	76.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.64% 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

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	0/7709	0.65	2/10390 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	633	GLN	N-CA-C	-6.06	94.64	111.00
1	A	723	LEU	CA-CB-CG	5.34	127.58	115.30

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	7567	0	7560	453	0
2	A	94	0	0	12	0
All	All	7661	0	7560	453	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 30.

The worst 5 of 453 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:114:ILE:H	1:A:114:ILE:HD12	1.10	1.13
1:A:575:PRO:HG3	1:A:628:THR:HG21	1.22	1.10
1:A:848:LEU:HD23	1:A:848:LEU:H	1.24	1.02
1:A:14:PRO:HA	1:A:22:LEU:HD21	1.45	0.99
1:A:745:MSE:HE1	1:A:806:LEU:HD13	1.41	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	A	931/982 (95%)	792 (85%)	121 (13%)	18 (2%)	8 11

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	849	ALA
1	A	931	LEU
1	A	950	GLN
1	A	105	GLU
1	A	494	GLN

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.

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	848/861 (98%)	753 (89%)	95 (11%)	6 8

5 of 95 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	567	ARG
1	A	705	LEU
1	A	582	VAL
1	A	677	VAL
1	A	740	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	665	GLN
1	A	773	ASN
1	A	724	GLN
1	A	793	GLN
1	A	234	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 monosaccharides 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

6.1 Protein, DNA and RNA chains

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^{th} 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^2)	Q<0.9
1	A	919/982 (93%)	0.06	43 (4%)	31	28	38, 71, 125, 151	0

The worst 5 of 43 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	504	ILE	7.5
1	A	24	LYS	6.0
1	A	376	ASP	5.7
1	A	789	VAL	5.6
1	A	38	PHE	5.4

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

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.