Full wwPDB X-ray Structure Validation Report (i)

Sep 4, 2023 – 11:35 PM EDT

PDB ID	:	3UV7
Title	:	Ec_IspH in complex with buta-2,3-dienyl diphosphate (1300)
Authors	:	Span, I.; Wang, K.; Wang, W.; Zhang, Y.; Bacher, A.; Eisenreich, W.; Schulz, C.; Oldfield, E.; Groll, M.
Deposited on	:	2011-11-29
Resolution	:	1.60 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:

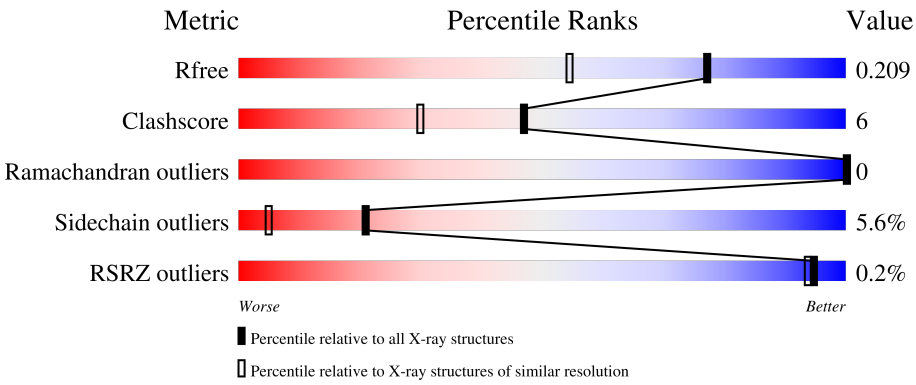
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 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 1.60 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	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

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	324	82% 10% • • 5%
1	B	324	80% 13% • • •

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 5290 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.

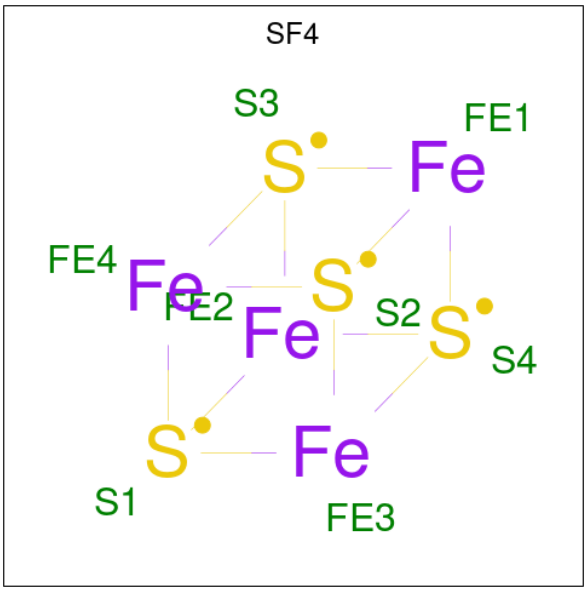
- Molecule 1 is a protein called 4-hydroxy-3-methylbut-2-enyl diphosphate reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	309	2383	1487	427	459	10	0	0	0
1	B	310	2390	1492	428	460	10	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

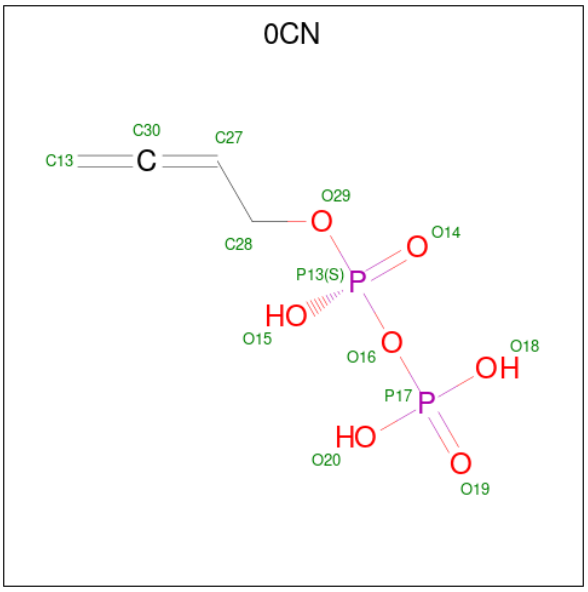
Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	HIS	-	expression tag	UNP P62623
A	-6	HIS	-	expression tag	UNP P62623
A	-5	HIS	-	expression tag	UNP P62623
A	-4	HIS	-	expression tag	UNP P62623
A	-3	HIS	-	expression tag	UNP P62623
A	-2	HIS	-	expression tag	UNP P62623
A	-1	GLY	-	expression tag	UNP P62623
A	0	SER	-	expression tag	UNP P62623
B	-7	HIS	-	expression tag	UNP P62623
B	-6	HIS	-	expression tag	UNP P62623
B	-5	HIS	-	expression tag	UNP P62623
B	-4	HIS	-	expression tag	UNP P62623
B	-3	HIS	-	expression tag	UNP P62623
B	-2	HIS	-	expression tag	UNP P62623
B	-1	GLY	-	expression tag	UNP P62623
B	0	SER	-	expression tag	UNP P62623

- Molecule 2 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
2	A	1	8	4	4	0	0
			Total	Fe	S		
2	B	1	8	4	4	0	0

- Molecule 3 is buta-2,3-dien-1-yl trihydrogen diphosphate (three-letter code: 0CN) (formula: $C_4H_8O_7P_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
3	A	1	13	4	7	2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
3	B	1	13	4	7	2	0	0

- Molecule 4 is water.

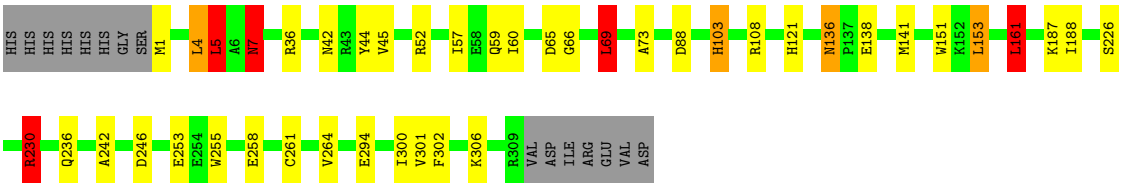
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	236	236	236	0	0
			Total	O		
4	B	239	239	239	0	0

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.

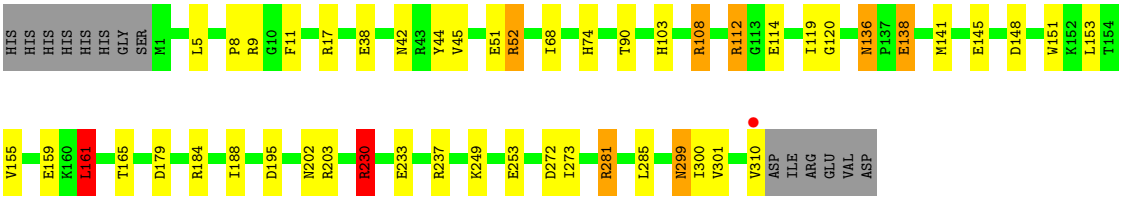
• Molecule 1: 4-hydroxy-3-methylbut-2-enyl diphosphate reductase

Chain A:



• Molecule 1: 4-hydroxy-3-methylbut-2-enyl diphosphate reductase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	70.40Å 80.51Å 111.73Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 1.60 47.88 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.00-1.60) 99.7 (47.88-1.60)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.12 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.160 , 0.210 0.160 , 0.209	Depositor DCC
R_{free} test set	4204 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	15.5	Xtriage
Anisotropy	0.596	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 51.2	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	0.97	EDS
Total number of atoms	5290	wwPDB-VP
Average B, all atoms (Å^2)	23.0	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 43.34 % 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 1.7890e-04. 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: 0CN, SF4

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	1.20	7/2418 (0.3%)	1.45	14/3273 (0.4%)
1	B	1.18	8/2425 (0.3%)	1.51	24/3283 (0.7%)
All	All	1.19	15/4843 (0.3%)	1.48	38/6556 (0.6%)

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	A	0	1

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	230	ARG	CD-NE	-8.42	1.32	1.46
1	A	151	TRP	CD2-CE2	6.91	1.49	1.41
1	B	151	TRP	CD2-CE2	6.42	1.49	1.41
1	B	38	GLU	CD-OE2	-6.40	1.18	1.25
1	A	230	ARG	CZ-NH2	6.38	1.41	1.33
1	B	184	ARG	CZ-NH2	6.38	1.41	1.33
1	B	230	ARG	CD-NE	-6.21	1.35	1.46
1	B	230	ARG	CZ-NH2	5.57	1.40	1.33
1	A	151	TRP	CG-CD1	5.43	1.44	1.36
1	B	237	ARG	CD-NE	-5.36	1.37	1.46
1	B	151	TRP	CG-CD1	5.34	1.44	1.36
1	A	226	SER	CB-OG	5.29	1.49	1.42
1	B	38	GLU	CD-OE1	-5.14	1.20	1.25
1	A	7	ASN	CB-CG	-5.14	1.39	1.51
1	A	255	TRP	CD2-CE2	5.07	1.47	1.41

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	230	ARG	NE-CZ-NH1	-40.28	100.16	120.30
1	B	230	ARG	NE-CZ-NH1	-31.23	104.68	120.30
1	B	230	ARG	NE-CZ-NH2	28.08	134.34	120.30
1	A	230	ARG	NE-CZ-NH2	26.30	133.45	120.30
1	B	281	ARG	NE-CZ-NH1	16.28	128.44	120.30
1	B	237	ARG	NE-CZ-NH2	14.17	127.39	120.30
1	B	184	ARG	NE-CZ-NH1	-12.77	113.92	120.30
1	B	281	ARG	NE-CZ-NH2	-12.51	114.04	120.30
1	B	52	ARG	NE-CZ-NH2	11.60	126.10	120.30
1	B	230	ARG	CD-NE-CZ	10.69	138.57	123.60
1	A	230	ARG	CD-NE-CZ	10.16	137.82	123.60
1	B	230	ARG	CG-CD-NE	-9.49	91.87	111.80
1	B	237	ARG	NE-CZ-NH1	-9.05	115.77	120.30
1	A	161	LEU	CB-CG-CD2	8.53	125.50	111.00
1	A	141	MET	CG-SD-CE	8.48	113.77	100.20
1	B	184	ARG	NE-CZ-NH2	7.74	124.17	120.30
1	B	52	ARG	NE-CZ-NH1	-7.67	116.46	120.30
1	B	237	ARG	CB-CG-CD	7.53	131.18	111.60
1	B	9	ARG	NE-CZ-NH1	6.66	123.63	120.30
1	A	230	ARG	CG-CD-NE	-6.57	98.01	111.80
1	B	300	ILE	CG1-CB-CG2	-6.45	97.22	111.40
1	B	281	ARG	CD-NE-CZ	6.33	132.46	123.60
1	A	69	LEU	CB-CG-CD2	6.32	121.74	111.00
1	A	302	PHE	CB-CG-CD2	6.28	125.19	120.80
1	A	302	PHE	CB-CG-CD1	-6.21	116.46	120.80
1	B	161	LEU	CB-CG-CD2	5.98	121.16	111.00
1	B	179	ASP	CB-CG-OD2	5.90	123.61	118.30
1	B	17	ARG	NE-CZ-NH1	-5.83	117.38	120.30
1	A	65	ASP	CB-CG-OD1	5.66	123.40	118.30
1	B	11	PHE	CB-CG-CD1	5.50	124.65	120.80
1	A	300	ILE	CG1-CB-CG2	-5.49	99.31	111.40
1	A	5	LEU	CB-CG-CD1	5.42	120.22	111.00
1	A	153	LEU	CB-CG-CD2	5.35	120.10	111.00
1	B	195	ASP	CB-CG-OD1	5.19	122.97	118.30
1	B	155	VAL	CA-CB-CG1	5.11	118.57	110.90
1	B	203	ARG	CA-CB-CG	-5.09	102.20	113.40
1	B	141	MET	CG-SD-CE	5.05	108.28	100.20
1	A	246	ASP	CB-CG-OD1	-5.00	113.80	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	7	ASN	Sidechain

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	2383	0	2395	30	1
1	B	2390	0	2404	31	1
2	A	8	0	0	0	0
2	B	8	0	0	0	0
3	A	13	0	5	3	0
3	B	13	0	6	1	0
4	A	236	0	0	9	0
4	B	239	0	0	5	0
All	All	5290	0	4810	60	1

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 6.

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:121:HIS:HD2	4:A:566:HOH:O	0.85	1.18
1:A:36:ARG:HH21	1:A:36:ARG:HG2	1.19	1.02
1:A:36:ARG:HG2	1:A:36:ARG:NH2	1.78	0.87
1:B:108:ARG:NH2	1:B:108:ARG:HB2	1.94	0.83
1:B:42:ASN:HD22	1:B:45:VAL:H	1.26	0.80
1:A:121:HIS:CD2	4:A:566:HOH:O	1.75	0.79
1:B:108:ARG:HB2	1:B:108:ARG:CZ	2.17	0.75
1:B:112:ARG:HG3	1:B:112:ARG:HH21	1.51	0.74
1:B:51:GLU:OE2	1:B:52:ARG:HD2	1.88	0.73
1:A:42:ASN:HD22	1:A:45:VAL:H	1.34	0.72
1:A:103:HIS:HD2	4:A:478:HOH:O	1.71	0.72
1:B:233:GLU:OE2	4:B:451:HOH:O	2.09	0.71
1:B:68:ILE:HD13	1:B:90:THR:HB	1.74	0.69
1:A:73:ALA:CB	3:A:318:0CN:H11	2.23	0.68
1:B:103:HIS:HD2	4:B:424:HOH:O	1.77	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:310:VAL:HG12	1:B:310:VAL:O	1.93	0.68
1:A:36:ARG:HH21	1:A:36:ARG:CG	1.95	0.67
1:B:272:ASP:OD2	4:B:580:HOH:O	2.14	0.65
1:A:4:LEU:HD22	1:A:261:CYS:SG	2.37	0.65
1:B:112:ARG:HB3	1:B:114:GLU:HG3	1.80	0.64
1:A:73:ALA:HB3	3:A:318:0CN:H11	1.83	0.60
1:A:52:ARG:NH1	4:A:494:HOH:O	2.34	0.60
1:A:66:GLY:H	1:A:88:ASP:HB3	1.66	0.59
1:B:136:ASN:ND2	1:B:138:GLU:H	2.00	0.59
1:A:103:HIS:HE1	4:A:324:HOH:O	1.88	0.57
1:B:108:ARG:CZ	1:B:108:ARG:CB	2.85	0.53
1:B:74:HIS:CD2	3:B:318:0CN:H11	2.43	0.53
1:B:112:ARG:CB	1:B:114:GLU:HG3	2.39	0.53
1:B:161:LEU:HB3	1:B:188:ILE:HG13	1.94	0.50
1:A:136:ASN:HD22	1:A:136:ASN:C	2.15	0.50
1:B:136:ASN:HD22	1:B:138:GLU:H	1.60	0.49
1:B:103:HIS:HE1	4:B:327:HOH:O	1.97	0.48
1:B:310:VAL:O	1:B:310:VAL:CG1	2.61	0.48
1:A:136:ASN:ND2	1:A:138:GLU:H	2.11	0.47
1:A:73:ALA:HB1	3:A:318:0CN:H11	1.95	0.47
1:A:1:MET:N	4:A:471:HOH:O	2.49	0.46
1:A:236:GLN:HG3	1:A:242:ALA:HB3	1.97	0.46
1:A:36:ARG:HB3	4:A:441:HOH:O	2.16	0.46
1:B:119:ILE:HD12	1:B:165:THR:HG22	1.98	0.45
1:B:299:ASN:HD22	1:B:299:ASN:C	2.20	0.45
1:A:161:LEU:HD13	1:A:188:ILE:HD12	1.97	0.45
1:A:301:VAL:HB	1:B:301:VAL:HB	1.98	0.45
1:A:60:ILE:CD1	1:A:69:LEU:HD11	2.48	0.44
1:A:59:GLN:HB3	4:A:479:HOH:O	2.17	0.44
1:B:42:ASN:ND2	1:B:45:VAL:H	2.04	0.43
1:B:230:ARG:HA	1:B:230:ARG:HD3	1.68	0.43
1:A:42:ASN:ND2	1:A:45:VAL:H	2.10	0.43
1:A:230:ARG:HD3	1:A:230:ARG:HA	1.83	0.43
1:B:136:ASN:HD22	1:B:136:ASN:C	2.22	0.43
1:A:7:ASN:OD1	4:A:564:HOH:O	2.21	0.42
1:A:5:LEU:HD12	1:A:264:VAL:HB	2.01	0.42
1:A:42:ASN:HD21	1:A:44:TYR:HB3	1.85	0.42
1:B:42:ASN:HD21	1:B:44:TYR:HB3	1.84	0.42
1:B:108:ARG:NH2	1:B:108:ARG:CB	2.75	0.42
1:B:120:GLY:O	1:B:145:GLU:HG2	2.20	0.42
1:A:136:ASN:HD22	1:A:138:GLU:H	1.68	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:136:ASN:HD21	1:B:138:GLU:HB2	1.86	0.41
1:B:230:ARG:HD3	4:B:451:HOH:O	2.21	0.40
1:A:108:ARG:CZ	1:A:108:ARG:HB2	2.51	0.40
1:B:8:PRO:HG2	1:B:202:ASN:HB3	2.04	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:253:GLU:OE1	1:B:52:ARG:NH1[4_545]	2.17	0.03

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	307/324 (95%)	304 (99%)	3 (1%)	0	100	100
1	B	308/324 (95%)	305 (99%)	3 (1%)	0	100	100
All	All	615/648 (95%)	609 (99%)	6 (1%)	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	257/271 (95%)	244 (95%)	13 (5%)	24 6
1	B	258/271 (95%)	242 (94%)	16 (6%)	18 4
All	All	515/542 (95%)	486 (94%)	29 (6%)	21 5

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	LEU
1	A	5	LEU
1	A	57	ILE
1	A	69	LEU
1	A	103	HIS
1	A	136	ASN
1	A	153	LEU
1	A	161	LEU
1	A	187	LYS
1	A	230	ARG
1	A	258	GLU
1	A	294	GLU
1	A	306	LYS
1	B	5	LEU
1	B	108	ARG
1	B	112	ARG
1	B	136	ASN
1	B	138	GLU
1	B	148	ASP
1	B	153	LEU
1	B	159	GLU
1	B	161	LEU
1	B	230	ARG
1	B	249	LYS
1	B	253	GLU
1	B	273	ILE
1	B	281	ARG
1	B	285	LEU
1	B	299	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	ASN

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Mol	Chain	Res	Type
1	A	59	GLN
1	A	78	GLN
1	A	103	HIS
1	A	121	HIS
1	A	133	GLN
1	A	136	ASN
1	A	229	ASN
1	A	236	GLN
1	A	277	ASN
1	B	2	GLN
1	B	42	ASN
1	B	78	GLN
1	B	103	HIS
1	B	133	GLN
1	B	136	ASN
1	B	229	ASN
1	B	276	GLN
1	B	283	GLN
1	B	299	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)

4 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	$\#\|Z\| > 2$
2	SF4	B	317	1,4	0,12,12	-	-	-		
3	0CN	B	318	-	10,12,12	2.31	4 (40%)	13,17,17	0.95	1 (7%)
2	SF4	A	317	1,4	0,12,12	-	-	-		
3	0CN	A	318	-	10,12,12	2.10	4 (40%)	13,17,17	1.12	1 (7%)

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
2	SF4	B	317	1,4	-	-	0/6/5/5
3	0CN	B	318	-	-	1/10/12/12	-
2	SF4	A	317	1,4	-	-	0/6/5/5
3	0CN	A	318	-	-	1/10/12/12	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	318	0CN	C30-C27	4.67	1.39	1.29
3	A	318	0CN	C30-C27	4.02	1.38	1.29
3	A	318	0CN	P17-O20	-3.16	1.42	1.54
3	B	318	0CN	P13-O14	-2.68	1.41	1.50
3	B	318	0CN	P13-O15	-2.68	1.42	1.55
3	A	318	0CN	P17-O18	-2.55	1.45	1.54
3	B	318	0CN	P17-O19	-2.23	1.43	1.50
3	A	318	0CN	C13-C30	2.22	1.40	1.30

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	318	0CN	C28-C27-C30	-2.46	118.12	124.60
3	A	318	0CN	C28-C27-C30	-2.09	119.09	124.60

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	318	0CN	C27-C28-O29-P13
3	B	318	0CN	C27-C28-O29-P13

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	318	0CN	1	0
3	A	318	0CN	3	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	309/324 (95%)	-0.55	0 100 100	11, 20, 40, 65	0
1	B	310/324 (95%)	-0.52	1 (0%) 94 93	11, 21, 44, 69	0
All	All	619/648 (95%)	-0.54	1 (0%) 95 94	11, 20, 42, 69	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	310	VAL	3.7

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, 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	0CN	A	318	13/13	0.99	0.06	8,14,16,19	0
3	0CN	B	318	13/13	0.99	0.05	8,13,16,16	0
2	SF4	A	317	8/8	1.00	0.06	11,12,15,16	0
2	SF4	B	317	8/8	1.00	0.06	11,12,15,16	0

6.5 Other polymers (i)

There are no such residues in this entry.