



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:23 AM UTC

PDB ID : 1ZNJ / pdb_00001znj
Title : INSULIN, MONOCLINIC CRYSTAL FORM
Authors : Turkenburg, M.G.W.; Whittingham, J.L.; Turkenburg, J.P.; Dodson, G.G.;
Derewenda, U.; Smith, G.D.; Dodson, E.J.; Derewenda, Z.S.; Xiao, B.
Deposited on : 1997-09-23
Resolution : 2.00 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

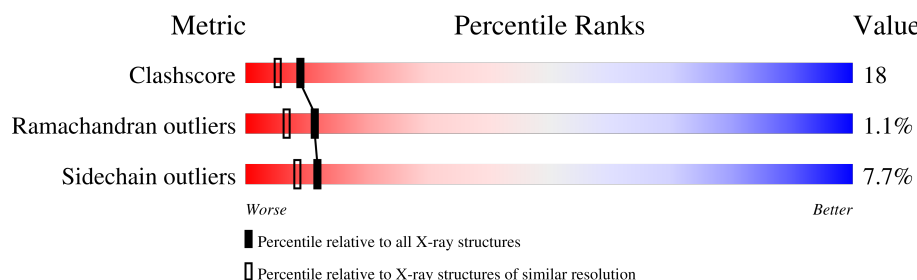
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	21	48% 48% 5%
1	C	21	43% 52% 5%
1	E	21	29% 57% 14%
1	G	21	24% 57% 19%
1	I	21	48% 43% 10%
1	K	21	24% 57% 19%
2	B	30	30% 57% 13%
2	D	30	33% 53% 7% . .

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Mol	Chain	Length	Quality of chain
2	F	30	33%30%33%
2	H	30	40%50%7%
2	J	30	40%40%17%
2	L	30	40%37%23%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 2755 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.

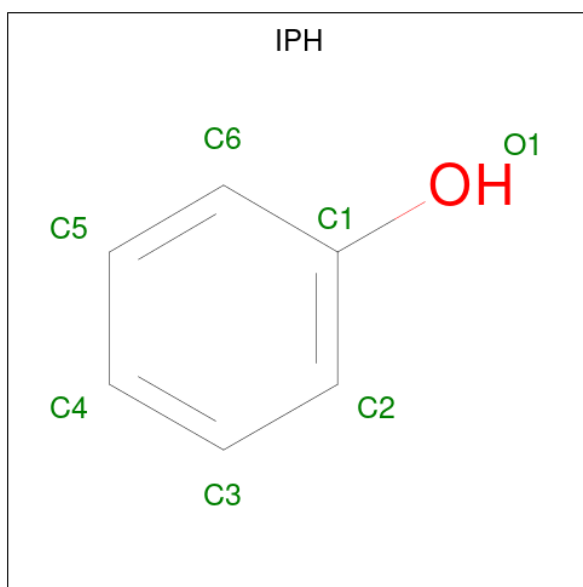
- Molecule 1 is a protein called INSULIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	21	Total	C	N	O	S	0	0	0
			156	93	25	34	4			
1	C	21	Total	C	N	O	S	0	0	0
			163	99	25	35	4			
1	E	21	Total	C	N	O	S	0	1	0
			165	100	25	36	4			
1	G	21	Total	C	N	O	S	0	1	0
			166	100	25	37	4			
1	I	21	Total	C	N	O	S	0	0	0
			163	99	25	35	4			
1	K	21	Total	C	N	O	S	0	2	0
			166	100	25	37	4			

- Molecule 2 is a protein called INSULIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	30	Total	C	N	O	S	0	2	1
			239	158	39	40	2			
2	D	29	Total	C	N	O	S	0	2	0
			234	155	38	39	2			
2	F	29	Total	C	N	O	S	0	1	0
			226	146	38	40	2			
2	H	29	Total	C	N	O	S	0	0	1
			226	148	38	38	2			
2	J	30	Total	C	N	O	S	0	1	1
			238	155	42	39	2			
2	L	30	Total	C	N	O	S	0	2	1
			229	147	40	40	2			

- Molecule 3 is PHENOL (CCD ID: IPH) (formula: C₆H₆O).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	6	1		
3	B	1	Total	C	O	0	0
			7	6	1		
3	C	1	Total	C	O	0	0
			7	6	1		
3	E	1	Total	C	O	0	0
			7	6	1		
3	G	1	Total	C	O	0	0
			7	6	1		
3	I	1	Total	C	O	0	0
			7	6	1		
3	K	1	Total	C	O	0	0
			7	6	1		

- Molecule 4 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

- Molecule 5 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total Cl 1 1	0	0
5	H	1	Total Cl 1 1	0	0

- Molecule 6 is water.

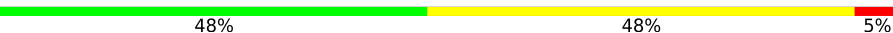
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	31	Total O 31 31	0	0
6	B	29	Total O 29 29	0	0
6	C	24	Total O 24 24	0	0
6	D	35	Total O 35 35	0	0
6	E	17	Total O 17 17	0	0
6	F	29	Total O 29 29	0	0
6	G	24	Total O 24 24	0	0
6	H	27	Total O 27 27	0	0
6	I	32	Total O 32 32	0	0
6	J	26	Total O 26 26	0	0
6	K	25	Total O 25 25	0	0
6	L	32	Total O 32 32	0	0

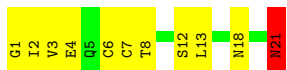
3 Residue-property plots [i](#)

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. 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.

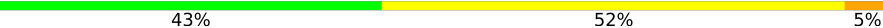
Note EDS was not executed.

• Molecule 1: INSULIN

Chain A: 



• Molecule 1: INSULIN

Chain C: 

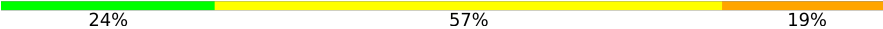


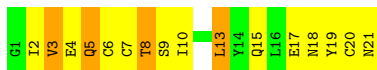
• Molecule 1: INSULIN

Chain E: 



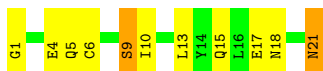
• Molecule 1: INSULIN

Chain G: 

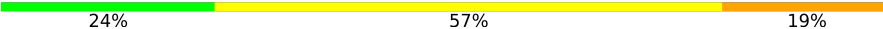


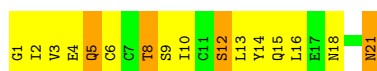
• Molecule 1: INSULIN

Chain I: 



• Molecule 1: INSULIN

Chain K: 



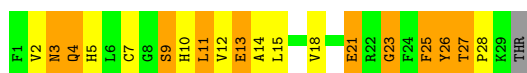
• Molecule 2: INSULIN



• Molecule 2: INSULIN



• Molecule 2: INSULIN



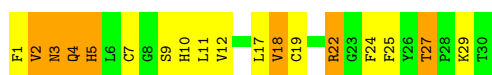
• Molecule 2: INSULIN



• Molecule 2: INSULIN



• Molecule 2: INSULIN



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	61.23Å 61.65Å 48.05Å 90.00° 110.50° 90.00°	Depositor
Resolution (Å)	8.00 – 2.00	Depositor
% Data completeness (in resolution range)	98.6 (8.00-2.00)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, R_{free}	0.178 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2755	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	1.16	0/156	2.29	8/209 (3.8%)
1	C	1.55	0/164	2.41	10/220 (4.5%)
1	E	1.39	0/171	2.49	13/230 (5.7%)
1	G	1.18	0/173	2.51	17/232 (7.3%)
1	I	1.27	0/164	2.39	10/220 (4.5%)
1	K	1.29	1/177 (0.6%)	2.47	16/238 (6.7%)
2	B	1.62	3/257 (1.2%)	3.10	40/348 (11.5%)
2	D	1.60	3/251 (1.2%)	2.66	28/340 (8.2%)
2	F	1.51	1/237 (0.4%)	2.77	27/321 (8.4%)
2	H	1.49	2/233 (0.9%)	2.67	24/316 (7.6%)
2	J	1.47	2/250 (0.8%)	2.75	23/338 (6.8%)
2	L	1.51	2/246 (0.8%)	2.86	30/333 (9.0%)
All	All	1.45	14/2479 (0.6%)	2.66	246/3345 (7.4%)

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	10	HIS	CG-CD2	-7.24	1.27	1.35
2	B	10	HIS	CE1-NE2	6.75	1.39	1.32
2	D	10	HIS	CE1-NE2	-6.12	1.26	1.32
2	L	10	HIS	CE1-NE2	5.97	1.38	1.32
1	K	2	ILE	CA-CB	5.75	1.61	1.54
2	J	26	TYR	C-N	-5.50	1.28	1.33
2	B	4	GLN	C-N	-5.47	1.26	1.33
2	D	16	TYR	CA-C	-5.37	1.46	1.52
2	L	10	HIS	ND1-CE1	5.34	1.37	1.32
2	H	11	LEU	C-N	-5.30	1.27	1.33
2	J	8	GLY	C-N	-5.28	1.27	1.33
2	F	11	LEU	CA-C	5.09	1.59	1.52
2	H	8	GLY	N-CA	5.06	1.52	1.45
2	D	16	TYR	C-O	5.06	1.29	1.24

All (246) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	4	GLN	OE1-CD-NE2	-14.27	108.33	122.60
2	B	8	GLY	CA-C-O	-13.22	107.14	120.75
2	L	22	ARG	NE-CZ-NH1	11.65	133.15	121.50
2	B	10	HIS	CG-CD2-NE2	10.99	118.19	107.20
2	B	10	HIS	CE1-NE2-CD2	-9.98	99.02	109.00
2	B	9[A]	SER	CA-C-O	9.65	131.23	120.90
2	B	9[B]	SER	CA-C-O	9.65	131.23	120.90
2	D	2	VAL	CA-C-O	-9.33	110.39	120.47
2	F	10	HIS	CA-CB-CG	-9.20	104.60	113.80
1	I	21	ASN	CA-CB-CG	8.99	121.59	112.60
1	G	2	ILE	N-CA-C	-8.80	101.64	110.62
2	H	25	PHE	N-CA-CB	8.75	124.31	110.57
2	L	3[A]	ASN	CA-C-O	-8.60	111.69	120.90
2	L	3[B]	ASN	CA-C-O	-8.60	111.69	120.90
2	B	11	LEU	CA-C-O	-8.59	110.09	119.97
2	F	7	CYS	CA-C-O	-8.56	111.83	120.82
2	J	8	GLY	CA-C-N	8.56	132.10	120.54
2	J	8	GLY	C-N-CA	8.56	132.10	120.54
2	F	27	THR	O-C-N	8.43	128.44	121.44
2	J	10	HIS	CB-CG-CD2	-8.37	120.31	131.20
2	L	1	PHE	CA-C-N	8.35	131.14	120.70
2	L	1	PHE	C-N-CA	8.35	131.14	120.70
2	F	11	LEU	CA-C-O	-8.30	111.75	120.55
1	K	9[A]	SER	N-CA-CB	8.18	125.06	111.08
1	K	9[B]	SER	N-CA-CB	8.18	125.06	111.08
2	F	5	HIS	CA-C-N	8.15	131.53	120.44
2	F	5	HIS	C-N-CA	8.15	131.53	120.44
2	B	4	GLN	CB-CG-CD	8.13	126.42	112.60
2	J	12	VAL	CA-C-O	-8.10	111.72	120.47
2	D	4	GLN	CA-CB-CG	-8.10	97.91	114.10
2	J	5	HIS	CA-C-O	-7.95	112.51	120.70
2	B	8	GLY	O-C-N	7.82	129.70	122.19
2	L	12	VAL	O-C-N	7.74	130.54	121.80
2	L	22	ARG	NH1-CZ-NH2	-7.74	109.25	119.30
1	I	6	CYS	N-CA-C	7.64	123.71	112.94
1	E	6	CYS	N-CA-C	7.63	122.59	113.28
2	L	18	VAL	N-CA-C	7.59	118.36	110.62
2	B	4	GLN	CA-C-N	7.58	130.30	120.44
2	B	4	GLN	C-N-CA	7.58	130.30	120.44
2	H	15	LEU	O-C-N	7.54	130.12	122.12
1	C	3	VAL	CB-CA-C	7.54	121.53	111.88
2	L	9	SER	CA-C-N	7.54	131.00	120.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	L	9	SER	C-N-CA	7.54	131.00	120.29
2	J	4	GLN	OE1-CD-NE2	7.49	130.09	122.60
2	D	4	GLN	O-C-N	7.46	130.65	122.15
2	H	5	HIS	CA-C-N	7.45	130.58	120.44
2	H	5	HIS	C-N-CA	7.45	130.58	120.44
2	F	18	VAL	CA-C-N	7.44	134.16	121.14
2	F	18	VAL	C-N-CA	7.44	134.16	121.14
2	H	14	ALA	O-C-N	7.40	130.58	122.15
2	H	25	PHE	CA-CB-CG	-7.38	106.42	113.80
1	E	18	ASN	OD1-CG-ND2	-7.36	115.24	122.60
2	F	14	ALA	CA-C-O	-7.30	112.68	120.42
1	I	9	SER	CA-C-O	-7.29	112.98	120.71
2	F	23	GLY	N-CA-C	-7.23	100.53	112.83
1	K	3	VAL	O-C-N	7.15	128.81	121.87
2	J	25	PHE	CA-CB-CG	-7.06	106.74	113.80
2	J	18	VAL	N-CA-C	7.04	117.18	110.42
2	L	22	ARG	CG-CD-NE	7.03	127.46	112.00
2	J	7	CYS	CA-C-N	7.02	127.93	119.99
2	J	7	CYS	C-N-CA	7.02	127.93	119.99
2	H	11	LEU	CA-C-O	-7.02	113.11	120.55
1	I	15	GLN	OE1-CD-NE2	6.96	129.56	122.60
1	A	8	THR	CB-CA-C	6.86	121.25	109.24
2	L	9	SER	N-CA-CB	-6.83	100.10	110.01
2	B	3	ASN	CA-C-O	6.81	128.19	120.90
2	L	2	VAL	CA-C-O	-6.80	114.01	121.29
1	G	8	THR	CA-C-O	6.78	128.78	120.31
2	H	2	VAL	CA-C-O	-6.77	113.91	120.95
2	D	7	CYS	CA-C-N	6.73	128.55	120.14
2	D	7	CYS	C-N-CA	6.73	128.55	120.14
1	A	2	ILE	CA-C-O	-6.72	113.72	120.85
2	F	10	HIS	CE1-NE2-CD2	6.71	115.71	109.00
2	J	13	GLU	N-CA-CB	6.71	120.08	110.16
2	B	24	PHE	CA-C-O	6.69	128.47	121.38
1	I	17	GLU	CG-CD-OE2	-6.63	103.15	118.40
2	F	3	ASN	CA-C-N	6.63	129.05	120.44
2	F	3	ASN	C-N-CA	6.63	129.05	120.44
1	G	3	VAL	N-CA-C	6.62	116.78	110.42
2	J	3	ASN	CA-C-N	6.62	129.15	120.28
2	J	3	ASN	C-N-CA	6.62	129.15	120.28
1	I	17	GLU	OE1-CD-OE2	6.61	138.77	122.90
2	B	9[A]	SER	O-C-N	-6.61	115.22	122.09
2	B	9[B]	SER	O-C-N	-6.61	115.22	122.09

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	26	TYR	CB-CA-C	6.61	121.13	110.16
1	C	5	GLN	O-C-N	6.58	129.65	122.15
1	A	21	ASN	CB-CA-C	6.57	122.59	110.10
1	E	9	SER	CA-C-O	-6.54	113.79	121.44
2	L	3[A]	ASN	N-CA-CB	6.52	119.66	109.94
2	L	3[B]	ASN	N-CA-CB	6.52	119.66	109.94
2	H	25	PHE	CA-C-O	-6.51	113.28	120.38
2	L	27	THR	CB-CA-C	6.51	119.99	111.01
2	L	12	VAL	CA-C-O	-6.50	113.45	120.47
2	L	4	GLN	OE1-CD-NE2	6.49	129.09	122.60
2	F	13	GLU	CA-C-O	6.49	127.30	120.42
2	B	11	LEU	O-C-N	6.49	130.25	122.27
1	A	21	ASN	CA-CB-CG	6.49	119.09	112.60
1	K	16	LEU	CA-C-O	6.43	127.37	120.55
2	D	24	PHE	CA-C-O	6.41	128.09	121.23
2	D	4	GLN	OE1-CD-NE2	6.41	129.01	122.60
2	D	23	GLY	N-CA-C	-6.34	102.05	112.83
2	L	10	HIS	CB-CG-CD2	-6.34	122.95	131.20
1	I	18	ASN	CB-CG-ND2	6.34	125.90	116.40
2	L	10	HIS	N-CA-CB	6.33	119.53	110.16
2	J	5	HIS	N-CA-C	-6.30	104.33	111.14
1	K	6	CYS	CB-CA-C	6.26	120.54	110.09
2	H	25	PHE	O-C-N	6.25	130.66	123.29
1	C	18	ASN	CB-CG-ND2	6.23	125.75	116.40
2	J	10	HIS	CB-CG-ND1	6.20	132.00	122.70
1	E	19	TYR	O-C-N	6.17	130.89	122.37
2	B	16	TYR	CA-C-N	6.16	128.81	120.44
2	B	16	TYR	C-N-CA	6.16	128.81	120.44
2	L	5	HIS	CA-CB-CG	-6.13	107.67	113.80
2	D	28	PRO	CA-C-N	6.13	132.73	121.70
2	D	28	PRO	C-N-CA	6.13	132.73	121.70
2	L	11	LEU	CB-CA-C	-6.13	101.26	110.88
2	F	15	LEU	CA-C-O	6.12	126.90	120.42
1	G	13	LEU	CA-C-N	6.04	128.38	120.28
1	G	13	LEU	C-N-CA	6.04	128.38	120.28
2	D	22	ARG	NE-CZ-NH2	-6.04	113.77	119.20
1	G	4[A]	GLU	CA-CB-CG	6.03	126.16	114.10
1	G	4[B]	GLU	CA-CB-CG	6.03	126.16	114.10
2	D	5	HIS	CA-C-N	6.00	128.60	120.44
2	D	5	HIS	C-N-CA	6.00	128.60	120.44
2	B	10	HIS	CA-CB-CG	-6.00	107.80	113.80
1	A	8	THR	N-CA-C	-5.98	106.11	113.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	25[A]	PHE	CA-C-N	-5.96	114.37	123.07
2	B	25[A]	PHE	C-N-CA	-5.96	114.37	123.07
2	B	25[B]	PHE	CA-C-N	-5.96	114.37	123.07
2	B	25[B]	PHE	C-N-CA	-5.96	114.37	123.07
1	G	15	GLN	OE1-CD-NE2	-5.96	116.64	122.60
1	E	14	TYR	CA-C-O	5.94	126.84	120.55
2	D	25[A]	PHE	CA-C-N	-5.93	114.63	123.00
2	D	25[A]	PHE	C-N-CA	-5.93	114.63	123.00
2	D	25[B]	PHE	CA-C-N	-5.93	114.63	123.00
2	D	25[B]	PHE	C-N-CA	-5.93	114.63	123.00
2	L	4	GLN	CG-CD-NE2	-5.92	107.52	116.40
2	J	22[A]	ARG	CA-C-O	-5.92	114.28	120.55
2	J	22[B]	ARG	CA-C-O	-5.92	114.28	120.55
1	E	17	GLU	CA-C-O	5.92	126.83	120.20
1	C	18	ASN	OD1-CG-ND2	-5.89	116.71	122.60
2	D	29	LYS	CA-C-O	-5.88	110.81	120.80
2	D	20	GLY	CA-C-O	5.86	129.24	121.51
2	H	13	GLU	CA-C-N	5.85	128.60	120.29
2	H	13	GLU	C-N-CA	5.85	128.60	120.29
1	E	13	LEU	CB-CA-C	5.85	121.90	110.67
1	G	8	THR	CA-CB-CG2	5.84	120.42	110.50
2	D	21	GLU	CB-CG-CD	5.83	122.50	112.60
2	B	25[A]	PHE	CA-C-O	-5.82	114.07	120.36
2	B	25[B]	PHE	CA-C-O	-5.82	114.07	120.36
2	F	25	PHE	CA-CB-CG	-5.81	107.99	113.80
2	J	27	THR	CB-CA-C	-5.79	101.85	110.71
2	B	9[A]	SER	CA-C-N	5.78	128.50	120.29
2	B	9[A]	SER	C-N-CA	5.78	128.50	120.29
2	B	9[B]	SER	CA-C-N	5.78	128.50	120.29
2	B	9[B]	SER	C-N-CA	5.78	128.50	120.29
1	E	19	TYR	CA-C-O	-5.78	112.29	119.28
2	F	7	CYS	O-C-N	5.78	128.02	122.07
1	I	5	GLN	N-CA-C	5.77	117.65	111.36
2	F	2	VAL	CA-C-N	5.76	128.27	120.38
2	F	2	VAL	C-N-CA	5.76	128.27	120.38
1	C	18	ASN	CA-CB-CG	-5.75	106.85	112.60
2	L	24	PHE	CA-C-N	5.75	130.94	123.00
2	L	24	PHE	C-N-CA	5.75	130.94	123.00
2	J	10	HIS	CA-CB-CG	-5.75	108.06	113.80
2	H	3	ASN	OD1-CG-ND2	-5.74	116.86	122.60
1	C	12	SER	N-CA-C	-5.74	102.43	110.35
2	B	22	ARG	NE-CZ-NH2	-5.71	114.06	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	5	GLN	CB-CA-C	-5.69	101.18	110.85
2	H	25	PHE	CA-C-N	-5.68	115.05	123.11
2	H	25	PHE	C-N-CA	-5.68	115.05	123.11
2	B	12	VAL	CA-CB-CG2	5.67	120.04	110.40
2	F	9	SER	CA-CB-OG	-5.67	99.76	111.10
2	D	16	TYR	CA-C-N	5.67	128.13	120.65
2	D	16	TYR	C-N-CA	5.67	128.13	120.65
1	A	6	CYS	O-C-N	5.66	129.08	122.24
1	C	9	SER	CA-C-O	-5.65	114.83	121.44
1	G	20	CYS	CA-C-O	-5.65	115.40	121.56
1	G	17	GLU	CA-CB-CG	5.65	125.40	114.10
2	H	13	GLU	O-C-N	-5.64	115.72	122.15
2	B	3	ASN	CA-CB-CG	5.63	118.23	112.60
2	F	25	PHE	O-C-N	5.61	129.98	123.30
2	D	5	HIS	CA-CB-CG	-5.59	108.21	113.80
2	B	17	LEU	CB-CA-C	5.55	119.67	110.90
2	L	11	LEU	CA-C-O	-5.54	115.00	120.82
2	B	3	ASN	O-C-N	-5.53	116.33	122.09
1	G	5	GLN	CB-CG-CD	5.52	121.99	112.60
2	H	10	HIS	CE1-NE2-CD2	-5.52	103.48	109.00
1	K	12	SER	CA-CB-OG	-5.50	100.10	111.10
1	C	5	GLN	CA-C-O	-5.49	114.60	120.42
2	J	4	GLN	CB-CG-CD	-5.48	103.29	112.60
1	K	6	CYS	N-CA-CB	-5.47	102.40	110.49
1	G	5	GLN	OE1-CD-NE2	-5.46	117.14	122.60
2	F	13	GLU	CG-CD-OE2	-5.45	105.86	118.40
2	J	27	THR	O-C-N	5.45	127.79	121.47
2	H	4	GLN	CA-C-N	5.45	127.52	120.44
2	H	4	GLN	C-N-CA	5.45	127.52	120.44
2	J	12	VAL	O-C-N	5.43	127.94	121.80
1	A	12	SER	N-CA-C	-5.43	103.52	110.53
2	F	26	TYR	N-CA-CB	5.43	119.22	110.65
2	H	12	VAL	CA-CB-CG2	5.42	119.62	110.40
1	K	8[A]	THR	CA-C-N	-5.39	114.34	122.81
1	K	8[A]	THR	C-N-CA	-5.39	114.34	122.81
1	K	8[B]	THR	CA-C-N	-5.39	114.34	122.81
1	K	8[B]	THR	C-N-CA	-5.39	114.34	122.81
2	D	26	TYR	N-CA-C	-5.39	99.63	108.41
2	D	18	VAL	CA-C-N	5.36	128.46	120.31
2	D	18	VAL	C-N-CA	5.36	128.46	120.31
1	I	10	ILE	CA-CB-CG2	5.35	119.60	110.50
2	H	25	PHE	CB-CA-C	-5.35	100.47	109.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1	PHE	O-C-N	5.33	131.53	123.00
1	K	5	GLN	CB-CA-C	-5.33	98.95	109.67
1	A	21	ASN	OD1-CG-ND2	5.33	127.93	122.60
2	L	7	CYS	CA-C-N	5.31	125.88	119.98
2	L	7	CYS	C-N-CA	5.31	125.88	119.98
2	B	16	TYR	CA-C-O	5.30	126.58	120.90
2	D	16	TYR	O-C-N	-5.30	116.61	122.07
2	B	22	ARG	CA-C-O	-5.28	114.13	120.10
2	F	9	SER	CA-C-N	5.27	127.78	120.29
2	F	9	SER	C-N-CA	5.27	127.78	120.29
2	B	3	ASN	OD1-CG-ND2	-5.25	117.35	122.60
1	K	10	ILE	N-CA-CB	-5.25	103.12	110.05
1	I	6	CYS	N-CA-CB	-5.25	102.32	110.98
2	H	14	ALA	N-CA-CB	5.24	117.92	110.16
2	L	10	HIS	CA-CB-CG	-5.19	108.61	113.80
1	E	6	CYS	N-CA-CB	-5.18	102.32	110.46
1	E	4	GLU	O-C-N	-5.18	116.24	122.15
1	K	18	ASN	CB-CG-ND2	-5.18	108.63	116.40
1	E	15	GLN	CG-CD-NE2	-5.16	108.66	116.40
2	H	10	HIS	CG-CD2-NE2	5.16	112.36	107.20
2	J	13	GLU	CB-CG-CD	5.13	121.33	112.60
2	L	2	VAL	O-C-N	5.12	127.21	121.94
1	G	18	ASN	N-CA-C	-5.11	106.88	113.01
1	E	8[A]	THR	CA-C-O	5.09	126.21	120.00
1	E	8[B]	THR	CA-C-O	5.09	126.21	120.00
2	H	18	VAL	N-CA-C	5.09	115.86	110.72
2	F	12	VAL	N-CA-CB	5.08	117.45	110.54
1	K	21	ASN	CA-CB-CG	5.07	117.67	112.60
1	G	9	SER	CA-CB-OG	-5.06	100.99	111.10
2	B	8	GLY	CA-C-N	5.04	127.35	120.54
2	B	8	GLY	C-N-CA	5.04	127.35	120.54
1	K	2	ILE	O-C-N	5.04	126.75	121.87
1	G	2	ILE	O-C-N	5.03	126.75	121.87
1	C	17	GLU	CA-CB-CG	5.03	124.16	114.10
2	F	10	HIS	ND1-CE1-NE2	-5.03	103.37	108.40
1	G	6	CYS	N-CA-C	5.02	120.03	113.30

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	156	0	142	8	0
1	C	163	0	149	10	0
1	E	165	0	152	7	0
1	G	166	0	147	8	0
1	I	163	0	149	5	0
1	K	166	0	153	4	0
2	B	239	0	221	12	0
2	D	234	0	221	7	0
2	F	226	0	207	17	0
2	H	226	0	212	6	0
2	J	238	0	224	14	0
2	L	229	0	207	19	0
3	A	7	0	5	0	0
3	B	7	0	6	2	0
3	C	7	0	5	0	0
3	E	7	0	6	0	0
3	G	7	0	6	0	0
3	I	7	0	6	0	0
3	K	7	0	6	0	0
4	B	1	0	0	0	0
4	D	1	0	0	0	0
5	B	1	0	0	0	0
5	H	1	0	0	0	0
6	A	31	0	0	1	0
6	B	29	0	0	1	0
6	C	24	0	0	1	0
6	D	35	0	0	1	0
6	E	17	0	0	0	0
6	F	29	0	0	3	0
6	G	24	0	0	0	0
6	H	27	0	0	2	0
6	I	32	0	0	1	0
6	J	26	0	0	2	0
6	K	25	0	0	0	0
6	L	32	0	0	1	0
All	All	2755	0	2224	86	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 18.

All (86) 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)
6:C:36:HOH:O	2:L:2:VAL:HG11	1.60	1.01
1:C:10:ILE:HD11	2:L:2:VAL:HA	1.52	0.91
1:I:21:ASN:ND2	2:L:27:THR:HG22	2.01	0.75
1:C:10:ILE:HD11	2:L:2:VAL:CA	2.18	0.74
1:G:5:GLN:OE1	1:G:19:TYR:OH	2.08	0.71
2:B:4:GLN:OE1	6:B:36:HOH:O	2.09	0.69
1:K:12:SER:OG	1:K:15:GLN:HG3	1.95	0.67
2:B:25[B]:PHE:HE1	1:C:21:ASN:HD21	1.44	0.66
2:J:5:HIS:ND1	6:J:46:HOH:O	2.30	0.65
2:B:28:PRO:O	2:B:30:THR:N	2.31	0.64
2:L:19:CYS:HA	2:L:22:ARG:HH11	1.61	0.64
2:F:23:GLY:HA3	2:H:26:TYR:O	2.00	0.61
2:F:4[B]:GLN:NE2	6:F:34:HOH:O	2.33	0.61
2:F:13:GLU:HG3	6:F:45:HOH:O	2.00	0.60
2:F:9:SER:O	6:F:37:HOH:O	2.16	0.60
1:K:13:LEU:HD22	2:L:18:VAL:CG2	2.32	0.60
2:B:25[B]:PHE:HE1	1:C:21:ASN:ND2	2.01	0.58
1:A:21:ASN:OD1	2:D:25[B]:PHE:HE1	1.86	0.58
2:F:23:GLY:CA	2:H:26:TYR:O	2.52	0.57
1:K:21:ASN:HD21	2:L:25:PHE:HD1	1.52	0.56
1:A:18:ASN:OD1	6:A:26:HOH:O	2.18	0.55
1:C:1:GLY:CA	1:C:4:GLU:OE1	2.55	0.54
1:C:4:GLU:H	1:C:4:GLU:CD	2.14	0.54
2:B:6:LEU:O	2:B:9[B]:SER:HB2	2.08	0.54
2:J:10:HIS:O	2:J:13:GLU:HG2	2.08	0.54
2:J:3:ASN:H	2:J:3:ASN:ND2	2.07	0.53
1:E:2:ILE:HD12	1:E:19:TYR:CD2	2.44	0.53
2:F:25:PHE:CE1	1:G:21:ASN:OD1	2.63	0.52
1:I:21:ASN:HD22	2:L:27:THR:HG22	1.73	0.52
2:F:3:ASN:HB3	2:J:1:PHE:CE1	2.45	0.52
2:F:21:GLU:O	2:H:28:PRO:HG2	2.09	0.52
2:L:2:VAL:O	2:L:5:HIS:HB3	2.10	0.52
1:A:21:ASN:OD1	2:D:25[B]:PHE:CE1	2.63	0.52
1:G:3:VAL:HG11	6:H:58:HOH:O	2.10	0.52
2:L:19:CYS:HA	2:L:22:ARG:NH1	2.24	0.52
2:D:2:VAL:HG22	1:G:10:ILE:HG13	1.92	0.51
1:K:1:GLY:N	1:K:4:GLU:OE1	2.28	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3:VAL:O	1:C:7:CYS:HB2	2.11	0.51
1:A:13:LEU:HD22	2:B:18:VAL:CG2	2.41	0.50
2:J:25:PHE:CD1	2:J:25:PHE:N	2.78	0.50
1:E:12:SER:OG	1:E:15:GLN:HG3	2.12	0.50
2:F:3:ASN:HB3	2:J:1:PHE:CZ	2.47	0.50
2:F:25:PHE:CD1	2:F:27:THR:HG23	2.47	0.50
1:E:6:CYS:CB	2:F:11:LEU:HD21	2.42	0.50
1:I:1:GLY:HA3	1:I:4:GLU:OE1	2.12	0.48
1:A:1:GLY:N	1:A:4:GLU:OE1	2.37	0.48
1:C:10:ILE:HD13	1:C:10:ILE:N	2.28	0.48
2:D:21:GLU:HB2	6:D:56:HOH:O	2.13	0.47
1:G:3:VAL:O	1:G:7:CYS:HB2	2.15	0.47
2:J:3:ASN:H	2:J:3:ASN:HD22	1.63	0.47
2:B:6:LEU:HD12	3:B:33:IPH:C2	2.45	0.46
1:A:3:VAL:O	1:A:7:CYS:HB2	2.15	0.46
2:L:19:CYS:O	2:L:22:ARG:HD2	2.15	0.46
2:B:27:THR:HA	2:B:28:PRO:HD2	1.85	0.45
2:F:25:PHE:CE1	2:F:27:THR:HG23	2.51	0.45
2:J:20:GLY:HA2	6:J:41:HOH:O	2.16	0.45
1:A:21:ASN:C	1:A:21:ASN:HD22	2.25	0.45
1:E:6:CYS:HB3	2:F:11:LEU:HD21	1.98	0.44
2:H:3:ASN:O	6:H:53:HOH:O	2.21	0.44
1:I:1:GLY:CA	1:I:4:GLU:OE1	2.66	0.44
1:E:10:ILE:HD12	2:J:5:HIS:ND1	2.32	0.44
2:L:18:VAL:O	2:L:22:ARG:NH1	2.52	0.43
2:F:25:PHE:CZ	1:G:21:ASN:OD1	2.71	0.43
2:F:26:TYR:O	2:H:23:GLY:HA3	2.19	0.43
2:B:25[B]:PHE:HE1	1:C:21:ASN:CG	2.27	0.42
3:B:33:IPH:C3	2:J:6:LEU:HD12	2.49	0.42
1:I:13:LEU:HG	6:I:157:HOH:O	2.18	0.42
2:J:6:LEU:O	2:J:10:HIS:HD2	2.02	0.42
1:E:6:CYS:HB2	2:F:11:LEU:HD21	2.02	0.42
1:A:13:LEU:HD22	2:B:18:VAL:HG21	2.02	0.41
1:G:13:LEU:HD22	2:H:18:VAL:CG2	2.50	0.41
2:J:25:PHE:HB3	2:L:25:PHE:CE2	2.55	0.41
2:D:1:PHE:N	1:G:10:ILE:HD12	2.36	0.41
2:L:29:LYS:H	2:L:29:LYS:HG3	1.66	0.41
1:C:1:GLY:HA3	1:C:4:GLU:OE1	2.20	0.40
2:L:17:LEU:HD22	6:L:45:HOH:O	2.20	0.40
1:E:10:ILE:HD12	2:J:5:HIS:CE1	2.56	0.40
2:B:13:GLU:OE2	2:D:13:GLU:HB2	2.21	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	19/21 (90%)	19 (100%)	0	0	100	100
1	C	19/21 (90%)	19 (100%)	0	0	100	100
1	E	20/21 (95%)	20 (100%)	0	0	100	100
1	G	20/21 (95%)	20 (100%)	0	0	100	100
1	I	19/21 (90%)	19 (100%)	0	0	100	100
1	K	21/21 (100%)	21 (100%)	0	0	100	100
2	B	30/30 (100%)	28 (93%)	1 (3%)	1 (3%)	3	1
2	D	29/30 (97%)	28 (97%)	1 (3%)	0	100	100
2	F	28/30 (93%)	27 (96%)	0	1 (4%)	2	1
2	H	27/30 (90%)	27 (100%)	0	0	100	100
2	J	29/30 (97%)	27 (93%)	1 (3%)	1 (3%)	3	1
2	L	30/30 (100%)	30 (100%)	0	0	100	100
All	All	291/306 (95%)	285 (98%)	3 (1%)	3 (1%)	11	8

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	29	LYS
2	J	2	VAL
2	F	28	PRO

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	19/20 (95%)	18 (95%)	1 (5%)	20	18
1	C	20/20 (100%)	19 (95%)	1 (5%)	22	20
1	E	21/20 (105%)	19 (90%)	2 (10%)	8	5
1	G	21/20 (105%)	20 (95%)	1 (5%)	23	21
1	I	20/20 (100%)	19 (95%)	1 (5%)	22	20
1	K	22/20 (110%)	18 (82%)	4 (18%)	2	1
2	B	26/26 (100%)	24 (92%)	2 (8%)	12	8
2	D	25/26 (96%)	23 (92%)	2 (8%)	11	8
2	F	24/26 (92%)	21 (88%)	3 (12%)	4	2
2	H	24/26 (92%)	23 (96%)	1 (4%)	26	25
2	J	25/26 (96%)	23 (92%)	2 (8%)	11	8
2	L	24/26 (92%)	21 (88%)	3 (12%)	4	2
All	All	271/276 (98%)	248 (92%)	23 (8%)	12	7

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	ASN
2	B	17	LEU
2	B	21	GLU
1	C	16	LEU
2	D	6	LEU
2	D	21	GLU
1	E	3	VAL
1	E	5	GLN
2	F	4[A]	GLN
2	F	4[B]	GLN
2	F	21	GLU
1	G	8	THR
2	H	17	LEU
1	I	9	SER
2	J	3	ASN
2	J	4	GLN
1	K	5	GLN
1	K	8[A]	THR
1	K	8[B]	THR

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Mol	Chain	Res	Type
1	K	14	TYR
2	L	3[A]	ASN
2	L	3[B]	ASN
2	L	4	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	21	ASN
2	B	4	GLN
2	B	5	HIS
1	C	5	GLN
2	F	5	HIS
1	G	21	ASN
1	I	21	ASN
2	J	3	ASN
1	K	5	GLN
1	K	21	ASN
2	L	5	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 11 ligands modelled in this entry, 4 are monoatomic - leaving 7 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	IPH	A	22	-	7,7,7	1.01	0	8,8,8	1.02	0
3	IPH	C	22	-	7,7,7	0.81	0	8,8,8	1.33	2 (25%)
3	IPH	K	22	-	7,7,7	0.77	0	8,8,8	0.32	0
3	IPH	G	22	-	7,7,7	1.70	3 (42%)	8,8,8	1.10	0
3	IPH	E	22	-	7,7,7	1.27	0	8,8,8	0.84	0
3	IPH	I	22	-	7,7,7	1.26	0	8,8,8	1.04	0
3	IPH	B	33	-	7,7,7	0.61	0	8,8,8	1.28	1 (12%)

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	IPH	A	22	-	-	-	0/1/1/1
3	IPH	C	22	-	-	-	0/1/1/1
3	IPH	K	22	-	-	-	0/1/1/1
3	IPH	G	22	-	-	-	0/1/1/1
3	IPH	E	22	-	-	-	0/1/1/1
3	IPH	I	22	-	-	-	0/1/1/1
3	IPH	B	33	-	-	-	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	22	IPH	C5-C6	2.42	1.43	1.38
3	G	22	IPH	C6-C1	2.36	1.43	1.39
3	G	22	IPH	C3-C2	2.03	1.42	1.38

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	33	IPH	C5-C4-C3	-2.41	116.57	119.87
3	C	22	IPH	C6-C1-C2	2.40	123.59	119.77
3	C	22	IPH	C5-C6-C1	-2.05	116.52	119.29

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	33	IPH	2	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

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.