



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 8, 2023 – 07:50 am GMT

PDB ID : 8BTL  
Title : Crystal structure of a complex between the E2 conjugating enzyme UBE2A and the E3 ligase module from UBR4  
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Deposited on : 2022-11-29  
Resolution : 3.20 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
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) : 2.36

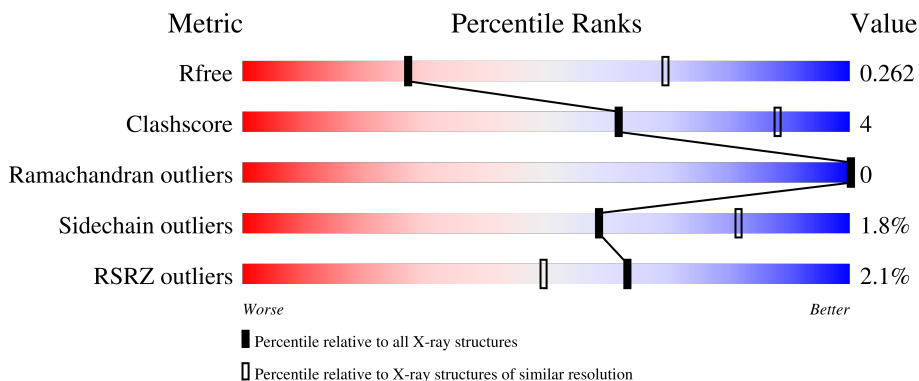
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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  $\leq 5\%$ . 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	459	 68% 8% 23%
2	C	158	 4% 82% 15%
2	D	158	 4% 80% 15% 5%

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5187 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 cDNA FLJ12511 fis, clone NT2RM2001727, highly similar to Homo sapiens ubiquitin protein ligase E3 component n-recogin 4 (UBR4), mRNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	354	2795	1794	468	521	12	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	4725	GLY	-	expression tag	UNP B3KMT2
A	4726	PRO	-	expression tag	UNP B3KMT2
A	4727	LEU	-	expression tag	UNP B3KMT2
A	4729	SER	LEU	conflict	UNP B3KMT2

- Molecule 2 is a protein called Ubiquitin conjugating enzyme E2 A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	153	1211	762	207	238	4	0	0	0
2	D	150	1180	746	200	231	3	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-5	GLY	-	expression tag	UNP A0A7N4PN18
C	-4	HIS	-	expression tag	UNP A0A7N4PN18
C	-3	MET	VAL	conflict	UNP A0A7N4PN18
C	0	SER	ASP	conflict	UNP A0A7N4PN18
C	88	LYS	CYS	conflict	UNP A0A7N4PN18
D	-5	GLY	-	expression tag	UNP A0A7N4PN18
D	-4	HIS	-	expression tag	UNP A0A7N4PN18
D	-3	MET	VAL	conflict	UNP A0A7N4PN18
D	0	SER	ASP	conflict	UNP A0A7N4PN18

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Chain	Residue	Modelled	Actual	Comment	Reference
D	88	LYS	CYS	conflict	UNP A0A7N4PN18

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Zn	0	0
			1	1		



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	89.16Å 89.16Å 263.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	65.83 – 3.20 65.83 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.6 (65.83-3.20) 99.6 (65.83-3.20)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.50 (at 3.19Å)	Xtrriage
Refinement program	PHENIX 1.17.1	Depositor
R, $R_{free}$	0.228 , 0.263 0.228 , 0.262	Depositor DCC
$R_{free}$ test set	970 reflections (5.30%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	84.0	Xtrriage
Anisotropy	0.538	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 32.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	5187	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	82.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% 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 [i](#)

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

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

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	0.24	0/2866	0.39	0/3900
2	C	0.24	0/1243	0.40	0/1694
2	D	0.24	0/1212	0.39	0/1655
All	All	0.24	0/5321	0.39	0/7249

There are no bond length outliers.

There are no bond angle outliers.

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	2795	0	2720	21	0
2	C	1211	0	1154	14	0
2	D	1180	0	1115	12	0
3	A	1	0	0	0	0
All	All	5187	0	4989	45	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 4.

All (45) 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)
2:D:80:ASN:HD21	2:D:117:ASN:HB2	1.57	0.69
2:D:88:LYS:HA	2:D:93:GLN:HE22	1.67	0.58
1:A:5047:PRO:HD2	1:A:5050:GLN:HG3	1.85	0.57
2:D:89:LEU:HD13	2:D:112:LEU:HD22	1.89	0.55
2:C:8:ARG:HE	2:C:64:PRO:HG3	1.73	0.54
1:A:5054:THR:HG22	1:A:5058:ILE:HG13	1.89	0.54
2:C:6:ARG:HA	2:C:9:LEU:HB2	1.90	0.54
1:A:5042:ALA:HB1	1:A:5046:LEU:HD12	1.92	0.52
2:D:43:PRO:O	2:D:46:THR:OG1	2.27	0.51
1:A:4833:GLU:HB3	1:A:4837:THR:HG22	1.93	0.51
1:A:4884:ASN:ND2	1:A:4911:ASN:OD1	2.36	0.51
2:D:28:PRO:HG3	2:D:36:TRP:CE2	2.46	0.51
2:C:39:VAL:HG22	2:C:54:LYS:HG2	1.93	0.50
1:A:4930:SER:HB2	2:D:93:GLN:HE21	1.77	0.50
1:A:4965:PHE:HE1	1:A:4990:ILE:HD12	1.77	0.50
1:A:4868:GLU:O	1:A:4873:LYS:NZ	2.35	0.49
2:D:8:ARG:NH2	2:D:100:TYR:O	2.46	0.49
1:A:5112:THR:HG23	1:A:5113:SER:H	1.78	0.48
2:C:42:GLY:HA3	2:C:48:PHE:O	2.14	0.48
2:C:57:ILE:HG23	2:C:70:VAL:HG22	1.95	0.47
2:D:29:SER:OG	2:D:32:ASN:O	2.32	0.47
1:A:5110:VAL:HG22	1:A:5126:TYR:CG	2.49	0.47
1:A:5159:LEU:HD12	1:A:5171:PRO:HB3	1.97	0.47
2:C:46:THR:HG21	2:C:114:ASP:HA	1.97	0.47
2:D:79:PRO:HB3	2:D:127:ALA:HB2	1.97	0.47
1:A:4987:ILE:HG12	1:A:5142:LEU:HB2	1.97	0.47
2:C:6:ARG:NH1	2:C:61:GLU:OE2	2.48	0.46
2:C:8:ARG:HH12	2:C:101:ASP:HB3	1.81	0.46
1:A:4901:ARG:HH21	1:A:4906:SER:HA	1.82	0.44
1:A:4957:ASN:O	1:A:4961:ILE:HG13	2.17	0.44
1:A:5079:LEU:HD23	1:A:5079:LEU:HA	1.83	0.43
1:A:5028:SER:OG	1:A:5061:ARG:NH2	2.52	0.43
2:D:42:GLY:HA3	2:D:48:PHE:O	2.18	0.42
1:A:4882:HIS:HD2	1:A:4914:THR:HG21	1.84	0.42
1:A:4842:ARG:HH21	2:C:101:ASP:HB3	1.85	0.42
2:D:63:TYR:CD1	2:D:64:PRO:HA	2.55	0.41
2:D:88:LYS:HA	2:D:93:GLN:NE2	2.32	0.41
2:C:91:ILE:HG23	2:C:100:TYR:CE2	2.56	0.41
1:A:4901:ARG:NH2	1:A:4906:SER:HA	2.36	0.41
2:C:5:ALA:O	2:C:6:ARG:HB2	2.21	0.41
2:C:92:LEU:HD21	2:C:105:ILE:HG23	2.03	0.41
1:A:5055:ARG:HB3	1:A:5097:TRP:HZ2	1.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:28:PRO:HG3	2:C:36:TRP:CE2	2.56	0.40
2:C:94:ASN:OD1	2:C:95:ARG:HG2	2.20	0.40
1:A:5048:PRO:O	1:A:5052:ARG:HG2	2.22	0.40

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	352/459 (77%)	336 (96%)	16 (4%)	0	100	100
2	C	151/158 (96%)	144 (95%)	7 (5%)	0	100	100
2	D	148/158 (94%)	143 (97%)	5 (3%)	0	100	100
All	All	651/775 (84%)	623 (96%)	28 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 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	298/393 (76%)	292 (98%)	6 (2%)	55	80
2	C	134/141 (95%)	133 (99%)	1 (1%)	84	94
2	D	129/141 (92%)	126 (98%)	3 (2%)	50	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	561/675 (83%)	551 (98%)	10 (2%)	59 82

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4846	LYS
1	A	4888	TYR
1	A	4901	ARG
1	A	4910	GLN
1	A	5033	ASP
1	A	5079	LEU
2	C	150	ARG
2	D	13	PHE
2	D	90	ASP
2	D	147	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	D	93	GLN

### 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](#)

Of 1 ligands modelled in this entry, 1 is 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

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	354/459 (77%)	0.12	0 <span style="border: 1px solid blue; padding: 2px;">100</span> <span style="border: 1px solid blue; padding: 2px;">100</span>	55, 74, 101, 142	0
2	C	153/158 (96%)	0.64	7 (4%) <span style="border: 1px solid red; padding: 2px;">32</span> <span style="border: 1px solid red; padding: 2px;">20</span>	63, 90, 119, 130	0
2	D	150/158 (94%)	0.53	7 (4%) <span style="border: 1px solid red; padding: 2px;">31</span> <span style="border: 1px solid red; padding: 2px;">19</span>	66, 81, 105, 116	0
All	All	657/775 (84%)	0.33	14 (2%) <span style="border: 1px solid blue; padding: 2px;">63</span> <span style="border: 1px solid gray; padding: 2px;">49</span>	55, 79, 111, 142	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	151	ASP	3.7
2	D	53	PHE	3.3
2	C	77	PHE	3.2
2	D	52	THR	2.8
2	D	41	PHE	2.8
2	D	48	PHE	2.8
2	D	39	VAL	2.4
2	C	133	ASN	2.4
2	C	106	LEU	2.2
2	D	40	ILE	2.2
2	C	131	GLN	2.1
2	C	92	LEU	2.1
2	D	132	GLU	2.0
2	C	18	GLU	2.0

### 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](#)

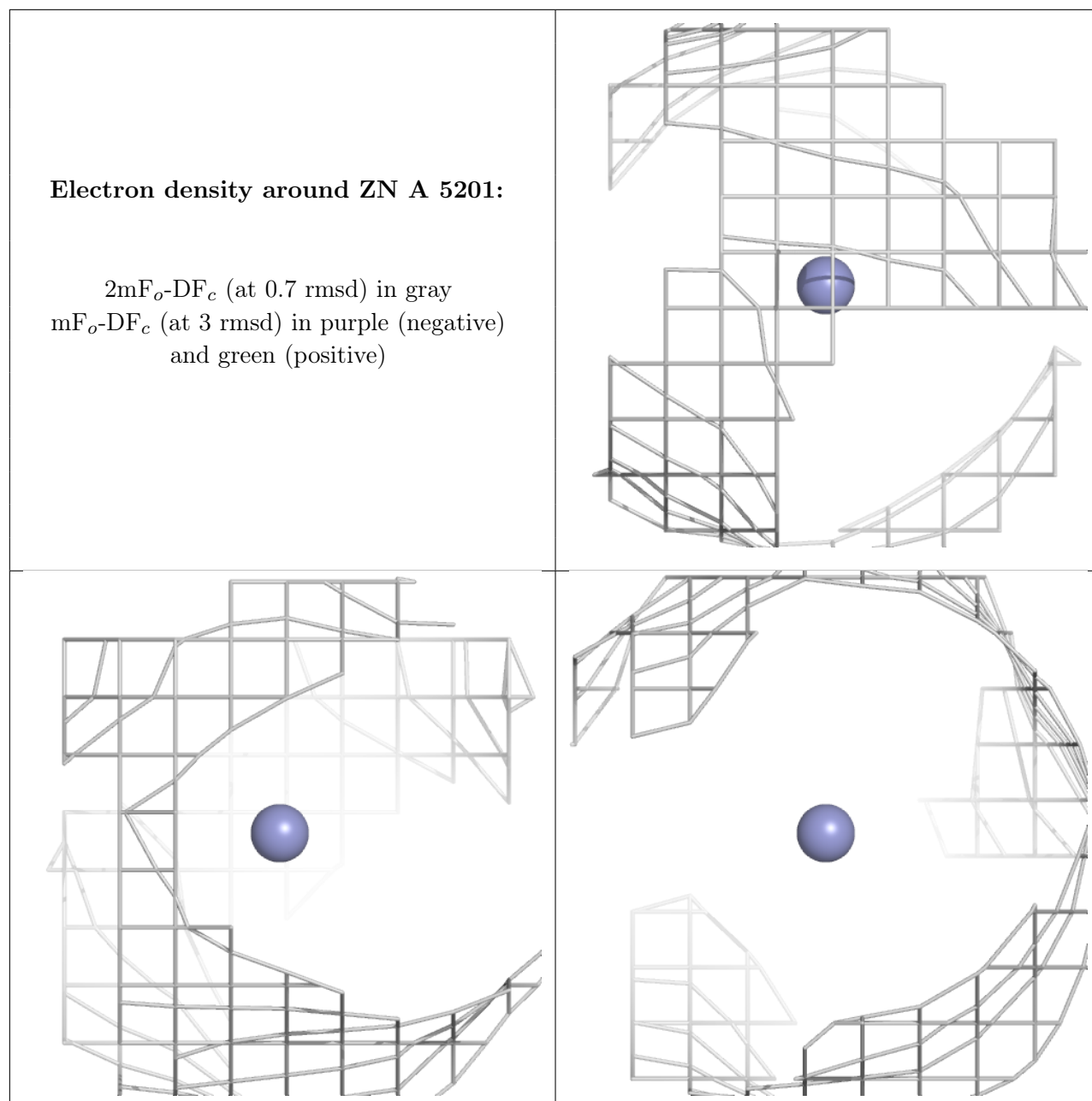
There are no monosaccharides in this entry.

### 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
3	ZN	A	5201	1/1	0.99	0.23	63,63,63,63	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.