



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 12:22 PM UTC

PDB ID : 1SCF / pdb_00001scf
Title : HUMAN RECOMBINANT STEM CELL FACTOR
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Deposited on : 1998-06-04
Resolution : 2.20 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

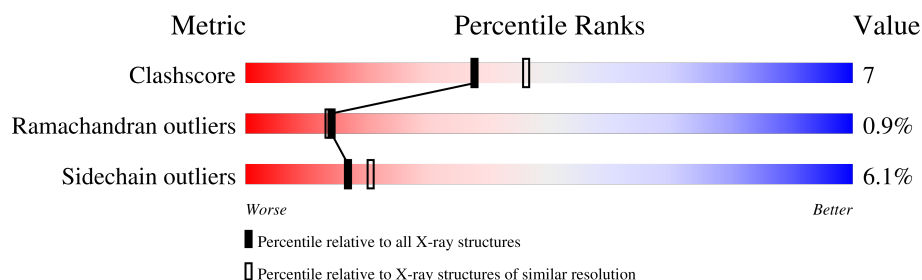
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments 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	273	
1	B	273	
1	C	273	
1	D	273	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3796 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.

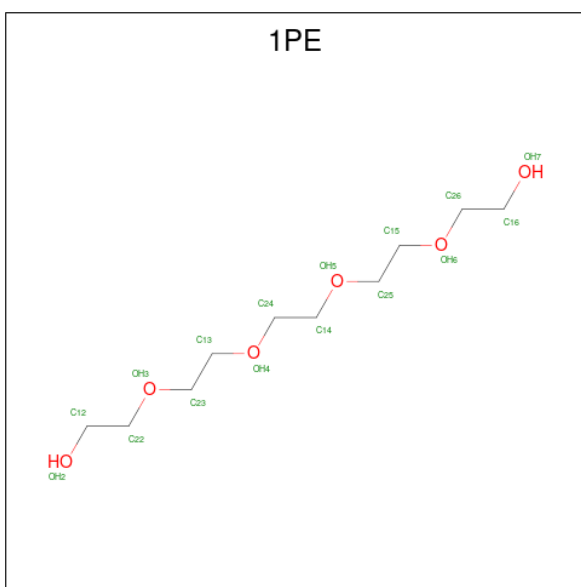
- Molecule 1 is a protein called STEM CELL FACTOR.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	119	Total	C	N	O	S	Se	0	0	0
			925	594	142	183	3	3			
1	B	121	Total	C	N	O	S	Se	0	0	0
			947	612	148	181	3	3			
1	C	104	Total	C	N	O	S	Se	0	0	0
			824	532	128	159	2	3			
1	D	104	Total	C	N	O	S	Se	0	0	0
			817	528	127	157	2	3			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	27	MSE	MET	modified residue	UNP P21583
A	36	MSE	MET	modified residue	UNP P21583
A	48	MSE	MET	modified residue	UNP P21583
B	27	MSE	MET	modified residue	UNP P21583
B	36	MSE	MET	modified residue	UNP P21583
B	48	MSE	MET	modified residue	UNP P21583
C	27	MSE	MET	modified residue	UNP P21583
C	36	MSE	MET	modified residue	UNP P21583
C	48	MSE	MET	modified residue	UNP P21583
D	27	MSE	MET	modified residue	UNP P21583
D	36	MSE	MET	modified residue	UNP P21583
D	48	MSE	MET	modified residue	UNP P21583

- Molecule 2 is PENTAETHYLENE GLYCOL (CCD ID: 1PE) (formula: C₁₀H₂₂O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			16	10	6		

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	1	Total	Ca	0	0
			1	1		
3	D	2	Total	Ca	0	0
			2	2		

- Molecule 4 is water.

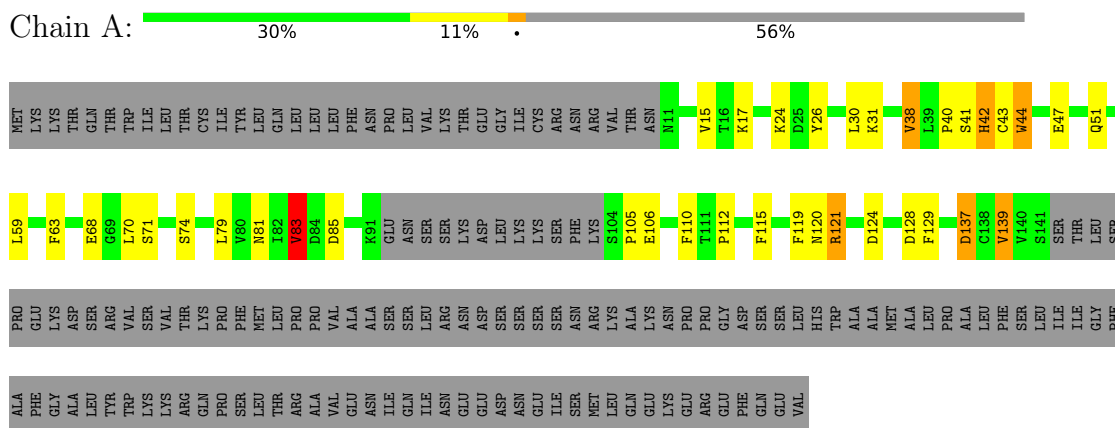
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	57	Total	O	0	0
			57	57		
4	B	77	Total	O	0	0
			77	77		
4	C	57	Total	O	0	0
			57	57		
4	D	73	Total	O	0	0
			73	73		

3 Residue-property plots

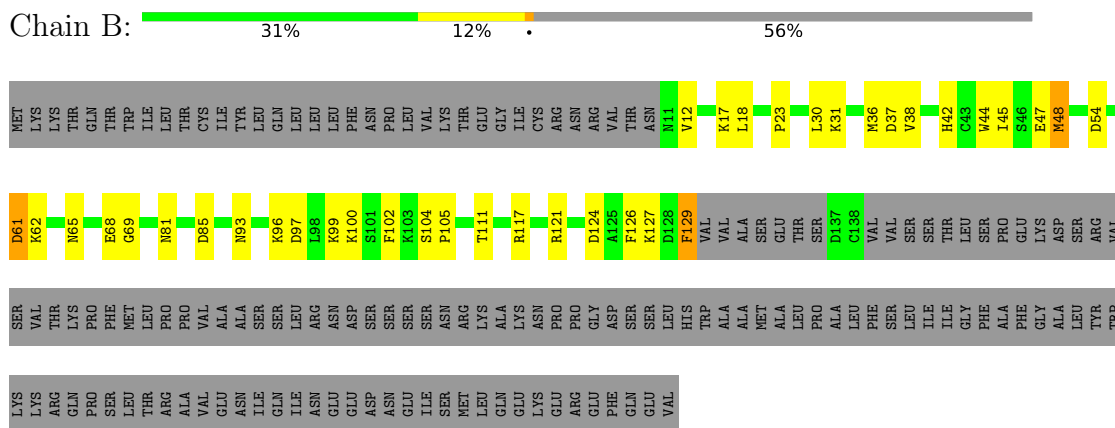
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

Note EDS was not executed.

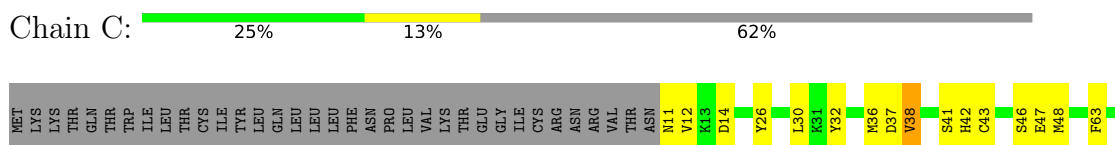
- Molecule 1: STEM CELL FACTOR

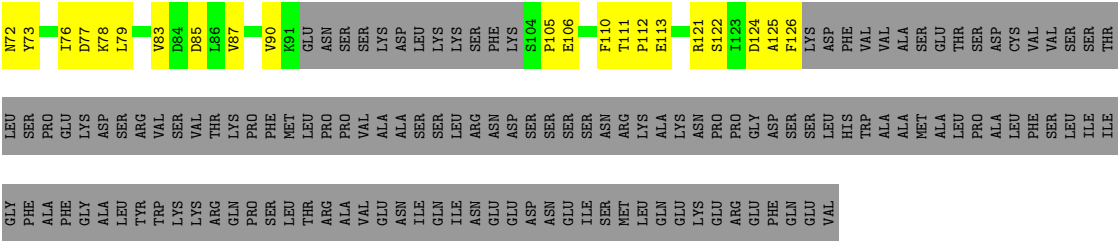


- Molecule 1: STEM CELL FACTOR

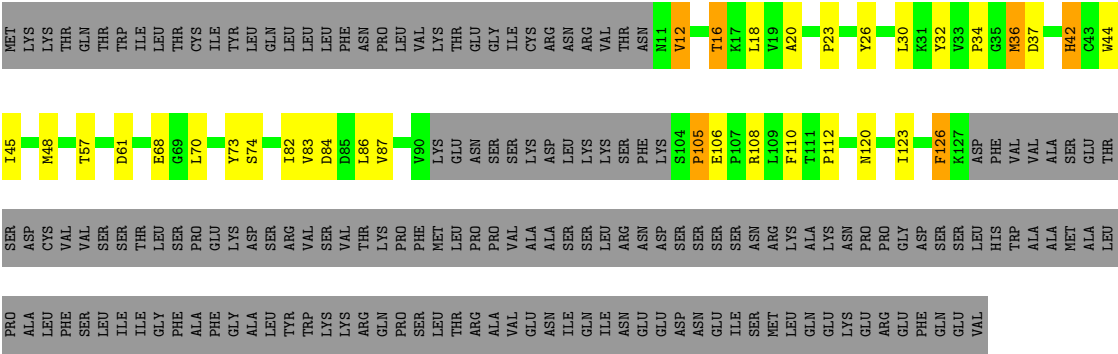


- Molecule 1: STEM CELL FACTOR





● Molecule 1: STEM CELL FACTOR



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	71.82Å 82.55Å 88.19Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.20	Depositor
% Data completeness (in resolution range)	96.6 (20.00-2.20)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.199 , 0.242	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3796	wwPDB-VP
Average B, all atoms (Å ²)	32.0	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: 1PE, CA

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	1.05	1/939 (0.1%)	1.75	16/1274 (1.3%)
1	B	1.00	2/962 (0.2%)	1.85	19/1298 (1.5%)
1	C	1.16	2/837 (0.2%)	1.85	17/1132 (1.5%)
1	D	1.03	2/830 (0.2%)	1.76	18/1124 (1.6%)
All	All	1.06	7/3568 (0.2%)	1.80	70/4828 (1.4%)

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	C	0	1
1	D	0	1
All	All	0	2

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	42	HIS	CD2-NE2	-6.66	1.30	1.37
1	C	42	HIS	CD2-NE2	-6.56	1.30	1.37
1	B	42	HIS	CD2-NE2	-5.94	1.31	1.37
1	D	42	HIS	CG-ND1	-5.64	1.32	1.38
1	C	12	VAL	CA-CB	5.42	1.62	1.54
1	A	42	HIS	CD2-NE2	-5.32	1.31	1.37
1	B	48	MSE	SE-CE	-5.04	1.80	1.95

All (70) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	61	ASP	CA-CB-CG	14.09	126.69	112.60
1	A	128	ASP	CA-CB-CG	12.60	125.19	112.60
1	B	97	ASP	N-CA-C	10.02	123.13	111.11
1	D	84	ASP	CA-CB-CG	9.57	122.17	112.60
1	A	85	ASP	CA-CB-CG	9.22	121.82	112.60
1	C	12	VAL	N-CA-C	8.27	121.39	111.05
1	A	137	ASP	CA-CB-CG	8.02	120.62	112.60
1	A	81	ASN	N-CA-C	7.64	119.61	111.28
1	A	38	VAL	N-CA-CB	-7.62	98.65	111.23
1	C	11	ASN	CA-C-N	7.39	132.15	120.47
1	C	11	ASN	C-N-CA	7.39	132.15	120.47
1	B	54	ASP	CA-CB-CG	7.17	119.77	112.60
1	C	85	ASP	N-CA-C	7.02	119.83	111.33
1	C	122	SER	N-CA-C	6.82	118.51	111.14
1	D	37	ASP	CA-CB-CG	6.79	119.39	112.60
1	A	83	VAL	CB-CA-C	-6.75	102.90	112.22
1	B	12	VAL	N-CA-C	6.75	119.53	111.09
1	D	61	ASP	CA-CB-CG	6.67	119.27	112.60
1	C	105	PRO	N-CA-C	6.17	119.86	111.22
1	A	124	ASP	CA-CB-CG	-6.09	106.51	112.60
1	C	42	HIS	CB-CG-CD2	-6.07	123.32	131.20
1	B	37	ASP	CA-CB-CG	6.05	118.65	112.60
1	C	124	ASP	CA-CB-CG	5.98	118.58	112.60
1	D	74	SER	CB-CA-C	-5.90	100.99	110.79
1	D	44	TRP	CG-CD2-CE3	5.84	139.74	133.90
1	C	106	GLU	CA-C-N	5.79	125.98	119.90
1	C	106	GLU	C-N-CA	5.79	125.98	119.90
1	C	38	VAL	CA-C-O	-5.76	115.80	120.70
1	B	127	LYS	N-CA-C	5.74	118.28	111.33
1	B	124	ASP	CA-CB-CG	5.74	118.34	112.60
1	D	18	LEU	CA-C-O	-5.73	114.81	120.82
1	D	12	VAL	N-CA-C	5.62	121.03	109.34
1	D	16	THR	N-CA-CB	-5.57	101.64	110.28
1	D	42	HIS	CB-CG-CD2	-5.57	123.96	131.20
1	B	42	HIS	CB-CG-CD2	-5.54	124.00	131.20
1	A	38	VAL	CB-CA-C	5.50	120.31	111.29
1	A	106	GLU	CA-C-N	5.48	125.75	119.83
1	A	106	GLU	C-N-CA	5.48	125.75	119.83
1	B	44	TRP	CE2-CD2-CG	-5.47	100.63	107.20
1	A	44	TRP	CG-CD2-CE3	5.47	139.37	133.90
1	C	126	PHE	CA-CB-CG	5.46	119.26	113.80
1	A	44	TRP	CE2-CD2-CG	-5.46	100.66	107.20
1	B	45	ILE	N-CA-C	5.45	116.83	110.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	85	ASP	CA-CB-CG	5.41	118.01	112.60
1	C	111	THR	CA-C-O	-5.38	114.66	121.01
1	C	37	ASP	CA-CB-CG	5.36	117.95	112.60
1	A	139	VAL	CB-CA-C	-5.34	102.70	110.81
1	B	96	LYS	CA-C-N	5.33	127.73	120.54
1	B	96	LYS	C-N-CA	5.33	127.73	120.54
1	D	44	TRP	CB-CG-CD1	-5.32	118.92	126.90
1	C	47	GLU	CB-CG-CD	5.32	121.64	112.60
1	B	65	ASN	N-CA-C	5.32	118.35	110.48
1	D	44	TRP	CE2-CD2-CG	-5.31	100.83	107.20
1	B	81	ASN	OD1-CG-ND2	-5.30	117.30	122.60
1	B	48	MSE	CG-SE-CE	-5.29	87.28	98.92
1	D	120	ASN	CA-CB-CG	5.27	117.87	112.60
1	B	18	LEU	CA-C-O	-5.25	115.31	120.82
1	C	14	ASP	CA-C-O	-5.24	113.60	119.79
1	A	44	TRP	CB-CG-CD1	-5.16	119.17	126.90
1	D	82	ILE	N-CA-C	5.15	115.92	110.72
1	A	83	VAL	N-CA-CB	5.14	118.29	110.58
1	D	57	THR	CA-CB-OG1	-5.12	101.93	109.60
1	D	106	GLU	CA-C-N	5.08	125.32	119.83
1	D	106	GLU	C-N-CA	5.08	125.32	119.83
1	C	77	ASP	CA-CB-CG	5.06	117.66	112.60
1	B	38	VAL	N-CA-C	5.04	119.81	109.34
1	D	45	ILE	N-CA-C	5.03	117.33	111.05
1	A	115	PHE	N-CA-C	-5.02	105.89	111.36
1	B	111	THR	O-C-N	-5.01	116.29	121.60
1	D	20	ALA	N-CA-C	5.01	117.47	111.71

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	73	TYR	Sidechain
1	D	73	TYR	Sidechain

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	925	0	893	18	0
1	B	947	0	927	15	0
1	C	824	0	814	11	0
1	D	817	0	801	12	0
2	B	16	0	22	3	0
3	C	1	0	0	0	0
3	D	2	0	0	0	0
4	A	57	0	0	1	0
4	B	77	0	0	2	0
4	C	57	0	0	0	0
4	D	73	0	0	1	0
All	All	3796	0	3457	49	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 7.

All (49) 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:B:30:LEU:HD21	1:B:48:MSE:HE1	1.60	0.83
1:C:41:SER:HB2	1:C:125:ALA:HB1	1.76	0.66
1:B:31:LYS:HG2	1:B:105:PRO:O	2.02	0.60
1:A:31:LYS:HB3	1:A:105:PRO:HG2	1.84	0.58
1:B:99:LYS:HD3	1:B:102:PHE:CE2	2.39	0.58
1:D:83:VAL:O	1:D:87:VAL:HG23	2.05	0.56
1:A:83:VAL:HG22	1:A:119:PHE:HE2	1.71	0.55
1:A:26:TYR:O	1:A:112:PRO:HD3	2.07	0.54
1:A:70:LEU:HD13	1:B:68:GLU:OE1	2.07	0.54
1:C:26:TYR:O	1:C:112:PRO:HD3	2.07	0.54
1:B:126:PHE:HA	1:B:129:PHE:HD2	1.74	0.52
1:D:30:LEU:HD21	1:D:48:MSE:HE1	1.92	0.52
1:A:121:ARG:HD2	4:A:1393:HOH:O	2.11	0.50
1:C:63:PHE:CZ	1:D:23:PRO:HG3	2.48	0.49
2:B:249:1PE:H162	1:D:110:PHE:CE1	2.48	0.48
1:A:71:SER:HB3	1:A:74:SER:OG	2.13	0.48
1:C:36:MSE:SE	1:C:48:MSE:HE2	2.64	0.48
2:B:249:1PE:H121	2:B:249:1PE:H232	1.71	0.48
1:A:47:GLU:O	1:A:51:GLN:HG2	2.14	0.47
1:D:36:MSE:HE2	1:D:36:MSE:HB3	1.87	0.47
1:A:17:LYS:HD3	1:B:68:GLU:OE1	2.14	0.47
1:A:41:SER:HA	1:A:44:TRP:CE2	2.50	0.46
1:C:32:TYR:HA	1:C:48:MSE:HE1	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:68:GLU:HG2	1:B:69:GLY:N	2.30	0.46
1:A:70:LEU:HD13	1:B:68:GLU:CD	2.40	0.46
1:B:100:LYS:HG2	4:B:1434:HOH:O	2.16	0.45
1:A:70:LEU:HD13	1:B:68:GLU:OE2	2.17	0.45
1:A:15:VAL:HG11	1:A:120:ASN:HD21	1.81	0.45
1:A:30:LEU:HB3	1:A:110:PHE:CE2	2.52	0.45
1:C:121:ARG:HH11	1:C:121:ARG:HG3	1.82	0.45
1:A:40:PRO:HG2	1:A:43:CYS:SG	2.57	0.44
1:A:79:LEU:O	1:A:83:VAL:HG23	2.18	0.44
1:B:31:LYS:HB3	1:B:105:PRO:HB2	1.99	0.44
1:A:40:PRO:HB2	1:A:42:HIS:HD2	1.82	0.43
1:D:26:TYR:O	1:D:112:PRO:HD3	2.18	0.43
1:C:83:VAL:O	1:C:87:VAL:HG23	2.18	0.42
1:D:42:HIS:HA	4:D:1291:HOH:O	2.19	0.42
1:B:17:LYS:HD2	4:B:1311:HOH:O	2.19	0.42
1:C:30:LEU:HB3	1:C:110:PHE:CE2	2.55	0.42
2:B:249:1PE:H241	1:D:108:ARG:HH12	1.85	0.42
1:B:47:GLU:HB2	1:B:102:PHE:CD1	2.55	0.42
1:C:72:ASN:O	1:C:76:ILE:HG13	2.20	0.41
1:A:63:PHE:CZ	1:B:23:PRO:HG3	2.55	0.41
1:D:86:LEU:HD13	1:D:126:PHE:CD2	2.55	0.41
1:D:32:TYR:O	1:D:105:PRO:HB2	2.21	0.41
1:A:24:LYS:HG3	1:B:62:LYS:O	2.21	0.41
1:C:79:LEU:O	1:C:83:VAL:HG23	2.20	0.41
1:C:63:PHE:HZ	1:D:23:PRO:HG3	1.85	0.40
1:D:32:TYR:O	1:D:34:PRO:HD3	2.21	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	115/273 (42%)	107 (93%)	7 (6%)	1 (1%)	14	14
1	B	117/273 (43%)	110 (94%)	6 (5%)	1 (1%)	14	14
1	C	100/273 (37%)	97 (97%)	3 (3%)	0	100	100
1	D	100/273 (37%)	95 (95%)	3 (3%)	2 (2%)	6	4
All	All	432/1092 (40%)	409 (95%)	19 (4%)	4 (1%)	14	14

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	93	ASN
1	A	137	ASP
1	D	105	PRO
1	D	12	VAL

5.3.2 Protein sidechains ⓘ

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	108/251 (43%)	101 (94%)	7 (6%)	15	18
1	B	109/251 (43%)	103 (94%)	6 (6%)	19	24
1	C	97/251 (39%)	91 (94%)	6 (6%)	16	20
1	D	95/251 (38%)	89 (94%)	6 (6%)	16	19
All	All	409/1004 (41%)	384 (94%)	25 (6%)	17	20

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	38	VAL
1	A	59	LEU
1	A	68	GLU
1	A	83	VAL
1	A	121	ARG
1	A	129	PHE
1	A	139	VAL

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Mol	Chain	Res	Type
1	B	36	MSE
1	B	61	ASP
1	B	104	SER
1	B	117	ARG
1	B	121	ARG
1	B	129	PHE
1	C	38	VAL
1	C	43	CYS
1	C	46	SER
1	C	78	LYS
1	C	90	VAL
1	C	113	GLU
1	D	16	THR
1	D	36	MSE
1	D	68	GLU
1	D	70	LEU
1	D	123	ILE
1	D	126	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	HIS
1	A	65	ASN
1	A	120	ASN
1	B	81	ASN
1	C	120	ASN
1	D	65	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 3 are monoatomic - leaving 1 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
2	1PE	B	249	-	15,15,15	0.61	0	14,14,14	0.68	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
2	1PE	B	249	-	-	3/13/13/13	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	249	1PE	OH7-C16-C26-OH6
2	B	249	1PE	OH5-C14-C24-OH4
2	B	249	1PE	C12-C22-OH3-C23

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	249	1PE	3	0

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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.