



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 04:33 PM UTC

PDB ID : 3EOE / pdb_00003eoe
Title : Crystal Structure of Pyruvate Kinase from toxoplasma gondii, 55.m00007
Authors : Wernimont, A.K.; Lew, J.; Kozieradzki, I.; Wasney, G.; Hassani, A.; Vedadi, M.; Cossar, D.; Schapiro, M.; Bochkarev, A.; Arrowsmith, C.H.; Bountra, C.; Weigelt, J.; Edwards, A.M.; Hui, R.; Pizarro, J.; Structural Genomics Consortium (SGC)
Deposited on : 2008-09-26
Resolution : 2.31 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

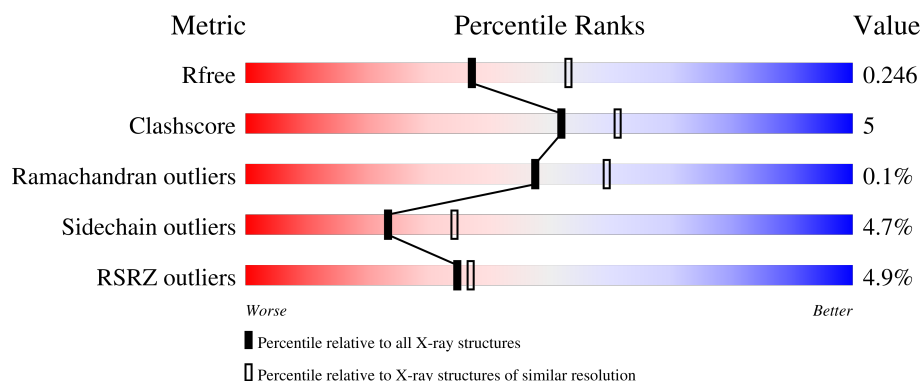
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.31 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}	180053	7754 (2.34-2.30)
Clashscore	190562	8383 (2.34-2.30)
Ramachandran outliers	187476	8303 (2.34-2.30)
Sidechain outliers	187428	8303 (2.34-2.30)
RSRZ outliers	180081	7760 (2.34-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	511	 7% 78% 14% 8%
1	B	511	 2% 83% 11% 5%
1	C	511	 4% 79% 14% 7%
1	D	511	 5% 64% 10% 25%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GOL	B	512	-	-	X	-

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 14040 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 Pyruvate kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	472	Total	C	N	O	S	0	1	0
			3464	2179	603	654	28			
1	B	483	Total	C	N	O	S	0	2	0
			3617	2273	632	684	28			
1	C	475	Total	C	N	O	S	3	1	0
			3510	2201	621	661	27			
1	D	382	Total	C	N	O	S	3	0	0
			2792	1762	485	519	26			

There are 72 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP Q969A2
A	2	HIS	-	expression tag	UNP Q969A2
A	3	HIS	-	expression tag	UNP Q969A2
A	4	HIS	-	expression tag	UNP Q969A2
A	5	HIS	-	expression tag	UNP Q969A2
A	6	HIS	-	expression tag	UNP Q969A2
A	7	HIS	-	expression tag	UNP Q969A2
A	8	SER	-	expression tag	UNP Q969A2
A	9	SER	-	expression tag	UNP Q969A2
A	10	GLY	-	expression tag	UNP Q969A2
A	11	ARG	-	expression tag	UNP Q969A2
A	12	GLU	-	expression tag	UNP Q969A2
A	13	ASN	-	expression tag	UNP Q969A2
A	14	LEU	-	expression tag	UNP Q969A2
A	15	TYR	-	expression tag	UNP Q969A2
A	16	PHE	-	expression tag	UNP Q969A2
A	17	GLN	-	expression tag	UNP Q969A2
A	18	GLY	-	expression tag	UNP Q969A2
B	1	MET	-	expression tag	UNP Q969A2
B	2	HIS	-	expression tag	UNP Q969A2
B	3	HIS	-	expression tag	UNP Q969A2

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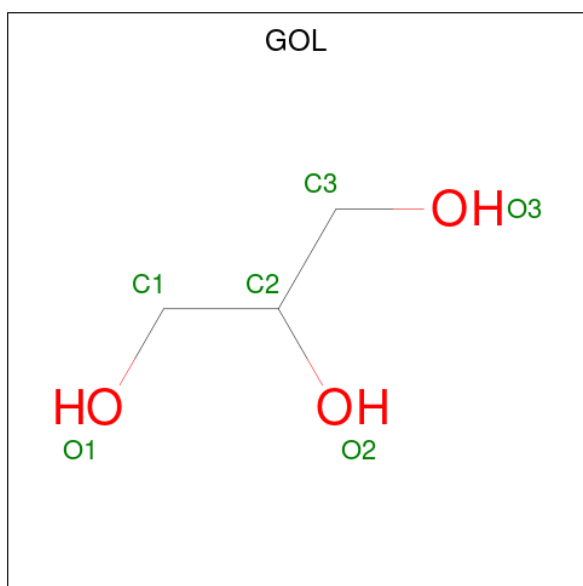
Chain	Residue	Modelled	Actual	Comment	Reference
B	4	HIS	-	expression tag	UNP Q969A2
B	5	HIS	-	expression tag	UNP Q969A2
B	6	HIS	-	expression tag	UNP Q969A2
B	7	HIS	-	expression tag	UNP Q969A2
B	8	SER	-	expression tag	UNP Q969A2
B	9	SER	-	expression tag	UNP Q969A2
B	10	GLY	-	expression tag	UNP Q969A2
B	11	ARG	-	expression tag	UNP Q969A2
B	12	GLU	-	expression tag	UNP Q969A2
B	13	ASN	-	expression tag	UNP Q969A2
B	14	LEU	-	expression tag	UNP Q969A2
B	15	TYR	-	expression tag	UNP Q969A2
B	16	PHE	-	expression tag	UNP Q969A2
B	17	GLN	-	expression tag	UNP Q969A2
B	18	GLY	-	expression tag	UNP Q969A2
C	1	MET	-	expression tag	UNP Q969A2
C	2	HIS	-	expression tag	UNP Q969A2
C	3	HIS	-	expression tag	UNP Q969A2
C	4	HIS	-	expression tag	UNP Q969A2
C	5	HIS	-	expression tag	UNP Q969A2
C	6	HIS	-	expression tag	UNP Q969A2
C	7	HIS	-	expression tag	UNP Q969A2
C	8	SER	-	expression tag	UNP Q969A2
C	9	SER	-	expression tag	UNP Q969A2
C	10	GLY	-	expression tag	UNP Q969A2
C	11	ARG	-	expression tag	UNP Q969A2
C	12	GLU	-	expression tag	UNP Q969A2
C	13	ASN	-	expression tag	UNP Q969A2
C	14	LEU	-	expression tag	UNP Q969A2
C	15	TYR	-	expression tag	UNP Q969A2
C	16	PHE	-	expression tag	UNP Q969A2
C	17	GLN	-	expression tag	UNP Q969A2
C	18	GLY	-	expression tag	UNP Q969A2
D	1	MET	-	expression tag	UNP Q969A2
D	2	HIS	-	expression tag	UNP Q969A2
D	3	HIS	-	expression tag	UNP Q969A2
D	4	HIS	-	expression tag	UNP Q969A2
D	5	HIS	-	expression tag	UNP Q969A2
D	6	HIS	-	expression tag	UNP Q969A2
D	7	HIS	-	expression tag	UNP Q969A2
D	8	SER	-	expression tag	UNP Q969A2
D	9	SER	-	expression tag	UNP Q969A2

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Chain	Residue	Modelled	Actual	Comment	Reference
D	10	GLY	-	expression tag	UNP Q969A2
D	11	ARG	-	expression tag	UNP Q969A2
D	12	GLU	-	expression tag	UNP Q969A2
D	13	ASN	-	expression tag	UNP Q969A2
D	14	LEU	-	expression tag	UNP Q969A2
D	15	TYR	-	expression tag	UNP Q969A2
D	16	PHE	-	expression tag	UNP Q969A2
D	17	GLN	-	expression tag	UNP Q969A2
D	18	GLY	-	expression tag	UNP Q969A2

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	166	Total	O	0	0
			166	166		
3	B	195	Total	O	0	0
			195	195		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	190	Total 190	O 190	0	0
3	D	88	Total 88	O 88	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	98.04Å 130.68Å 113.85Å 90.00° 117.40° 90.00°	Depositor
Resolution (Å)	42.68 – 2.31 42.68 – 2.31	Depositor EDS
% Data completeness (in resolution range)	90.9 (42.68-2.31) 90.9 (42.68-2.31)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 2.32Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.206 , 0.253 0.201 , 0.246	Depositor DCC
R_{free} test set	5071 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	47.3	Xtriage
Anisotropy	0.065	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 42.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.017 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	14040	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.96% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.55	0/3514	0.90	1/4776 (0.0%)
1	B	0.54	0/3668	0.86	0/4982
1	C	0.54	1/3557 (0.0%)	0.88	1/4833 (0.0%)
1	D	0.55	1/2826 (0.0%)	0.89	0/3836
All	All	0.55	2/13565 (0.0%)	0.88	2/18427 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	82	GLN	CG-CD	8.41	1.73	1.52
1	C	89	LYS	CG-CD	-5.24	1.36	1.52

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	89	LYS	CB-CG-CD	6.09	125.31	111.30
1	A	136	GLY	N-CA-C	5.03	118.98	112.54

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3464	0	3431	37	0
1	B	3617	0	3647	41	0
1	C	3510	0	3492	35	0
1	D	2792	0	2759	32	0
2	B	12	0	16	9	0
2	C	6	0	8	0	0
3	A	166	0	0	0	0
3	B	195	0	0	2	0
3	C	190	0	0	3	0
3	D	88	0	0	1	0
All	All	14040	0	13353	135	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 5.

All (135) 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:445:ILE:HG23	1:B:456:THR:HG21	1.35	1.07
1:D:42:CYS:HB2	1:D:62:MET:HE3	1.32	1.06
1:B:66:ARG:HH12	2:B:512:GOL:H32	1.12	1.05
1:B:43:THR:HG21	2:B:512:GOL:H11	1.49	0.95
1:B:347:SER:HB3	2:B:512:GOL:H31	1.50	0.93
1:B:152:VAL:CG1	1:B:169:VAL:HG21	2.03	0.88
1:D:445:ILE:HG23	1:D:456:THR:HG21	1.60	0.83
1:B:152:VAL:HG11	1:B:169:VAL:HG21	1.60	0.83
1:B:66:ARG:NH1	2:B:512:GOL:H32	1.94	0.80
1:B:68:ASN:HD22	2:B:512:GOL:H12	1.48	0.77
1:B:172:VAL:HG12	1:B:177:VAL:HG22	1.65	0.77
1:C:255:LYS:HD2	1:C:276:MET:SD	2.26	0.75
1:B:68:ASN:ND2	2:B:512:GOL:H12	2.04	0.73
1:A:54:LEU:HD21	1:A:84:ILE:HD13	1.69	0.73
1:C:129:VAL:HG12	1:C:131:ASP:H	1.55	0.69
1:B:78:ALA:O	1:B:82:GLN:HG2	1.94	0.68
1:B:28:ARG:NE	1:B:28:ARG:HA	2.10	0.67
1:B:68:ASN:HD22	2:B:512:GOL:C1	2.08	0.66
1:D:44:MET:CE	1:D:62:MET:HE1	2.26	0.66
1:B:43:THR:CG2	2:B:512:GOL:H11	2.26	0.65
1:D:346:LEU:HD21	1:D:363:MET:HE2	1.79	0.65
1:C:304:VAL:HA	1:C:383:MET:HE1	1.77	0.65
1:D:44:MET:HE1	1:D:62:MET:HE1	1.78	0.64
1:A:152:VAL:CG1	1:A:169:VAL:HG21	2.28	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:362:THR:O	1:C:366:ILE:HG12	2.00	0.62
1:A:106:GLU:OE2	1:A:108:ARG:NH1	2.32	0.62
1:A:172:VAL:HG12	1:A:177:VAL:HG22	1.82	0.61
1:B:441:SER:O	1:B:445:ILE:HD12	2.00	0.60
1:B:482:VAL:HG11	1:B:488:ILE:HD11	1.84	0.60
1:C:315:MET:HE3	1:C:333:VAL:HG22	1.83	0.60
1:C:293:LEU:HD12	1:D:373:CYS:SG	2.42	0.59
1:C:300:ALA:O	1:C:304:VAL:HG23	2.03	0.59
1:B:430:ARG:NH1	3:B:708:HOH:O	2.33	0.58
1:C:457:MET:HE1	1:C:475:VAL:HG21	1.85	0.58
1:B:338:LEU:HD21	1:B:373:CYS:HB2	1.86	0.57
1:B:129:VAL:HG21	1:B:134:LEU:HD13	1.87	0.56
1:A:152:VAL:HG21	1:A:158:ILE:HD11	1.87	0.56
1:B:28:ARG:HA	1:B:28:ARG:HE	1.69	0.56
1:C:296:LYS:HE2	1:D:338:LEU:HD13	1.88	0.55
1:A:152:VAL:HG13	1:A:169:VAL:HG21	1.89	0.55
1:B:66:ARG:HH12	2:B:512:GOL:C3	2.04	0.55
1:B:305:VAL:HG12	1:B:305:VAL:O	2.07	0.55
1:C:37:ARG:NH1	1:C:431:PRO:O	2.37	0.55
1:A:157:THR:O	1:A:196:PRO:HD2	2.07	0.55
1:D:37:ARG:HE	1:D:453:GLY:HA2	1.71	0.55
1:A:315:MET:HE3	1:A:333:VAL:HG22	1.89	0.54
1:C:503:ASN:N	3:C:574:HOH:O	2.40	0.54
1:A:327:ARG:HD2	3:B:608:HOH:O	2.08	0.53
1:D:204:VAL:HG12	1:D:205:ILE:HD12	1.90	0.53
1:A:152:VAL:HG11	1:A:169:VAL:HG21	1.90	0.52
1:D:342:ASP:HA	1:D:452:ARG:HB2	1.91	0.52
1:A:70:SER:HA	1:A:103:LYS:HG3	1.92	0.52
1:A:103:LYS:HD2	1:A:208:LYS:HE2	1.91	0.52
1:B:492:HIS:CE1	1:B:494:MET:HE1	2.45	0.52
1:C:383:MET:HA	1:C:383:MET:HE3	1.92	0.51
1:A:315:MET:HE2	1:A:344:VAL:HB	1.91	0.51
1:B:349:GLU:HB3	1:B:359:THR:HG21	1.93	0.51
1:B:438:LEU:HD22	1:B:457:MET:HE2	1.93	0.51
1:C:342:ASP:HA	1:C:452:ARG:HB2	1.93	0.51
1:B:342:ASP:HA	1:B:452:ARG:HB2	1.93	0.50
1:D:362:THR:O	1:D:366:ILE:HG12	2.11	0.50
1:A:38:THR:HA	1:A:452:ARG:HG3	1.92	0.50
1:A:255:LYS:HD2	1:A:276:MET:SD	2.52	0.49
1:A:296:LYS:HE2	1:B:338:LEU:CD1	2.43	0.49
1:A:467:HIS:CG	1:A:468:VAL:H	2.30	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:109:THR:O	1:A:190:ARG:HA	2.12	0.49
1:C:412:ILE:HG22	1:C:434:PRO:HB2	1.94	0.49
1:C:152:VAL:HG13	1:C:169:VAL:HG21	1.94	0.49
1:D:349:GLU:HB3	1:D:359:THR:HG21	1.95	0.49
1:A:338:LEU:HD13	1:B:296:LYS:HE2	1.95	0.49
1:C:369:GLU:O	1:C:372:THR:HB	2.13	0.49
1:A:296:LYS:HE2	1:B:338:LEU:HD13	1.95	0.48
1:C:173:GLY:HA3	1:C:176:TYR:CE1	2.49	0.48
1:A:337:VAL:O	1:A:452:ARG:NH2	2.44	0.48
1:C:349:GLU:HB3	1:C:359:THR:HG21	1.94	0.48
1:A:365:ARG:O	1:A:369:GLU:HG2	2.14	0.48
1:A:349:GLU:HB3	1:A:359:THR:HG21	1.96	0.48
1:A:338:LEU:HD21	1:A:373:CYS:HB2	1.96	0.47
1:C:293:LEU:HD23	1:D:24:ILE:HG23	1.95	0.47
1:A:41:VAL:HB	1:A:345:MET:HG3	1.96	0.47
1:C:380:TYR:CZ	1:C:403:GLU:HG3	2.50	0.47
1:C:289:GLU:HB3	1:D:366:ILE:HD13	1.96	0.47
1:C:440:ALA:HA	1:C:459:VAL:O	2.14	0.47
1:C:327:ARG:HG3	1:D:291:VAL:HB	1.97	0.47
1:A:80:THR:O	1:A:84:ILE:HG12	2.15	0.46
1:A:355:PHE:HB3	1:A:358:ILE:HB	1.96	0.46
1:B:85:GLN:O	1:B:89:LYS:HG2	2.16	0.46
1:A:438:LEU:HD23	1:A:457:MET:HB3	1.98	0.46
1:D:503:ASN:OD1	1:D:503:ASN:N	2.49	0.45
1:A:440:ALA:HB2	1:A:461:SER:HB3	1.97	0.45
1:C:167:VAL:HG12	1:C:181:ALA:HA	1.99	0.45
1:B:404:THR:O	1:B:408:VAL:HG22	2.17	0.45
1:C:86:GLU:HG2	3:C:566:HOH:O	2.17	0.45
1:D:38:THR:HA	1:D:452:ARG:HG3	1.99	0.45
1:D:88:MET:HE3	1:D:95:ARG:HA	1.99	0.44
1:B:169:VAL:HG13	1:B:177:VAL:HG13	1.98	0.44
1:D:226:ALA:HA	1:D:253:ILE:O	2.17	0.44
1:B:38:THR:HA	1:B:452:ARG:HG3	1.99	0.44
1:C:346:LEU:HG	1:C:363:MET:HE1	2.00	0.43
1:D:255:LYS:HG2	1:D:276:MET:HB3	2.00	0.43
1:A:118:ILE:HB	1:A:138:GLU:HG3	2.01	0.43
1:C:264:ASN:O	1:C:267:GLU:HG2	2.18	0.43
1:D:421:GLN:O	1:D:425:LEU:HB2	2.17	0.43
1:A:64:VAL:HG22	1:A:97:ALA:HB3	2.01	0.43
1:A:226:ALA:HA	1:A:253:ILE:O	2.18	0.43
1:A:324:ARG:HE	1:A:324:ARG:HB3	1.70	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:369:GLU:O	1:A:372:THR:HB	2.18	0.43
1:B:356:PRO:O	1:B:360:VAL:HG23	2.19	0.43
1:D:338:LEU:HD21	1:D:373:CYS:HB2	1.99	0.42
1:D:482:VAL:HG11	1:D:488:ILE:HD11	2.01	0.42
1:C:302:CYS:HB3	1:C:307:LYS:O	2.19	0.42
1:B:305:VAL:O	1:B:305:VAL:CG1	2.66	0.42
1:C:216:PHE:O	1:C:220:MET:HB2	2.19	0.42
1:D:103:LYS:HD2	1:D:208:LYS:HE3	2.01	0.42
1:B:228:SER:HA	1:B:255:LYS:HD3	2.01	0.42
1:A:218:ILE:HB	1:A:219:PRO:HD3	2.00	0.42
1:A:445:ILE:HG23	1:A:456:THR:HG21	2.02	0.42
1:B:103:LYS:HD3	1:B:208:LYS:HE2	2.02	0.42
1:C:293:LEU:CD1	1:D:373:CYS:SG	3.08	0.42
1:C:335:ASN:HB3	3:C:663:HOH:O	2.18	0.42
1:C:218:ILE:HB	1:C:219:PRO:HD3	2.01	0.41
1:D:26:GLU:HA	1:D:27:PRO:HD3	1.87	0.41
1:D:249:HIS:O	1:D:447:HIS:NE2	2.51	0.41
1:B:457:MET:HE1	1:B:472:ALA:HA	2.03	0.41
1:D:257:GLU:HG2	1:D:278:ALA:HB3	2.02	0.41
1:D:305:VAL:HG22	3:D:594:HOH:O	2.19	0.41
1:A:148:LEU:HB3	1:A:149:PRO:HD3	2.03	0.41
1:C:109:THR:O	1:C:190:ARG:HA	2.20	0.41
1:B:346:LEU:HD21	1:B:363:MET:HE2	2.03	0.40
1:C:41:VAL:HG22	1:C:64:VAL:HB	2.02	0.40
1:B:116:LYS:HA	1:B:116:LYS:HD2	1.88	0.40
1:C:25:LEU:HD21	1:D:259:VAL:HG13	2.04	0.40
1:D:41:VAL:HG22	1:D:64:VAL:HB	2.04	0.40
1:D:471:ASN:O	1:D:475:VAL:HG23	2.21	0.40
1:B:417:THR:HB	1:B:422:THR:HB	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	461/511 (90%)	449 (97%)	11 (2%)	1 (0%)	43	53
1	B	477/511 (93%)	471 (99%)	6 (1%)	0	100	100
1	C	466/511 (91%)	454 (97%)	11 (2%)	1 (0%)	43	53
1	D	364/511 (71%)	357 (98%)	7 (2%)	0	100	100
All	All	1768/2044 (86%)	1731 (98%)	35 (2%)	2 (0%)	48	59

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	313	THR
1	C	313	THR

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	355/428 (83%)	338 (95%)	17 (5%)	23	33
1	B	385/428 (90%)	367 (95%)	18 (5%)	23	34
1	C	362/428 (85%)	344 (95%)	18 (5%)	22	32
1	D	283/428 (66%)	271 (96%)	12 (4%)	26	39
All	All	1385/1712 (81%)	1320 (95%)	65 (5%)	23	34

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	GLN
1	A	108	ARG
1	A	119	THR
1	A	121	GLN
1	A	140	THR
1	A	152	VAL
1	A	256	ILE
1	A	305	VAL
1	A	395	GLU

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Mol	Chain	Res	Type
1	A	407	CYS
1	A	408	VAL
1	A	425	LEU
1	A	433	GLN
1	A	450	VAL
1	A	459	VAL
1	A	491	VAL
1	A	509	THR
1	B	82	GLN
1	B	89	LYS
1	B	96	LEU
1	B	108	ARG
1	B	138	GLU
1	B	168	LYS
1	B	197	ASN
1	B	208	LYS
1	B	262	LEU
1	B	354	GLU
1	B	372	THR
1	B	433	GLN
1	B	445	ILE
1	B	450	VAL
1	B	456	THR
1	B	465	THR
1	B	487	SER
1	B	491	VAL
1	C	108	ARG
1	C	121	GLN
1	C	125	THR
1	C	152	VAL
1	C	172	VAL
1	C	177	VAL
1	C	195	LEU
1	C	197	ASN
1	C	256	ILE
1	C	262	LEU
1	C	316	LEU
1	C	341	THR
1	C	372	THR
1	C	379	LEU
1	C	399	ARG
1	C	425	LEU

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Mol	Chain	Res	Type
1	C	438	LEU
1	C	450	VAL
1	D	305	VAL
1	D	341	THR
1	D	407	CYS
1	D	414	LEU
1	D	445	ILE
1	D	448	LEU
1	D	450	VAL
1	D	456	THR
1	D	483	THR
1	D	491	VAL
1	D	503	ASN
1	D	509	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	121	GLN
1	A	215	ASN
1	A	322	ASN
1	A	433	GLN
1	A	449	GLN
1	B	68	ASN
1	B	82	GLN
1	B	121	GLN
1	B	458	GLN
1	B	492	HIS
1	C	36	HIS
1	C	71	HIS
1	C	82	GLN
1	C	121	GLN
1	C	211	HIS
1	C	322	ASN
1	C	335	ASN
1	C	449	GLN
1	C	503	ASN
1	D	394	GLN
1	D	503	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

3 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	GOL	C	512	-	5,5,5	0.36	0	5,5,5	0.24	0
2	GOL	B	513	-	5,5,5	0.35	0	5,5,5	0.40	0
2	GOL	B	512	-	5,5,5	0.35	0	5,5,5	0.45	0

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	GOL	C	512	-	-	0/4/4/4	-
2	GOL	B	513	-	-	2/4/4/4	-
2	GOL	B	512	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	513	GOL	O1-C1-C2-C3
2	B	512	GOL	C1-C2-C3-O3
2	B	513	GOL	O1-C1-C2-O2
2	B	512	GOL	O2-C2-C3-O3

There are no ring outliers.

1 monomer is involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	512	GOL	9	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 ⓘ

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	472/511 (92%)	0.36	35 (7%)	20 23	20, 35, 40, 47	13 (2%)
1	B	483/511 (94%)	0.12	10 (2%)	63 66	18, 35, 39, 44	11 (2%)
1	C	475/511 (92%)	0.31	19 (4%)	42 45	18, 35, 40, 42	14 (2%)
1	D	382/511 (74%)	0.39	24 (6%)	26 28	24, 35, 41, 49	15 (3%)
All	All	1812/2044 (88%)	0.29	88 (4%)	35 37	18, 35, 40, 49	53 (2%)

All (88) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	195	LEU	8.5
1	A	467	HIS	6.7
1	A	394	GLN	6.6
1	D	160	ILE	5.5
1	C	479	ARG	5.4
1	D	158	ILE	5.3
1	A	482	VAL	5.3
1	D	29	SER	5.0
1	A	21	MET	4.7
1	D	30	GLU	4.7
1	A	476	ALA	4.5
1	C	494	MET	4.4
1	A	469	ILE	4.3
1	A	468	VAL	4.2
1	A	107	ILE	4.2
1	D	19	ILE	4.0
1	D	467	HIS	3.9
1	A	473	ILE	3.8
1	C	409	ASN	3.8
1	B	501	SER	3.6
1	A	480	GLU	3.4

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Mol	Chain	Res	Type	RSRZ
1	D	476	ALA	3.4
1	A	503	ASN	3.4
1	A	49	TRP	3.3
1	B	385	LEU	3.2
1	D	379	LEU	3.2
1	B	28	ARG	3.2
1	D	377	PRO	3.2
1	D	26	GLU	3.1
1	D	49	TRP	3.1
1	A	474	VAL	3.0
1	A	475	VAL	3.0
1	B	21	MET	3.0
1	A	393	THR	2.9
1	D	194	ASN	2.9
1	D	466	ASP	2.9
1	A	481	LEU	2.8
1	D	370	ALA	2.8
1	D	25	LEU	2.7
1	D	193	MET	2.7
1	D	390	PRO	2.7
1	A	372	THR	2.7
1	D	38	THR	2.6
1	A	392	SER	2.6
1	A	31	GLU	2.6
1	A	380	TYR	2.6
1	C	493	GLY	2.6
1	C	504	LEU	2.5
1	A	370	ALA	2.5
1	C	503	ASN	2.5
1	A	244	GLY	2.5
1	C	207	GLU	2.4
1	A	371	GLU	2.4
1	B	387	VAL	2.4
1	D	469	ILE	2.4
1	A	25	LEU	2.4
1	B	388	PRO	2.4
1	D	33	TRP	2.4
1	C	465	THR	2.3
1	C	70	SER	2.3
1	C	355	PHE	2.3
1	C	377	PRO	2.2
1	A	472	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	391	ILE	2.2
1	A	92	PRO	2.2
1	C	245	PRO	2.2
1	B	370	ALA	2.2
1	C	378	ALA	2.2
1	A	22	SER	2.2
1	A	78	ALA	2.2
1	A	140	THR	2.2
1	B	478	GLU	2.1
1	A	50	ASN	2.1
1	A	478	GLU	2.1
1	B	464	GLY	2.1
1	A	479	ARG	2.1
1	B	481	LEU	2.1
1	C	510	VAL	2.1
1	D	386	ALA	2.1
1	C	385	LEU	2.1
1	C	47	ALA	2.0
1	A	137	ASP	2.0
1	C	358	ILE	2.0
1	A	28	ARG	2.0
1	C	246	ARG	2.0
1	D	474	VAL	2.0
1	C	471	ASN	2.0
1	D	159	LEU	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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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($\text{\AA}^2$)	Q<0.9
2	GOL	C	512	6/6	0.72	0.18	80,81,81,81	0
2	GOL	B	513	6/6	0.82	0.17	66,67,67,67	0
2	GOL	B	512	6/6	0.89	0.16	40,41,43,43	0

6.5 Other polymers [i](#)

There are no such residues in this entry.