Full wwPDB X-ray Structure Validation Report (i)

Sep 14, 2022 – 11:35 am BST

PDB ID	:	7PPR
Title	:	The structure of UDP-glucose pyrophosphorylase from Aspergillus fumigatus
Authors	:	Morton, S.; Raimi, O.G.; Yan, K.; van Aalten, D.M.F.
Deposited on	:	2021-09-14
Resolution	:	2.57 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:

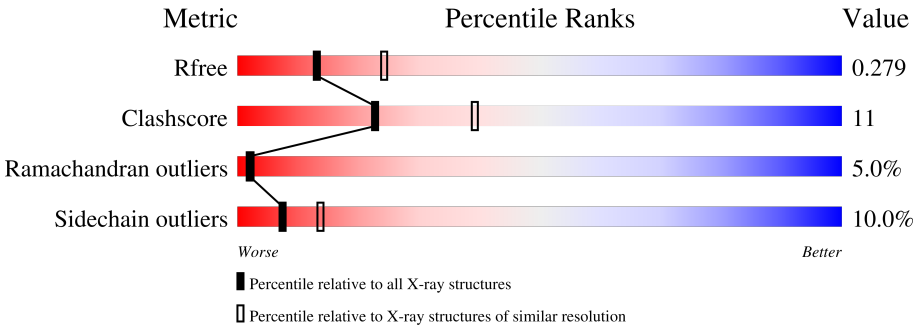
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.30
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.30

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 2.57 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	3676 (2.60-2.56)
Clashscore	141614	4049 (2.60-2.56)
Ramachandran outliers	138981	3979 (2.60-2.56)
Sidechain outliers	138945	3979 (2.60-2.56)

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%

Mol	Chain	Length	Quality of chain
1	A	492	65% 22% • 9%
1	B	492	71% 17% 5% • 6%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 7187 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.

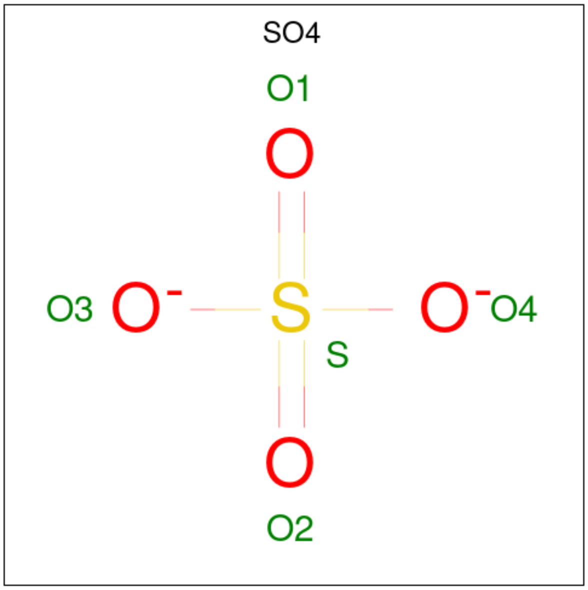
- Molecule 1 is a protein called UTP--glucose-1-phosphate uridylyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	450	Total	C	N	O	S	0	6	0
			3452	2193	606	641	12			
1	B	464	Total	C	N	O	S	0	4	0
			3527	2242	606	666	13			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	20	GLY	-	expression tag	UNP E9R9Z5
A	21	PRO	-	expression tag	UNP E9R9Z5
A	22	LEU	-	expression tag	UNP E9R9Z5
A	23	GLY	-	expression tag	UNP E9R9Z5
A	24	SER	-	expression tag	UNP E9R9Z5
B	20	GLY	-	expression tag	UNP E9R9Z5
B	21	PRO	-	expression tag	UNP E9R9Z5
B	22	LEU	-	expression tag	UNP E9R9Z5
B	23	GLY	-	expression tag	UNP E9R9Z5
B	24	SER	-	expression tag	UNP E9R9Z5

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



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

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

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	2	Total Cl 2 2	0	0

- Molecule 4 is water.

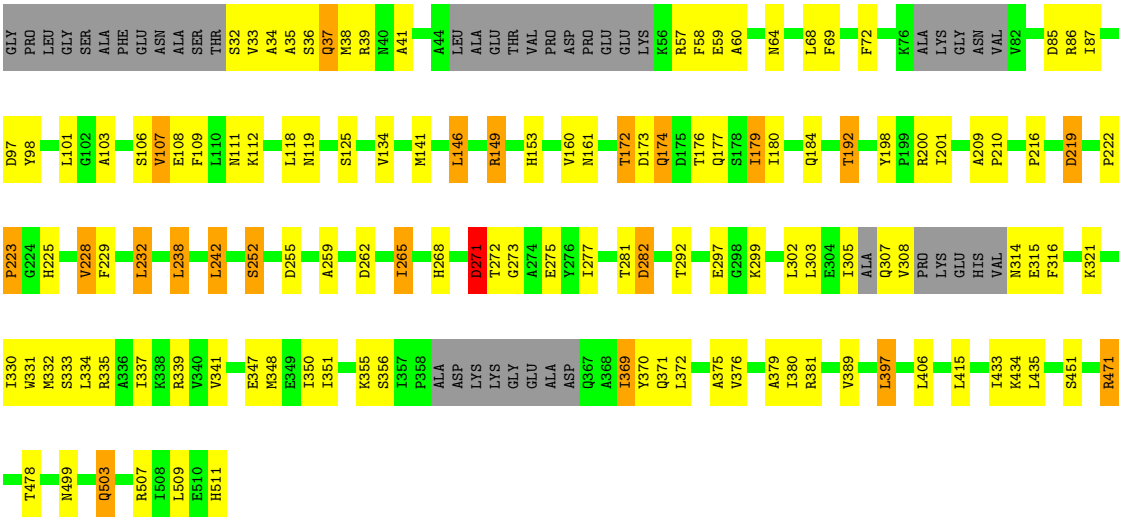
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	61	Total O 61 61	0	0
4	B	70	Total O 70 70	0	0

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. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

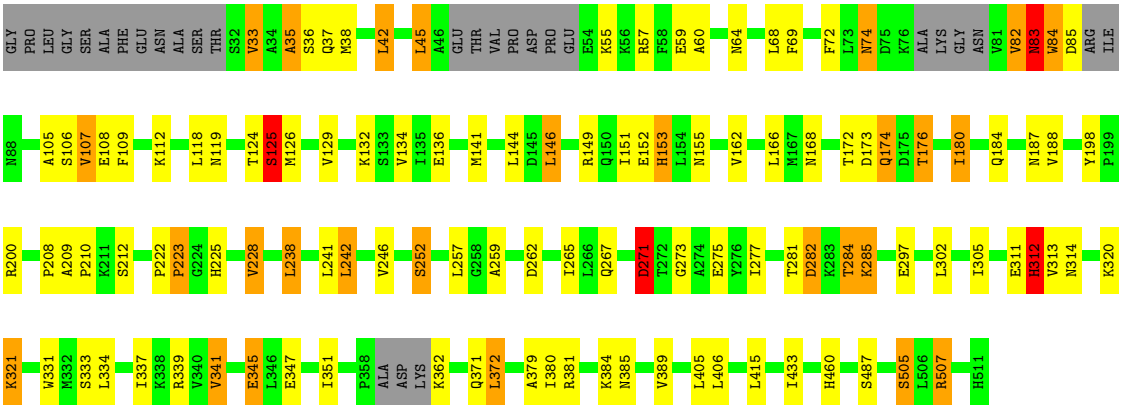
- Molecule 1: UTP--glucose-1-phosphate uridylyltransferase

Chain A:



- Molecule 1: UTP--glucose-1-phosphate uridylyltransferase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	134.16Å 152.61Å 160.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	80.00 – 2.57 80.00 – 2.57	Depositor EDS
% Data completeness (in resolution range)	99.8 (80.00-2.57) 99.8 (80.00-2.57)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.65 (at 2.58Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.227 , 0.277 0.231 , 0.279	Depositor DCC
R_{free} test set	2699 reflections (5.15%)	wwPDB-VP
Wilson B-factor (Å^2)	60.7	Xtriage
Anisotropy	0.181	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.015 for -h,-l,-k	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	7187	wwPDB-VP
Average B, all atoms (Å^2)	76.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.06% 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: CL, 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	0.74	0/3518	0.91	2/4765 (0.0%)
1	B	0.74	0/3596	0.88	1/4882 (0.0%)
All	All	0.74	0/7114	0.90	3/9647 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	255	ASP	CB-CA-C	-9.59	91.23	110.40
1	B	271	ASP	CB-CA-C	6.31	123.02	110.40
1	A	271	ASP	CB-CA-C	5.25	120.89	110.40

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	3452	0	3361	77	0
1	B	3527	0	3428	83	0
2	A	45	0	0	2	0
2	B	30	0	0	1	0
3	B	2	0	0	0	0
4	A	61	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	70	0	0	0	0
All	All	7187	0	6789	159	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 11.

All (159) 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:112:LYS:O	1:B:246:VAL:O	1.60	1.17
1:B:57[B]:ARG:HG2	1:B:57[B]:ARG:HH11	1.12	1.07
1:A:119:ASN:O	1:A:172:THR:HG21	1.60	1.01
1:A:111:ASN:OD1	1:A:160:VAL:HG13	1.62	0.97
1:B:57[B]:ARG:HH11	1:B:57[B]:ARG:CG	1.83	0.92
1:A:60:ALA:O	1:A:64:ASN:ND2	2.09	0.86
1:B:60:ALA:O	1:B:64:ASN:ND2	2.09	0.86
1:A:200:ARG:NH1	1:A:371:GLN:OE1	2.12	0.83
1:B:200:ARG:HE	1:B:371:GLN:HE21	1.28	0.82
1:B:362[B]:LYS:HE3	1:B:362[B]:LYS:HA	1.63	0.79
1:B:155:ASN:HD21	1:B:162:VAL:H	1.32	0.78
1:B:57[B]:ARG:HG2	1:B:57[B]:ARG:NH1	1.94	0.77
1:A:106:SER:O	1:A:107:VAL:HG23	1.85	0.76
1:A:57:ARG:O	1:A:59:GLU:N	2.20	0.75
1:B:200:ARG:HE	1:B:371:GLN:NE2	1.83	0.75
1:A:225[B]:HIS:CD2	1:A:376:VAL:H	2.06	0.73
1:A:111:ASN:OD1	1:A:160:VAL:CG1	2.36	0.72
1:B:262:ASP:O	1:B:265:ILE:HG22	1.90	0.71
1:A:229:PHE:HE1	1:A:332:MET:CE	2.03	0.70
1:B:106:SER:O	1:B:107:VAL:HG23	1.92	0.70
1:B:74:ASN:HD22	1:B:74:ASN:N	1.90	0.69
1:A:271:ASP:O	1:A:271:ASP:OD1	2.11	0.69
1:B:271:ASP:O	1:B:271:ASP:OD1	2.11	0.69
1:A:153:HIS:ND1	2:A:602:SO4:O1	2.24	0.67
1:B:507:ARG:NH1	2:B:602:SO4:O3	2.27	0.67
1:B:83:ASN:O	1:B:85:ASP:N	2.27	0.67
1:B:241:LEU:O	1:B:246:VAL:HG13	1.95	0.67
1:A:229:PHE:CE1	1:A:332:MET:CE	2.79	0.66
1:A:201:ILE:HG23	1:A:370:TYR:HB2	1.78	0.65
1:A:198:TYR:CD2	1:A:223:PRO:HG3	2.32	0.64
1:B:105:ALA:HA	1:B:267:GLN:HE21	1.62	0.64
1:B:198:TYR:CD2	1:B:223:PRO:HG3	2.33	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:98:TYR:HA	1:A:101:LEU:HD13	1.80	0.63
1:B:83:ASN:O	1:B:83:ASN:ND2	2.24	0.62
1:B:284:THR:O	1:B:285[B]:LYS:HG3	2.00	0.62
1:A:406:LEU:HD22	1:A:433:ILE:HD13	1.82	0.61
1:B:126:MET:HE3	1:B:132:LYS:HE3	1.84	0.59
1:B:35:ALA:O	1:B:38:MET:N	2.35	0.59
1:B:337:ILE:O	1:B:341:VAL:CG1	2.50	0.59
1:A:355:LYS:HB2	1:A:369:ILE:HD11	1.84	0.58
1:A:229:PHE:CE1	1:A:332:MET:HE3	2.39	0.57
1:B:362[B]:LYS:HE3	1:B:362[B]:LYS:CA	2.32	0.57
1:B:351:ILE:O	1:B:372:LEU:HA	2.04	0.57
1:B:151:ILE:O	1:B:153:HIS:O	2.21	0.57
1:B:57[B]:ARG:CG	1:B:57[B]:ARG:NH1	2.50	0.57
1:A:272:THR:O	1:A:272:THR:HG22	2.03	0.57
1:B:172:THR:O	1:B:176:THR:CG2	2.53	0.56
1:A:37:GLN:O	1:A:39:ARG:N	2.38	0.56
1:B:124:THR:O	1:B:125:SER:HB3	2.05	0.56
1:B:337:ILE:O	1:B:341:VAL:HG12	2.05	0.56
1:A:252:SER:OG	1:A:259:ALA:HB1	2.05	0.55
1:A:141:MET:HB3	1:A:146:LEU:HD13	1.89	0.55
1:B:252:SER:OG	1:B:259:ALA:HB1	2.07	0.54
1:A:160:VAL:HG12	1:A:161:ASN:H	1.72	0.54
1:A:173:ASP:O	1:A:174:GLN:CB	2.55	0.54
1:A:511:HIS:OXT	1:B:460:HIS:HE1	1.89	0.54
1:B:141:MET:HB3	1:B:146:LEU:HD13	1.88	0.54
1:A:32:SER:O	1:A:34:ALA:N	2.41	0.54
1:B:265:ILE:CG2	1:B:331:TRP:CZ2	2.91	0.53
1:B:173:ASP:O	1:B:174:GLN:CB	2.56	0.52
1:A:305:ILE:HD12	1:A:305:ILE:O	2.10	0.52
1:A:225[A]:HIS:O	1:A:228:VAL:HG22	2.10	0.52
1:B:238:LEU:CD1	1:B:334:LEU:HG	2.40	0.52
1:B:487:SER:HB3	1:B:505:SER:OG	2.10	0.52
1:B:241:LEU:HB3	1:B:246:VAL:HG21	1.92	0.51
1:A:149:ARG:NH2	2:A:603:SO4:O2	2.44	0.51
1:A:337:ILE:O	1:A:341:VAL:HG23	2.11	0.51
1:A:238:LEU:HD13	1:A:334:LEU:HD11	1.93	0.50
1:A:265:ILE:HD11	1:A:331:TRP:NE1	2.25	0.50
1:A:379:ALA:O	1:A:381:ARG:N	2.45	0.50
1:B:200:ARG:HH21	1:B:371:GLN:HE22	1.60	0.50
1:B:379:ALA:O	1:B:381:ARG:N	2.45	0.50
1:B:152:GLU:C	1:B:153:HIS:O	2.45	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:225[B]:HIS:O	1:A:228:VAL:HG22	2.12	0.50
1:A:503:GLN:HG2	1:A:503:GLN:O	2.12	0.50
1:A:200:ARG:HD3	1:A:369:ILE:HG13	1.93	0.49
1:A:238:LEU:CD1	1:A:334:LEU:HG	2.41	0.49
1:B:105:ALA:CA	1:B:267:GLN:HG2	2.42	0.49
1:B:172:THR:O	1:B:176:THR:HG23	2.11	0.49
1:B:64:ASN:O	1:B:68:LEU:HD13	2.13	0.49
1:B:225:HIS:O	1:B:228:VAL:HG22	2.12	0.49
1:A:160:VAL:HG12	1:A:161:ASN:N	2.28	0.49
1:B:74:ASN:N	1:B:74:ASN:ND2	2.61	0.49
1:A:225[B]:HIS:CD2	1:A:375:ALA:HA	2.48	0.48
1:B:119:ASN:HD22	1:B:168:ASN:ND2	2.12	0.48
1:A:64:ASN:O	1:A:68:LEU:HD13	2.13	0.48
1:B:238:LEU:HD13	1:B:334:LEU:HD11	1.95	0.47
1:A:177:GLN:OE1	1:A:192:THR:HG21	2.13	0.47
1:A:265:ILE:HD11	1:A:331:TRP:CD1	2.49	0.47
1:B:265:ILE:HG21	1:B:331:TRP:CZ2	2.49	0.47
1:A:229:PHE:CE1	1:A:332:MET:HE1	2.50	0.47
1:A:478:THR:H	1:A:499:ASN:HD22	1.62	0.47
1:A:101:LEU:HD23	1:A:268:HIS:HB2	1.96	0.47
1:A:225[B]:HIS:HD2	1:A:376:VAL:H	1.55	0.47
1:A:307:GLN:O	1:A:308:VAL:CB	2.63	0.47
1:A:262:ASP:HB3	1:A:265:ILE:HG23	1.96	0.47
1:A:177:GLN:O	1:A:180:ILE:HG22	2.16	0.46
1:B:311:GLU:O	1:B:312:HIS:HB2	2.16	0.46
1:A:176:THR:O	1:A:180:ILE:HB	2.16	0.46
1:A:209:ALA:N	1:A:210:PRO:HD2	2.31	0.45
1:A:351:ILE:O	1:A:372:LEU:HA	2.16	0.45
1:A:108:GLU:O	1:A:112:LYS:HD2	2.17	0.45
1:B:242:LEU:HD13	1:B:334:LEU:HD23	1.99	0.45
1:B:105:ALA:HA	1:B:267:GLN:HG2	1.98	0.45
1:B:172:THR:O	1:B:176:THR:HG22	2.16	0.45
1:A:507[A]:ARG:CZ	1:A:509:LEU:HD21	2.46	0.45
1:A:216:PRO:O	1:A:219:ASP:OD1	2.34	0.44
1:A:275:GLU:OE1	1:A:339:ARG:NH2	2.51	0.44
1:B:176:THR:O	1:B:180:ILE:HB	2.17	0.44
1:B:222:PRO:O	1:B:223:PRO:O	2.36	0.44
1:A:209:ALA:N	1:A:210:PRO:CD	2.81	0.44
1:A:222:PRO:O	1:A:223:PRO:O	2.35	0.44
1:A:229:PHE:HE1	1:A:332:MET:HE3	1.78	0.44
1:A:201:ILE:CG2	1:A:370:TYR:HB2	2.46	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:82:VAL:O	1:B:84:TRP:N	2.51	0.43
1:B:246:VAL:CG2	1:B:334:LEU:HD22	2.48	0.43
1:B:277:ILE:HG23	1:B:389:VAL:HG23	2.00	0.43
1:B:42:LEU:HD12	1:B:42:LEU:HA	1.80	0.43
1:B:200:ARG:HH21	1:B:371:GLN:NE2	2.15	0.43
1:B:275:GLU:OE1	1:B:339:ARG:NH2	2.51	0.43
1:B:406:LEU:HD22	1:B:433:ILE:HD13	2.01	0.43
1:B:35:ALA:O	1:B:37:GLN:N	2.52	0.43
1:B:124:THR:O	1:B:125:SER:CB	2.66	0.43
1:A:252:SER:OG	1:A:259:ALA:CB	2.67	0.43
1:B:108:GLU:O	1:B:112:LYS:HD2	2.19	0.43
1:B:209:ALA:N	1:B:210:PRO:HD2	2.34	0.43
1:B:371:GLN:O	1:B:372:LEU:HG	2.19	0.42
1:A:173:ASP:O	1:A:174:GLN:HB2	2.19	0.42
1:B:277:ILE:CG2	1:B:389:VAL:HG23	2.48	0.42
1:B:285[B]:LYS:HE2	1:B:285[B]:LYS:HB2	1.87	0.42
1:B:109:PHE:O	1:B:112:LYS:HB2	2.19	0.42
1:A:69:PHE:O	1:A:72:PHE:HB3	2.19	0.42
1:B:209:ALA:N	1:B:210:PRO:CD	2.82	0.42
1:B:144:LEU:HD23	1:B:144:LEU:HA	1.78	0.42
1:B:242:LEU:HD12	1:B:242:LEU:HA	1.89	0.42
1:A:397:LEU:HD23	1:A:397:LEU:HA	1.89	0.42
1:A:471[A]:ARG:H	1:A:471[A]:ARG:HG3	1.56	0.42
1:A:348:MET:O	1:A:350:ILE:HD12	2.19	0.41
1:A:415:LEU:HD12	1:A:415:LEU:HA	1.89	0.41
1:B:69:PHE:O	1:B:72:PHE:HB3	2.21	0.41
1:B:415:LEU:HD12	1:B:415:LEU:HA	1.87	0.41
1:A:277:ILE:HG23	1:A:389:VAL:HG23	2.02	0.41
1:A:229:PHE:CZ	1:A:332:MET:HE3	2.56	0.41
1:A:281:THR:O	1:A:282:ASP:CB	2.68	0.41
1:A:109:PHE:O	1:A:112:LYS:HB2	2.21	0.41
1:A:232:LEU:HD12	1:A:232:LEU:HA	1.90	0.41
1:B:38:MET:SD	1:B:208:PRO:HD3	2.61	0.41
1:B:320:LYS:O	1:B:321:LYS:HB2	2.21	0.41
1:B:345:GLU:O	1:B:345:GLU:HG3	2.20	0.41
1:A:106:SER:O	1:A:107:VAL:CG2	2.62	0.40
1:B:334:LEU:HD12	1:B:334:LEU:HA	1.92	0.40
1:B:406:LEU:C	1:B:406:LEU:HD23	2.42	0.40
1:A:242:LEU:HD12	1:A:242:LEU:HA	1.90	0.40
1:A:330:ILE:HG22	1:A:332:MET:SD	2.61	0.40
1:B:281:THR:O	1:B:282:ASP:CB	2.69	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:478:THR:H	1:A:499:ASN:ND2	2.19	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	443/492 (90%)	387 (87%)	38 (9%)	18 (4%)	3	3
1	B	457/492 (93%)	390 (85%)	38 (8%)	29 (6%)	1	1
All	All	900/984 (92%)	777 (86%)	76 (8%)	47 (5%)	2	2

All (47) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	35	ALA
1	A	37	GLN
1	A	38	MET
1	A	58	PHE
1	A	107	VAL
1	A	174	GLN
1	A	282	ASP
1	A	380	ILE
1	B	33	VAL
1	B	35	ALA
1	B	36	SER
1	B	84	TRP
1	B	107	VAL
1	B	174	GLN
1	B	187	ASN
1	B	282	ASP
1	A	41	ALA

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Mol	Chain	Res	Type
1	A	103	ALA
1	A	223	PRO
1	A	321	LYS
1	B	83	ASN
1	B	125	SER
1	B	223	PRO
1	B	285[A]	LYS
1	B	285[B]	LYS
1	B	314	ASN
1	B	380	ILE
1	B	385	ASN
1	A	85	ASP
1	A	87	ILE
1	A	347	GLU
1	B	45[A]	LEU
1	B	45[B]	LEU
1	B	55	LYS
1	B	153	HIS
1	B	297	GLU
1	B	321	LYS
1	B	372	LEU
1	B	384	LYS
1	A	33	VAL
1	B	312	HIS
1	B	347	GLU
1	A	273	GLY
1	A	297	GLU
1	B	188	VAL
1	B	273	GLY
1	B	313	VAL

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	354/425 (83%)	316 (89%)	38 (11%)	6 11

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	B	366/425 (86%)	332 (91%)	34 (9%)	9 16
All	All	720/850 (85%)	648 (90%)	72 (10%)	7 14

All (72) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	SER
1	A	86	ARG
1	A	97	ASP
1	A	118	LEU
1	A	125	SER
1	A	134	VAL
1	A	146	LEU
1	A	149	ARG
1	A	172	THR
1	A	179	ILE
1	A	184	GLN
1	A	192	THR
1	A	219	ASP
1	A	228	VAL
1	A	232	LEU
1	A	238	LEU
1	A	242	LEU
1	A	252	SER
1	A	265	ILE
1	A	271	ASP
1	A	292	THR
1	A	299	LYS
1	A	302	LEU
1	A	303	LEU
1	A	314	ASN
1	A	315	GLU
1	A	316	PHE
1	A	333	SER
1	A	335	ARG
1	A	356	SER
1	A	369	ILE
1	A	397	LEU
1	A	434	LYS
1	A	435	LEU
1	A	451	SER
1	A	471[A]	ARG

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Mol	Chain	Res	Type
1	A	471[B]	ARG
1	A	503	GLN
1	B	33	VAL
1	B	42	LEU
1	B	59	GLU
1	B	74	ASN
1	B	82	VAL
1	B	83	ASN
1	B	118	LEU
1	B	125	SER
1	B	129	VAL
1	B	134	VAL
1	B	136	GLU
1	B	146	LEU
1	B	149	ARG
1	B	166	LEU
1	B	176	THR
1	B	180	ILE
1	B	184	GLN
1	B	212	SER
1	B	228	VAL
1	B	238	LEU
1	B	242	LEU
1	B	252	SER
1	B	257	LEU
1	B	271	ASP
1	B	284	THR
1	B	302	LEU
1	B	305	ILE
1	B	312	HIS
1	B	333	SER
1	B	341	VAL
1	B	345	GLU
1	B	405	LEU
1	B	505	SER
1	B	507	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	234	ASN
1	A	268	HIS

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Mol	Chain	Res	Type
1	A	307	GLN
1	A	419	GLN
1	A	499	ASN
1	B	74	ASN
1	B	150	GLN
1	B	153	HIS
1	B	155	ASN
1	B	168	ASN
1	B	177	GLN
1	B	186	HIS
1	B	267	GLN
1	B	367	GLN
1	B	371	GLN
1	B	460	HIS
1	B	468	ASN

5.3.3 RNA (i)

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)

Of 17 ligands modelled in this entry, 2 are monoatomic - leaving 15 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	SO4	A	607	-	4,4,4	0.35	0	6,6,6	0.04	0
2	SO4	A	606	-	4,4,4	0.34	0	6,6,6	0.15	0
2	SO4	A	609	-	4,4,4	0.35	0	6,6,6	0.11	0
2	SO4	A	602	-	4,4,4	0.38	0	6,6,6	0.12	0
2	SO4	A	603	-	4,4,4	0.35	0	6,6,6	0.12	0
2	SO4	B	601	-	4,4,4	0.31	0	6,6,6	0.07	0
2	SO4	B	602	-	4,4,4	0.25	0	6,6,6	0.17	0
2	SO4	B	603	-	4,4,4	0.49	0	6,6,6	0.17	0
2	SO4	B	606	-	4,4,4	0.35	0	6,6,6	0.09	0
2	SO4	A	605	-	4,4,4	0.35	0	6,6,6	0.16	0
2	SO4	A	604	-	4,4,4	0.29	0	6,6,6	0.17	0
2	SO4	A	601	-	4,4,4	0.33	0	6,6,6	0.05	0
2	SO4	B	605	-	4,4,4	0.32	0	6,6,6	0.12	0
2	SO4	A	608	-	4,4,4	0.35	0	6,6,6	0.08	0
2	SO4	B	604	-	4,4,4	0.33	0	6,6,6	0.09	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.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	602	SO4	1	0
2	A	603	SO4	1	0
2	B	602	SO4	1	0

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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.