Full wwPDB X-ray Structure Validation Report (i)

Jun 26, 2024 – 09:01 AM EDT

PDB ID	:	6RMM
Title	:	Crystal structure of TOPBP1 BRCT4,5 in complex with a 53BP1 phospho-peptide
Authors	:	Day, M.; Oliver, A.W.; Pearl, L.H.
Deposited on	:	2019-05-07
Resolution	:	3.53 Å(reported)

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

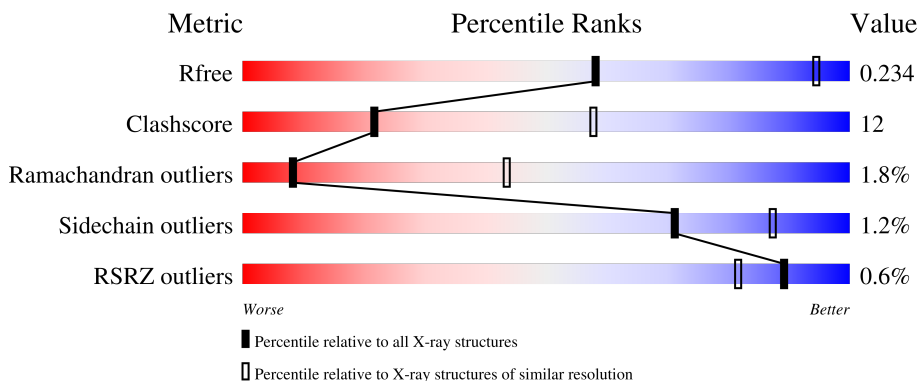|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 3.53 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.
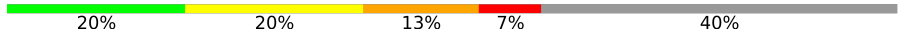
Metric	Percentile Ranks	Value
Rfree		0.234
Clashscore		12
Ramachandran outliers		1.8%
Sidechain outliers		1.2%
RSRZ outliers		0.6%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1028 (3.60-3.48)
Clashscore	141614	1109 (3.60-3.48)
Ramachandran outliers	138981	1073 (3.60-3.48)
Sidechain outliers	138945	1074 (3.60-3.48)
RSRZ outliers	127900	1079 (3.62-3.46)

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	196	67% 27% · ·
1	B	196	66% 29% · ·
1	C	196	% 72% 20% · ·
1	D	196	2% 71% 20% 5% ·
2	P	15	27% 13% 13% 7% 40%

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Mol	Chain	Length	Quality of chain
2	R	15	20% 20% 13% 7% 40%

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 6078 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 DNA topoisomerase 2-binding protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	196	Total	C	N	O	S	0	0	0
			1509	962	248	291	8			
1	B	196	Total	C	N	O	S	0	0	0
			1509	962	248	291	8			
1	C	190	Total	C	N	O	S	0	0	0
			1464	937	240	279	8			
1	D	190	Total	C	N	O	S	0	0	0
			1464	937	240	279	8			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	546	HIS	-	expression tag	UNP Q92547
A	547	SER	-	expression tag	UNP Q92547
B	546	HIS	-	expression tag	UNP Q92547
B	547	SER	-	expression tag	UNP Q92547
C	546	HIS	-	expression tag	UNP Q92547
C	547	SER	-	expression tag	UNP Q92547
D	546	HIS	-	expression tag	UNP Q92547
D	547	SER	-	expression tag	UNP Q92547

- Molecule 2 is a protein called 53BP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	P	9	Total	C	N	O	P	0	0	0
			66	38	9	18	1			
2	R	9	Total	C	N	O	P	0	0	0
			66	38	9	18	1			

3　Residue-property plots ⓘ

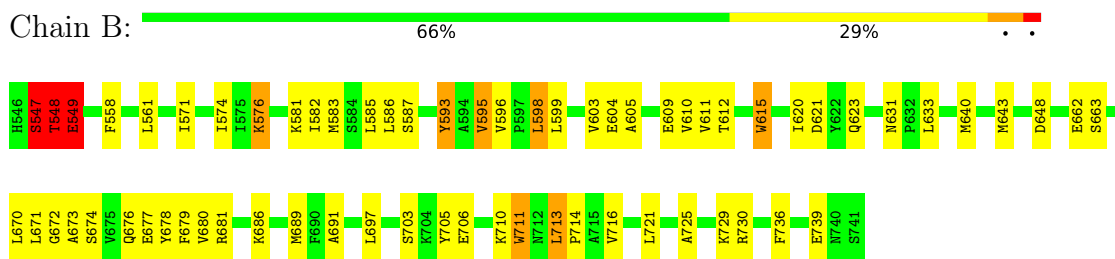These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: DNA topoisomerase 2-binding protein 1
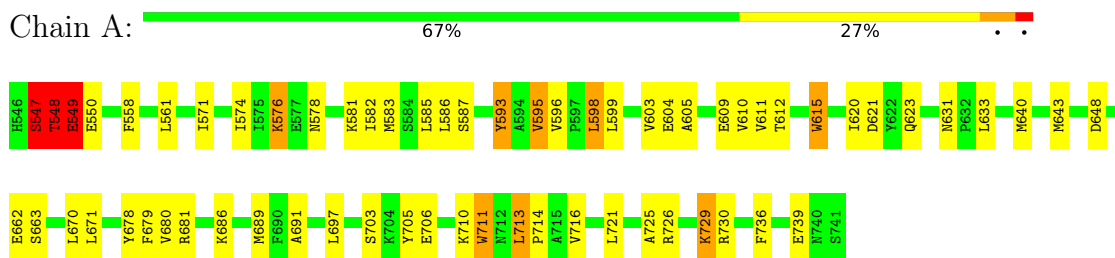
Chain A:

- Molecule 1: DNA topoisomerase 2-binding protein 1

Chain B:

- Molecule 1: DNA topoisomerase 2-binding protein 1

Chain C:

- Molecule 1: DNA topoisomerase 2-binding protein 1

Chain D:

L695 I696 L697 R700 K704 K710 V716 T717 L722 E723 T724 R730 A731 D732 E733 S734 H735 F736 L737 I738 E739 N740 S741

● Molecule 2: 53BP1

Chain P:

27%	13%	13%	7%	40%

SER S360 D361 L362 V363 A364 P365 S366 P367 D368 ALA PHE ARG SER THR

● Molecule 2: 53BP1

Chain R:

20%	20%	13%	7%	40%

SER S360 D361 L362 V363 A364 P365 S366 P367 D368 ALA PHE ARG SER THR
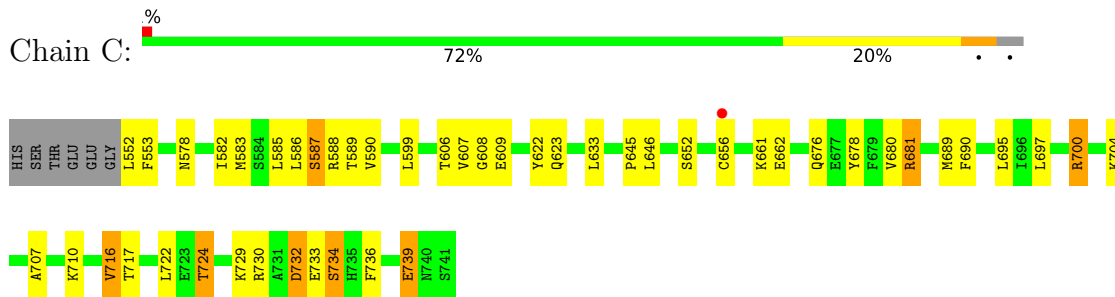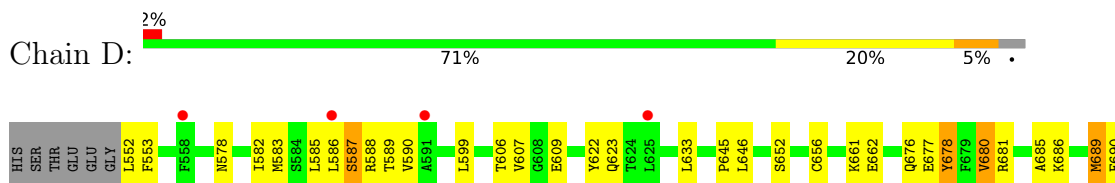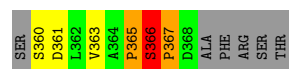
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α, β, γ	134.81Å 134.81Å 303.02Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	67.41 – 3.53 67.41 – 3.53	Depositor EDS
% Data completeness (in resolution range)	100.0 (67.41-3.53) 100.0 (67.41-3.53)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.73 (at 3.49Å)	Xtriage
Refinement program	PHENIX (1.14_3260: ???)	Depositor
R, R_{free}	0.221 , 0.234 0.221 , 0.234	Depositor DCC
R_{free} test set	1047 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	133.5	Xtriage
Anisotropy	0.005	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 83.5	EDS
L-test for twinning[2]	$< |L| > = 0.45, < L^2 > = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6078	wwPDB-VP
Average B, all atoms (Å^2)	137.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.84% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: SEP

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	1.23	13/1538 (0.8%)	1.30	10/2085 (0.5%)
1	B	1.23	13/1538 (0.8%)	1.30	10/2085 (0.5%)
1	C	1.07	5/1492 (0.3%)	1.25	18/2023 (0.9%)
1	D	1.07	6/1492 (0.4%)	1.25	18/2023 (0.9%)
2	P	1.03	0/56	1.23	0/75
2	R	1.03	0/56	1.23	0/75
All	All	1.15	37/6172 (0.6%)	1.28	56/8366 (0.7%)

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	3
1	B	0	3
2	P	0	1
2	R	0	1
All	All	0	8

All (37) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	662	GLU	CG-CD	12.66	1.71	1.51
1	D	662	GLU	CG-CD	12.65	1.71	1.51
1	A	711	TRP	CB-CG	-7.07	1.37	1.50
1	B	711	TRP	CB-CG	-7.06	1.37	1.50
1	D	662	GLU	CB-CG	6.86	1.65	1.52
1	C	662	GLU	CB-CG	6.83	1.65	1.52
1	A	547	SER	CA-CB	6.72	1.63	1.52
1	B	547	SER	CA-CB	6.71	1.63	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	547	SER	CB-OG	6.44	1.50	1.42
1	A	547	SER	CB-OG	6.41	1.50	1.42
1	B	549	GLU	CG-CD	6.09	1.61	1.51
1	A	549	GLU	CG-CD	6.07	1.61	1.51
1	B	595	VAL	CB-CG1	-6.07	1.40	1.52
1	A	595	VAL	CB-CG1	-6.03	1.40	1.52
1	A	549	GLU	CB-CG	5.91	1.63	1.52
1	B	549	GLU	CB-CG	5.91	1.63	1.52
1	B	615	TRP	CB-CG	5.91	1.60	1.50
1	A	615	TRP	CB-CG	5.90	1.60	1.50
1	C	733	GLU	CG-CD	5.60	1.60	1.51
1	D	733	GLU	CG-CD	5.56	1.60	1.51
1	A	662	GLU	CG-CD	5.54	1.60	1.51
1	D	716	VAL	CB-CG2	-5.53	1.41	1.52
1	C	716	VAL	CB-CG2	-5.51	1.41	1.52
1	B	662	GLU	CG-CD	5.48	1.60	1.51
1	A	706	GLU	CG-CD	5.37	1.60	1.51
1	B	706	GLU	CG-CD	5.36	1.59	1.51
1	B	648	ASP	CB-CG	5.27	1.62	1.51
1	A	593	TYR	CB-CG	-5.25	1.43	1.51
1	B	593	TYR	CB-CG	-5.25	1.43	1.51
1	B	621	ASP	CB-CG	5.24	1.62	1.51
1	A	621	ASP	CB-CG	5.23	1.62	1.51
1	A	648	ASP	CB-CG	5.22	1.62	1.51
1	C	739	GLU	CG-CD	5.14	1.59	1.51
1	D	739	GLU	CG-CD	5.10	1.59	1.51
1	B	576	LYS	CD-CE	5.06	1.63	1.51
1	A	576	LYS	CD-CE	5.05	1.63	1.51
1	D	710	LYS	CD-CE	5.00	1.63	1.51

All (56) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	633	LEU	CB-CG-CD2	-8.68	96.25	111.00
1	A	633	LEU	CB-CG-CD2	-8.66	96.28	111.00
1	D	730	ARG	NE-CZ-NH1	-7.94	116.33	120.30
1	C	730	ARG	NE-CZ-NH1	-7.87	116.37	120.30
1	C	722	LEU	CB-CG-CD2	-7.05	99.01	111.00
1	D	722	LEU	CB-CG-CD2	-7.05	99.01	111.00
1	A	599	LEU	CB-CG-CD1	-7.03	99.05	111.00
1	B	599	LEU	CB-CG-CD1	-7.01	99.08	111.00
1	C	700	ARG	NE-CZ-NH2	-6.96	116.82	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	633	LEU	CB-CG-CD2	-6.87	99.32	111.00
1	C	633	LEU	CB-CG-CD2	-6.86	99.34	111.00
1	D	700	ARG	NE-CZ-NH2	-6.85	116.87	120.30
1	A	548	THR	N-CA-C	6.83	129.44	111.00
1	B	548	THR	N-CA-C	6.82	129.40	111.00
1	D	586	LEU	C-N-CA	6.72	138.50	121.70
1	C	586	LEU	C-N-CA	6.71	138.49	121.70
1	A	713	LEU	CB-CG-CD2	-6.64	99.72	111.00
1	B	713	LEU	CB-CG-CD2	-6.63	99.73	111.00
1	B	689	MET	CG-SD-CE	6.53	110.65	100.20
1	A	689	MET	CG-SD-CE	6.50	110.61	100.20
1	D	678	TYR	CA-CB-CG	6.34	125.44	113.40
1	C	678	TYR	CA-CB-CG	6.32	125.41	113.40
1	A	561	LEU	CA-CB-CG	6.12	129.37	115.30
1	B	561	LEU	CA-CB-CG	6.12	129.37	115.30
1	C	689	MET	CA-CB-CG	-5.84	103.38	113.30
1	A	547	SER	CA-CB-OG	5.83	126.94	111.20
1	B	547	SER	CA-CB-OG	5.82	126.92	111.20
1	D	689	MET	CA-CB-CG	-5.81	103.43	113.30
1	D	622	TYR	CA-CB-CG	5.64	124.11	113.40
1	C	622	TYR	CA-CB-CG	5.63	124.10	113.40
1	C	662	GLU	OE1-CD-OE2	-5.60	116.58	123.30
1	D	662	GLU	OE1-CD-OE2	-5.59	116.60	123.30
1	B	710	LYS	CA-CB-CG	5.56	125.64	113.40
1	D	681	ARG	CG-CD-NE	5.55	123.46	111.80
1	C	681	ARG	CG-CD-NE	5.55	123.46	111.80
1	A	710	LYS	CA-CB-CG	5.54	125.60	113.40
1	C	710	LYS	CD-CE-NZ	5.42	124.16	111.70
1	D	710	LYS	CD-CE-NZ	5.40	124.13	111.70
1	C	734	SER	N-CA-CB	-5.39	102.41	110.50
1	D	734	SER	N-CA-CB	-5.38	102.43	110.50
1	D	704	LYS	CD-CE-NZ	-5.37	99.34	111.70
1	C	704	LYS	CD-CE-NZ	-5.37	99.35	111.70
1	D	609	GLU	N-CA-CB	5.32	120.17	110.60
1	C	609	GLU	N-CA-CB	5.28	120.10	110.60
1	D	732	ASP	CB-CG-OD1	5.27	123.04	118.30
1	C	732	ASP	CB-CG-OD1	5.23	123.01	118.30
1	B	598	LEU	CA-CB-CG	-5.21	103.31	115.30
1	A	598	LEU	CA-CB-CG	-5.21	103.32	115.30
1	A	721	LEU	CB-CG-CD1	5.13	119.73	111.00
1	B	721	LEU	CB-CG-CD1	5.12	119.70	111.00
1	D	599	LEU	CA-CB-CG	5.08	126.99	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	599	LEU	CA-CB-CG	5.08	126.97	115.30
1	D	680	VAL	CG1-CB-CG2	-5.07	102.79	110.90
1	C	680	VAL	CG1-CB-CG2	-5.07	102.79	110.90
1	D	724	THR	CA-CB-CG2	-5.04	105.34	112.40
1	C	724	THR	CA-CB-CG2	-5.02	105.37	112.40

There are no chirality outliers.

All (8) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	548	THR	Peptide
1	A	623	GLN	Mainchain
1	A	631	ASN	Mainchain
1	B	548	THR	Peptide
1	B	623	GLN	Mainchain
1	B	631	ASN	Mainchain
2	P	366	SEP	Peptide
2	R	366	SEP	Peptide

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	1509	0	1511	38	1
1	B	1509	0	1511	39	0
1	C	1464	0	1475	31	1
1	D	1464	0	1475	40	0
2	P	66	0	54	11	0
2	R	66	0	54	5	0
All	All	6078	0	6080	145	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 12.

All (145) 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:548:THR:HG23	1:C:732:ASP:HA	1.36	1.00
1:D:677:GLU:HG3	2:P:365:PRO:HG3	1.44	0.98
1:D:700:ARG:HH12	1:D:739:GLU:HA	1.40	0.87
1:C:700:ARG:HH12	1:C:739:GLU:HA	1.40	0.85
1:C:700:ARG:HG2	1:C:700:ARG:HH11	1.42	0.84
1:D:700:ARG:HH11	1:D:700:ARG:HG2	1.42	0.84
1:C:676:GLN:NE2	1:C:690:PHE:O	2.19	0.76
1:B:673:ALA:O	1:D:686:LYS:HD3	1.84	0.76
1:D:676:GLN:NE2	1:D:690:PHE:O	2.19	0.73
1:A:550:GLU:HG2	1:C:729:LYS:HD2	1.71	0.72
1:D:677:GLU:CG	2:P:365:PRO:HG3	2.19	0.71
1:A:730:ARG:HH11	1:A:730:ARG:HG2	1.58	0.69
1:B:705:TYR:OH	1:B:739:GLU:OE1	2.11	0.69
1:B:730:ARG:HG2	1:B:730:ARG:HH11	1.58	0.69
1:A:574:ILE:HG13	1:A:620:ILE:HD13	1.75	0.68
1:A:705:TYR:OH	1:A:739:GLU:OE1	2.11	0.68
1:D:678:TYR:CD2	2:P:364:ALA:HA	2.29	0.68
1:B:574:ILE:HG13	1:B:620:ILE:HD13	1.75	0.67
1:A:679:PHE:O	1:B:549:GLU:HB2	1.96	0.66
1:A:549:GLU:HB2	1:B:679:PHE:O	1.98	0.64
1:C:585:LEU:C	1:C:587:SER:H	2.03	0.62
1:C:645:PRO:HG2	1:C:646:LEU:HD12	1.82	0.62
1:D:700:ARG:HG2	1:D:700:ARG:NH1	2.14	0.62
1:A:578:ASN:OD1	1:B:677:GLU:HG2	2.00	0.62
1:D:645:PRO:HG2	1:D:646:LEU:HD12	1.82	0.61
1:D:585:LEU:C	1:D:587:SER:H	2.03	0.60
1:D:678:TYR:CG	2:P:365:PRO:HD3	2.37	0.60
1:B:681:ARG:HB2	1:B:711:TRP:CE3	2.37	0.60
1:C:717:THR:HG22	1:C:736:PHE:O	2.02	0.60
1:D:656:CYS:O	1:D:661:LYS:HD2	2.02	0.59
1:D:717:THR:HG22	1:D:736:PHE:O	2.02	0.59
1:A:681:ARG:HB2	1:A:711:TRP:CE3	2.37	0.59
1:C:656:CYS:O	1:C:661:LYS:HD2	2.02	0.59
1:B:598:LEU:HD22	1:B:663:SER:HB3	1.86	0.57
1:C:582:ILE:N	1:C:582:ILE:HD12	2.20	0.57
1:D:582:ILE:HD12	1:D:582:ILE:N	2.20	0.57
1:D:677:GLU:HG3	2:P:365:PRO:CG	2.28	0.57
1:B:603:VAL:HG11	1:B:610:VAL:HG21	1.87	0.57
1:B:671:LEU:HD21	1:B:725:ALA:HA	1.87	0.57
1:C:646:LEU:HD11	1:C:724:THR:HG21	1.87	0.57
1:D:646:LEU:HD11	1:D:724:THR:HG21	1.87	0.57
1:A:603:VAL:HG11	1:A:610:VAL:HG21	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:598:LEU:HD22	1:A:663:SER:HB3	1.86	0.56
1:A:671:LEU:HD21	1:A:725:ALA:HA	1.87	0.56
1:C:732:ASP:OD1	1:C:734:SER:HB3	2.06	0.55
1:D:732:ASP:OD1	1:D:734:SER:HB3	2.06	0.55
1:D:689:MET:CE	2:P:362:LEU:HD11	2.36	0.55
1:D:590:VAL:HG13	1:D:606:THR:O	2.07	0.54
2:P:365:PRO:O	2:P:367:PRO:HD3	2.07	0.54
1:B:571:ILE:O	1:B:574:ILE:HG22	2.08	0.54
1:C:590:VAL:HG13	1:C:606:THR:O	2.07	0.54
1:A:571:ILE:O	1:A:574:ILE:HG22	2.08	0.53
2:R:365:PRO:O	2:R:367:PRO:HD3	2.07	0.53
1:D:700:ARG:NH1	1:D:739:GLU:HA	2.18	0.52
1:D:585:LEU:C	1:D:587:SER:N	2.63	0.52
1:B:585:LEU:CD2	1:B:586:LEU:HG	2.39	0.52
1:C:585:LEU:C	1:C:587:SER:N	2.63	0.52
1:B:678:TYR:CD1	1:B:678:TYR:O	2.63	0.52
1:D:689:MET:HE1	2:P:362:LEU:HD11	1.91	0.52
1:A:678:TYR:O	1:A:678:TYR:CD1	2.63	0.52
1:D:583:MET:HE1	1:D:589:THR:O	2.10	0.52
1:A:576:LYS:HZ3	1:A:581:LYS:HA	1.75	0.51
1:A:585:LEU:CD2	1:A:586:LEU:HG	2.39	0.51
1:C:646:LEU:HD12	1:C:646:LEU:N	2.26	0.51
1:A:716:VAL:HA	1:A:736:PHE:O	2.11	0.51
1:B:716:VAL:HA	1:B:736:PHE:O	2.10	0.51
1:C:583:MET:HE1	1:C:589:THR:O	2.11	0.51
1:D:646:LEU:HD12	1:D:646:LEU:N	2.26	0.50
1:B:697:LEU:N	1:B:697:LEU:HD23	2.27	0.50
1:C:700:ARG:HG2	1:C:700:ARG:NH1	2.15	0.49
1:A:697:LEU:HD23	1:A:697:LEU:N	2.27	0.49
1:D:680:VAL:HG12	2:P:362:LEU:HG	1.93	0.49
1:A:611:VAL:HG21	1:A:615:TRP:CE3	2.47	0.49
1:C:717:THR:CG2	1:C:736:PHE:HB3	2.43	0.49
1:B:604:GLU:HG2	1:B:605:ALA:N	2.27	0.49
1:B:611:VAL:HG21	1:B:615:TRP:CE3	2.47	0.49
1:C:717:THR:HG22	1:C:736:PHE:HB3	1.95	0.49
1:D:717:THR:HG22	1:D:736:PHE:HB3	1.95	0.49
1:D:717:THR:CG2	1:D:736:PHE:HB3	2.43	0.48
1:A:680:VAL:HG23	1:A:691:ALA:HA	1.95	0.48
1:A:611:VAL:HG21	1:A:615:TRP:CZ3	2.48	0.48
1:B:611:VAL:HG21	1:B:615:TRP:CZ3	2.48	0.48
1:B:676:GLN:OE1	1:B:678:TYR:OH	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:697:LEU:HD23	1:C:716:VAL:O	2.14	0.47
1:A:604:GLU:HG2	1:A:605:ALA:N	2.27	0.47
1:B:680:VAL:HG23	1:B:691:ALA:HA	1.95	0.47
1:C:589:THR:HG22	1:C:590:VAL:H	1.78	0.47
1:B:576:LYS:HZ3	1:B:581:LYS:HA	1.78	0.47
1:B:596:VAL:O	1:B:612:THR:HA	2.15	0.47
1:C:700:ARG:NH1	1:C:739:GLU:HA	2.18	0.47
1:D:589:THR:HG22	1:D:590:VAL:H	1.79	0.47
1:B:672:GLY:O	1:D:686:LYS:HE2	2.15	0.47
1:D:553:PHE:N	1:D:578:ASN:O	2.33	0.46
1:D:652:SER:O	1:D:695:LEU:HD12	2.15	0.46
1:A:583:MET:HE3	1:A:587:SER:HB3	1.96	0.46
1:D:697:LEU:HD23	1:D:716:VAL:O	2.14	0.46
1:A:596:VAL:O	1:A:612:THR:HA	2.15	0.46
1:B:583:MET:HE3	1:B:587:SER:HB3	1.98	0.46
2:P:366:SEP:O2P	2:P:366:SEP:HA	2.17	0.45
1:A:713:LEU:HB3	1:A:714:PRO:HD2	1.98	0.45
1:B:549:GLU:HG3	1:B:549:GLU:O	2.17	0.45
1:B:713:LEU:HB3	1:B:714:PRO:HD2	1.98	0.45
1:A:549:GLU:O	1:A:549:GLU:HG3	2.17	0.45
1:A:571:ILE:HA	1:A:574:ILE:HG22	1.99	0.45
1:C:652:SER:O	1:C:695:LEU:HD12	2.15	0.45
1:B:571:ILE:HA	1:B:574:ILE:HG22	1.99	0.45
1:B:640:MET:HG2	1:B:643:MET:HG3	1.98	0.45
1:C:553:PHE:N	1:C:578:ASN:O	2.33	0.45
2:R:366:SEP:O1P	2:R:366:SEP:HA	2.17	0.45
1:A:640:MET:HG2	1:A:643:MET:HG3	1.98	0.44
1:A:583:MET:HE3	1:A:583:MET:HB3	1.82	0.44
1:B:681:ARG:HD3	1:B:711:TRP:HB3	2.00	0.44
1:C:707:ALA:HB2	2:R:363:VAL:HG21	2.00	0.44
1:A:595:VAL:HA	1:A:611:VAL:O	2.18	0.44
1:C:589:THR:HG22	1:C:590:VAL:N	2.33	0.44
1:D:739:GLU:H	1:D:739:GLU:HG2	1.54	0.44
1:D:589:THR:HG22	1:D:590:VAL:N	2.33	0.44
1:A:681:ARG:HD3	1:A:711:TRP:HB3	2.00	0.44
1:B:593:TYR:HE1	1:B:609:GLU:OE2	2.01	0.44
1:B:595:VAL:HA	1:B:611:VAL:O	2.18	0.43
1:B:576:LYS:HD3	1:B:582:ILE:HG13	1.99	0.43
1:A:576:LYS:HD3	1:A:582:ILE:HG13	2.00	0.43
1:B:670:LEU:HA	1:B:670:LEU:HD12	1.78	0.43
1:B:558:PHE:CE2	1:B:593:TYR:CD2	3.06	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:674:SER:OG	1:D:685:ALA:HB3	2.18	0.43
1:A:593:TYR:HE1	1:A:609:GLU:OE2	2.01	0.42
1:A:558:PHE:CE2	1:A:593:TYR:CD2	3.06	0.42
1:A:585:LEU:HD21	1:A:586:LEU:HG	2.02	0.42
1:A:670:LEU:HA	1:A:670:LEU:HD12	1.78	0.42
1:A:730:ARG:HG2	1:A:730:ARG:NH1	2.31	0.42
1:D:590:VAL:CG1	1:D:607:VAL:HA	2.50	0.42
1:C:590:VAL:CG1	1:C:607:VAL:HA	2.50	0.42
1:D:680:VAL:CG1	2:P:362:LEU:HG	2.49	0.42
1:B:730:ARG:HG2	1:B:730:ARG:NH1	2.31	0.41
1:C:583:MET:HE3	1:C:583:MET:HB3	1.83	0.41
1:D:696:ILE:HD13	1:D:696:ILE:HG21	1.81	0.41
1:C:552:LEU:HD21	1:C:623:GLN:HG3	2.02	0.41
1:C:681:ARG:HD3	2:R:361:ASP:OD2	2.20	0.41
2:R:360:SER:HB2	2:R:361:ASP:H	1.64	0.41
1:A:729:LYS:HE2	1:A:729:LYS:HB3	1.84	0.41
1:B:583:MET:HE3	1:B:583:MET:HB3	1.76	0.41
1:C:724:THR:HG23	1:C:729:LYS:O	2.21	0.41
1:D:552:LEU:HD21	1:D:623:GLN:HG3	2.02	0.40
1:D:738:ILE:HD12	1:D:738:ILE:HA	1.89	0.40
1:B:585:LEU:HD21	1:B:586:LEU:HG	2.02	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:726:ARG:NH1	1:C:608:GLY:O[12_544]	2.18	0.02

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	194/196 (99%)	191 (98%)	0	3 (2%)	10	47
1	B	194/196 (99%)	191 (98%)	0	3 (2%)	10	47
1	C	188/196 (96%)	185 (98%)	1 (0%)	2 (1%)	14	54
1	D	188/196 (96%)	185 (98%)	1 (0%)	2 (1%)	14	54
2	P	6/15 (40%)	2 (33%)	2 (33%)	2 (33%)	0	0
2	R	6/15 (40%)	2 (33%)	2 (33%)	2 (33%)	0	0
All	All	776/814 (95%)	756 (97%)	6 (1%)	14 (2%)	8	43

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	547	SER
1	A	548	THR
1	A	549	GLU
1	B	547	SER
1	B	548	THR
1	B	549	GLU
1	C	587	SER
1	C	588	ARG
1	D	587	SER
1	D	588	ARG
2	P	365	PRO
2	R	365	PRO
2	P	367	PRO
2	R	367	PRO

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	167/167 (100%)	163 (98%)	4 (2%)	49	76
1	B	167/167 (100%)	163 (98%)	4 (2%)	49	76
1	C	162/167 (97%)	162 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	162/167 (97%)	162 (100%)	0	100	100
2	P	7/12 (58%)	7 (100%)	0	100	100
2	R	7/12 (58%)	7 (100%)	0	100	100
All	All	672/692 (97%)	664 (99%)	8 (1%)	71	87

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	547	SER
1	A	686	LYS
1	A	703	SER
1	A	729	LYS
1	B	547	SER
1	B	686	LYS
1	B	703	SER
1	B	729	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3　RNA ⓘ

There are no RNA molecules in this entry.

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

2 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	#$|Z| > 2$
2	SEP	R	366	2,1	8,9,10	2.48	2 (25%)	8,12,14	2.97	2 (25%)
2	SEP	P	366	2,1	8,9,10	2.59	3 (37%)	8,12,14	2.96	2 (25%)

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	SEP	R	366	2,1	-	2/5/8/10	-
2	SEP	P	366	2,1	-	2/5/8/10	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	P	366	SEP	P-O1P	5.82	1.69	1.50
2	R	366	SEP	P-O1P	4.93	1.66	1.50
2	R	366	SEP	P-O2P	3.77	1.69	1.54
2	P	366	SEP	P-O2P	2.98	1.66	1.54
2	P	366	SEP	CB-CA	2.01	1.58	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	P	366	SEP	OG-CB-CA	7.96	115.89	108.14
2	R	366	SEP	OG-CB-CA	7.95	115.88	108.14
2	P	366	SEP	O2P-P-O1P	2.19	119.25	110.68
2	R	366	SEP	O2P-P-O1P	2.19	119.24	110.68

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	P	366	SEP	N-CA-CB-OG
2	P	366	SEP	CA-CB-OG-P
2	R	366	SEP	N-CA-CB-OG
2	R	366	SEP	CA-CB-OG-P

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	R	366	SEP	1	0
2	P	366	SEP	1	0

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

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 ⓘ

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	196/196 (100%)	-0.18	0	100	100	85, 110, 164, 187	0
1	B	196/196 (100%)	-0.11	0	100	100	97, 138, 183, 203	0
1	C	190/196 (96%)	-0.05	1 (0%)	91	84	104, 134, 167, 196	0
1	D	190/196 (96%)	-0.06	4 (2%)	63	50	93, 148, 209, 229	0
2	P	8/15 (53%)	-0.10	0	100	100	112, 127, 166, 170	0
2	R	8/15 (53%)	0.19	0	100	100	146, 157, 193, 204	0
All	All	788/814 (96%)	-0.10	5 (0%)	89	81	85, 131, 197, 229	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	558	PHE	2.8
1	D	625	LEU	2.5
1	D	586	LEU	2.4
1	C	656	CYS	2.2
1	D	591	ALA	2.1

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

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
2	SEP	P	366	10/11	0.80	0.19	127,164,177,182	0
2	SEP	R	366	10/11	0.91	0.09	166,178,191,192	0

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.