Full wwPDB X-ray Structure Validation Report (i)

Sep 11, 2023 – 06:26 AM EDT

PDB ID	:	4L1G
Title	:	Crystal structure of the Bc1960 peptidoglycan N-acetylglucosamine deacetylase from Bacillus cereus
Authors	:	Tsalafouta, A.; Fadouloglou, V.E.; Kokkinidis, M.
Deposited on	:	2013-06-03
Resolution	:	2.34 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*
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.

The following versions of software and data (see references (i)) were used in the production of this report:

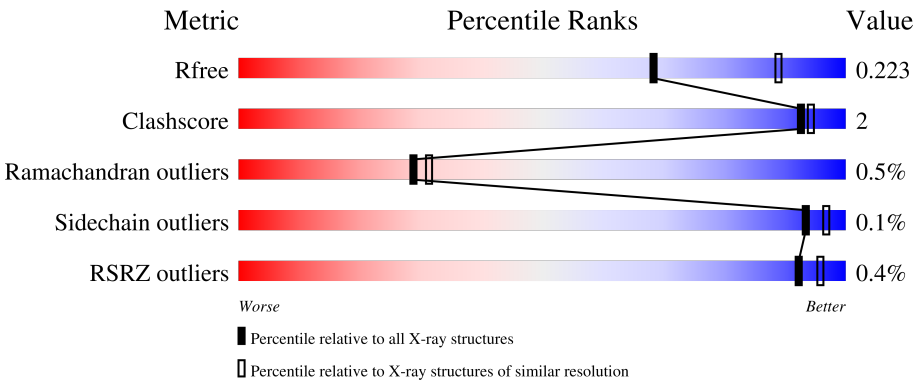
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.34 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	2096 (2.36-2.32)
Clashscore	141614	2193 (2.36-2.32)
Ramachandran outliers	138981	2159 (2.36-2.32)
Sidechain outliers	138945	2160 (2.36-2.32)
RSRZ outliers	127900	2067 (2.36-2.32)

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	273	75% • • 22%
1	B	273	74% • 22%
1	C	273	76% • 22%
1	D	273	74% • 22%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 7688 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 Peptidoglycan N-acetylglucosamine deacetylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	214	1721	1109	290	320	2	0	1	0
1	B	214	1723	1110	292	319	2	0	1	0
1	C	214	1730	1114	292	322	2	0	2	0
1	D	213	1699	1093	286	318	2	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	268	HIS	-	expression tag	UNP Q81EK9
A	269	HIS	-	expression tag	UNP Q81EK9
A	270	HIS	-	expression tag	UNP Q81EK9
A	271	HIS	-	expression tag	UNP Q81EK9
A	272	HIS	-	expression tag	UNP Q81EK9
A	273	HIS	-	expression tag	UNP Q81EK9
B	268	HIS	-	expression tag	UNP Q81EK9
B	269	HIS	-	expression tag	UNP Q81EK9
B	270	HIS	-	expression tag	UNP Q81EK9
B	271	HIS	-	expression tag	UNP Q81EK9
B	272	HIS	-	expression tag	UNP Q81EK9
B	273	HIS	-	expression tag	UNP Q81EK9
C	268	HIS	-	expression tag	UNP Q81EK9
C	269	HIS	-	expression tag	UNP Q81EK9
C	270	HIS	-	expression tag	UNP Q81EK9
C	271	HIS	-	expression tag	UNP Q81EK9
C	272	HIS	-	expression tag	UNP Q81EK9
C	273	HIS	-	expression tag	UNP Q81EK9
D	268	HIS	-	expression tag	UNP Q81EK9
D	269	HIS	-	expression tag	UNP Q81EK9
D	270	HIS	-	expression tag	UNP Q81EK9

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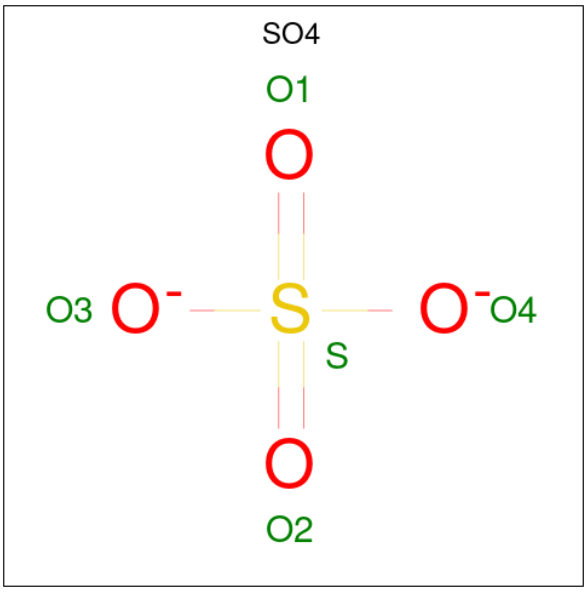
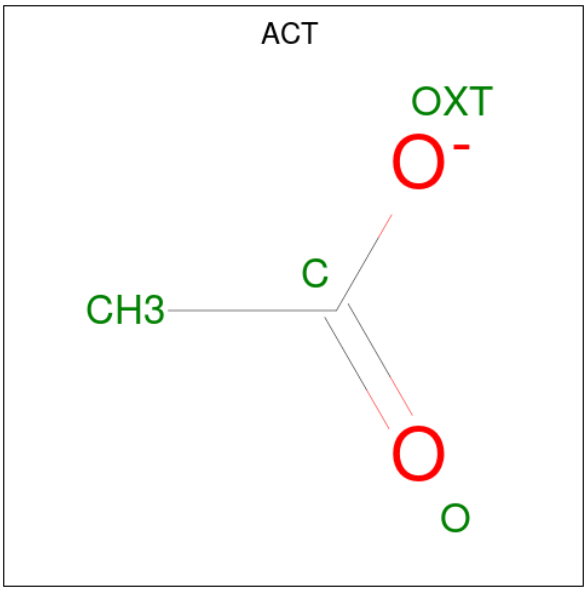
Chain	Residue	Modelled	Actual	Comment	Reference
D	271	HIS	-	expression tag	UNP Q81EK9
D	272	HIS	-	expression tag	UNP Q81EK9
D	273	HIS	-	expression tag	UNP Q81EK9

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	O	S			
2	A	1	5	4	1		0	0
2	B	1	5	4	1		0	0
2	C	1	5	4	1		0	0
2	C	1	5	4	1		0	0
2	D	1	5	4	1		0	0
2	D	1	5	4	1		0	0

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

- Molecule 4 is water.

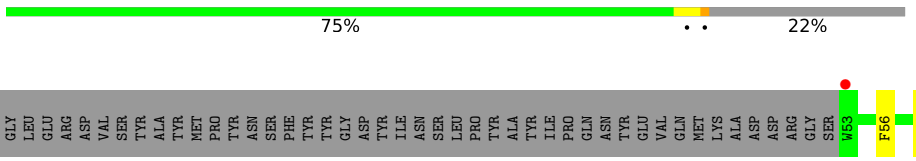
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	224	224	224	0	0
4	B	199	199	199	0	0
4	C	189	189	189	0	0
4	D	157	157	157	0	0

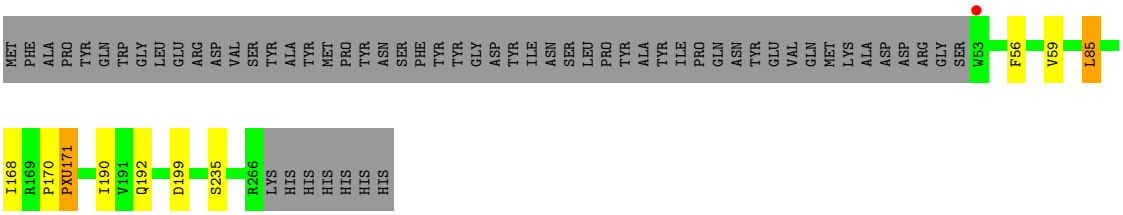
3 Residue-property plots (i)

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: Peptidoglycan N-acetylglucosamine deacetylase

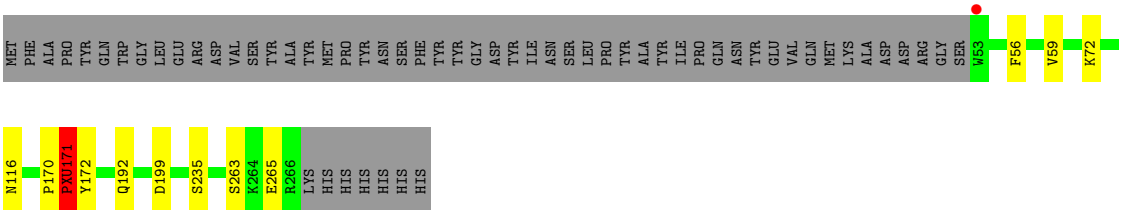
Chain A:





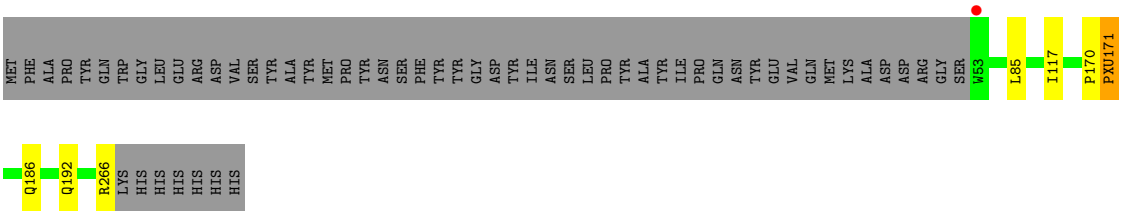
• Molecule 1: Peptidoglycan N-acetylglucosamine deacetylase

Chain B:



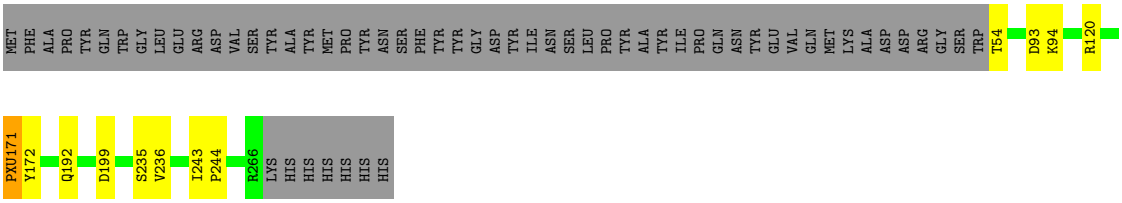
• Molecule 1: Peptidoglycan N-acetylglucosamine deacetylase

Chain C:



• Molecule 1: Peptidoglycan N-acetylglucosamine deacetylase

Chain D:


PXU171
Y172
Q192
D199
S235
V236
I243
P244
R266
LYS
HIS
HIS
HIS
HIS
HIS
HIS
MET
PHE
ALA
PRO
TYR
GLN
TRP
GLY
LEU
GLU
ARG
ASP
VAL
SER
TYR
ALA
TYR
MET
PRO
TYR
ASN
SER
PHE
TYR
TYR
GLY
ASP
TYR
ILE
ASN
SER
LEU
PRO
TYR
ALA
TYR
ILE
PRO
GLN
ASN
TYR
GLU
VAL
GLN
MET
LYS
ALA
ASP
ASP
ARG
GLY
SER
TRP
T54
D93
K94
R120

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	92.66Å 92.66Å 242.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.64 – 2.34 86.57 – 2.34	Depositor EDS
% Data completeness (in resolution range)	98.9 (30.64-2.34) 98.9 (86.57-2.34)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.36 (at 2.34Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, R_{free}	0.179 , 0.223 0.181 , 0.223	Depositor DCC
R_{free} test set	2282 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	34.8	Xtriage
Anisotropy	0.470	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 48.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	7688	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 31.39 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.1159e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: ACT, PXU, SO4

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	0/1761	0.40	0/2390
1	B	0.24	0/1763	0.40	0/2393
1	C	0.23	0/1770	0.40	0/2403
1	D	0.23	0/1734	0.40	0/2354
All	All	0.23	0/7028	0.40	0/9540

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
1	D	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	171	PXU	Mainchain
1	D	171	PXU	Mainchain

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	1721	0	1694	5	0
1	B	1723	0	1696	7	0
1	C	1730	0	1694	3	0
1	D	1699	0	1666	6	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
2	C	10	0	0	0	0
2	D	10	0	0	0	0
3	A	4	0	3	0	0
3	B	4	0	3	1	0
3	C	4	0	3	0	0
3	D	4	0	3	1	0
4	A	224	0	0	0	0
4	B	199	0	0	2	0
4	C	189	0	0	0	0
4	D	157	0	0	1	0
All	All	7688	0	6762	21	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 2.

All (21) 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:D:54:THR:N	4:D:528:HOH:O	2.31	0.63
1:C:186:GLN:O	1:C:266:ARG:HD2	2.08	0.53
1:B:199:ASP:HB2	1:B:235:SER:HB2	1.95	0.48
1:B:172:TYR:H	3:B:302:ACT:H3	1.79	0.48
1:D:199:ASP:HB2	1:D:235:SER:HB2	1.97	0.47
1:A:168:ILE:HB	1:A:190:ILE:HG12	1.96	0.47
1:D:172:TYR:H	3:D:303:ACT:H3	1.80	0.47
1:B:72:LYS:NZ	4:B:581:HOH:O	2.35	0.46
1:B:56:PHE:O	1:B:59:VAL:HG22	2.16	0.44
1:B:116:ASN:HB2	4:B:556:HOH:O	2.16	0.44
1:C:85:LEU:HD23	1:C:117:ILE:HD11	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:93:ASP:OD2	1:D:120:ARG:NH2	2.41	0.43
1:C:170:PRO:HA	1:C:171:PXU:H8	1.85	0.43
1:B:263:SER:OG	1:B:265:GLU:OE1	2.37	0.42
1:A:199:ASP:HB2	1:A:235:SER:HB2	2.00	0.42
1:A:170:PRO:HA	1:A:171:PXU:H8	1.62	0.42
1:B:170:PRO:HA	1:B:171:PXU:H8	1.78	0.42
1:A:56:PHE:O	1:A:59:VAL:HG22	2.21	0.40
1:A:85:LEU:HD12	1:A:85:LEU:HA	1.83	0.40
1:D:94:LYS:HE2	1:D:236:VAL:HG12	2.03	0.40
1:D:243:ILE:HB	1:D:244:PRO:HD3	2.04	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	212/273 (78%)	206 (97%)	5 (2%)	1 (0%)	29	31
1	B	212/273 (78%)	206 (97%)	5 (2%)	1 (0%)	29	31
1	C	213/273 (78%)	209 (98%)	3 (1%)	1 (0%)	29	31
1	D	210/273 (77%)	204 (97%)	5 (2%)	1 (0%)	29	31
All	All	847/1092 (78%)	825 (97%)	18 (2%)	4 (0%)	29	31

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	192	GLN
1	C	192	GLN
1	D	192	GLN
1	B	192	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.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	186/237 (78%)	185 (100%)	1 (0%)	88	93
1	B	185/237 (78%)	185 (100%)	0	100	100
1	C	185/237 (78%)	185 (100%)	0	100	100
1	D	182/237 (77%)	182 (100%)	0	100	100
All	All	738/948 (78%)	737 (100%)	1 (0%)	93	97

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	85	LEU

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)

4 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	$\#\|Z\| > 2$
1	PXU	B	171	1	6,8,9	2.73	2 (33%)	4,11,13	1.13	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	PXU	D	171	1	6,8,9	2.74	2 (33%)	4,11,13	1.12	0
1	PXU	A	171	1	6,8,9	2.75	2 (33%)	4,11,13	1.00	0
1	PXU	C	171	1	6,8,9	2.75	2 (33%)	4,11,13	0.87	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
1	PXU	B	171	1	-	0/0/12/15	0/1/1/1
1	PXU	D	171	1	-	0/0/12/15	0/1/1/1
1	PXU	A	171	1	-	0/0/12/15	0/1/1/1
1	PXU	C	171	1	-	0/0/12/15	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	171	PXU	O-C	5.68	1.38	1.19
1	C	171	PXU	O-C	5.67	1.38	1.19
1	A	171	PXU	O-C	5.65	1.38	1.19
1	B	171	PXU	O-C	5.64	1.38	1.19
1	A	171	PXU	CD-N	-3.40	1.33	1.47
1	B	171	PXU	CD-N	-3.37	1.33	1.47
1	C	171	PXU	CD-N	-3.34	1.33	1.47
1	D	171	PXU	CD-N	-3.29	1.34	1.47

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	171	PXU	1	0
1	A	171	PXU	1	0
1	C	171	PXU	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

10 ligands 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	$\#\|Z\| > 2$
3	ACT	A	302	-	3,3,3	0.78	0	3,3,3	1.38	0
2	SO4	A	301	-	4,4,4	0.14	0	6,6,6	0.05	0
3	ACT	C	303	-	3,3,3	0.77	0	3,3,3	1.39	0
3	ACT	D	303	-	3,3,3	0.78	0	3,3,3	1.35	0
2	SO4	D	302	-	4,4,4	0.14	0	6,6,6	0.05	0
2	SO4	B	301	-	4,4,4	0.14	0	6,6,6	0.07	0
2	SO4	C	301	-	4,4,4	0.15	0	6,6,6	0.08	0
3	ACT	B	302	-	3,3,3	0.76	0	3,3,3	1.33	0
2	SO4	C	302	-	4,4,4	0.15	0	6,6,6	0.05	0
2	SO4	D	301	-	4,4,4	0.15	0	6,6,6	0.15	0

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.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	303	ACT	1	0
3	B	302	ACT	1	0

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)

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, 95th 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	213/273 (78%)	-0.34	1 (0%)	91	95	8, 16, 29, 42	0
1	B	213/273 (78%)	-0.34	1 (0%)	91	95	6, 15, 27, 46	0
1	C	213/273 (78%)	-0.35	1 (0%)	91	95	6, 16, 31, 82	0
1	D	212/273 (77%)	-0.24	0	100	100	10, 21, 39, 54	0
All	All	851/1092 (77%)	-0.32	3 (0%)	92	96	6, 17, 34, 82	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	53	TRP	3.0
1	C	53	TRP	2.9
1	A	53	TRP	2.3

6.2 Non-standard residues in protein, DNA, RNA chains (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, 95th 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(Å^2)	Q<0.9
1	PXU	D	171	8/9	0.94	0.11	16,16,17,18	0
1	PXU	C	171	8/9	0.95	0.12	14,15,16,16	0
1	PXU	A	171	8/9	0.95	0.12	14,15,15,15	0
1	PXU	B	171	8/9	0.98	0.10	13,14,16,17	0

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, 95th 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(Å^2)	Q<0.9
3	ACT	C	303	4/4	0.87	0.19	30,35,40,43	0
3	ACT	A	302	4/4	0.88	0.18	28,31,32,45	0
3	ACT	B	302	4/4	0.90	0.13	31,32,36,42	0
3	ACT	D	303	4/4	0.90	0.15	32,33,34,39	0
2	SO4	D	302	5/5	0.93	0.20	61,63,63,64	0
2	SO4	C	302	5/5	0.94	0.13	67,69,69,70	0
2	SO4	B	301	5/5	0.95	0.10	58,60,60,61	0
2	SO4	A	301	5/5	0.97	0.12	49,50,51,51	0
2	SO4	D	301	5/5	0.99	0.14	18,18,18,18	0
2	SO4	C	301	5/5	0.99	0.13	12,14,14,15	0

6.5 Other polymers (i)

There are no such residues in this entry.