Full wwPDB X-ray Structure Validation Report (i)

Jan 7, 2024 – 11:11 am GMT

PDB ID	:	6HEJ
Title	:	Structure of human USP28
Authors	:	Gersch, M.; Komander, D.
Deposited on	:	2018-08-20
Resolution	:	2.79 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 (i) 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 (1)) were used in the production of this report:

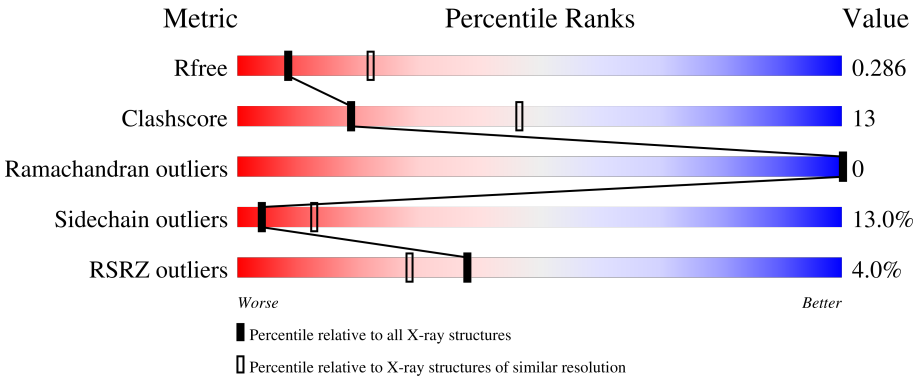
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.79 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	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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	556	3% 52% 22% 5% 22%
1	B	556	3% 55% 16% · 26%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6531 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.

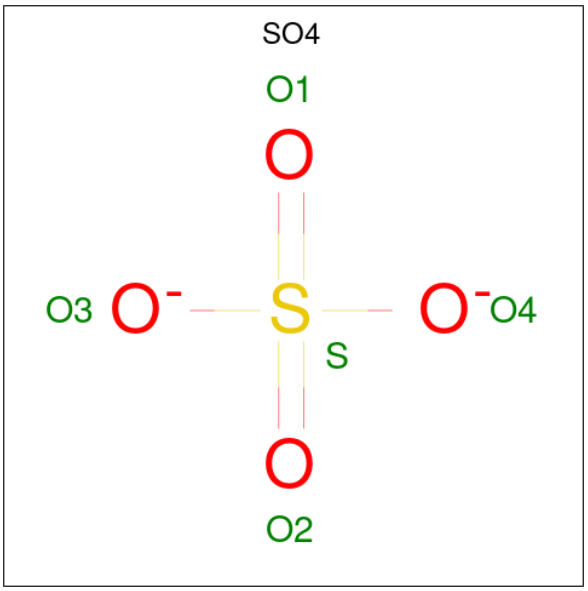
- Molecule 1 is a protein called Ubiquitin carboxyl-terminal hydrolase 28.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	436	Total	C	N	O	S	0	0	0
			3373	2170	558	628	17			
1	B	409	Total	C	N	O	S	0	0	0
			3078	1985	504	571	18			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	148	GLY	-	expression tag	UNP Q96RU2
B	148	GLY	-	expression tag	UNP Q96RU2

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



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

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

- Molecule 3 is water.

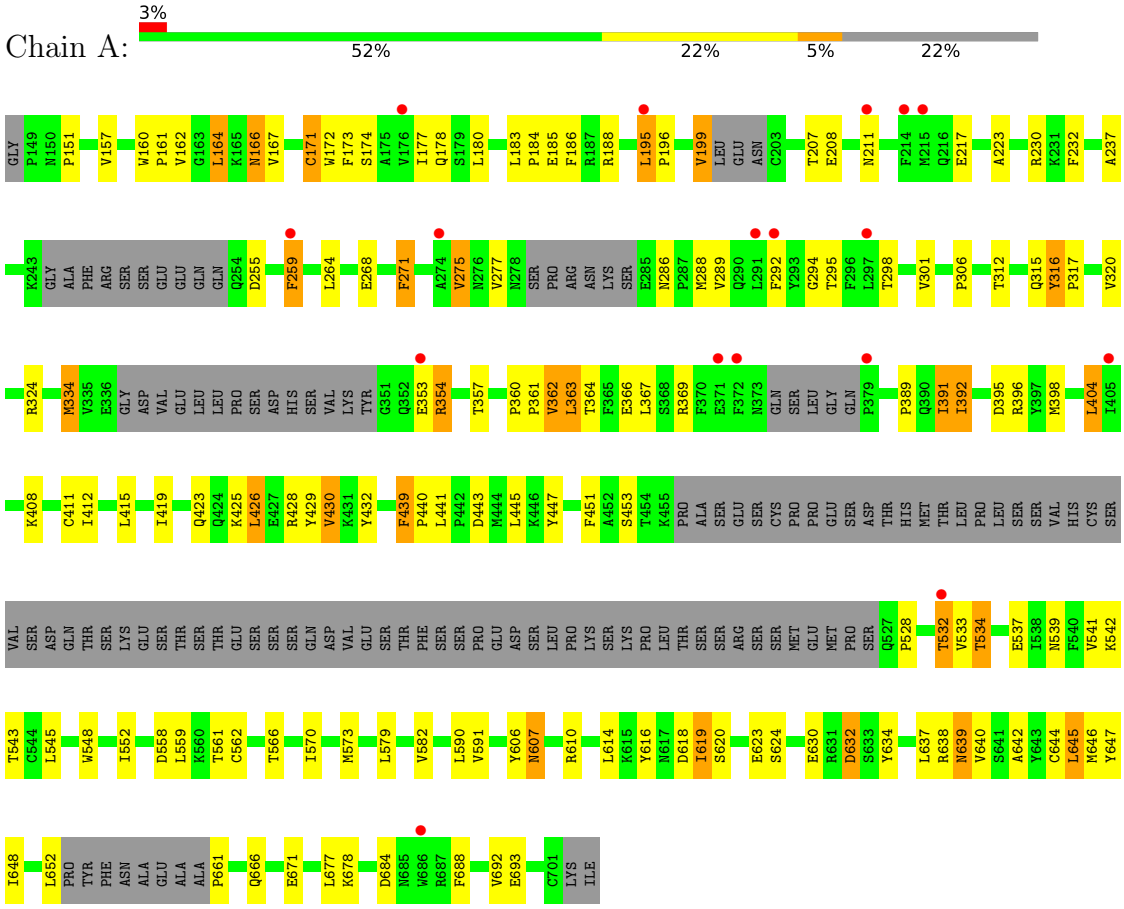
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	38	Total O 38 38	0	0
3	B	32	Total O 32 32	0	0

3 Residue-property plots (i)

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

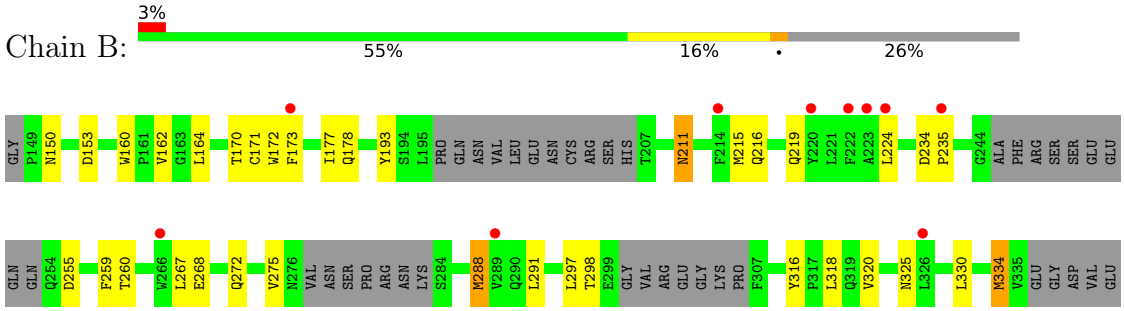
• Molecule 1: Ubiquitin carboxyl-terminal hydrolase 28

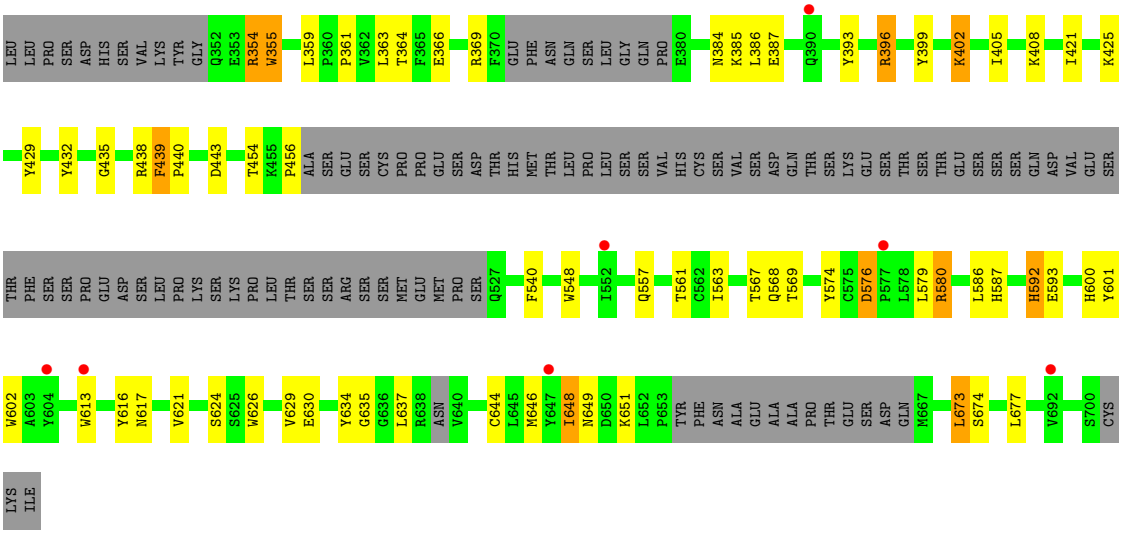
Chain A:



• Molecule 1: Ubiquitin carboxyl-terminal hydrolase 28

Chain B:




LEU LEU PRO SER ASP HIS SER VAL LYS TYR GLY Q352 E353 R354 W355 L359 P360 P361 V362 L363 T364 F365 E366 R369 F370 GLU PHE ASN GLN SER LEU GLY GLN PRO E380 N384 K385 L386 E387 Q390 Y393 R396 Y399 K402 I405 K408 I421 K425
Y429 Y432 G435 R438 F439 P440 D443 T454 K455 P456 ALA SER GLU SER CYS PRO PRO GLU SER ASP THR HIS MET THR LEU PRO LEU SER SER VAL HIS CYS SER VAL SER ASP GLN THR SER LYS GLU SER THR SER THR GLU SER SER SER GLN ASP VAL GLU SER
THR PHE SER SER PRO GLU ASP SER LEU PRO LYS SER LYS PRO LEU THR SER SER ARG SER SER MET GLU MET PRO SER Q527 F540 W548 I552 Q557 T561 C562 I563 T567 Q568 T569 Y574 C575 D576 P577 L578 L579 R580 L586 H587 H592 E593 H600 Y601
W602 A603 Y604 W613 Y616 N617 V621 S624 S625 W626 V629 E630 Y634 G635 G636 L637 R638 ASN V640 C644 L645 M646 Y647 I648 N649 D650 K651 L652 P653 TYR PHE ASN ALA GLU ALA ALA PRO THR GLU SER ASP GLN M667 L673 S674 L677 V692 S700 CYS
LYS ILE

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	104.23Å 200.46Å 206.06Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	71.84 – 2.79 71.84 – 2.79	Depositor EDS
% Data completeness (in resolution range)	58.8 (71.84-2.79) 58.8 (71.84-2.79)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.71 (at 2.77Å)	Xtriage
Refinement program	PHENIX (1.13_2998), RESTRAIN	Depositor
R, R_{free}	0.261 , 0.286 0.261 , 0.286	Depositor DCC
R_{free} test set	1594 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	102.8	Xtriage
Anisotropy	0.091	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 63.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.001 for -h,-l,-k	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	6531	wwPDB-VP
Average B, all atoms (Å^2)	89.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.40% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: 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	0.32	0/3456	0.48	0/4708
1	B	0.29	0/3151	0.46	0/4297
All	All	0.30	0/6607	0.47	0/9005

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	3373	0	3040	99	0
1	B	3078	0	2704	70	0
2	A	10	0	0	0	0
3	A	38	0	0	1	0
3	B	32	0	0	0	0
All	All	6531	0	5744	160	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 (160) 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:183:LEU:HD21	1:A:362:VAL:HG21	1.52	0.89
1:B:173:PHE:CZ	1:B:177:ILE:HD11	2.09	0.88
1:A:195:LEU:HD12	1:A:196:PRO:HD3	1.55	0.86
1:B:173:PHE:CZ	1:B:177:ILE:CD1	2.64	0.81
1:A:195:LEU:HD12	1:A:196:PRO:CD	2.10	0.81
1:A:440:PRO:HG2	1:A:443:ASP:HB2	1.67	0.76
1:A:171:CYS:O	1:A:174:SER:N	2.21	0.74
1:A:230:ARG:HH21	1:A:688:PHE:HB2	1.53	0.74
1:A:638:ARG:O	1:A:639:ASN:ND2	2.23	0.72
1:B:334:MET:HG3	1:B:354:ARG:HB3	1.72	0.71
1:A:208:GLU:O	1:A:211:ASN:HB2	1.90	0.71
1:A:294:GLY:HA3	1:A:360:PRO:HD3	1.73	0.71
1:A:614:LEU:HB3	1:A:616:TYR:HE2	1.55	0.69
1:A:562:CYS:O	1:A:566:THR:HG22	1.92	0.69
1:B:387:GLU:HA	1:B:634:TYR:CD2	2.28	0.69
1:B:291:LEU:HA	1:B:361:PRO:HD2	1.75	0.68
1:A:614:LEU:HB3	1:A:616:TYR:CE2	2.30	0.67
1:A:298:THR:HG22	1:A:354:ARG:HG3	1.76	0.66
1:B:454:THR:HG22	1:B:456:PRO:HD2	1.78	0.66
1:A:412:ILE:HD11	1:A:570:ILE:HG23	1.77	0.64
1:A:362:VAL:HG23	1:A:648:ILE:HG22	1.81	0.62
1:B:364:THR:HG22	1:B:646:MET:HG2	1.80	0.62
1:A:232:PHE:CB	1:A:619:ILE:HG22	2.29	0.62
1:A:164:LEU:HD21	1:A:177:ILE:HD11	1.82	0.62
1:B:173:PHE:HZ	1:B:177:ILE:HD11	1.61	0.62
1:B:440:PRO:HG2	1:B:443:ASP:HB2	1.84	0.60
1:A:334:MET:HG3	1:A:354:ARG:HB3	1.84	0.60
1:B:268:GLU:HA	1:B:288:MET:HE1	1.84	0.59
1:A:607:ASN:HD21	1:A:610:ARG:HG3	1.69	0.58
1:A:528:PRO:HB3	1:B:429:TYR:HE1	1.69	0.58
1:A:275:VAL:O	1:A:275:VAL:HG13	2.03	0.57
1:A:590:LEU:HD12	1:A:644:CYS:HB3	1.85	0.57
1:A:534:THR:HG23	1:A:537:GLU:HB2	1.85	0.57
1:A:196:PRO:HB2	1:A:199:VAL:HG22	1.87	0.57
1:A:532:THR:O	1:A:532:THR:OG1	2.21	0.57
1:A:415:LEU:O	1:A:419:ILE:HG12	2.05	0.56
1:B:586:LEU:HD23	1:B:613:TRP:CH2	2.41	0.56
1:B:387:GLU:HA	1:B:634:TYR:HD2	1.69	0.55
1:A:363:LEU:HB3	1:A:647:TYR:HB2	1.88	0.55
1:B:369:ARG:HH12	1:B:635:GLY:HA3	1.71	0.55
1:B:387:GLU:HA	1:B:634:TYR:CE2	2.42	0.55
1:B:592:HIS:HB2	1:B:601:TYR:CE2	2.42	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:426:LEU:O	1:A:430:VAL:HG23	2.08	0.54
1:A:292:PHE:CD2	1:A:362:VAL:HG11	2.43	0.54
1:B:600:HIS:NE2	1:B:617:ASN:OD1	2.40	0.53
1:A:277:VAL:HG12	1:A:277:VAL:O	2.08	0.53
1:A:364:THR:HG23	1:A:646:MET:HG2	1.90	0.53
1:B:385:LYS:HA	1:B:634:TYR:O	2.09	0.53
1:B:673:LEU:HD23	1:B:674:SER:H	1.74	0.53
1:A:404:LEU:HD22	1:A:408:LYS:HE2	1.90	0.53
1:B:586:LEU:HD23	1:B:613:TRP:HH2	1.74	0.52
1:A:439:PHE:CG	1:A:440:PRO:HD2	2.44	0.52
1:B:563:ILE:O	1:B:567:THR:HG23	2.09	0.52
1:A:361:PRO:O	1:A:648:ILE:HA	2.09	0.52
1:A:230:ARG:NH2	1:A:688:PHE:HB2	2.23	0.52
1:B:172:TRP:CZ2	1:B:259:PHE:HD1	2.29	0.51
1:A:301:VAL:HA	1:A:306:PRO:HA	1.92	0.51
1:A:591:VAL:HA	1:A:642:ALA:HA	1.93	0.50
1:A:161:PRO:HG2	1:A:616:TYR:OH	2.12	0.50
1:A:164:LEU:HD23	1:A:174:SER:HA	1.92	0.50
1:A:195:LEU:HD12	1:A:196:PRO:HD2	1.93	0.50
1:B:557:GLN:O	1:B:561:THR:HG23	2.12	0.50
1:B:630:GLU:O	1:B:634:TYR:HD1	1.95	0.50
1:B:369:ARG:NH1	1:B:384:ASN:O	2.45	0.49
1:B:359:LEU:HD22	1:B:363:LEU:HD11	1.93	0.49
1:A:232:PHE:CG	1:A:619:ILE:HG22	2.47	0.49
1:A:439:PHE:HB2	1:B:439:PHE:CE1	2.48	0.49
1:A:637:LEU:HB2	1:A:640:VAL:HG12	1.95	0.49
1:B:320:VAL:HG13	1:B:386:LEU:HD23	1.95	0.49
1:B:626:TRP:HD1	1:B:630:GLU:HG3	1.78	0.49
1:B:171:CYS:SG	1:B:171:CYS:O	2.71	0.48
1:A:151:PRO:HB2	1:A:692:VAL:HG22	1.96	0.48
1:B:173:PHE:CZ	1:B:177:ILE:HD12	2.47	0.48
1:A:217:GLU:OE2	1:A:237:ALA:HB1	2.14	0.48
1:A:395:ASP:CG	1:A:582:VAL:HG22	2.33	0.48
1:A:528:PRO:HG3	1:B:429:TYR:CE1	2.48	0.48
1:A:362:VAL:HG12	1:A:362:VAL:O	2.14	0.48
1:A:439:PHE:HB2	1:B:439:PHE:CD1	2.48	0.48
1:B:673:LEU:HD23	1:B:674:SER:N	2.29	0.48
1:A:184:PRO:O	1:A:188:ARG:HG3	2.14	0.47
1:B:439:PHE:CG	1:B:440:PRO:HD2	2.50	0.47
1:A:271:PHE:CD2	1:A:288:MET:HG3	2.49	0.47
1:A:294:GLY:CA	1:A:360:PRO:HD3	2.44	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:389:PRO:HB2	1:A:392:ILE:HG22	1.97	0.47
1:A:632:ASP:N	1:A:632:ASP:OD1	2.48	0.47
1:A:678:LYS:HE3	1:A:678:LYS:HB2	1.60	0.46
1:B:164:LEU:HB3	1:B:235:PRO:HG3	1.96	0.46
1:A:271:PHE:HB3	1:A:286:ASN:HD21	1.80	0.46
1:A:295:THR:O	1:A:357:THR:OG1	2.22	0.46
1:B:369:ARG:NH1	1:B:635:GLY:HA3	2.29	0.46
1:A:398:MET:CE	1:A:582:VAL:HG21	2.45	0.46
1:A:666:GLN:OE1	1:A:666:GLN:N	2.47	0.46
1:B:649:ASN:OD1	1:B:651:LYS:N	2.49	0.46
1:A:392:ILE:O	1:A:392:ILE:HG12	2.13	0.46
1:B:160:TRP:NE1	1:B:621:VAL:O	2.47	0.46
1:A:429:TYR:HD2	1:A:552:ILE:HG23	1.81	0.46
1:A:425:LYS:HB3	1:A:559:LEU:HD11	1.97	0.45
1:A:661:PRO:HB3	3:A:932:HOH:O	2.16	0.45
1:A:180:LEU:HB3	1:A:186:PHE:CE2	2.52	0.45
1:A:447:TYR:OH	1:B:435:GLY:HA3	2.17	0.45
1:A:432:TYR:CD2	1:A:441:LEU:HD12	2.52	0.45
1:A:537:GLU:HG3	1:B:540:PHE:CZ	2.52	0.45
1:B:320:VAL:HG22	1:B:386:LEU:HG	1.98	0.45
1:A:445:LEU:HD22	1:A:545:LEU:HD22	1.98	0.45
1:B:405:ILE:HD11	1:B:579:LEU:HD21	1.99	0.45
1:B:224:LEU:HD23	1:B:224:LEU:HA	1.84	0.45
1:A:537:GLU:HG3	1:B:540:PHE:HZ	1.81	0.44
1:B:421:ILE:O	1:B:425:LYS:HG3	2.17	0.44
1:A:183:LEU:CD2	1:A:362:VAL:HG21	2.37	0.44
1:A:391:ILE:O	1:A:391:ILE:HG12	2.17	0.44
1:A:533:VAL:HG21	1:B:548:TRP:HE1	1.82	0.44
1:B:593:GLU:HB2	1:B:602:TRP:HZ3	1.83	0.44
1:A:178:GLN:HG2	1:A:616:TYR:HD1	1.82	0.44
1:A:317:PRO:HA	1:A:366:GLU:HB2	2.00	0.44
1:A:429:TYR:CD2	1:A:552:ILE:HG23	2.53	0.43
1:A:316:TYR:HD1	1:A:317:PRO:HD2	1.83	0.43
1:A:315:GLN:N	1:A:315:GLN:OE1	2.52	0.43
1:A:178:GLN:CG	1:A:616:TYR:HD1	2.31	0.43
1:B:602:TRP:HB2	1:B:616:TYR:O	2.19	0.43
1:A:367:LEU:HD11	1:A:645:LEU:HD11	2.00	0.43
1:B:297:LEU:HD23	1:B:298:THR:N	2.33	0.43
1:B:673:LEU:HD22	1:B:677:LEU:HB3	2.01	0.43
1:B:396:ARG:NH1	1:B:574:TYR:HD1	2.17	0.43
1:A:172:TRP:CH2	1:A:259:PHE:HB3	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:593:GLU:HB2	1:B:602:TRP:CZ3	2.55	0.42
1:A:230:ARG:NH2	1:A:684:ASP:OD1	2.50	0.42
1:B:267:LEU:O	1:B:288:MET:HE1	2.18	0.42
1:B:216:GLN:HA	1:B:219:GLN:NE2	2.34	0.42
1:B:396:ARG:H	1:B:396:ARG:HG3	1.55	0.42
1:A:268:GLU:HG3	1:A:289:VAL:HG23	2.01	0.42
1:B:297:LEU:N	1:B:355:TRP:O	2.52	0.42
1:A:295:THR:HG22	1:A:312:THR:HG22	2.01	0.42
1:B:330:LEU:HD23	1:B:330:LEU:HA	1.94	0.42
1:B:384:ASN:OD1	1:B:385:LYS:N	2.53	0.42
1:B:162:VAL:O	1:B:178:GLN:NE2	2.47	0.42
1:B:325:ASN:HA	1:B:387:GLU:H	1.84	0.42
1:A:558:ASP:HA	1:A:561:THR:HG22	2.02	0.41
1:A:453:SER:HB3	1:A:542:LYS:CD	2.51	0.41
1:A:630:GLU:HG2	1:A:634:TYR:CE1	2.56	0.41
1:A:223:ALA:HB2	1:A:677:LEU:HD22	2.01	0.41
1:A:411:CYS:O	1:A:415:LEU:HD23	2.21	0.41
1:A:415:LEU:HB3	1:A:570:ILE:HD11	2.01	0.41
1:A:183:LEU:HD21	1:A:362:VAL:CG2	2.38	0.41
1:A:292:PHE:CE2	1:A:362:VAL:HG11	2.56	0.41
1:A:451:PHE:HB2	1:B:432:TYR:CE2	2.56	0.41
1:A:614:LEU:HD23	1:A:623:GLU:HA	2.03	0.41
1:A:426:LEU:HD13	1:A:430:VAL:HG21	2.03	0.41
1:B:150:ASN:O	1:B:153:ASP:HB3	2.21	0.41
1:B:272:GLN:O	1:B:275:VAL:HG22	2.21	0.41
1:B:408:LYS:NZ	1:B:576:ASP:OD1	2.27	0.41
1:B:393:TYR:CD1	1:B:580:ARG:HA	2.56	0.41
1:B:399:TYR:HE2	1:B:402:LYS:HE3	1.85	0.41
1:A:559:LEU:HD23	1:A:559:LEU:HA	1.92	0.41
1:A:324:ARG:H	1:A:324:ARG:HG3	1.48	0.40
1:A:548:TRP:O	1:A:552:ILE:HG12	2.22	0.40
1:B:211:ASN:OD1	1:B:211:ASN:N	2.54	0.40
1:B:172:TRP:HB2	1:B:601:TYR:HD1	1.87	0.40
1:A:171:CYS:O	1:A:173:PHE:N	2.54	0.40
1:B:587:HIS:HB2	1:B:648:ILE:HG23	2.03	0.40
1:A:166:ASN:HB2	1:A:618:ASP:CG	2.41	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	420/556 (76%)	408 (97%)	12 (3%)	0	100 100
1	B	389/556 (70%)	374 (96%)	15 (4%)	0	100 100
All	All	809/1112 (73%)	782 (97%)	27 (3%)	0	100 100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	329/513 (64%)	278 (84%)	51 (16%)	2 8
1	B	286/513 (56%)	257 (90%)	29 (10%)	7 22
All	All	615/1026 (60%)	535 (87%)	80 (13%)	4 13

All (80) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	157	VAL
1	A	160	TRP
1	A	162	VAL
1	A	164	LEU
1	A	166	ASN
1	A	167	VAL
1	A	171	CYS
1	A	185	GLU

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Mol	Chain	Res	Type
1	A	195	LEU
1	A	199	VAL
1	A	207	THR
1	A	255	ASP
1	A	259	PHE
1	A	264	LEU
1	A	271	PHE
1	A	275	VAL
1	A	316	TYR
1	A	320	VAL
1	A	334	MET
1	A	353	GLU
1	A	354	ARG
1	A	362	VAL
1	A	363	LEU
1	A	369	ARG
1	A	391	ILE
1	A	392	ILE
1	A	396	ARG
1	A	404	LEU
1	A	423	GLN
1	A	426	LEU
1	A	428	ARG
1	A	430	VAL
1	A	439	PHE
1	A	532	THR
1	A	534	THR
1	A	539	ASN
1	A	541	VAL
1	A	543	THR
1	A	573	MET
1	A	579	LEU
1	A	606	TYR
1	A	607	ASN
1	A	619	ILE
1	A	620	SER
1	A	624	SER
1	A	632	ASP
1	A	639	ASN
1	A	645	LEU
1	A	652	LEU
1	A	671	GLU

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Mol	Chain	Res	Type
1	A	693	GLU
1	B	170	THR
1	B	193	TYR
1	B	211	ASN
1	B	215	MET
1	B	234	ASP
1	B	255	ASP
1	B	260	THR
1	B	288	MET
1	B	316	TYR
1	B	318	LEU
1	B	334	MET
1	B	354	ARG
1	B	355	TRP
1	B	366	GLU
1	B	396	ARG
1	B	402	LYS
1	B	438	ARG
1	B	439	PHE
1	B	568	GLN
1	B	569	THR
1	B	576	ASP
1	B	580	ARG
1	B	592	HIS
1	B	624	SER
1	B	629	VAL
1	B	637	LEU
1	B	644	CYS
1	B	648	ILE
1	B	673	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	607	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands 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	SO4	A	801	-	4,4,4	0.14	0	6,6,6	0.05	0
2	SO4	A	802	-	4,4,4	0.14	0	6,6,6	0.05	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.

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, 95^{th} 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	436/556 (78%)	0.38	17 (3%)	39	29	42, 84, 126, 156	0
1	B	409/556 (73%)	0.29	17 (4%)	36	26	40, 97, 138, 150	0
All	All	845/1112 (75%)	0.34	34 (4%)	38	28	40, 89, 134, 156	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	220	TYR	5.3
1	B	214	PHE	4.4
1	B	613	TRP	4.1
1	B	222	PHE	3.4
1	A	379	PRO	3.2
1	A	372	PHE	3.2
1	A	195	LEU	3.2
1	A	215	MET	3.0
1	A	297	LEU	2.8
1	A	211	ASN	2.8
1	B	224	LEU	2.7
1	A	214	PHE	2.6
1	A	176	VAL	2.6
1	B	647	TYR	2.5
1	A	292	PHE	2.5
1	A	371	GLU	2.5
1	A	274	ALA	2.5
1	B	266	TRP	2.4
1	B	173	PHE	2.4
1	B	223	ALA	2.3
1	A	353	GLU	2.3
1	B	577	PRO	2.2
1	A	291	LEU	2.2
1	B	692	VAL	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	532	THR	2.1
1	B	235	PRO	2.1
1	A	405	ILE	2.1
1	B	552	ILE	2.1
1	B	604	TYR	2.1
1	A	686	TRP	2.1
1	B	326	LEU	2.0
1	A	259	PHE	2.0
1	B	390	GLN	2.0
1	B	289	VAL	2.0

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

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, 95^{th} 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	SO4	A	802	5/5	0.94	0.15	110,117,137,144	0
2	SO4	A	801	5/5	0.96	0.20	97,97,109,110	5

6.5 Other polymers (i)

There are no such residues in this entry.