



wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 31, 2016 – 10:58 PM GMT

PDB ID : 1VZ0
Title : CHROMOSOME SEGREGATION PROTEIN SPO0J FROM THERMUS
THERMOPHILUS
Authors : Leonard, T.A.; Butler, P.J.G.; Lowe, J.
Deposited on : 2004-05-12
Resolution : 2.30 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

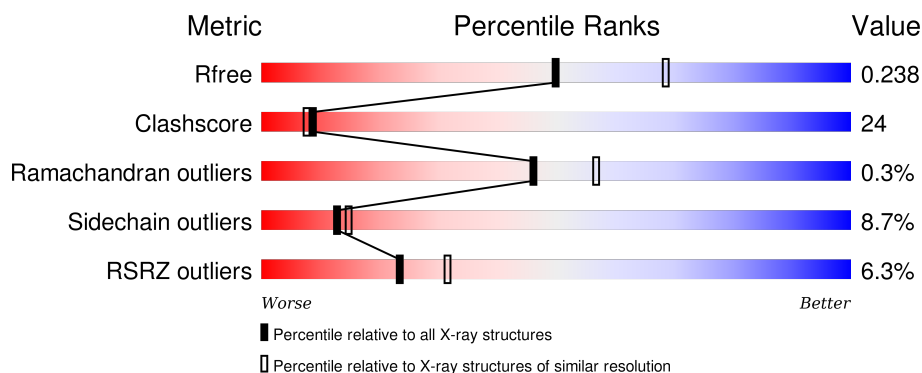
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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}	91344	3852 (2.30-2.30)
Clashscore	102246	4452 (2.30-2.30)
Ramachandran outliers	100387	4410 (2.30-2.30)
Sidechain outliers	100360	4409 (2.30-2.30)
RSRZ outliers	91569	3857 (2.30-2.30)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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 $\leq 5\%$. 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	230	<div> <div>4%</div> <div>56% 19% 7% 19%</div> </div>
1	B	230	<div> <div>6%</div> <div>48% 33% • 16%</div> </div>
1	C	230	<div> <div>4%</div> <div>53% 27% • 17%</div> </div>
1	D	230	<div> <div>7%</div> <div>59% 23% • 16%</div> </div>
1	E	230	<div> <div>7%</div> <div>57% 22% 5% 17%</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	230	<div><div><div></div><div></div><div></div><div></div></div><div><div>2%</div><div>54%</div><div>26%</div><div>•</div><div>18%</div></div></div>
1	G	230	<div><div><div></div><div></div><div></div><div></div></div><div><div>8%</div><div>50%</div><div>27%</div><div>•</div><div>19%</div></div></div>
1	H	230	<div><div><div></div><div></div><div></div><div></div></div><div><div>4%</div><div>56%</div><div>23%</div><div>•</div><div>18%</div></div></div>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 12878 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 CHROMOSOME PARTITIONING PROTEIN PARB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	187	Total	C	N	O	S	0	0	1
			1459	911	272	273	3			
1	B	193	Total	C	N	O	S	0	0	1
			1511	943	284	281	3			
1	C	190	Total	C	N	O	S	0	0	1
			1487	928	278	278	3			
1	D	193	Total	C	N	O	S	0	0	1
			1511	943	284	281	3			
1	E	192	Total	C	N	O	S	0	0	1
			1506	940	283	280	3			
1	F	189	Total	C	N	O	S	0	0	1
			1478	923	277	275	3			
1	G	187	Total	C	N	O	S	0	0	1
			1459	911	272	273	3			
1	H	188	Total	C	N	O	S	0	0	1
			1467	917	273	274	3			

- Molecule 2 is COBALT (II) ION (three-letter code: CO) (formula: Co).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	G	1	Total	Co	0	0
			1	1		
2	D	2	Total	Co	0	0
			2	2		
2	E	2	Total	Co	0	0
			2	2		
2	H	1	Total	Co	0	0
			1	1		
2	B	2	Total	Co	0	0
			2	2		
2	C	2	Total	Co	0	0
			2	2		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	3	Total 3	Co 3	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

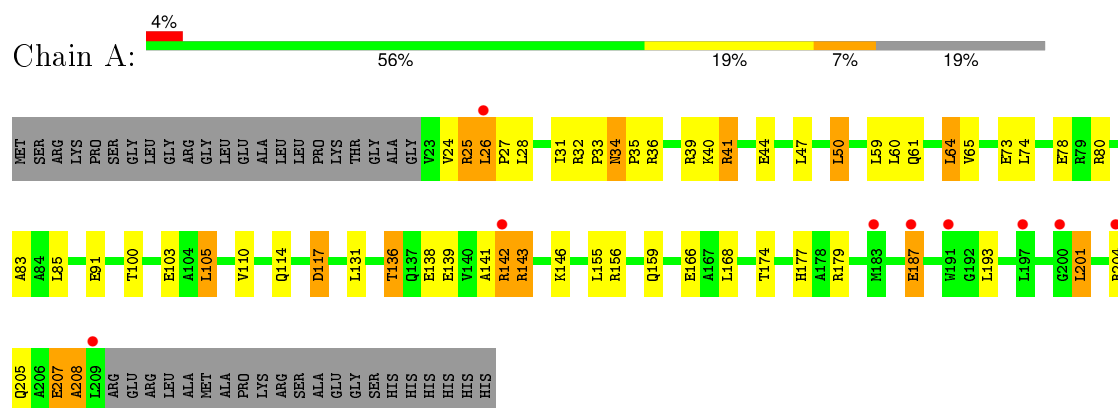
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	140	Total 140	O 140	0	0
4	B	130	Total 130	O 130	0	0
4	C	114	Total 114	O 114	0	0
4	D	126	Total 126	O 126	0	0
4	E	110	Total 110	O 110	0	0
4	F	117	Total 117	O 117	0	0
4	G	122	Total 122	O 122	0	0
4	H	126	Total 126	O 126	0	0

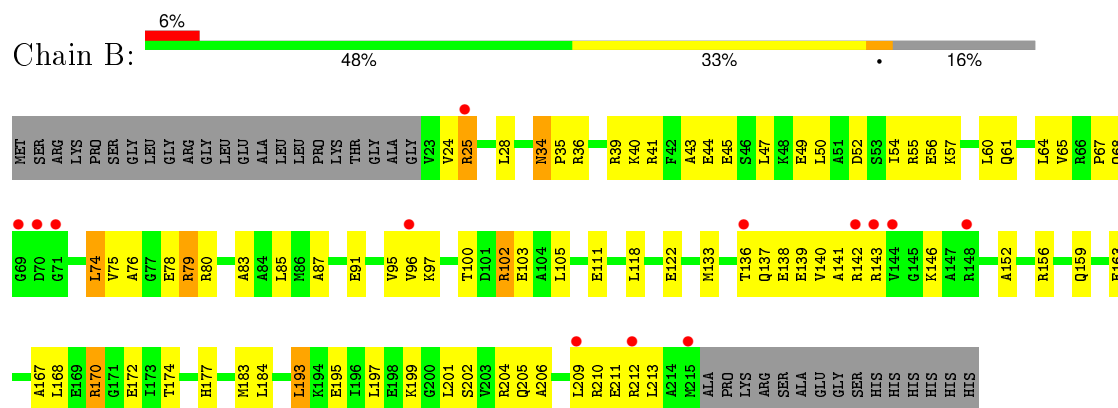
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ($\text{RSRZ} > 2$). 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.

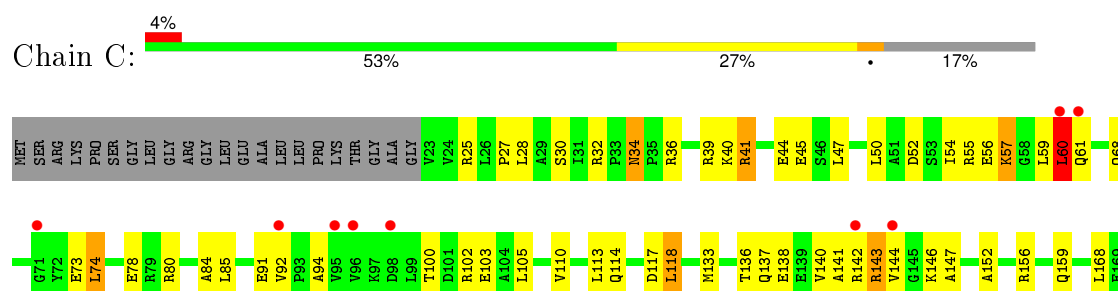
• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB



• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB

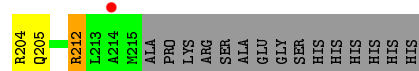
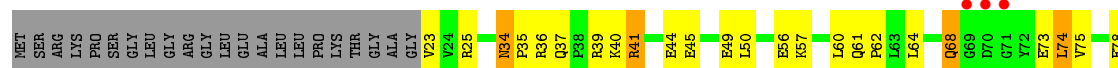


• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB

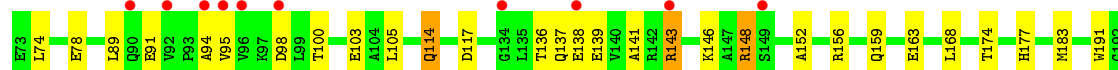
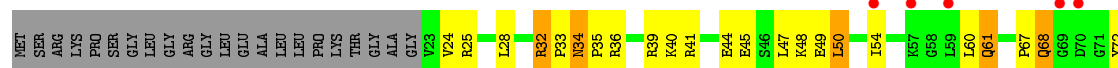




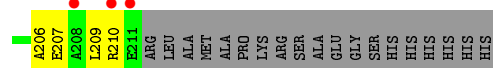
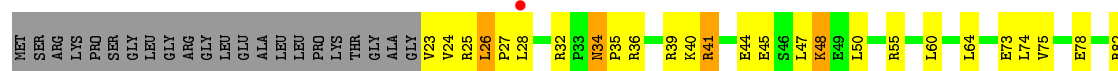
• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB



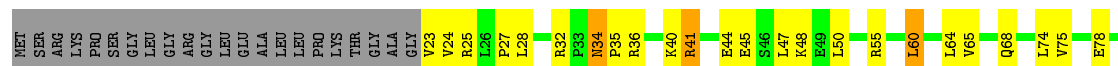
• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB

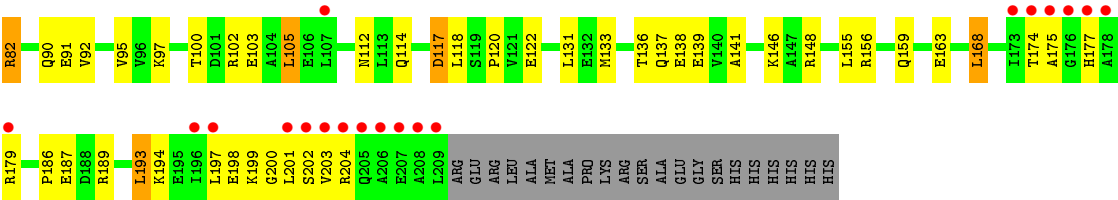


• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB

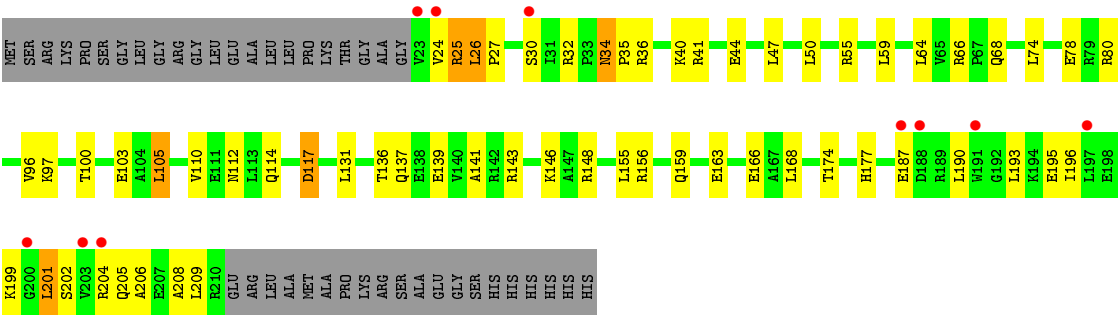


• Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB





● Molecule 1: CHROMOSOME PARTITIONING PROTEIN PARB



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	182.24Å 295.15Å 73.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.72 – 2.30 155.06 – 2.29	Depositor EDS
% Data completeness (in resolution range)	98.9 (38.72-2.30) 98.2 (155.06-2.29)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.47 (at 2.29Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.235 , 0.278 0.236 , 0.238	Depositor DCC
R_{free} test set	4438 reflections (5.34%)	DCC
Wilson B-factor (Å ²)	30.9	Xtriage
Anisotropy	0.327	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 63.5	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	6 of 89231 reflections (0.007%)	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	12878	wwPDB-VP
Average B, all atoms (Å ²)	39.0	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 25.31 % 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 3.2475e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: MG, CO

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	0.36	0/1476	0.62	0/1993
1	B	0.33	0/1528	0.63	1/2062 (0.0%)
1	C	0.34	0/1504	0.62	0/2030
1	D	0.33	0/1528	0.58	0/2062
1	E	0.33	0/1523	0.62	0/2055
1	F	0.35	0/1495	0.60	0/2018
1	G	0.36	0/1476	0.64	1/1993 (0.1%)
1	H	0.36	0/1484	0.61	0/2004
All	All	0.34	0/12014	0.61	2/16217 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	79	ARG	NE-CZ-NH2	-5.54	117.53	120.30
1	G	82	ARG	NE-CZ-NH1	5.04	122.82	120.30

There are no chirality outliers.

There are no planarity outliers.

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	1459	0	1517	80	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1511	0	1576	94	0
1	C	1487	0	1547	90	0
1	D	1511	0	1576	71	0
1	E	1506	0	1571	81	0
1	F	1478	0	1541	69	0
1	G	1459	0	1517	91	0
1	H	1467	0	1528	80	0
2	A	3	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
2	E	2	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	140	0	0	7	0
4	B	130	0	0	17	0
4	C	114	0	0	11	0
4	D	126	0	0	8	0
4	E	110	0	0	11	0
4	F	117	0	0	8	0
4	G	122	0	0	13	0
4	H	126	0	0	3	0
All	All	12878	0	12373	573	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 24.

The worst 5 of 573 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:C:25:ARG:HH21	1:C:25:ARG:HB3	1.12	1.11
1:G:64:LEU:HG	1:G:97:LYS:HZ1	1.14	1.06
1:A:142:ARG:HA	1:A:142:ARG:HE	1.20	1.01
1:D:94:ALA:HB3	1:H:26:LEU:HD21	1.42	1.01
1:B:202:SER:H	1:B:205:GLN:HE21	1.03	0.98

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	185/230 (80%)	183 (99%)	0	2 (1%)	17	18
1	B	191/230 (83%)	186 (97%)	5 (3%)	0	100	100
1	C	188/230 (82%)	185 (98%)	2 (1%)	1 (0%)	34	41
1	D	191/230 (83%)	188 (98%)	3 (2%)	0	100	100
1	E	190/230 (83%)	186 (98%)	3 (2%)	1 (0%)	34	41
1	F	187/230 (81%)	181 (97%)	6 (3%)	0	100	100
1	G	185/230 (80%)	178 (96%)	7 (4%)	0	100	100
1	H	186/230 (81%)	182 (98%)	4 (2%)	0	100	100
All	All	1503/1840 (82%)	1469 (98%)	30 (2%)	4 (0%)	46	57

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	212	ARG
1	A	208	ALA
1	C	60	LEU
1	A	207	GLU

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	151/184 (82%)	134 (89%)	17 (11%)	7 8

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	156/184 (85%)	140 (90%)	16 (10%)	9	10
1	C	154/184 (84%)	141 (92%)	13 (8%)	14	16
1	D	156/184 (85%)	147 (94%)	9 (6%)	25	33
1	E	156/184 (85%)	139 (89%)	17 (11%)	8	9
1	F	153/184 (83%)	141 (92%)	12 (8%)	16	19
1	G	151/184 (82%)	141 (93%)	10 (7%)	21	27
1	H	152/184 (83%)	139 (91%)	13 (9%)	13	15
All	All	1229/1472 (84%)	1122 (91%)	107 (9%)	13	15

5 of 107 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	50	LEU
1	E	47	LEU
1	H	47	LEU
1	D	68	GLN
1	D	212	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 53 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	137	GLN
1	E	137	GLN
1	H	68	GLN
1	D	177	HIS
1	E	34	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 [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 15 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	187/230 (81%)	0.23	9 (4%) 34 43	15, 32, 69, 88	0
1	B	193/230 (83%)	0.43	13 (6%) 21 29	16, 37, 71, 95	0
1	C	190/230 (82%)	0.35	9 (4%) 35 44	15, 37, 67, 80	0
1	D	193/230 (83%)	0.45	15 (7%) 16 22	15, 38, 71, 84	0
1	E	192/230 (83%)	0.47	17 (8%) 12 17	17, 38, 74, 87	0
1	F	189/230 (82%)	0.24	4 (2%) 67 74	14, 33, 75, 101	0
1	G	187/230 (81%)	0.48	19 (10%) 9 13	17, 33, 77, 120	0
1	H	188/230 (81%)	0.32	10 (5%) 30 39	16, 33, 76, 93	0
All	All	1519/1840 (82%)	0.37	96 (6%) 23 31	14, 35, 73, 120	0

The worst 5 of 96 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	175	ALA	9.5
1	C	142	ARG	5.6
1	G	206	ALA	4.9
1	H	204	ARG	4.7
1	D	142	ARG	4.4

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

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

6.3 Carbohydrates ⓘ

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	CO	B	1216	1/1	0.99	0.16	1.98	24,24,24,24	0
2	CO	A	1210	1/1	1.00	0.15	1.08	22,22,22,22	0
2	CO	D	1216	1/1	1.00	0.15	0.70	20,20,20,20	0
2	CO	C	1212	1/1	1.00	0.14	0.59	23,23,23,23	0
2	CO	A	1209	1/1	0.97	0.12	-0.90	46,46,46,46	0
2	CO	D	1215	1/1	0.99	0.08	-2.61	26,26,26,26	0
2	CO	C	1213	1/1	0.99	0.08	-3.26	34,34,34,34	0
2	CO	B	1215	1/1	0.99	0.10	-3.85	33,33,33,33	0
2	CO	E	1214	1/1	0.99	0.10	-6.64	34,34,34,34	0
3	MG	D	1217	1/1	0.91	0.45	-	27,27,27,27	0
2	CO	H	1210	1/1	0.97	0.21	-	64,64,64,64	0
3	MG	C	1214	1/1	0.94	0.43	-	24,24,24,24	0
2	CO	A	1211	1/1	0.97	0.22	-	56,56,56,56	0
2	CO	E	1215	1/1	0.98	0.16	-	52,52,52,52	0
2	CO	G	1209	1/1	0.98	0.22	-	61,61,61,61	0

6.5 Other polymers [i](#)

There are no such residues in this entry.