



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 05:41 AM EDT

PDB ID : 6NN5  
Title : The structure of human liver pyruvate kinase, hLPYK-W527H  
Authors : McFarlane, J.S.; Ronnebaum, T.A.; Meneely, K.M.; Fenton, A.W.; Lamb, A.L.  
Deposited on : 2019-01-14  
Resolution : 2.26 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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.36.2  
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) : 2.36.2

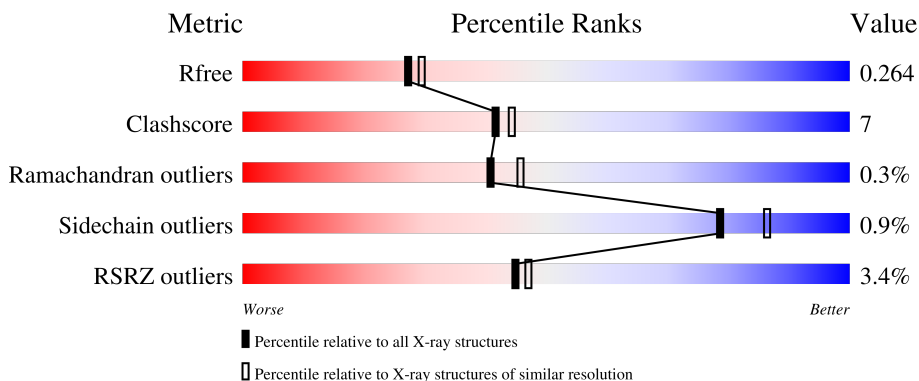
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.26 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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  $\geq 3$ , 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	543	
1	B	543	
1	C	543	
1	D	543	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 26076 atoms, of which 13067 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 PKLR.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	417	6413	1995	3232	579	589	18	0	0	0
1	B	417	6419	1996	3236	581	588	18	0	0	0
1	C	413	6337	1968	3197	574	580	18	0	0	0
1	D	420	6446	2007	3249	581	591	18	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP P30613
A	2	GLU	-	expression tag	UNP P30613
A	527	HIS	TRP	engineered mutation	UNP P30613
B	1	MET	-	expression tag	UNP P30613
B	2	GLU	-	expression tag	UNP P30613
B	527	HIS	TRP	engineered mutation	UNP P30613
C	1	MET	-	expression tag	UNP P30613
C	2	GLU	-	expression tag	UNP P30613
C	527	HIS	TRP	engineered mutation	UNP P30613
D	1	MET	-	expression tag	UNP P30613
D	2	GLU	-	expression tag	UNP P30613
D	527	HIS	TRP	engineered mutation	UNP P30613

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
2	A	1	14	3	8	3	0	0
2	A	1	14	3	8	3	0	0
2	A	1	13	3	7	3	0	0
2	A	1	14	3	8	3	0	0
2	B	1	13	3	7	3	0	0
2	B	1	14	3	8	3	0	0
2	C	1	14	3	8	3	0	0
2	C	1	13	3	7	3	0	0
2	C	1	14	3	8	3	0	0
2	D	1	14	3	8	3	0	0
2	D	1	14	3	8	3	0	0
2	D	1	14	3	8	3	0	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			10	2	6	2		
3	A	1	Total	C	H	O	0	0
			10	2	6	2		
3	A	1	Total	C	H	O	0	0
			10	2	6	2		
3	B	1	Total	C	H	O	0	0
			10	2	6	2		
3	B	1	Total	C	H	O	0	0
			10	2	6	2		
3	C	1	Total	C	H	O	0	0
			10	2	6	2		
3	C	1	Total	C	H	O	0	0
			10	2	6	2		
3	C	1	Total	C	H	O	0	0
			10	2	6	2		
3	D	1	Total	C	H	O	0	0
			10	2	6	2		
3	D	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	51	Total	O	0	0
			51	51		
4	B	52	Total	O	0	0
			52	52		

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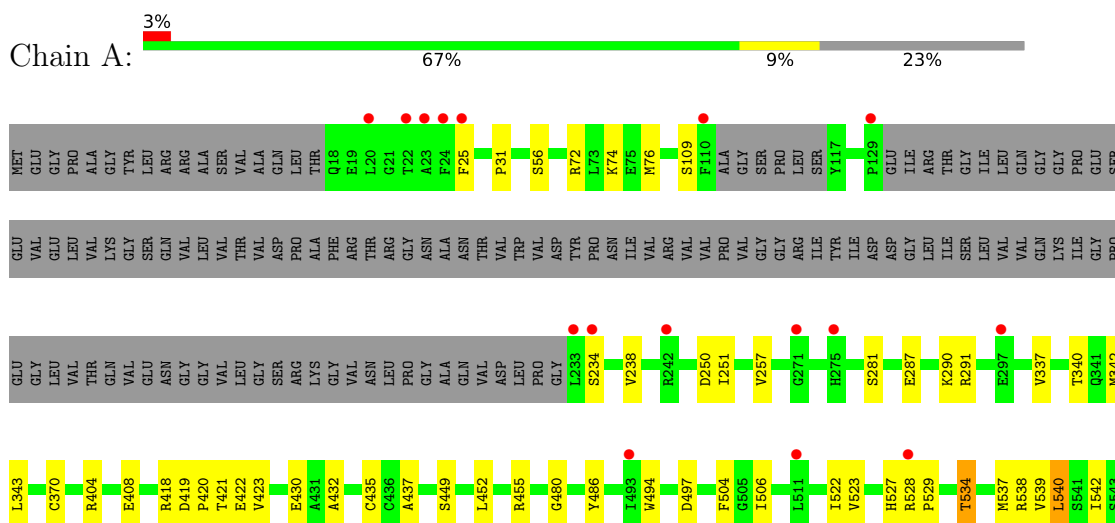
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
4	C	37	Total	O	0	0
			37	37		
4	D	56	Total	O	0	0
			56	56		

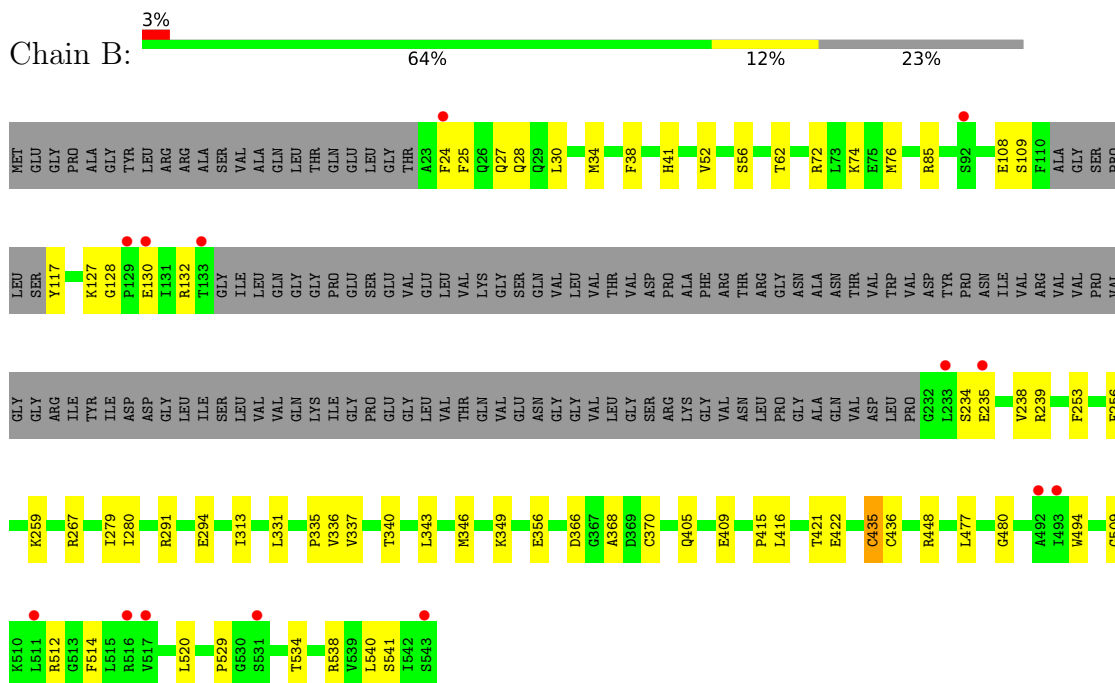
### 3 Residue-property plots

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.

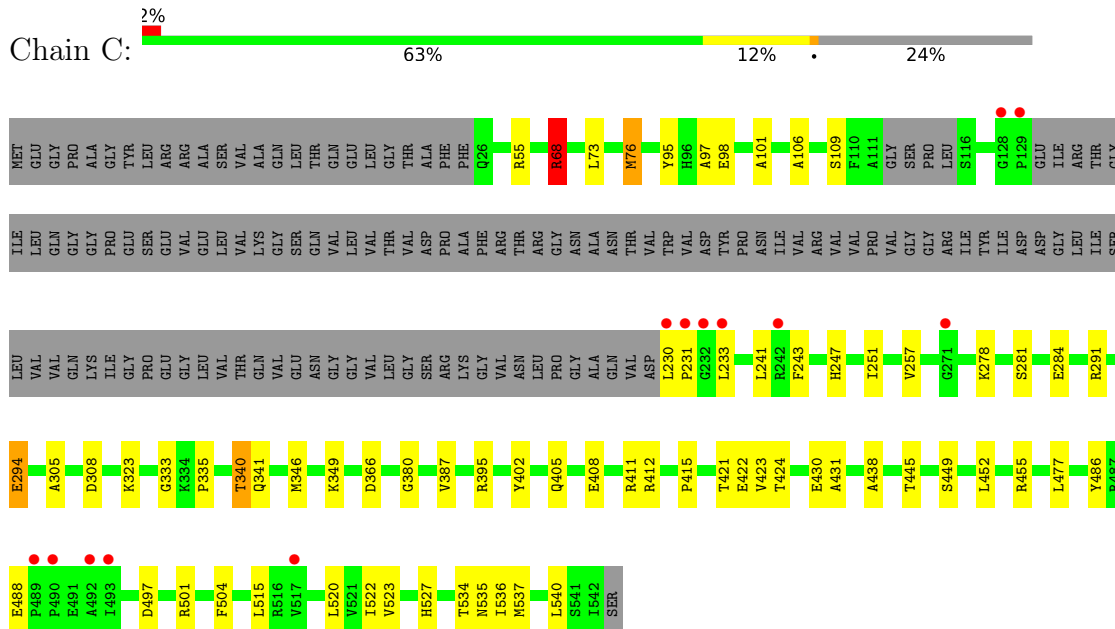
- Molecule 1: Pyruvate kinase PKLR



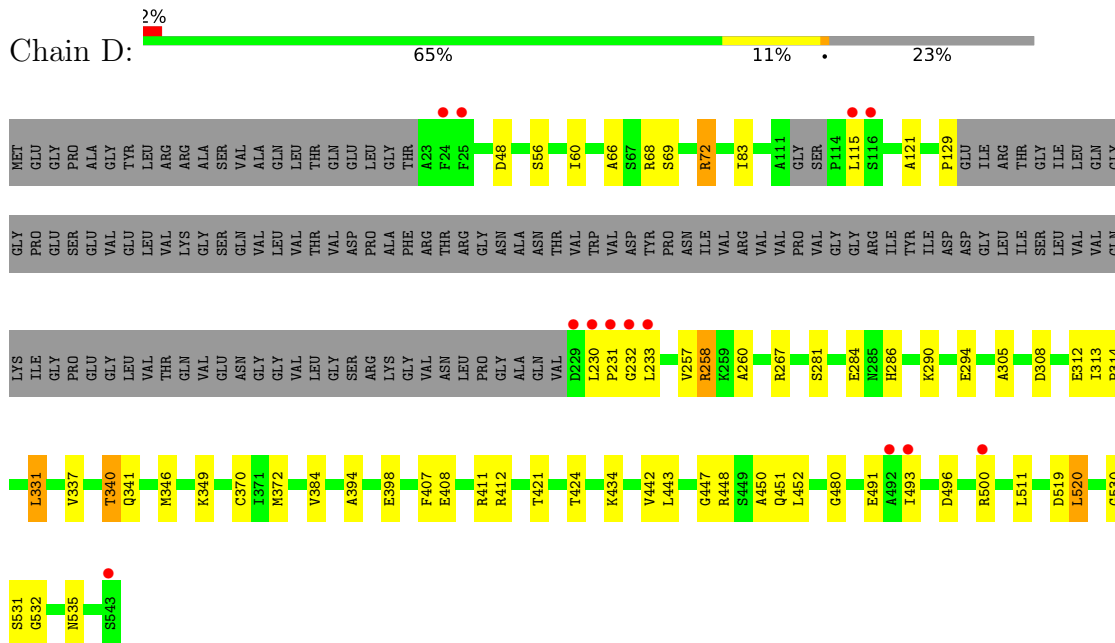
- Molecule 1: Pyruvate kinase PKLR



- Molecule 1: Pyruvate kinase PKLR



- Molecule 1: Pyruvate kinase PKLR





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	120.01Å 204.62Å 112.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	54.18 – 2.26 54.18 – 2.26	Depositor EDS
% Data completeness (in resolution range)	64.8 (54.18-2.26) 64.8 (54.18-2.26)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.06 (at 2.25Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, $R_{free}$	0.225 , 0.264 0.226 , 0.264	Depositor DCC
$R_{free}$ test set	4178 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.9	Xtrriage
Anisotropy	0.122	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.41 , 38.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.53$ , $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	26076	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 44.42 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.5294e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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, EDO

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	0.56	0/3231	0.75	1/4365 (0.0%)
1	B	0.65	3/3233 (0.1%)	0.74	2/4367 (0.0%)
1	C	0.58	0/3189	0.72	1/4311 (0.0%)
1	D	0.71	7/3249 (0.2%)	0.80	4/4391 (0.1%)
All	All	0.63	10/12902 (0.1%)	0.75	8/17434 (0.0%)

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	436	CYS	CB-SG	-8.17	1.68	1.82
1	D	530	GLY	C-O	-7.86	1.11	1.23
1	B	436	CYS	C-O	-6.79	1.10	1.23
1	B	435	CYS	C-O	-6.30	1.11	1.23
1	D	531	SER	C-N	-5.66	1.22	1.33
1	D	532	GLY	C-O	-5.63	1.14	1.23
1	D	531	SER	C-O	-5.37	1.13	1.23
1	D	520	LEU	C-O	-5.36	1.13	1.23
1	D	532	GLY	N-CA	-5.07	1.38	1.46
1	D	519	ASP	CB-CG	-5.02	1.41	1.51

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	331	LEU	CA-CB-CG	-7.22	98.69	115.30
1	D	72	ARG	NE-CZ-NH1	5.85	123.23	120.30
1	D	258	ARG	NE-CZ-NH2	-5.68	117.46	120.30
1	B	366	ASP	CB-CG-OD1	5.40	123.16	118.30
1	D	72	ARG	NE-CZ-NH2	-5.38	117.61	120.30
1	A	540	LEU	CB-CG-CD1	-5.24	102.09	111.00
1	B	448	ARG	NE-CZ-NH1	5.04	122.82	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	68	ARG	CG-CD-NE	-5.01	101.29	111.80

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	3181	3232	3229	41	0
1	B	3183	3236	3234	50	0
1	C	3140	3197	3197	58	0
1	D	3197	3249	3248	42	0
2	A	24	31	32	1	0
2	B	12	15	16	0	0
2	C	18	23	24	3	0
2	D	18	24	24	0	0
3	A	12	18	17	1	0
3	B	8	12	12	3	0
3	C	12	18	17	6	0
3	D	8	12	12	1	0
4	A	51	0	0	1	0
4	B	52	0	0	5	0
4	C	37	0	0	2	0
4	D	56	0	0	1	0
All	All	13009	13067	13062	181	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 7.

All (181) 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:421:THR:HG23	1:A:534:THR:HG22	1.27	1.14
1:C:278:LYS:HE3	3:C:606:EDO:H21	1.39	1.01
1:B:421:THR:HG23	1:B:534:THR:HG22	1.50	0.92

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:421:THR:HG23	1:C:534:THR:HG22	1.53	0.90
1:B:108:GLU:HB2	4:B:713:HOH:O	1.77	0.85
1:C:527:HIS:HA	1:C:536:ILE:HD11	1.61	0.82
1:D:340:THR:HG22	1:D:341:GLN:HG3	1.68	0.75
1:D:232:GLY:CA	1:D:258:ARG:HH22	1.99	0.74
1:C:422:GLU:OE2	1:C:455:ARG:NH1	2.20	0.74
1:C:68:ARG:NH2	1:C:95:TYR:O	2.22	0.72
1:C:421:THR:HG23	1:C:534:THR:CG2	2.20	0.71
1:B:56:SER:HB2	1:B:480:GLY:HA2	1.72	0.70
1:A:337:VAL:HG22	1:A:370:CYS:HB2	1.74	0.70
1:C:421:THR:HG22	1:C:452:LEU:HD12	1.76	0.68
1:D:56:SER:HB2	1:D:480:GLY:HA2	1.75	0.68
1:B:267:ARG:HE	3:B:604:EDO:H12	1.59	0.67
1:A:421:THR:HG23	1:A:534:THR:CG2	2.17	0.66
1:B:74:LYS:HE3	1:B:109:SER:OG	1.97	0.64
1:C:449:SER:OG	1:C:534:THR:HG21	1.98	0.63
1:B:267:ARG:HE	3:B:604:EDO:C1	2.12	0.62
3:A:607:EDO:H11	4:A:723:HOH:O	1.98	0.62
1:C:520:LEU:HD23	1:C:540:LEU:O	2.00	0.62
1:D:232:GLY:HA3	1:D:258:ARG:HH22	1.64	0.62
1:D:491:GLU:OE2	1:D:500:ARG:NH1	2.32	0.61
1:B:416:LEU:HD23	1:B:416:LEU:N	2.16	0.61
1:B:28:GLN:HG2	1:B:30:LEU:HD13	1.83	0.60
1:C:97:ALA:HB1	3:C:604:EDO:H12	1.84	0.60
1:B:130:GLU:HG3	1:B:132:ARG:HH12	1.66	0.60
1:C:305:ALA:HB1	2:C:603:GOL:H12	1.84	0.59
1:D:511:LEU:HD13	1:D:511:LEU:O	2.03	0.59
1:A:419:ASP:HB3	1:A:422:GLU:HB3	1.84	0.58
1:A:234:SER:O	1:A:238:VAL:HG23	2.03	0.58
1:B:127:LYS:O	1:B:130:GLU:HG2	2.03	0.57
1:B:435:CYS:HB2	1:B:520:LEU:HD12	1.87	0.57
1:B:130:GLU:HB2	1:B:132:ARG:HH22	1.71	0.56
1:A:523:VAL:HG21	1:A:540:LEU:HD13	1.88	0.55
1:B:130:GLU:OE2	1:B:256:PHE:HE2	1.89	0.55
1:D:115:LEU:HB2	1:D:511:LEU:HD11	1.89	0.54
1:B:337:VAL:HG22	1:B:370:CYS:HB2	1.88	0.54
1:D:257:VAL:HG21	1:D:281:SER:HB3	1.90	0.54
1:B:72:ARG:O	1:B:76:MET:HG3	2.07	0.54
1:B:130:GLU:OE2	1:B:256:PHE:CE2	2.61	0.54
1:B:38:PHE:O	1:B:41:HIS:HB3	2.08	0.53
1:A:418:ARG:O	1:A:420:PRO:HD3	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:230:LEU:HD12	1:C:231:PRO:HD3	1.91	0.53
1:D:421:THR:HG22	1:D:452:LEU:HD12	1.89	0.53
1:D:260:ALA:HB2	1:D:294:GLU:HG2	1.91	0.53
1:A:528:ARG:HH21	1:A:528:ARG:HG3	1.73	0.52
1:C:73:LEU:HA	1:C:76:MET:HG3	1.90	0.52
1:B:30:LEU:O	1:B:34:MET:HG2	2.10	0.52
1:C:527:HIS:HA	1:C:536:ILE:CD1	2.36	0.52
1:C:534:THR:O	1:C:534:THR:HG23	2.10	0.52
1:A:494:TRP:CD1	1:A:529:PRO:HB3	2.45	0.52
1:C:445:THR:H	2:C:602:GOL:H11	1.75	0.52
1:C:230:LEU:HD12	1:C:231:PRO:CD	2.39	0.51
1:B:128:GLY:O	1:B:130:GLU:N	2.43	0.51
1:B:117:TYR:N	4:B:704:HOH:O	2.43	0.51
1:C:522:ILE:HG23	1:C:537:MET:CE	2.40	0.51
1:A:257:VAL:HG21	1:A:281:SER:HB3	1.93	0.51
1:A:56:SER:HB2	1:A:480:GLY:HA2	1.93	0.51
1:B:28:GLN:CG	1:B:30:LEU:HD13	2.41	0.50
1:D:267:ARG:NH1	4:D:702:HOH:O	2.39	0.50
1:D:286:HIS:CE1	1:D:290:LYS:HG3	2.46	0.50
1:D:337:VAL:HG22	1:D:370:CYS:HB2	1.94	0.50
1:C:523:VAL:O	1:C:537:MET:HA	2.11	0.50
1:C:243:PHE:CE2	1:C:247:HIS:CE1	2.99	0.49
1:D:230:LEU:HD23	1:D:231:PRO:HD3	1.94	0.49
1:A:494:TRP:CZ3	1:A:527:HIS:O	2.65	0.49
1:A:523:VAL:O	1:A:537:MET:HA	2.11	0.49
1:D:346:MET:HA	1:D:349:LYS:O	2.12	0.49
1:C:55:ARG:HB2	1:C:395:ARG:HG3	1.94	0.49
1:A:421:THR:HA	1:A:534:THR:O	2.12	0.49
1:A:290:LYS:NZ	1:D:48:ASP:OD2	2.46	0.49
1:B:130:GLU:HG3	1:B:132:ARG:NH1	2.28	0.48
1:B:336:VAL:HG13	1:B:368:ALA:HA	1.94	0.48
1:B:405:GLN:O	1:B:409:GLU:HG3	2.14	0.48
1:C:251:ILE:HD13	1:C:477:LEU:HD21	1.95	0.48
1:B:27:GLN:OE1	1:B:52:VAL:HG21	2.14	0.48
1:A:432:ALA:HB1	1:A:437:ALA:HB3	1.95	0.47
1:C:291:ARG:NH2	1:C:294:GLU:OE2	2.44	0.47
1:B:534:THR:O	1:B:534:THR:CG2	2.62	0.47
1:A:25:PHE:O	1:A:31:PRO:HD3	2.15	0.47
1:D:411:ARG:HG3	1:D:412:ARG:N	2.28	0.47
1:C:101:ALA:HB2	3:C:604:EDO:H21	1.97	0.47
1:B:346:MET:HA	1:B:349:LYS:O	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:257:VAL:HG21	1:C:281:SER:HB3	1.98	0.46
1:C:278:LYS:CE	3:C:606:EDO:H21	2.28	0.46
1:D:394:ALA:O	1:D:398:GLU:HG3	2.15	0.46
1:A:449:SER:HB3	1:A:534:THR:HG21	1.97	0.46
1:B:56:SER:HB2	1:B:480:GLY:CA	2.43	0.46
1:B:534:THR:O	1:B:534:THR:HG23	2.15	0.46
1:D:424:THR:OG1	1:D:535:ASN:HA	2.16	0.46
1:B:24:PHE:HD2	1:B:25:PHE:CD1	2.34	0.46
1:B:127:LYS:O	1:B:130:GLU:CG	2.64	0.46
1:C:449:SER:CB	1:C:534:THR:HG21	2.46	0.46
1:A:250:ASP:C	1:A:251:ILE:HG13	2.37	0.45
1:A:435:CYS:HB3	1:C:423:VAL:HG21	1.98	0.45
1:C:233:LEU:HD21	1:C:241:LEU:CD1	2.47	0.45
1:D:232:GLY:HA2	1:D:258:ARG:HH22	1.78	0.45
1:A:494:TRP:CE3	1:A:529:PRO:HD3	2.52	0.45
1:C:486:TYR:HD1	1:C:504:PHE:CD2	2.35	0.45
1:B:259:LYS:HD2	1:B:291:ARG:HH12	1.82	0.45
1:C:422:GLU:HG3	4:C:733:HOH:O	2.16	0.45
1:A:452:LEU:O	1:A:455:ARG:HG2	2.17	0.45
1:B:335:PRO:HB3	1:B:477:LEU:O	2.17	0.44
1:D:442:VAL:O	1:D:442:VAL:HG13	2.16	0.44
1:A:423:VAL:HG12	1:C:431:ALA:HB1	1.99	0.44
1:A:74:LYS:HE3	1:A:109:SER:OG	2.17	0.44
1:C:278:LYS:HE3	3:C:606:EDO:C2	2.29	0.44
1:C:284:GLU:HG2	1:C:305:ALA:HB3	1.99	0.44
1:A:287:GLU:HG2	1:A:291:ARG:HD3	2.00	0.44
1:A:506:ILE:HG23	1:A:542:ILE:HD12	2.00	0.44
1:D:69:SER:OG	1:D:72:ARG:HB2	2.17	0.44
1:A:290:LYS:CE	1:D:48:ASP:OD2	2.65	0.44
1:A:408:GLU:OE2	1:C:408:GLU:OE1	2.35	0.44
1:C:335:PRO:HB3	1:C:477:LEU:O	2.18	0.44
1:A:72:ARG:O	1:A:76:MET:HG3	2.17	0.44
1:C:522:ILE:HG23	1:C:537:MET:HE1	2.00	0.44
1:C:333:GLY:HA2	1:C:455:ARG:HB2	2.00	0.43
1:A:430:GLU:OE2	1:C:430:GLU:OE2	2.36	0.43
1:B:117:TYR:HA	4:B:714:HOH:O	2.17	0.43
2:A:603:GOL:H32	1:C:411:ARG:HH22	1.83	0.43
1:B:291:ARG:NH2	1:B:294:GLU:OE2	2.52	0.43
1:D:284:GLU:OE2	1:D:308:ASP:OD2	2.37	0.43
1:B:540:LEU:HD23	1:B:541:SER:N	2.34	0.43
1:C:497:ASP:OD2	1:C:501:ARG:NH2	2.52	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:106:ALA:O	1:C:109:SER:OG	2.36	0.43
1:D:233:LEU:HD12	1:D:233:LEU:HA	1.82	0.43
1:D:313:ILE:O	1:D:314:PRO:C	2.56	0.43
1:A:537:MET:CG	1:C:537:MET:HG2	2.49	0.43
1:D:129:PRO:HB3	1:D:230:LEU:HD13	2.01	0.43
1:B:253:PHE:HD1	1:B:280:ILE:HB	1.84	0.43
1:C:68:ARG:NH2	1:C:98:GLU:HB2	2.34	0.43
1:C:438:ALA:HB3	1:C:515:LEU:HD23	2.00	0.42
1:B:117:TYR:O	1:B:512:ARG:NH2	2.52	0.42
1:D:66:ALA:O	1:D:72:ARG:HG2	2.19	0.42
1:D:443:LEU:N	1:D:443:LEU:CD1	2.82	0.42
1:B:127:LYS:NZ	1:B:132:ARG:NH2	2.68	0.42
1:B:343:LEU:HD23	1:B:356:GLU:HB3	2.02	0.42
1:B:62:THR:HA	1:B:85:ARG:HB3	2.01	0.42
1:C:76:MET:HE2	1:C:387:VAL:HG21	2.01	0.42
1:D:284:GLU:HG2	1:D:305:ALA:HB3	2.01	0.42
1:B:130:GLU:HB2	1:B:132:ARG:NH2	2.35	0.42
1:D:493:ILE:HB	1:D:496:ASP:OD2	2.18	0.42
1:B:494:TRP:CG	1:B:529:PRO:HG3	2.55	0.42
1:B:28:GLN:HA	4:B:720:HOH:O	2.19	0.42
1:B:234:SER:O	1:B:238:VAL:HG23	2.18	0.42
1:D:232:GLY:HA2	1:D:258:ARG:NH2	2.35	0.42
1:D:448:ARG:O	1:D:451:GLN:N	2.53	0.42
1:C:308:ASP:H	2:C:603:GOL:H11	1.85	0.42
1:C:424:THR:OG1	1:C:535:ASN:HA	2.19	0.42
1:B:279:ILE:HD12	3:B:604:EDO:H11	2.02	0.41
1:D:60:ILE:CG2	1:D:372:MET:HG3	2.48	0.41
1:D:408:GLU:O	1:D:412:ARG:HB2	2.20	0.41
1:A:522:ILE:HD13	1:A:539:VAL:HG22	2.03	0.41
1:B:108:GLU:CB	4:B:713:HOH:O	2.50	0.41
1:B:509:GLY:O	1:B:514:PHE:N	2.52	0.41
1:C:97:ALA:HB1	3:C:604:EDO:C1	2.48	0.41
1:C:402:TYR:CE2	1:C:405:GLN:HB2	2.56	0.41
1:D:447:GLY:O	1:D:450:ALA:HB3	2.20	0.41
1:A:342:MET:O	1:A:343:LEU:HD23	2.20	0.41
1:A:494:TRP:HZ3	1:A:527:HIS:O	2.03	0.41
1:B:415:PRO:O	1:D:434:LYS:HE3	2.20	0.41
1:C:522:ILE:HG23	1:C:537:MET:HE3	2.01	0.41
1:C:346:MET:HA	1:C:349:LYS:O	2.20	0.41
1:A:404:ARG:HD3	1:C:412:ARG:CZ	2.51	0.41
1:A:404:ARG:HD3	1:C:412:ARG:NH2	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:494:TRP:O	1:A:497:ASP:N	2.53	0.41
1:A:534:THR:CG2	1:A:534:THR:O	2.68	0.41
1:A:538:ARG:HA	1:C:535:ASN:O	2.21	0.41
1:A:486:TYR:HD1	1:A:504:PHE:CD2	2.39	0.40
1:C:340:THR:HG22	1:C:341:GLN:HG3	2.04	0.40
1:A:494:TRP:NE1	1:A:529:PRO:HB3	2.37	0.40
1:C:323:LYS:NZ	1:C:366:ASP:OD1	2.48	0.40
1:D:83:ILE:HG12	1:D:121:ALA:HB3	2.03	0.40
1:D:284:GLU:O	1:D:312:GLU:HG3	2.22	0.40
1:D:384:VAL:HG23	3:D:605:EDO:H22	2.03	0.40
1:D:407:PHE:CE2	1:D:411:ARG:NH1	2.89	0.40
1:D:434:LYS:O	1:D:434:LYS:HG3	2.20	0.40
1:B:235:GLU:O	1:B:239:ARG:HG3	2.22	0.40
1:C:380:GLY:HA3	4:C:701:HOH:O	2.22	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	411/543 (76%)	402 (98%)	8 (2%)	1 (0%)	47	55
1	B	411/543 (76%)	404 (98%)	6 (2%)	1 (0%)	47	55
1	C	407/543 (75%)	403 (99%)	2 (0%)	2 (0%)	29	29
1	D	414/543 (76%)	403 (97%)	10 (2%)	1 (0%)	47	55
All	All	1643/2172 (76%)	1612 (98%)	26 (2%)	5 (0%)	41	46

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	340	THR

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Mol	Chain	Res	Type
1	B	340	THR
1	C	340	THR
1	D	340	THR
1	C	415	PRO

### 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	333/433 (77%)	332 (100%)	1 (0%)	92	95
1	B	333/433 (77%)	329 (99%)	4 (1%)	71	80
1	C	329/433 (76%)	325 (99%)	4 (1%)	71	80
1	D	335/433 (77%)	332 (99%)	3 (1%)	78	86
All	All	1330/1732 (77%)	1318 (99%)	12 (1%)	78	86

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	534	THR
1	B	313	ILE
1	B	331	LEU
1	B	422	GLU
1	B	538	ARG
1	C	68	ARG
1	C	76	MET
1	C	294	GLU
1	C	488	GLU
1	D	68	ARG
1	D	331	LEU
1	D	520	LEU

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

### 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](#)

22 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	D	601	-	5,5,5	1.52	0	5,5,5	0.75	0
2	GOL	C	601	-	5,5,5	0.80	0	5,5,5	1.45	1 (20%)
3	EDO	C	605	-	3,3,3	0.52	0	2,2,2	0.28	0
3	EDO	C	606	-	3,3,3	0.83	0	2,2,2	1.36	0
2	GOL	B	602	-	5,5,5	1.08	0	5,5,5	1.08	1 (20%)
2	GOL	B	601	-	5,5,5	0.71	0	5,5,5	0.85	0
2	GOL	D	603	-	5,5,5	0.78	0	5,5,5	0.70	0
3	EDO	C	604	-	3,3,3	0.39	0	2,2,2	0.40	0
3	EDO	A	606	-	3,3,3	0.56	0	2,2,2	0.22	0
2	GOL	A	602	-	5,5,5	0.95	0	5,5,5	0.55	0
2	GOL	D	602	-	5,5,5	0.87	0	5,5,5	1.18	0
3	EDO	B	603	-	3,3,3	0.53	0	2,2,2	0.45	0
2	GOL	A	604	-	5,5,5	0.99	0	5,5,5	0.53	0
2	GOL	C	602	-	5,5,5	1.10	1 (20%)	5,5,5	1.10	0
3	EDO	A	607	-	3,3,3	0.83	0	2,2,2	0.32	0
3	EDO	B	604	-	3,3,3	0.43	0	2,2,2	0.55	0
2	GOL	C	603	-	5,5,5	1.15	0	5,5,5	0.60	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GOL	A	603	-	5,5,5	1.17	1 (20%)	5,5,5	0.95	0
2	GOL	A	601	-	5,5,5	1.21	0	5,5,5	1.09	0
3	EDO	A	605	-	3,3,3	0.39	0	2,2,2	0.44	0
3	EDO	D	604	-	3,3,3	0.70	0	2,2,2	0.25	0
3	EDO	D	605	-	3,3,3	0.49	0	2,2,2	0.78	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	D	601	-	-	4/4/4/4	-
2	GOL	C	601	-	-	0/4/4/4	-
3	EDO	C	605	-	-	0/1/1/1	-
3	EDO	C	606	-	-	1/1/1/1	-
2	GOL	B	602	-	-	3/4/4/4	-
2	GOL	B	601	-	-	0/4/4/4	-
2	GOL	D	603	-	-	1/4/4/4	-
3	EDO	C	604	-	-	1/1/1/1	-
3	EDO	A	606	-	-	1/1/1/1	-
2	GOL	A	602	-	-	2/4/4/4	-
2	GOL	D	602	-	-	4/4/4/4	-
3	EDO	B	603	-	-	1/1/1/1	-
2	GOL	A	604	-	-	4/4/4/4	-
2	GOL	C	602	-	-	2/4/4/4	-
3	EDO	A	607	-	-	0/1/1/1	-
3	EDO	B	604	-	-	0/1/1/1	-
2	GOL	C	603	-	-	0/4/4/4	-
2	GOL	A	603	-	-	2/4/4/4	-
2	GOL	A	601	-	-	2/4/4/4	-
3	EDO	A	605	-	-	1/1/1/1	-
3	EDO	D	604	-	-	0/1/1/1	-
3	EDO	D	605	-	-	0/1/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	602	GOL	O2-C2	-2.08	1.37	1.43
2	A	603	GOL	C1-C2	2.00	1.59	1.51

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	601	GOL	C3-C2-C1	-2.35	102.56	111.70
2	B	602	GOL	C3-C2-C1	-2.05	103.73	111.70

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	604	GOL	O1-C1-C2-C3
2	A	604	GOL	C1-C2-C3-O3
2	A	604	GOL	O2-C2-C3-O3
2	B	602	GOL	C1-C2-C3-O3
2	C	602	GOL	O1-C1-C2-C3
2	D	602	GOL	O1-C1-C2-C3
2	D	602	GOL	C1-C2-C3-O3
2	D	602	GOL	O2-C2-C3-O3
2	A	602	GOL	O1-C1-C2-O2
2	A	603	GOL	O2-C2-C3-O3
2	D	601	GOL	O1-C1-C2-O2
2	A	601	GOL	C1-C2-C3-O3
2	A	602	GOL	O1-C1-C2-C3
2	A	603	GOL	C1-C2-C3-O3
2	D	601	GOL	O1-C1-C2-C3
2	D	601	GOL	C1-C2-C3-O3
2	B	602	GOL	O2-C2-C3-O3
2	D	601	GOL	O2-C2-C3-O3
3	C	604	EDO	O1-C1-C2-O2
2	A	601	GOL	O2-C2-C3-O3
2	D	602	GOL	O1-C1-C2-O2
3	A	606	EDO	O1-C1-C2-O2
2	A	604	GOL	O1-C1-C2-O2
2	C	602	GOL	O1-C1-C2-O2
2	B	602	GOL	O1-C1-C2-O2
3	C	606	EDO	O1-C1-C2-O2
3	A	605	EDO	O1-C1-C2-O2
2	D	603	GOL	O2-C2-C3-O3
3	B	603	EDO	O1-C1-C2-O2

There are no ring outliers.

8 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	606	EDO	3	0
3	C	604	EDO	3	0
2	C	602	GOL	1	0
3	A	607	EDO	1	0
3	B	604	EDO	3	0
2	C	603	GOL	2	0
2	A	603	GOL	1	0
3	D	605	EDO	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

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	417/543 (76%)	-0.12	16 (3%) 40 43	20, 33, 59, 82	0
1	B	417/543 (76%)	-0.14	14 (3%) 45 47	22, 34, 60, 77	0
1	C	413/543 (76%)	-0.10	13 (3%) 49 52	20, 32, 61, 70	0
1	D	420/543 (77%)	-0.09	13 (3%) 49 52	18, 30, 60, 73	0
All	All	1667/2172 (76%)	-0.11	56 (3%) 45 47	18, 33, 60, 82	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	232	GLY	6.9
1	D	230	LEU	4.7
1	C	493	ILE	4.5
1	C	490	PRO	4.3
1	D	25	PHE	4.0
1	C	489	PRO	3.9
1	A	22	THR	3.9
1	C	233	LEU	3.7
1	B	493	ILE	3.7
1	D	115	LEU	3.6
1	D	229	ASP	3.6
1	A	20	LEU	3.6
1	A	24	PHE	3.4
1	B	492	ALA	3.4
1	A	110	PHE	3.4
1	A	233	LEU	3.2
1	B	511	LEU	3.2
1	B	531	SER	3.2
1	C	128	GLY	3.2
1	D	492	ALA	3.1
1	C	231	PRO	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	234	SER	3.0
1	D	24	PHE	3.0
1	B	517	VAL	3.0
1	A	23	ALA	2.9
1	A	297	GLU	2.9
1	B	543	SER	2.9
1	C	242	ARG	2.9
1	C	230	LEU	2.9
1	D	231	PRO	2.8
1	C	492	ALA	2.8
1	D	116	SER	2.8
1	D	232	GLY	2.7
1	A	493	ILE	2.7
1	D	493	ILE	2.7
1	B	133	THR	2.6
1	A	511	LEU	2.6
1	D	543	SER	2.6
1	C	129	PRO	2.5
1	A	25	PHE	2.5
1	B	516	ARG	2.5
1	C	517	VAL	2.4
1	D	500	ARG	2.3
1	B	233	LEU	2.2
1	A	271	GLY	2.2
1	B	235	GLU	2.2
1	A	129	PRO	2.2
1	A	242	ARG	2.2
1	B	130	GLU	2.2
1	D	233	LEU	2.2
1	B	129	PRO	2.1
1	A	528	ARG	2.1
1	B	24	PHE	2.1
1	C	271	GLY	2.0
1	B	92	SER	2.0
1	A	275	HIS	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
2	GOL	D	601	6/6	0.73	0.18	38,51,66,66	0
2	GOL	A	603	6/6	0.74	0.27	50,63,68,76	0
2	GOL	A	601	6/6	0.83	0.11	42,53,58,67	0
2	GOL	A	604	6/6	0.85	0.10	56,68,80,83	0
3	EDO	A	607	4/4	0.85	0.20	20,20,20,20	0
2	GOL	D	603	6/6	0.88	0.15	42,50,59,59	0
2	GOL	C	601	6/6	0.88	0.15	38,50,64,64	0
3	EDO	D	604	4/4	0.90	0.10	46,58,69,69	0
2	GOL	A	602	6/6	0.91	0.11	35,43,49,51	0
3	EDO	C	605	4/4	0.92	0.20	34,43,56,59	0
3	EDO	A	605	4/4	0.93	0.32	44,52,56,64	0
3	EDO	C	606	4/4	0.93	0.17	20,20,20,20	0
2	GOL	C	602	6/6	0.93	0.13	41,54,68,68	0
2	GOL	C	603	6/6	0.94	0.10	19,40,50,50	0
2	GOL	B	601	6/6	0.95	0.10	36,46,60,60	0
3	EDO	B	604	4/4	0.96	0.27	42,51,60,69	0
3	EDO	C	604	4/4	0.96	0.28	35,42,47,49	0
2	GOL	D	602	6/6	0.96	0.14	19,36,49,49	0
3	EDO	A	606	4/4	0.96	0.13	41,50,58,62	0
2	GOL	B	602	6/6	0.96	0.12	29,44,53,53	0
3	EDO	B	603	4/4	0.97	0.13	34,41,44,44	0
3	EDO	D	605	4/4	0.98	0.14	35,51,88,106	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.