W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

Full wwPDB X-ray Structure Validation Report (i)

Jun 14, 2022 – 04:08 pm BST

PDB ID	:	7ZMO
Title	:	Crystal structure of human RECQL5 helicase APO form in complex with engineered nanobody (Gluebody) G3-052
Authors	:	Ye, M.; Makola, M.; Newman, J.A.; Fairhead, M.; MacLean, E.; Krojer, T.; Aitkenhead, H.; Bountra, C.; Gileadi, O.; von Delft, F.
Deposited on	:	2022-04-19
Resolution	:	3.75 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	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.28.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.28.1

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 3.75 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
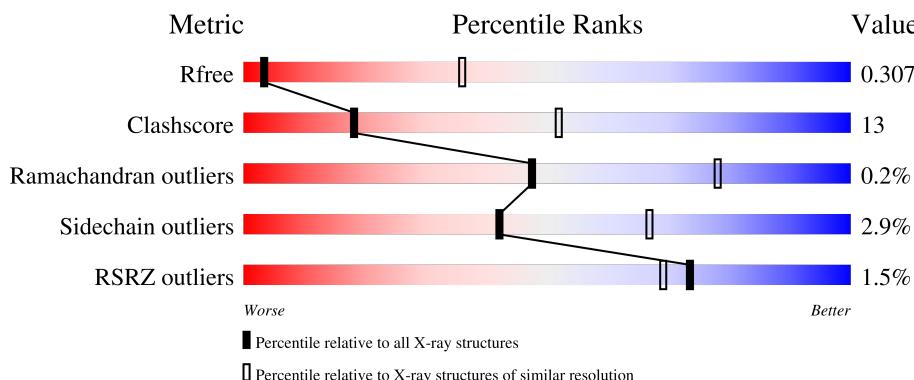
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1039 (3.94-3.58)
Clashscore	141614	1051 (3.92-3.60)
Ramachandran outliers	138981	1015 (3.92-3.60)
Sidechain outliers	138945	1011 (3.92-3.60)
RSRZ outliers	127900	1050 (3.96-3.56)

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	445	3% 72% 27% •
1	B	445	% 72% 26% ••
2	C	127	60% 37% ••
2	K	127	63% 34% ••
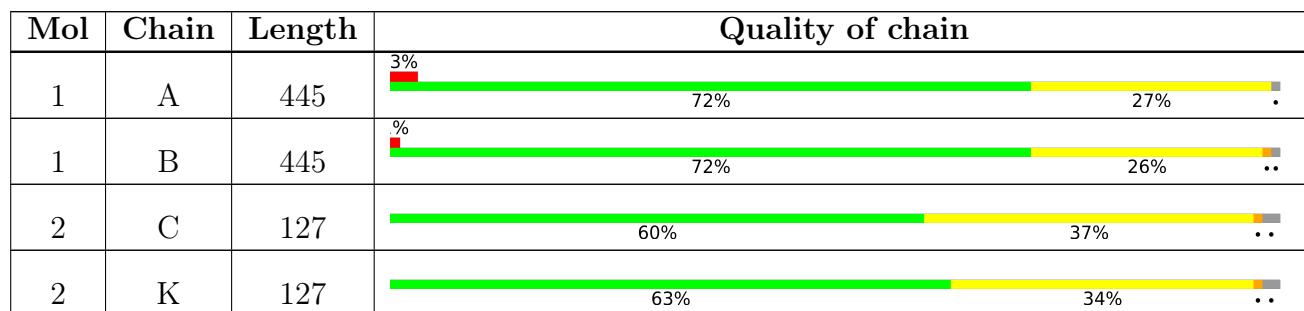
2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 8605 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 ATP-dependent DNA helicase Q5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	441	Total 3358	C 2115	N 594	O 626	S 23	0	3	0
1	B	441	Total 3337	C 2099	N 589	O 626	S 23	0	4	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	9	SER	-	expression tag	UNP O94762
A	10	MET	-	expression tag	UNP O94762
B	9	SER	-	expression tag	UNP O94762
B	10	MET	-	expression tag	UNP O94762

- Molecule 2 is a protein called Gluebody G3-052.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	K	124	Total 950	C 592	N 162	O 191	S 5	0	2	0
2	C	124	Total 944	C 589	N 161	O 189	S 5	0	2	0

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Zn 1	0	0
3	B	1	Total 1	Zn 1	0	0

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

SO4

O1

O

O3 O⁻ — S — O⁻ O4

S

O

O2

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0

• Molecule 5 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	3	Total 3	O 3	0	0
5	K	1	Total 1	O 1	0	0

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: ATP-dependent DNA helicase Q5
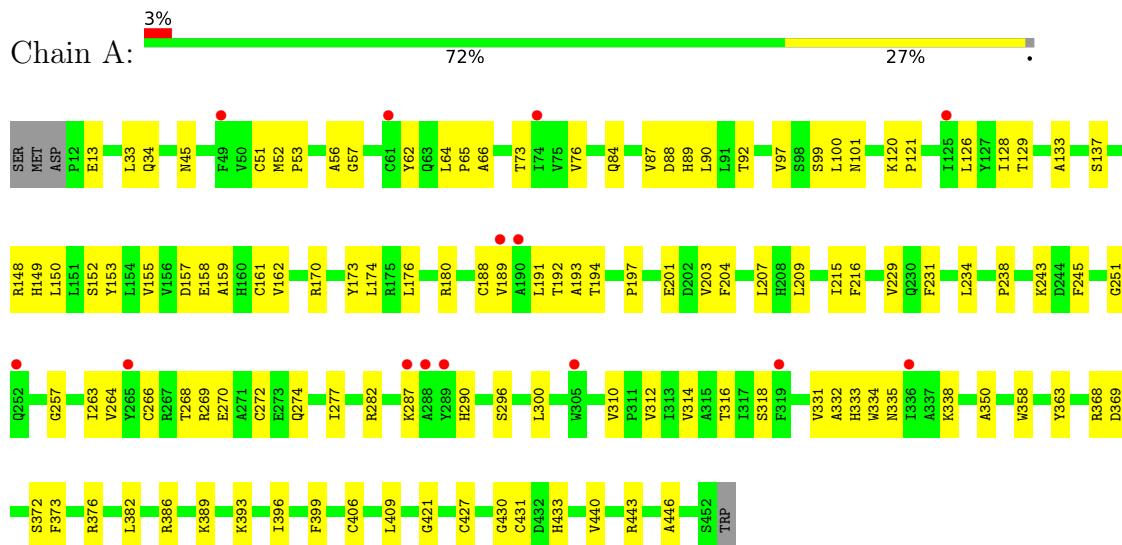
Chain A:

- Molecule 1: ATP-dependent DNA helicase Q5

Chain B:

- Molecule 2: Gluebody G3-052

Chain K:

SER MET ALA Q1 V2 C11 V12 Q13 L18 R19 L20 S21 C22 R33 M34 T35 W36 A40 K43 V48 A49 A50 I51 T52 Y59 A60 V63 F67 T68 D72 K75 V78 Y79 L80 Y81 M82 K86 P87 E88 D89 T90 Y93 Y94 C95 T100

Y101 T102 L103 A104 P105 D112 D113 Y114 G118 T119 T122 V123 S124

• Molecule 2: Gluebody G3-052

Chain C:

60%   37%

SER MET ALA Q1 V2 Q3 L4 V12 Q13 S17 L18 R19 L20 S21 C22 F29 R33 M34 T35 W36 Y37 R38 V48 A49 A50 I51 T52 G55 S56 T57 N58 Y59 A60 V63 K64 F67 T68 D72 K75 V78 Y79 L80 Y81 M82 L85 D89 T90

C95 E96 A97 T100 Y101 T102 L103 A104 P105 G109 D112 D113 Y114 T122 V123 S124
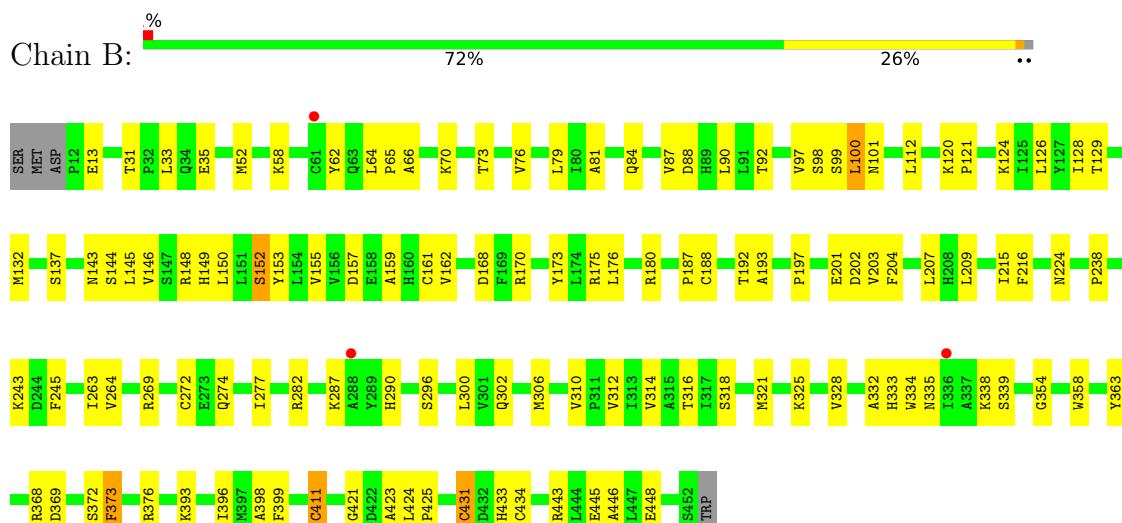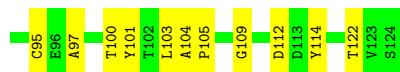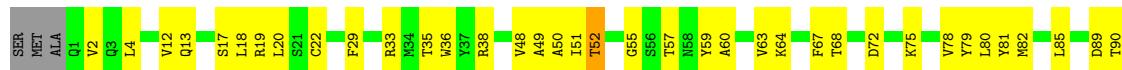
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α, β, γ	89.52Å 150.87Å 269.34Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	100.67 – 3.75 100.47 – 3.75	Depositor EDS
% Data completeness (in resolution range)	99.9 (100.67-3.75) 99.9 (100.47-3.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.61 (at 3.78Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.283 , 0.306 0.285 , 0.307	Depositor DCC
R_{free} test set	1891 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å^2)	106.1	Xtriage
Anisotropy	0.092	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< |L| > = 0.42, < L^2 > = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	8605	wwPDB-VP
Average B, all atoms (Å^2)	138.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% 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: ZN, SO4

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	0.76	0/3440	0.95	0/4661
1	B	0.75	0/3423	0.96	0/4646
2	C	0.81	0/974	1.09	0/1321
2	K	0.79	0/980	1.11	0/1329
All	All	0.76	0/8817	0.99	0/11957

There are no bond length outliers.

There are no bond angle outliers.

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	3358	0	3294	74	0
1	B	3337	0	3203	84	0
2	C	944	0	891	37	0
2	K	950	0	902	35	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	5	0	0	1	0
4	B	5	0	0	1	0
5	A	3	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	K	1	0	0	2	0
All	All	8605	0	8290	225	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 13.

All (225) 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:204:PHE:HD1	1:B:209:LEU:HD12	1.18	1.06
1:B:431:CYS:N	1:B:434:CYS:SG	2.32	1.02
1:B:204:PHE:CD1	1:B:209:LEU:HD12	2.05	0.91
1:B:197:PRO:O	1:B:201:GLU:HG2	1.74	0.87
2:K:67:PHE:O	2:K:68:THR:HG23	1.75	0.87
1:A:197:PRO:O	1:A:201:GLU:HG2	1.74	0.86
2:C:67:PHE:O	2:C:68:THR:HG23	1.76	0.85
1:B:274:GLN:O	1:B:277:ILE:HG13	1.79	0.81
1:B:173:TYR:HA	1:B:176:LEU:HD12	1.65	0.79
2:K:104:ALA:HB1	2:K:105:PRO:HD2	1.68	0.75
1:A:173:TYR:HA	1:A:176:LEU:HD12	1.70	0.72
1:A:266:CYS:O	1:A:316:THR:HA	1.90	0.71
1:B:443:ARG:O	1:B:446:ALA:HB3	1.92	0.69
1:A:274:GLN:O	1:A:277:ILE:HG12	1.93	0.69
1:B:203:VAL:O	1:B:207:LEU:HB2	1.94	0.67
1:B:431:CYS:O	1:B:434:CYS:SG	2.52	0.67
2:C:35:THR:O	2:C:95:CYS:HA	1.94	0.67
1:A:88:ASP:O	1:A:92:THR:HG23	1.96	0.66
1:B:98:SER:HB3	1:B:112:LEU:HD21	1.77	0.66
2:K:90:THR:HG23	2:K:122:THR:HA	1.78	0.66
1:A:203:VAL:O	1:A:207:LEU:HB2	1.96	0.65
2:C:67:PHE:O	2:C:68:THR:CG2	2.44	0.65
1:B:204:PHE:HD1	1:B:209:LEU:CD1	2.02	0.64
1:A:433:HIS:HA	1:A:440:VAL:HG21	1.79	0.64
1:B:58:LYS:HB2	4:B:502:SO4:O1	1.98	0.64
1:B:180:ARG:HD3	1:B:188:CYS:HB2	1.80	0.64
1:A:382:LEU:HD22	1:A:386:ARG:HH11	1.63	0.63
2:K:67:PHE:O	2:K:68:THR:CG2	2.45	0.63
2:C:90:THR:HG23	2:C:122:THR:HA	1.79	0.63
1:A:443:ARG:O	1:A:446:ALA:HB3	1.99	0.63
1:B:100:LEU:HD23	1:B:132:MET:SD	2.40	0.62
1:B:98:SER:CB	1:B:112:LEU:HD21	2.28	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:93:TYR:O	2:K:118:GLY:HA2	2.00	0.61
1:A:66:ALA:HB2	1:A:73:THR:HG21	1.82	0.61
1:B:66:ALA:HB2	1:B:73:THR:HG21	1.82	0.61
1:B:88:ASP:O	1:B:92:THR:HG23	2.00	0.60
1:A:157:ASP:O	1:A:173:TYR:OH	2.20	0.60
2:C:19:ARG:HD3	2:C:81:TYR:CE1	2.36	0.59
1:B:272:CYS:SG	1:B:314:VAL:HG12	2.43	0.59
1:A:158:GLU:O	1:A:161:CYS:SG	2.60	0.59
1:B:79:LEU:HG	1:B:81:ALA:HB3	1.85	0.59
1:A:331:VAL:HG23	1:A:350:ALA:HB2	1.83	0.58
1:B:321:MET:O	1:B:321:MET:HG3	2.02	0.58
2:K:2:VAL:HB	2:K:114:TYR:CE1	2.39	0.58
2:K:35:THR:O	2:K:95:CYS:HA	2.04	0.58
2:C:2:VAL:HB	2:C:114:TYR:CE1	2.39	0.57
1:A:170:ARG:O	1:A:173:TYR:HB2	2.05	0.56
1:B:62:TYR:HB2	1:B:155:VAL:HG21	1.87	0.56
1:B:159:ALA:O	1:B:162:VAL:HG12	2.04	0.56
2:C:104:ALA:HB1	2:C:105:PRO:HD2	1.88	0.56
2:K:19:ARG:HD3	2:K:81:TYR:CE1	2.40	0.56
1:A:62:TYR:HB2	1:A:155:VAL:HG21	1.88	0.56
1:A:159:ALA:O	1:A:162:VAL:HG12	2.04	0.56
1:A:272:CYS:SG	1:A:314:VAL:HG12	2.46	0.56
1:B:170:ARG:O	1:B:173:TYR:HB2	2.06	0.56
2:C:49:ALA:HB2	2:C:59:TYR:HA	1.88	0.56
2:C:51:ILE:HG23	2:C:51:ILE:O	2.06	0.55
1:A:296:SER:O	1:A:300:LEU:HG	2.07	0.55
1:B:302:GLN:O	1:B:306:MET:HG2	2.06	0.55
1:B:287:LYS:HG2	1:B:310:VAL:HG11	1.89	0.55
1:B:243:LYS:HD3	1:B:282:ARG:HB3	1.89	0.54
2:K:33:ARG:HE	2:K:52:THR:HG22	1.72	0.54
1:B:148:ARG:HB3	1:B:150:LEU:HG	1.89	0.54
2:C:29:PHE:HB3	2:C:101:TYR:HD2	1.73	0.54
1:B:423:ALA:HB2	2:C:104:ALA:C	2.28	0.54
2:K:51:ILE:O	2:K:51:ILE:HG23	2.08	0.54
2:K:11:CYS:SG	2:K:122:THR:OG1	2.66	0.53
1:A:287:LYS:HG2	1:A:310:VAL:HG11	1.91	0.53
1:B:52:MET:O	1:B:193:ALA:HA	2.08	0.53
1:A:148:ARG:HB3	1:A:150:LEU:HG	1.90	0.53
1:B:99:SER:OG	1:B:101:ASN:ND2	2.40	0.52
1:B:296:SER:O	1:B:300:LEU:HG	2.08	0.52
2:C:36:TRP:O	2:C:48:VAL:HB	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:67:PHE:C	2:K:68:THR:HG23	2.29	0.52
1:B:100:LEU:HB2	1:B:126:LEU:HD11	1.91	0.52
1:B:269:ARG:HD3	1:B:290:HIS:ND1	2.24	0.52
1:B:431:CYS:CA	1:B:434:CYS:SG	2.99	0.51
1:B:238:PRO:HB2	1:B:334:TRP:CH2	2.46	0.51
2:C:72:ASP:HB3	2:C:75:LYS:HB2	1.92	0.51
2:C:67:PHE:C	2:C:68:THR:HG23	2.31	0.51
1:A:13:GLU:O	1:A:13:GLU:HG2	2.10	0.50
1:B:180:ARG:HD3	1:B:188:CYS:CB	2.41	0.50
2:K:72:ASP:HB3	2:K:75:LYS:HB2	1.93	0.50
1:A:45:ASN:OD1	1:A:45:ASN:N	2.44	0.50
1:A:238:PRO:HB2	1:A:334:TRP:CH2	2.46	0.50
1:A:90:LEU:HB3	1:A:97:VAL:HG11	1.94	0.49
2:C:112:ASP:HB3	2:C:114:TYR:CE2	2.46	0.49
1:A:148:ARG:O	1:A:149:HIS:C	2.50	0.49
1:A:243:LYS:HD3	1:A:282:ARG:HB3	1.93	0.49
2:K:20:LEU:CD1	2:K:82:MET:SD	3.00	0.49
1:A:84:GLN:HA	1:A:87:VAL:HG12	1.94	0.49
1:B:224:ASN:HD22	1:B:354:GLY:HA2	1.77	0.49
1:B:264:VAL:HA	1:B:332:ALA:O	2.13	0.49
2:C:20:LEU:CD1	2:C:82:MET:SD	3.01	0.49
1:A:51:CYS:HA	1:A:192:THR:O	2.13	0.48
1:B:431:CYS:SG	1:B:434:CYS:SG	3.11	0.48
2:K:78:VAL:HG23	2:K:79:TYR:N	2.27	0.48
1:A:204:PHE:HD1	1:A:209:LEU:HD22	1.79	0.48
1:B:173:TYR:O	1:B:176:LEU:HB2	2.13	0.48
2:K:112:ASP:HB3	2:K:114:TYR:CE2	2.49	0.48
1:B:204:PHE:CD1	1:B:209:LEU:CD1	2.85	0.48
1:B:423:ALA:HB2	2:C:104:ALA:O	2.14	0.48
1:A:128:ILE:HG12	1:A:129:THR:O	2.13	0.48
1:B:148:ARG:O	1:B:149:HIS:C	2.52	0.48
1:B:411:CYS:HA	1:B:433:HIS:HB3	1.96	0.48
2:C:55:GLY:O	2:C:57:THR:HG23	2.13	0.48
2:C:64:LYS:O	2:C:64:LYS:HG3	2.12	0.48
1:B:90:LEU:HB3	1:B:97:VAL:HG11	1.96	0.47
1:A:173:TYR:O	1:A:176:LEU:HB2	2.14	0.47
2:K:11:CYS:O	2:K:12:VAL:HG23	2.14	0.47
2:K:12:VAL:HG12	2:K:13:GLN:N	2.29	0.47
1:A:238:PRO:HB2	1:A:334:TRP:HH2	1.79	0.47
1:A:245:PHE:CZ	1:A:358:TRP:HB3	2.49	0.47
1:A:251:GLY:HA2	1:A:257:GLY:O	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:78:VAL:HG23	2:C:79:TYR:N	2.28	0.47
1:A:269:ARG:HH11	1:A:290:HIS:HB2	1.79	0.47
1:B:152:SER:O	1:B:187:PRO:HD2	2.14	0.47
1:A:99:SER:OG	1:A:101:ASN:ND2	2.44	0.47
1:A:229:VAL:HG11	1:A:406:CYS:HB3	1.96	0.47
1:B:100:LEU:HD23	1:B:132:MET:CE	2.45	0.47
1:A:197:PRO:HG3	1:A:421:GLY:HA3	1.95	0.47
1:B:238:PRO:HB2	1:B:334:TRP:HH2	1.80	0.46
1:A:427:CYS:SG	1:A:430:GLY:N	2.88	0.46
2:C:35:THR:HG23	2:C:50:ALA:HB2	1.97	0.46
1:A:34:GLN:NE2	1:A:57:GLY:HA2	2.30	0.46
2:K:33:ARG:HD2	2:K:50:ALA:HB1	1.98	0.46
1:A:393:LYS:HA	1:A:396:ILE:HD12	1.97	0.46
2:K:60:ALA:HB3	2:K:63:VAL:HG22	1.98	0.46
1:B:84:GLN:HA	1:B:87:VAL:HG12	1.98	0.46
1:B:128:ILE:HG12	1:B:129:THR:O	2.16	0.46
1:B:197:PRO:HG3	1:B:421:GLY:HA3	1.98	0.46
1:A:338:LYS:O	1:A:399:PHE:HB2	2.16	0.46
1:B:373:PHE:HA	1:B:376:ARG:HB2	1.98	0.46
1:A:180:ARG:HD3	1:A:188:CYS:HB2	1.97	0.45
1:A:363:TYR:OH	1:A:368:ARG:HD3	2.15	0.45
1:B:64:LEU:N	1:B:65:PRO:CD	2.79	0.45
2:C:4:LEU:HD21	2:C:95:CYS:HB2	1.98	0.45
1:A:73:THR:HG23	1:A:153:TYR:HB2	1.97	0.45
1:B:393:LYS:HA	1:B:396:ILE:HD12	1.97	0.45
1:A:52:MET:O	1:A:193:ALA:HA	2.17	0.45
1:A:369:ASP:HA	1:A:372:SER:HB3	1.97	0.45
1:A:51:CYS:SG	1:A:194:THR:HA	2.57	0.45
1:B:269:ARG:O	1:B:272:CYS:HB3	2.17	0.45
2:C:20:LEU:HD12	2:C:82:MET:SD	2.56	0.45
2:C:20:LEU:O	2:C:79:TYR:HA	2.17	0.45
1:A:316:THR:HG23	1:A:318:SER:OG	2.17	0.45
2:K:36:TRP:O	2:K:48:VAL:HB	2.16	0.45
1:B:339:SER:HB2	1:B:398:ALA:HB1	1.98	0.45
2:K:104:ALA:HB1	2:K:105:PRO:CD	2.44	0.45
1:A:245:PHE:HZ	1:A:358:TRP:HB3	1.82	0.45
2:K:20:LEU:HD12	2:K:82:MET:SD	2.57	0.45
2:K:86:LYS:HB3	2:K:88:GLU:OE1	2.16	0.45
1:A:87:VAL:HG23	1:A:97:VAL:HG22	1.99	0.44
1:B:363:TYR:OH	1:B:368:ARG:HD3	2.18	0.44
1:B:153:TYR:CE1	1:B:187:PRO:HG2	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:203:VAL:HG12	1:B:204:PHE:N	2.31	0.44
1:B:33:LEU:HD11	1:B:216:PHE:HB3	1.98	0.44
1:B:76:VAL:HG22	1:B:128:ILE:HG23	1.98	0.44
1:A:120:LYS:N	1:A:121:PRO:HD3	2.33	0.44
1:B:98:SER:HB2	1:B:112:LEU:HD21	1.98	0.44
1:B:333:HIS:HB3	1:B:335:ASN:O	2.17	0.44
2:K:33:ARG:CZ	5:K:201:HOH:O	2.66	0.44
2:K:35:THR:HG23	2:K:50:ALA:HB2	1.99	0.44
1:A:333:HIS:HB3	1:A:335:ASN:O	2.17	0.44
1:B:73:THR:HG23	1:B:153:TYR:HB2	1.98	0.44
2:C:60:ALA:HB3	2:C:63:VAL:HG22	1.99	0.44
1:A:189:VAL:HG12	1:A:191:LEU:HD11	1.99	0.44
2:K:40:ALA:HB3	2:K:43:LYS:HB2	1.99	0.44
2:K:67:PHE:HA	2:K:81:TYR:O	2.17	0.44
1:A:64:LEU:N	1:A:65:PRO:CD	2.80	0.44
1:B:87:VAL:HG23	1:B:97:VAL:HG22	2.00	0.44
1:B:245:PHE:CZ	1:B:358:TRP:HB3	2.52	0.44
2:C:38:ARG:NH1	2:C:89:ASP:HA	2.33	0.44
1:A:310:VAL:HG12	1:A:312:VAL:O	2.17	0.44
1:B:310:VAL:HG12	1:B:312:VAL:O	2.18	0.44
1:B:338:LYS:O	1:B:399:PHE:HB2	2.17	0.43
2:C:12:VAL:HG12	2:C:13:GLN:N	2.33	0.43
1:A:264:VAL:HA	1:A:332:ALA:O	2.18	0.43
1:A:373:PHE:HA	1:A:376:ARG:HB2	2.00	0.43
1:A:33:LEU:HD11	1:A:216:PHE:HB3	2.01	0.43
2:C:18:LEU:HD12	2:C:85:LEU:CD1	2.48	0.43
2:C:33:ARG:NH2	2:C:52:THR:HG22	2.32	0.43
1:A:204:PHE:CD1	1:A:209:LEU:HD22	2.53	0.43
1:A:263:ILE:HG22	1:A:264:VAL:N	2.33	0.43
1:A:64:LEU:HB3	1:A:65:PRO:HD3	2.00	0.43
1:B:423:ALA:HB3	2:C:105:PRO:HA	2.01	0.43
1:B:245:PHE:HZ	1:B:358:TRP:HB3	1.84	0.43
1:A:89:HIS:O	1:A:92:THR:OG1	2.32	0.43
1:A:100:LEU:HB2	1:A:126:LEU:HD11	2.00	0.43
2:K:20:LEU:O	2:K:79:TYR:HA	2.19	0.43
1:A:76:VAL:HG22	1:A:128:ILE:HG23	2.01	0.43
1:A:203:VAL:HG12	1:A:204:PHE:N	2.34	0.42
1:A:269:ARG:O	1:A:272:CYS:HB3	2.19	0.42
1:B:70:LYS:HA	1:B:124:LYS:NZ	2.34	0.42
1:A:268:THR:HB	1:A:270:GLU:OE1	2.19	0.42
1:B:263:ILE:HG22	1:B:264:VAL:N	2.34	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:18:LEU:HA	2:C:17:SER:O	2.19	0.42
2:C:97:ALA:O	2:C:100:THR:OG1	2.35	0.42
2:K:19:ARG:HB3	2:C:17:SER:HB2	2.02	0.42
1:B:124:LYS:HD2	1:B:124:LYS:HA	1.91	0.42
1:B:161:CYS:O	1:B:170:ARG:N	2.48	0.42
1:B:316:THR:HG23	1:B:318:SER:H	1.85	0.41
1:A:56:ALA:HA	4:A:502:SO4:O3	2.20	0.41
1:B:157:ASP:O	1:B:173:TYR:OH	2.36	0.41
1:B:143:ASN:O	1:B:146:VAL:HB	2.21	0.41
2:C:33:ARG:HH21	2:C:52:THR:CG2	2.32	0.41
1:A:197:PRO:HG3	1:A:421:GLY:CA	2.51	0.41
1:A:274:GLN:O	1:A:277:ILE:CG1	2.65	0.41
1:B:369:ASP:HA	1:B:372:SER:HB3	2.02	0.41
1:A:316:THR:CG2	1:A:318:SER:OG	2.69	0.41
1:B:13:GLU:OE2	1:B:35:GLU:OE1	2.39	0.41
2:K:67:PHE:HB3	2:K:80:LEU:HD11	2.03	0.41
1:B:120:LYS:N	1:B:121:PRO:HD3	2.35	0.41
1:B:325:LYS:O	1:B:328:VAL:HG23	2.21	0.41
2:K:59:TYR:CZ	2:K:68:THR:HA	2.56	0.41
2:K:100:THR:O	2:K:102:THR:HG23	2.21	0.41
2:C:103:LEU:HA	2:C:109:GLY:HA2	2.03	0.41
1:A:231:PHE:HB2	1:A:234:LEU:HD12	2.03	0.40
1:B:445:GLU:HA	1:B:448:GLU:CG	2.50	0.40
2:C:18:LEU:HD12	2:C:85:LEU:HD11	2.02	0.40
2:C:67:PHE:HA	2:C:81:TYR:O	2.20	0.40
1:A:128:ILE:HD11	1:A:133:ALA:N	2.36	0.40
1:B:144:SER:CB	1:B:148:ARG:HH21	2.34	0.40
1:B:424:LEU:HA	1:B:425:PRO:HD3	1.91	0.40
2:K:33:ARG:HG2	5:K:201:HOH:O	2.20	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	442/445 (99%)	419 (95%)	22 (5%)	1 (0%)	47	78
1	B	443/445 (100%)	413 (93%)	29 (6%)	1 (0%)	47	78
2	C	124/127 (98%)	118 (95%)	6 (5%)	0	100	100
2	K	124/127 (98%)	116 (94%)	8 (6%)	0	100	100
All	All	1133/1144 (99%)	1066 (94%)	65 (6%)	2 (0%)	47	78

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	168	ASP
1	A	53	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	352/373 (94%)	345 (98%)	7 (2%)	55	75
1	B	344/373 (92%)	331 (96%)	13 (4%)	33	61
2	C	97/99 (98%)	94 (97%)	3 (3%)	40	65
2	K	99/99 (100%)	95 (96%)	4 (4%)	31	60
All	All	892/944 (94%)	865 (97%)	27 (3%)	42	66

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	137	SER
1	A	152	SER
1	A	174	LEU
1	A	215	ILE
1	A	389	LYS
1	A	409	LEU
1	A	431	CYS
1	B	31	THR
1	B	100	LEU

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Mol	Chain	Res	Type
1	B	137	SER
1	B	145	LEU
1	B	152	SER
1	B	175[A]	ARG
1	B	175[B]	ARG
1	B	192	THR
1	B	202	ASP
1	B	215	ILE
1	B	373	PHE
1	B	411	CYS
1	B	431	CYS
2	K	18	LEU
2	K	22	CYS
2	K	101	TYR
2	K	119	THR
2	C	22	CYS
2	C	52	THR
2	C	80	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	200	GLN
1	A	285	ASN
1	A	370	GLN
1	B	107	GLN
1	B	122	GLN
1	B	200	GLN
2	K	3	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	#$|Z| > 2$
4	SO4	B	502	-	4,4,4	0.38	0	6,6,6	0.15	0
4	SO4	A	502	-	4,4,4	0.36	0	6,6,6	0.10	0

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.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	502	SO4	1	0
4	A	502	SO4	1	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 ⓘ

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	441/445 (99%)	-0.06	14 (3%)	47	40	75, 141, 215, 258	0
1	B	441/445 (99%)	-0.17	3 (0%)	87	86	74, 140, 212, 279	0
2	C	124/127 (97%)	0.03	0	100	100	72, 113, 172, 198	0
2	K	124/127 (97%)	0.03	0	100	100	64, 110, 163, 186	0
All	All	1130/1144 (98%)	-0.08	17 (1%)	73	69	64, 134, 205, 279	0

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	61	CYS	4.3
1	A	49	PHE	3.1
1	B	61	CYS	3.0
1	A	252	GLN	2.9
1	B	288	ALA	2.9
1	A	289	TYR	2.9
1	A	288	ALA	2.8
1	A	190	ALA	2.8
1	A	287	LYS	2.5
1	A	189	VAL	2.4
1	A	319	PHE	2.4
1	A	305	TRP	2.3
1	A	336	ILE	2.2
1	A	125	ILE	2.2
1	B	336	ILE	2.1
1	A	74	ILE	2.1
1	A	265	TYR	2.0

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 (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	ZN	A	501	1/1	0.90	0.18	141,141,141,141	0
4	SO4	A	502	5/5	0.91	0.11	154,172,174,195	0
4	SO4	B	502	5/5	0.91	0.13	141,150,157,163	0
3	ZN	B	501	1/1	0.96	0.21	98,98,98,98	0

6.5 Other polymers (i)

There are no such residues in this entry.