



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 25, 2023 – 08:40 PM EDT

PDB ID : 6BN9  
Title : Crystal structure of DDB1-CRBN-BRD4(BD1) complex bound to dBET70 PROTAC  
Authors : Nowak, R.P.; DeAngelo, S.L.; Buckley, D.; Bradner, J.E.; Fischer, E.S.  
Deposited on : 2017-11-16  
Resolution : 4.38 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 : 2.35.1  
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) : 2.35.1

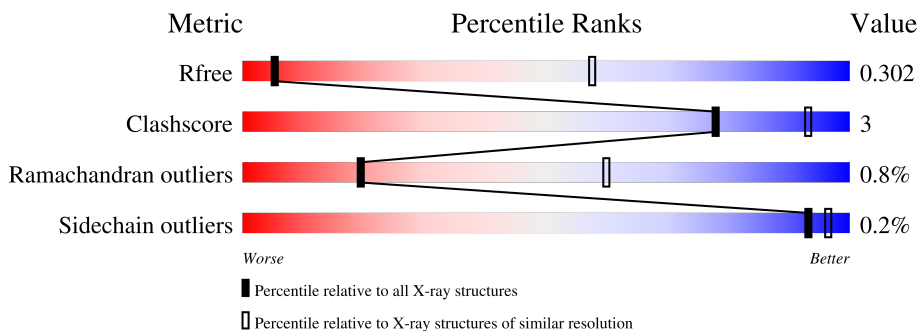
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 4.38 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	1022 (4.92-3.80)
Clashscore	141614	1085 (4.92-3.80)
Ramachandran outliers	138981	1036 (4.92-3.80)
Sidechain outliers	138945	1019 (4.92-3.80)

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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	864	86% (green), 8% (yellow), 6% (grey)
2	B	463	74% (green), 7% (yellow), 19% (grey)
3	C	127	91% (green), 9% (yellow)

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10314 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 DNA damage-binding protein 1, DNA damage-binding protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	808	6249	3962	1043	1209	35	0	0	0

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-27	MET	-	initiating methionine	UNP Q16531
A	-26	GLY	-	expression tag	UNP Q16531
A	-25	SER	-	expression tag	UNP Q16531
A	-24	SER	-	expression tag	UNP Q16531
A	-23	HIS	-	expression tag	UNP Q16531
A	-22	HIS	-	expression tag	UNP Q16531
A	-21	HIS	-	expression tag	UNP Q16531
A	-20	HIS	-	expression tag	UNP Q16531
A	-19	HIS	-	expression tag	UNP Q16531
A	-18	HIS	-	expression tag	UNP Q16531
A	-17	SER	-	expression tag	UNP Q16531
A	-16	ALA	-	expression tag	UNP Q16531
A	-15	ALA	-	expression tag	UNP Q16531
A	-14	HIS	-	expression tag	UNP Q16531
A	-13	ILE	-	expression tag	UNP Q16531
A	-12	VAL	-	expression tag	UNP Q16531
A	-11	MET	-	expression tag	UNP Q16531
A	-10	VAL	-	expression tag	UNP Q16531
A	-9	ASP	-	expression tag	UNP Q16531
A	-8	ALA	-	expression tag	UNP Q16531
A	-7	TYR	-	expression tag	UNP Q16531
A	-6	LYS	-	expression tag	UNP Q16531
A	-5	PRO	-	expression tag	UNP Q16531
A	-4	THR	-	expression tag	UNP Q16531
A	-3	LYS	-	expression tag	UNP Q16531
A	-2	GLY	-	expression tag	UNP Q16531

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP Q16531
A	0	ARG	-	expression tag	UNP Q16531
A	700	GLY	-	linker	UNP Q16531
A	701	ASN	-	linker	UNP Q16531
A	702	GLY	-	linker	UNP Q16531
A	703	ASN	-	linker	UNP Q16531
A	704	SER	-	linker	UNP Q16531
A	705	GLY	-	linker	UNP Q16531

- Molecule 2 is a protein called Protein cereblon.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	375	3005	1919	512	550	24	0	0	0

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-20	MET	-	initiating methionine	UNP Q96SW2
B	-19	GLY	-	expression tag	UNP Q96SW2
B	-18	SER	-	expression tag	UNP Q96SW2
B	-17	SER	-	expression tag	UNP Q96SW2
B	-16	HIS	-	expression tag	UNP Q96SW2
B	-15	HIS	-	expression tag	UNP Q96SW2
B	-14	HIS	-	expression tag	UNP Q96SW2
B	-13	HIS	-	expression tag	UNP Q96SW2
B	-12	HIS	-	expression tag	UNP Q96SW2
B	-11	HIS	-	expression tag	UNP Q96SW2
B	-10	SER	-	expression tag	UNP Q96SW2
B	-9	ALA	-	expression tag	UNP Q96SW2
B	-8	VAL	-	expression tag	UNP Q96SW2
B	-7	ASP	-	expression tag	UNP Q96SW2
B	-6	GLU	-	expression tag	UNP Q96SW2
B	-5	ASN	-	expression tag	UNP Q96SW2
B	-4	LEU	-	expression tag	UNP Q96SW2
B	-3	TYR	-	expression tag	UNP Q96SW2
B	-2	PHE	-	expression tag	UNP Q96SW2
B	-1	GLN	-	expression tag	UNP Q96SW2
B	0	GLY	-	expression tag	UNP Q96SW2
B	1	GLY	-	expression tag	UNP Q96SW2

- Molecule 3 is a protein called Bromodomain-containing protein 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	127	1059	685	173	194	7	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	43	MET	THR	engineered mutation	UNP O60885

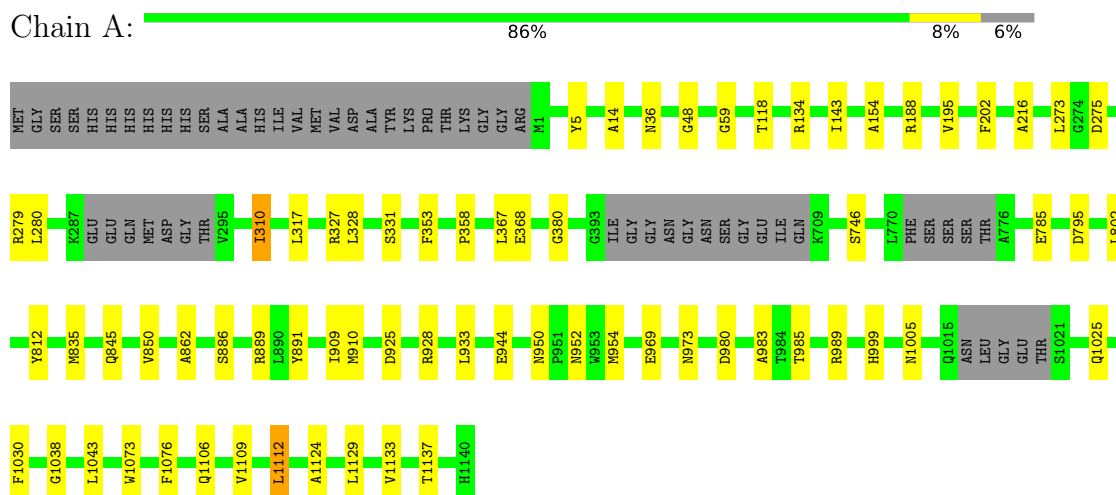
- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Zn	0	0
			1	1		

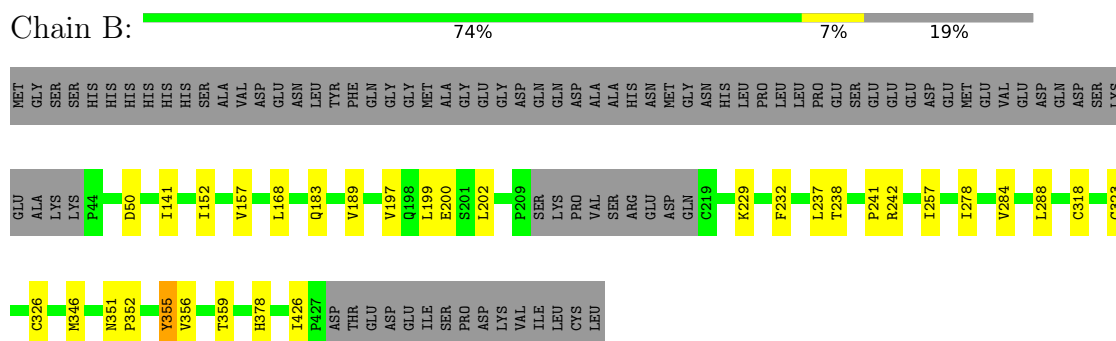
### 3 Residue-property plots

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.

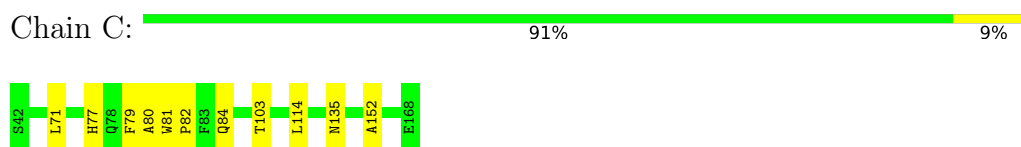
- Molecule 1: DNA damage-binding protein 1, DNA damage-binding protein 1



- Molecule 2: Protein cereblon



- Molecule 3: Bromodomain-containing protein 4



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	117.60Å 117.60Å 597.16Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	100.40 – 4.38 100.40 – 4.38	Depositor EDS
% Data completeness (in resolution range)	99.5 (100.40-4.38) 99.5 (100.40-4.38)	Depositor EDS
$R_{merge}$	0.35	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.41 (at 4.47Å)	Xtrriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, $R_{free}$	0.275 , 0.301 0.276 , 0.302	Depositor DCC
$R_{free}$ test set	851 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	206.8	Xtrriage
Anisotropy	0.402	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.26 , 206.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.42$ , $\langle L^2 \rangle = 0.24$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.87	EDS
Total number of atoms	10314	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	278.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.73% 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:  
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	0/6362	0.44	0/8624
2	B	0.24	0/3077	0.41	0/4177
3	C	0.25	0/1089	0.38	0/1481
All	All	0.24	0/10528	0.43	0/14282

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

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	6249	0	6105	40	0
2	B	3005	0	2985	24	0
3	C	1059	0	1047	6	0
4	B	1	0	0	0	0
All	All	10314	0	10137	60	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 3.

All (60) 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:14:ALA:HB1	1:A:327:ARG:HG3	1.54	0.90
1:A:327:ARG:NH2	2:B:200:GLU:OE1	2.29	0.66
1:A:980:ASP:HB3	1:A:983:ALA:HB2	1.79	0.64
1:A:1005:ASN:ND2	2:B:237:LEU:O	2.34	0.60
1:A:785:GLU:HB2	2:B:229:LYS:HZ1	1.67	0.59
1:A:1109:VAL:HG12	1:A:1129:LEU:HD22	1.85	0.59
1:A:143:ILE:HG12	1:A:154:ALA:HB2	1.85	0.58
3:C:103:THR:O	3:C:135:ASN:ND2	2.37	0.57
1:A:327:ARG:HD2	2:B:199:LEU:CD2	2.35	0.56
2:B:168:LEU:HD11	2:B:183:GLN:HB2	1.88	0.55
1:A:983:ALA:HB3	1:A:989:ARG:HG2	1.88	0.54
2:B:197:VAL:HG12	2:B:237:LEU:HD12	1.88	0.54
2:B:152:ILE:HB	3:C:152:ALA:HB2	1.90	0.54
2:B:355:TYR:HD1	2:B:356:VAL:H	1.55	0.53
1:A:5:TYR:HB2	1:A:1043:LEU:HD11	1.90	0.53
1:A:195:VAL:HG22	1:A:202:PHE:HE1	1.73	0.52
1:A:812:TYR:CZ	2:B:241:PRO:HB3	2.45	0.52
1:A:275:ASP:OD1	1:A:279:ARG:N	2.42	0.52
1:A:952:ASN:ND2	1:A:969:GLU:OE1	2.37	0.51
1:A:310:ILE:HG21	1:A:328:LEU:HD12	1.93	0.50
1:A:118:THR:OG1	1:A:134:ARG:NH2	2.44	0.50
1:A:835:MET:HB2	1:A:845:GLN:HB3	1.94	0.49
1:A:1030:PHE:CZ	1:A:1038:GLY:HA3	2.48	0.49
1:A:59:GLY:HA2	1:A:1073:TRP:CZ3	2.47	0.49
1:A:812:TYR:OH	2:B:241:PRO:HB3	2.14	0.48
1:A:928:ARG:HB3	1:A:950:ASN:O	2.14	0.48
1:A:358:PRO:HD2	1:A:380:GLY:HA2	1.97	0.46
1:A:909:ILE:HD12	1:A:925:ASP:HB2	1.96	0.46
2:B:346:MET:HA	2:B:359:THR:O	2.16	0.46
1:A:1106:GLN:HA	1:A:1109:VAL:HG22	1.97	0.46
2:B:318:CYS:HA	2:B:426:ILE:HG22	1.97	0.46
1:A:188:ARG:NH1	1:A:216:ALA:O	2.49	0.46
2:B:351:ASN:OD1	2:B:355:TYR:N	2.48	0.46
3:C:81:TRP:CG	3:C:82:PRO:HD3	2.51	0.46
1:A:1005:ASN:OD1	2:B:238:THR:HA	2.17	0.45
2:B:199:LEU:HD12	2:B:202:LEU:CD1	2.46	0.45
2:B:189:VAL:HG22	2:B:278:ILE:HD11	1.98	0.45
1:A:1005:ASN:HD21	2:B:238:THR:HA	1.82	0.45
1:A:889:ARG:HD2	1:A:891:TYR:CZ	2.51	0.45
1:A:1112:LEU:HD23	1:A:1124:ALA:HB3	1.99	0.45
3:C:80:ALA:O	3:C:84:GLN:HG3	2.16	0.44
1:A:331:SER:HB2	1:A:353:PHE:HB2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:71:LEU:HD13	3:C:114:LEU:HD12	1.99	0.43
1:A:985:THR:O	1:A:989:ARG:HG3	2.19	0.43
1:A:1005:ASN:ND2	2:B:238:THR:HA	2.34	0.43
2:B:352:PRO:HG3	2:B:378:HIS:CG	2.53	0.43
1:A:933:LEU:HD23	1:A:944:GLU:HA	2.01	0.42
3:C:77:HIS:CE1	3:C:79:PHE:HB2	2.54	0.42
1:A:886:SER:HA	1:A:910:MET:HA	2.02	0.42
1:A:795:ASP:HB2	1:A:802:LEU:HD11	2.01	0.41
2:B:288:LEU:HD23	2:B:288:LEU:HA	1.85	0.41
1:A:973:ASN:OD1	1:A:999:HIS:ND1	2.52	0.41
1:A:1133:VAL:O	1:A:1137:THR:HG23	2.20	0.41
2:B:257:ILE:HG21	2:B:284:VAL:HG21	2.03	0.41
1:A:850:VAL:HB	1:A:862:ALA:HB3	2.01	0.41
2:B:232:PHE:O	2:B:242:ARG:HG2	2.20	0.41
1:A:273:LEU:O	1:A:280:LEU:HD12	2.21	0.41
1:A:954:MET:HA	1:A:969:GLU:HA	2.03	0.40
2:B:141:ILE:HG23	2:B:157:VAL:HG13	2.03	0.40
2:B:323:CYS:HB3	2:B:326:CYS:HB2	2.03	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	798/864 (92%)	742 (93%)	47 (6%)	9 (1%)	14	52
2	B	371/463 (80%)	348 (94%)	22 (6%)	1 (0%)	41	76
3	C	125/127 (98%)	122 (98%)	3 (2%)	0	100	100
All	All	1294/1454 (89%)	1212 (94%)	72 (6%)	10 (1%)	19	60

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	367	LEU
1	A	368	GLU
1	A	1076	PHE
1	A	36	ASN
1	A	317	LEU
1	A	1112	LEU
1	A	746	SER
2	B	50	ASP
1	A	48	GLY
1	A	310	ILE

### 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	680/749 (91%)	679 (100%)	1 (0%)	93	97
2	B	335/416 (80%)	334 (100%)	1 (0%)	92	95
3	C	119/120 (99%)	119 (100%)	0	100	100
All	All	1134/1285 (88%)	1132 (100%)	2 (0%)	93	96

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1025	GLN
2	B	355	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 [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](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.5 Other polymers [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.