



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 14, 2017 – 08:31 am GMT

PDB ID : 4PNM  
Title : Crystal Structure of human Tankyrase 2 in complex with Nu1025.  
Authors : Qiu, W.; Lam, R.; Romanov, V.; Gordon, R.; Gebremeskel, S.; Vodsedalek, J.; Thompson, C.; Beletskaya, I.; Battaile, K.P.; Pai, E.F.; Chirgadze, N.Y.  
Deposited on : 2014-05-23  
Resolution : 2.19 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

<http://wwpdb.org/validation/2016/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	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

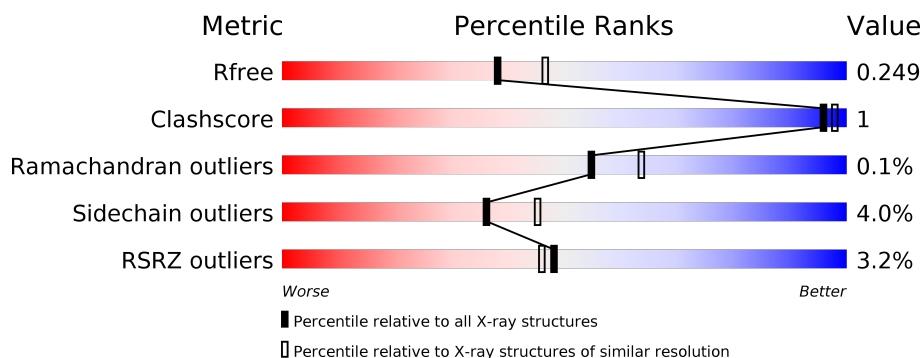
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.19 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))
$R_{free}$	100719	4002 (2.20-2.20)
Clashscore	112137	4730 (2.20-2.20)
Ramachandran outliers	110173	4656 (2.20-2.20)
Sidechain outliers	110143	4657 (2.20-2.20)
RSRZ outliers	101464	4033 (2.20-2.20)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	227	<div> <div>2%</div> <div> <div></div> <div>82%</div> <div>5%</div> <div>12%</div> </div> </div>
1	B	227	<div> <div>4%</div> <div> <div></div> <div>85%</div> <div>7%</div> <div>8%</div> </div> </div>
1	C	227	<div> <div>%</div> <div> <div></div> <div>84%</div> <div>8%</div> <div>7%</div> </div> </div>
1	D	227	<div> <div>4%</div> <div> <div></div> <div>84%</div> <div>•</div> <div>13%</div> </div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	EDO	C	1203	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6993 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 Tankyrase-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	199	Total	C	N	O	S	0	0	0
			1598	1007	296	284	11			
1	B	209	Total	C	N	O	S	0	1	0
			1694	1069	309	305	11			
1	C	210	Total	C	N	O	S	0	1	0
			1710	1078	314	307	11			
1	D	197	Total	C	N	O	S	0	1	0
			1583	998	294	280	11			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	938	MET	-	initiating methionine	UNP Q9H2K2
A	939	GLY	-	expression tag	UNP Q9H2K2
A	940	SER	-	expression tag	UNP Q9H2K2
A	941	SER	-	expression tag	UNP Q9H2K2
A	942	HIS	-	expression tag	UNP Q9H2K2
A	943	HIS	-	expression tag	UNP Q9H2K2
A	944	HIS	-	expression tag	UNP Q9H2K2
A	945	HIS	-	expression tag	UNP Q9H2K2
A	946	HIS	-	expression tag	UNP Q9H2K2
A	947	HIS	-	expression tag	UNP Q9H2K2
A	948	SER	-	expression tag	UNP Q9H2K2
A	949	SER	-	expression tag	UNP Q9H2K2
A	950	GLY	-	expression tag	UNP Q9H2K2
A	951	ARG	-	expression tag	UNP Q9H2K2
A	952	GLU	-	expression tag	UNP Q9H2K2
A	953	ASN	-	expression tag	UNP Q9H2K2
A	954	LEU	-	expression tag	UNP Q9H2K2
A	955	TYR	-	expression tag	UNP Q9H2K2
A	956	PHE	-	expression tag	UNP Q9H2K2
A	957	GLN	-	expression tag	UNP Q9H2K2
A	958	GLY	-	expression tag	UNP Q9H2K2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	938	MET	-	initiating methionine	UNP Q9H2K2
B	939	GLY	-	expression tag	UNP Q9H2K2
B	940	SER	-	expression tag	UNP Q9H2K2
B	941	SER	-	expression tag	UNP Q9H2K2
B	942	HIS	-	expression tag	UNP Q9H2K2
B	943	HIS	-	expression tag	UNP Q9H2K2
B	944	HIS	-	expression tag	UNP Q9H2K2
B	945	HIS	-	expression tag	UNP Q9H2K2
B	946	HIS	-	expression tag	UNP Q9H2K2
B	947	HIS	-	expression tag	UNP Q9H2K2
B	948	SER	-	expression tag	UNP Q9H2K2
B	949	SER	-	expression tag	UNP Q9H2K2
B	950	GLY	-	expression tag	UNP Q9H2K2
B	951	ARG	-	expression tag	UNP Q9H2K2
B	952	GLU	-	expression tag	UNP Q9H2K2
B	953	ASN	-	expression tag	UNP Q9H2K2
B	954	LEU	-	expression tag	UNP Q9H2K2
B	955	TYR	-	expression tag	UNP Q9H2K2
B	956	PHE	-	expression tag	UNP Q9H2K2
B	957	GLN	-	expression tag	UNP Q9H2K2
B	958	GLY	-	expression tag	UNP Q9H2K2
C	938	MET	-	initiating methionine	UNP Q9H2K2
C	939	GLY	-	expression tag	UNP Q9H2K2
C	940	SER	-	expression tag	UNP Q9H2K2
C	941	SER	-	expression tag	UNP Q9H2K2
C	942	HIS	-	expression tag	UNP Q9H2K2
C	943	HIS	-	expression tag	UNP Q9H2K2
C	944	HIS	-	expression tag	UNP Q9H2K2
C	945	HIS	-	expression tag	UNP Q9H2K2
C	946	HIS	-	expression tag	UNP Q9H2K2
C	947	HIS	-	expression tag	UNP Q9H2K2
C	948	SER	-	expression tag	UNP Q9H2K2
C	949	SER	-	expression tag	UNP Q9H2K2
C	950	GLY	-	expression tag	UNP Q9H2K2
C	951	ARG	-	expression tag	UNP Q9H2K2
C	952	GLU	-	expression tag	UNP Q9H2K2
C	953	ASN	-	expression tag	UNP Q9H2K2
C	954	LEU	-	expression tag	UNP Q9H2K2
C	955	TYR	-	expression tag	UNP Q9H2K2
C	956	PHE	-	expression tag	UNP Q9H2K2
C	957	GLN	-	expression tag	UNP Q9H2K2
C	958	GLY	-	expression tag	UNP Q9H2K2

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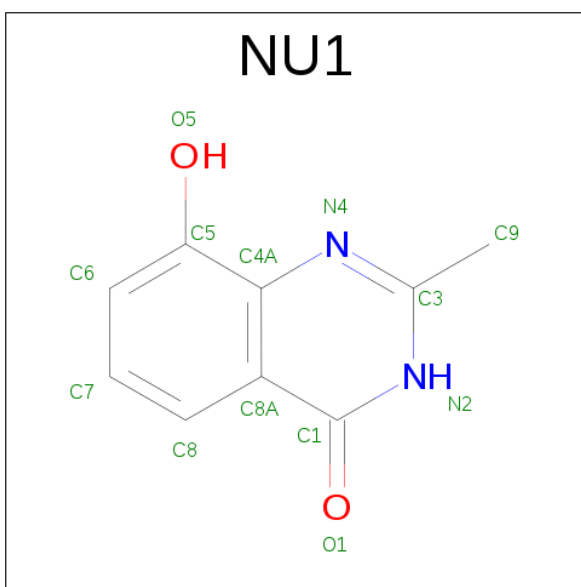
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Chain	Residue	Modelled	Actual	Comment	Reference
D	938	MET	-	initiating methionine	UNP Q9H2K2
D	939	GLY	-	expression tag	UNP Q9H2K2
D	940	SER	-	expression tag	UNP Q9H2K2
D	941	SER	-	expression tag	UNP Q9H2K2
D	942	HIS	-	expression tag	UNP Q9H2K2
D	943	HIS	-	expression tag	UNP Q9H2K2
D	944	HIS	-	expression tag	UNP Q9H2K2
D	945	HIS	-	expression tag	UNP Q9H2K2
D	946	HIS	-	expression tag	UNP Q9H2K2
D	947	HIS	-	expression tag	UNP Q9H2K2
D	948	SER	-	expression tag	UNP Q9H2K2
D	949	SER	-	expression tag	UNP Q9H2K2
D	950	GLY	-	expression tag	UNP Q9H2K2
D	951	ARG	-	expression tag	UNP Q9H2K2
D	952	GLU	-	expression tag	UNP Q9H2K2
D	953	ASN	-	expression tag	UNP Q9H2K2
D	954	LEU	-	expression tag	UNP Q9H2K2
D	955	TYR	-	expression tag	UNP Q9H2K2
D	956	PHE	-	expression tag	UNP Q9H2K2
D	957	GLN	-	expression tag	UNP Q9H2K2
D	958	GLY	-	expression tag	UNP Q9H2K2

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

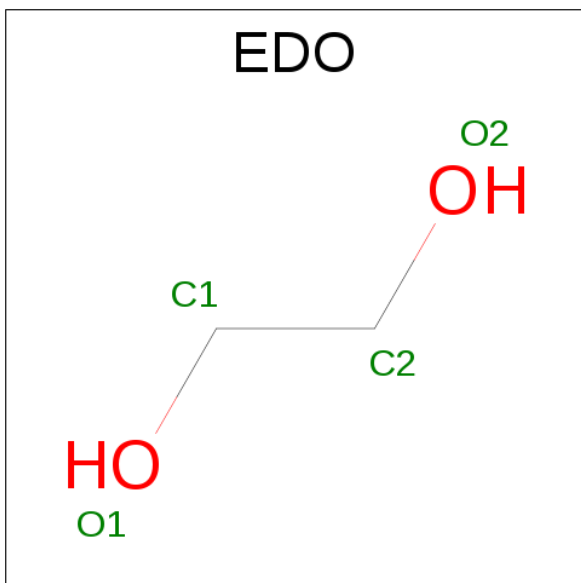
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Zn 1 1	0	0
2	A	1	Total Zn 1 1	0	0
2	D	1	Total Zn 1 1	0	0
2	C	1	Total Zn 1 1	0	0

- Molecule 3 is 8-HYDROXY-2-METHYL-3-HYDRO-QUINAZOLIN-4-ONE (three-letter code: NU1) (formula: C<sub>9</sub>H<sub>8</sub>N<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			13	9	2	2		
3	B	1	Total	C	N	O	0	0
			13	9	2	2		
3	C	1	Total	C	N	O	0	0
			13	9	2	2		
3	D	1	Total	C	N	O	0	0
			13	9	2	2		

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula:  $C_2H_6O_2$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0

- Molecule 5 is water.

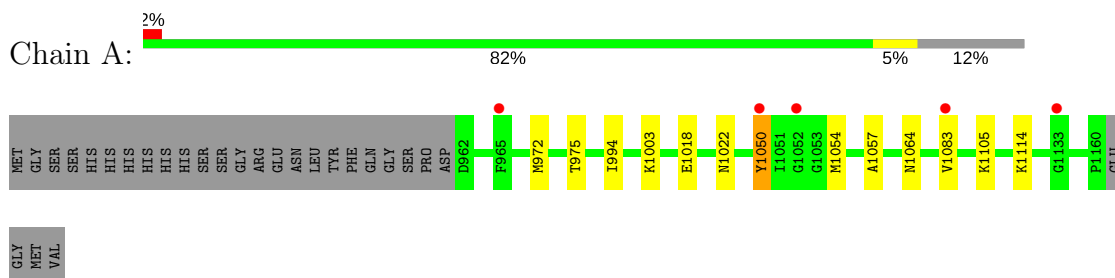
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	86	Total O 86 86	0	0
5	B	88	Total O 88 88	0	0
5	C	101	Total O 101 101	0	0
5	D	69	Total O 69 69	0	0



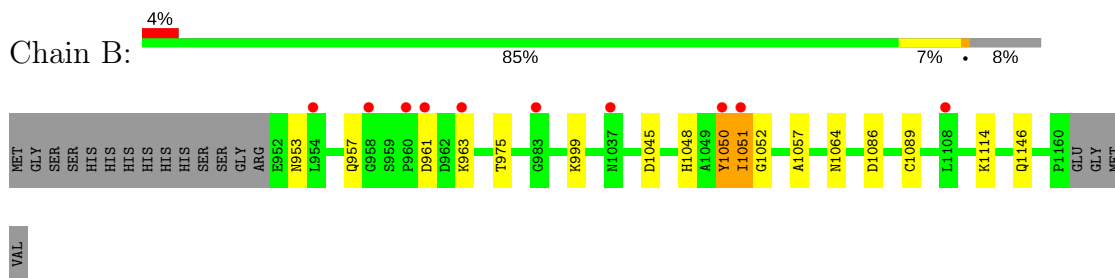
### 3 Residue-property plots [i](#)

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.

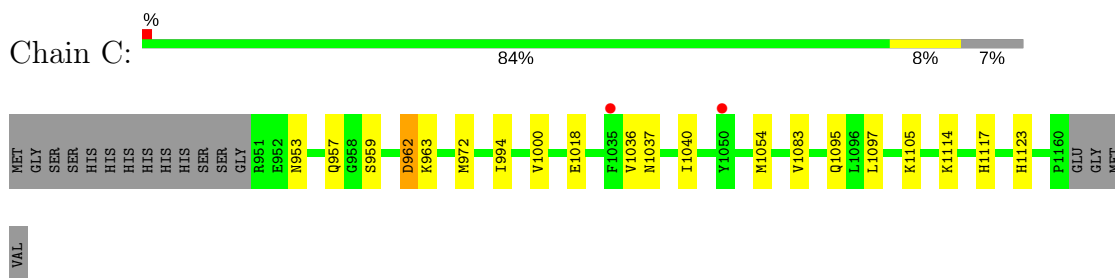
#### • Molecule 1: Tankyrase-2



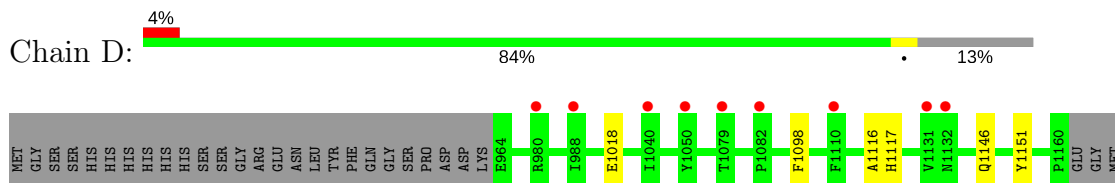
#### • Molecule 1: Tankyrase-2



#### • Molecule 1: Tankyrase-2



#### • Molecule 1: Tankyrase-2



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## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	72.96Å 79.25Å 153.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	76.92 – 2.19 76.92 – 2.19	Depositor EDS
% Data completeness (in resolution range)	99.8 (76.92-2.19) 99.8 (76.92-2.19)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.47 (at 2.18Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, $R_{free}$	0.203 , 0.244 0.209 , 0.249	Depositor DCC
$R_{free}$ test set	1070 reflections (2.35%)	DCC
Wilson B-factor (Å <sup>2</sup> )	33.0	Xtriage
Anisotropy	0.845	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 45.7	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	0.95	EDS
Total number of atoms	6993	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.49% 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, EDO, NU1

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	0.36	0/1641	0.57	0/2207
1	B	0.37	0/1741	0.62	0/2342
1	C	0.36	0/1757	0.58	0/2363
1	D	0.36	0/1630	0.56	0/2195
All	All	0.36	0/6769	0.58	0/9107

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	B	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	1050[B]	TYR	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	1598	0	1528	4	0
1	B	1694	0	1606	6	0
1	C	1710	0	1630	7	0
1	D	1583	0	1505	3	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	13	0	7	0	0
3	B	13	0	7	0	0
3	C	13	0	7	0	0
3	D	13	0	7	0	0
4	C	4	0	6	0	0
4	D	4	0	6	0	0
5	A	86	0	0	0	0
5	B	88	0	0	0	0
5	C	101	0	0	0	0
5	D	69	0	0	0	0
All	All	6993	0	6309	17	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 1.

All (17) 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:C:1105:LYS:H	1:C:1123:HIS:HD2	1.39	0.69
1:C:1040:ILE:HD11	1:C:1097:LEU:HD21	1.77	0.67
1:A:1050:TYR:H	1:A:1050:TYR:HD2	1.43	0.65
1:C:972:MET:HG2	1:C:994:ILE:HD11	1.88	0.56
1:C:1000:VAL:HG21	1:C:1040:ILE:HD12	1.88	0.54
1:B:1057:ALA:O	1:D:1117:HIS:HE1	1.92	0.52
1:C:1037:ASN:HD21	1:C:1095:GLN:HE22	1.58	0.52
1:A:1057:ALA:O	1:C:1117:HIS:HE1	1.91	0.52
1:B:1045:ASP:HB3	1:B:1048:HIS:HD2	1.77	0.50
1:D:1098:PHE:HB3	1:D:1151:TYR:HB2	1.95	0.48
1:C:959:SER:HB2	1:C:962:ASP:HB2	1.98	0.45
1:A:972:MET:HG2	1:A:994:ILE:HD11	1.98	0.45
1:B:1086:ASP:HB3	1:B:1089:CYS:HB2	1.99	0.44
1:B:975:THR:HB	1:B:1064:ASN:HA	2.01	0.43
1:A:975:THR:HB	1:A:1064:ASN:HA	2.02	0.42
1:B:1051:ILE:HG12	1:D:1116:ALA:HB2	2.02	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	197/227 (87%)	193 (98%)	4 (2%)	0	100	100
1	B	208/227 (92%)	202 (97%)	5 (2%)	1 (0%)	32	34
1	C	209/227 (92%)	203 (97%)	6 (3%)	0	100	100
1	D	196/227 (86%)	191 (97%)	5 (3%)	0	100	100
All	All	810/908 (89%)	789 (97%)	20 (2%)	1 (0%)	55	63

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	1114	LYS

### 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	166/192 (86%)	158 (95%)	8 (5%)	30	36
1	B	176/192 (92%)	167 (95%)	9 (5%)	28	33
1	C	179/192 (93%)	170 (95%)	9 (5%)	28	34
1	D	164/192 (85%)	162 (99%)	2 (1%)	75	86
All	All	685/768 (89%)	657 (96%)	28 (4%)	36	44

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1003	LYS
1	A	1018	GLU
1	A	1022	ASN
1	A	1050	TYR
1	A	1054	MET
1	A	1083	VAL
1	A	1105	LYS
1	A	1114	LYS
1	B	953	ASN
1	B	957	GLN
1	B	961	ASP
1	B	963	LYS
1	B	999	LYS
1	B	1050[A]	TYR
1	B	1050[B]	TYR
1	B	1051	ILE
1	B	1146	GLN
1	C	953	ASN
1	C	957	GLN
1	C	962	ASP
1	C	963	LYS
1	C	1018	GLU
1	C	1036	VAL
1	C	1054	MET
1	C	1083	VAL
1	C	1114	LYS
1	D	1018	GLU
1	D	1146	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1048	HIS
1	A	1156	GLN
1	B	1048	HIS
1	B	1156	GLN
1	C	1048	HIS
1	C	1095	GLN
1	C	1117	HIS
1	C	1123	HIS
1	C	1156	GLN

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Mol	Chain	Res	Type
1	D	984	HIS
1	D	1023	HIS
1	D	1109	GLN
1	D	1117	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 carbohydrates in this entry.

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

Of 10 ligands modelled in this entry, 4 are monoatomic - leaving 6 for Mogul analysis.

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	$\# Z  > 2$
3	NU1	A	1202	-	13,14,14	1.72	2 (15%)	17,20,20	2.93	7 (41%)
3	NU1	B	1202	-	13,14,14	1.93	2 (15%)	17,20,20	2.95	6 (35%)
3	NU1	C	1201	-	13,14,14	1.83	2 (15%)	17,20,20	2.90	5 (29%)
4	EDO	C	1203	-	3,3,3	0.60	0	2,2,2	0.35	0
3	NU1	D	1201	-	13,14,14	1.94	2 (15%)	17,20,20	2.90	5 (29%)
4	EDO	D	1203	-	3,3,3	0.57	0	2,2,2	0.35	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
3	NU1	A	1202	-	-	0/0/0/0	0/2/2/2
3	NU1	B	1202	-	-	0/0/0/0	0/2/2/2
3	NU1	C	1201	-	-	0/0/0/0	0/2/2/2
4	EDO	C	1203	-	-	0/1/1/1	0/0/0/0
3	NU1	D	1201	-	-	0/0/0/0	0/2/2/2
4	EDO	D	1203	-	-	0/1/1/1	0/0/0/0

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1202	NU1	C3-N2	3.72	1.40	1.34
3	A	1202	NU1	C1-N2	3.93	1.40	1.33
3	C	1201	NU1	C3-N2	3.98	1.41	1.34
3	D	1201	NU1	C3-N2	4.11	1.41	1.34
3	C	1201	NU1	C1-N2	4.20	1.40	1.33
3	B	1202	NU1	C3-N2	4.21	1.41	1.34
3	B	1202	NU1	C1-N2	4.56	1.41	1.33
3	D	1201	NU1	C1-N2	4.67	1.41	1.33

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1202	NU1	C8A-C1-N2	-7.86	118.91	124.45
3	B	1202	NU1	C8A-C1-N2	-7.58	119.11	124.45
3	C	1201	NU1	C8A-C1-N2	-7.49	119.17	124.45
3	D	1201	NU1	C8A-C1-N2	-6.99	119.52	124.45
3	C	1201	NU1	N4-C3-N2	-2.83	119.88	125.60
3	B	1202	NU1	N4-C3-N2	-2.82	119.89	125.60
3	A	1202	NU1	N4-C3-N2	-2.82	119.90	125.60
3	D	1201	NU1	N4-C3-N2	-2.77	120.00	125.60
3	D	1201	NU1	C8A-C4A-N4	-2.44	120.50	123.41
3	B	1202	NU1	C8A-C4A-N4	-2.35	120.61	123.41
3	A	1202	NU1	C8A-C4A-N4	-2.29	120.68	123.41
3	C	1201	NU1	C8A-C4A-N4	-2.26	120.71	123.41
3	A	1202	NU1	C8-C8A-C4A	2.03	119.96	118.16
3	B	1202	NU1	C9-C3-N2	2.09	120.62	117.20
3	B	1202	NU1	C5-C4A-N4	2.09	119.54	117.33
3	D	1201	NU1	C5-C4A-N4	2.20	119.66	117.33
3	C	1201	NU1	C5-C4A-N4	2.26	119.72	117.33
3	A	1202	NU1	C9-C3-N4	2.28	120.95	117.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1202	NU1	C5-C4A-N4	2.46	119.93	117.33
3	A	1202	NU1	C3-N4-C4A	7.13	121.39	115.32
3	C	1201	NU1	C3-N4-C4A	7.51	121.72	115.32
3	B	1202	NU1	C3-N4-C4A	7.84	122.00	115.32
3	D	1201	NU1	C3-N4-C4A	8.01	122.14	115.32

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](#)

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<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	199/227 (87%)	0.18	5 (2%) 58 55	28, 41, 60, 76	0
1	B	209/227 (92%)	0.25	10 (4%) 31 30	26, 41, 64, 77	0
1	C	210/227 (92%)	0.14	2 (0%) 82 81	26, 39, 58, 82	0
1	D	197/227 (86%)	0.29	9 (4%) 33 32	28, 45, 68, 90	0
All	All	815/908 (89%)	0.21	26 (3%) 48 46	26, 41, 64, 90	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	1050	TYR	6.4
1	B	1050[A]	TYR	4.8
1	A	1050	TYR	4.7
1	B	1051	ILE	4.0
1	C	1050[A]	TYR	3.8
1	D	1082	PRO	3.2
1	D	1131	VAL	2.9
1	B	958	GLY	2.8
1	D	980	ARG	2.7
1	B	954	LEU	2.7
1	D	1040	ILE	2.6
1	B	963	LYS	2.5
1	D	1110	PHE	2.5
1	B	1037	ASN	2.4
1	B	1108	LEU	2.3
1	A	1083	VAL	2.3
1	B	961	ASP	2.3
1	D	1132	ASN	2.2
1	A	1052	GLY	2.2
1	B	983	GLY	2.2
1	C	1035	PHE	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	988	ILE	2.1
1	A	1133	GLY	2.1
1	A	965	PHE	2.1
1	D	1079	THR	2.1
1	B	960	PRO	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 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
4	EDO	C	1203	4/4	0.69	0.23	6.13	47,49,50,51	0
4	EDO	D	1203	4/4	0.58	0.24	1.58	75,75,75,76	0
3	NU1	A	1202	13/13	0.96	0.14	0.06	29,30,31,31	0
3	NU1	C	1201	13/13	0.96	0.12	-0.43	31,33,33,34	0
3	NU1	B	1202	13/13	0.96	0.11	-0.78	30,30,31,32	0
3	NU1	D	1201	13/13	0.95	0.11	-1.01	30,32,33,33	0
2	ZN	A	1201	1/1	0.97	0.10	-1.02	46,46,46,46	0
2	ZN	B	1201	1/1	0.98	0.10	-1.17	58,58,58,58	0
2	ZN	D	1202	1/1	0.97	0.10	-1.76	55,55,55,55	0
2	ZN	C	1202	1/1	0.98	0.08	-	49,49,49,49	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.