



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 05:51 PM GMT

PDB ID : 4JPG
Title : 2-((1H-benzo[d]imidazol-1-yl)methyl)-4H-pyrido[1,2-a]pyrimidin-4-ones as Novel PKM2 Activators
Authors : Greasley, S.E.; Hickey, M.; Phonephaly, H.; Cronin, C.
Deposited on : 2013-03-19
Resolution : 2.33 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

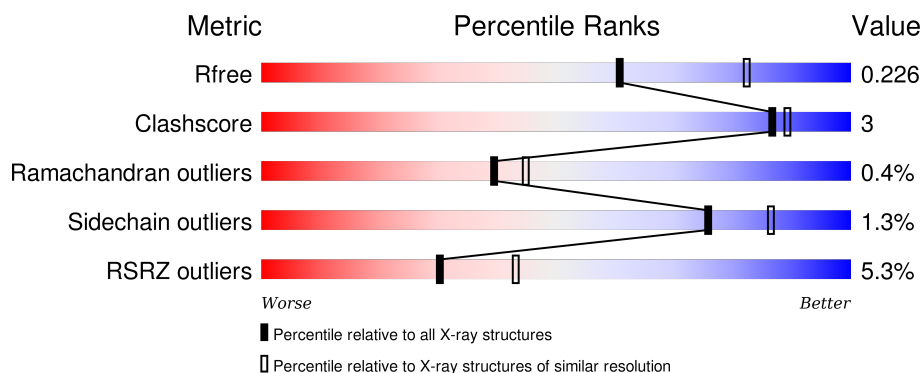
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.33 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}	91344	1406 (2.36-2.32)
Clashscore	102246	1509 (2.36-2.32)
Ramachandran outliers	100387	1490 (2.36-2.32)
Sidechain outliers	100360	1491 (2.36-2.32)
RSRZ outliers	91569	1412 (2.36-2.32)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	556	<div> <div>4%</div> <div>86%</div> <div>7%</div> <div>7%</div> </div>
1	B	556	<div> <div>7%</div> <div>82%</div> <div>9%</div> <div>8%</div> </div>
1	C	556	<div> <div>2%</div> <div>85%</div> <div>8%</div> <div>7%</div> </div>
1	D	556	<div> <div>7%</div> <div>86%</div> <div>5%</div> <div>8%</div> </div>

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
3	1OX	B	602[A]	-	-	-	X
3	1OX	B	602[B]	-	-	-	X
3	1OX	D	602[A]	-	-	-	X
3	1OX	D	602[B]	-	-	-	X

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 16344 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 isozymes M1/M2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	519	Total	C	N	O	S	0	1	0
			3905	2459	682	739	25			
1	B	510	Total	C	N	O	S	11	3	0
			3816	2403	672	716	25			
1	C	518	Total	C	N	O	S	0	3	0
			3921	2470	683	743	25			
1	D	512	Total	C	N	O	S	0	2	0
			3844	2412	684	723	25			

There are 100 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-24	GLY	-	EXPRESSION TAG	UNP P14618
A	-23	SER	-	EXPRESSION TAG	UNP P14618
A	-22	MET	-	EXPRESSION TAG	UNP P14618
A	-21	LYS	-	EXPRESSION TAG	UNP P14618
A	-20	HIS	-	EXPRESSION TAG	UNP P14618
A	-19	HIS	-	EXPRESSION TAG	UNP P14618
A	-18	HIS	-	EXPRESSION TAG	UNP P14618
A	-17	HIS	-	EXPRESSION TAG	UNP P14618
A	-16	HIS	-	EXPRESSION TAG	UNP P14618
A	-15	HIS	-	EXPRESSION TAG	UNP P14618
A	-14	ASP	-	EXPRESSION TAG	UNP P14618
A	-13	TYR	-	EXPRESSION TAG	UNP P14618
A	-12	GLY	-	EXPRESSION TAG	UNP P14618
A	-11	ILE	-	EXPRESSION TAG	UNP P14618
A	-10	LEU	-	EXPRESSION TAG	UNP P14618
A	-9	THR	-	EXPRESSION TAG	UNP P14618
A	-8	THR	-	EXPRESSION TAG	UNP P14618
A	-7	GLU	-	EXPRESSION TAG	UNP P14618
A	-6	ASN	-	EXPRESSION TAG	UNP P14618
A	-5	LEU	-	EXPRESSION TAG	UNP P14618
A	-4	TYR	-	EXPRESSION TAG	UNP P14618

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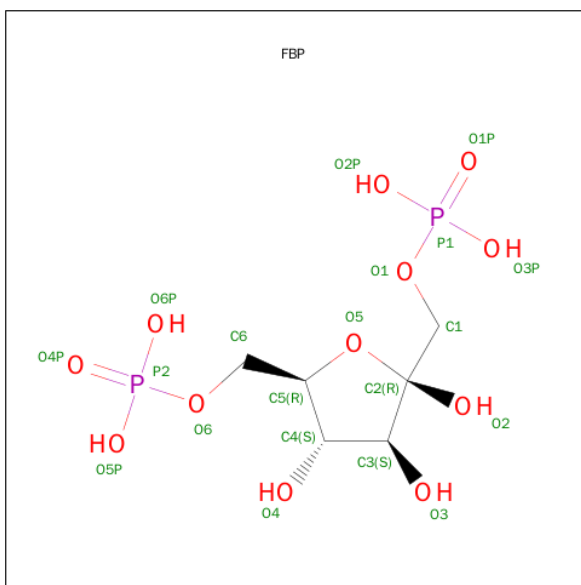
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	PHE	-	EXPRESSION TAG	UNP P14618
A	-2	GLN	-	EXPRESSION TAG	UNP P14618
A	-1	GLY	-	EXPRESSION TAG	UNP P14618
A	0	SER	-	EXPRESSION TAG	UNP P14618
B	-24	GLY	-	EXPRESSION TAG	UNP P14618
B	-23	SER	-	EXPRESSION TAG	UNP P14618
B	-22	MET	-	EXPRESSION TAG	UNP P14618
B	-21	LYS	-	EXPRESSION TAG	UNP P14618
B	-20	HIS	-	EXPRESSION TAG	UNP P14618
B	-19	HIS	-	EXPRESSION TAG	UNP P14618
B	-18	HIS	-	EXPRESSION TAG	UNP P14618
B	-17	HIS	-	EXPRESSION TAG	UNP P14618
B	-16	HIS	-	EXPRESSION TAG	UNP P14618
B	-15	HIS	-	EXPRESSION TAG	UNP P14618
B	-14	ASP	-	EXPRESSION TAG	UNP P14618
B	-13	TYR	-	EXPRESSION TAG	UNP P14618
B	-12	GLY	-	EXPRESSION TAG	UNP P14618
B	-11	ILE	-	EXPRESSION TAG	UNP P14618
B	-10	LEU	-	EXPRESSION TAG	UNP P14618
B	-9	THR	-	EXPRESSION TAG	UNP P14618
B	-8	THR	-	EXPRESSION TAG	UNP P14618
B	-7	GLU	-	EXPRESSION TAG	UNP P14618
B	-6	ASN	-	EXPRESSION TAG	UNP P14618
B	-5	LEU	-	EXPRESSION TAG	UNP P14618
B	-4	TYR	-	EXPRESSION TAG	UNP P14618
B	-3	PHE	-	EXPRESSION TAG	UNP P14618
B	-2	GLN	-	EXPRESSION TAG	UNP P14618
B	-1	GLY	-	EXPRESSION TAG	UNP P14618
B	0	SER	-	EXPRESSION TAG	UNP P14618
C	-24	GLY	-	EXPRESSION TAG	UNP P14618
C	-23	SER	-	EXPRESSION TAG	UNP P14618
C	-22	MET	-	EXPRESSION TAG	UNP P14618
C	-21	LYS	-	EXPRESSION TAG	UNP P14618
C	-20	HIS	-	EXPRESSION TAG	UNP P14618
C	-19	HIS	-	EXPRESSION TAG	UNP P14618
C	-18	HIS	-	EXPRESSION TAG	UNP P14618
C	-17	HIS	-	EXPRESSION TAG	UNP P14618
C	-16	HIS	-	EXPRESSION TAG	UNP P14618
C	-15	HIS	-	EXPRESSION TAG	UNP P14618
C	-14	ASP	-	EXPRESSION TAG	UNP P14618
C	-13	TYR	-	EXPRESSION TAG	UNP P14618
C	-12	GLY	-	EXPRESSION TAG	UNP P14618

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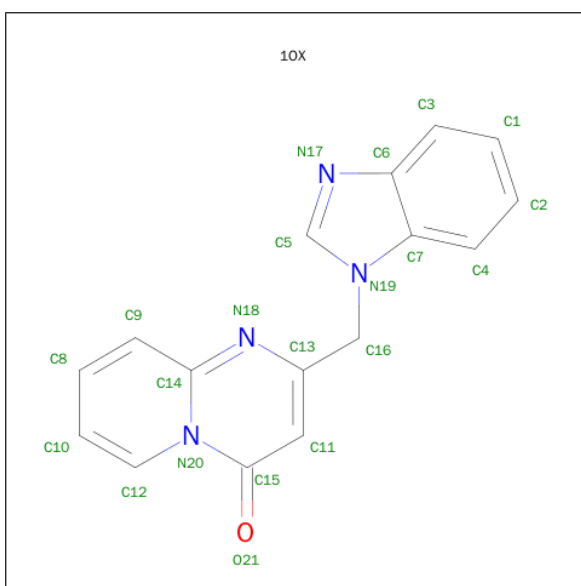
Chain	Residue	Modelled	Actual	Comment	Reference
C	-11	ILE	-	EXPRESSION TAG	UNP P14618
C	-10	LEU	-	EXPRESSION TAG	UNP P14618
C	-9	THR	-	EXPRESSION TAG	UNP P14618
C	-8	THR	-	EXPRESSION TAG	UNP P14618
C	-7	GLU	-	EXPRESSION TAG	UNP P14618
C	-6	ASN	-	EXPRESSION TAG	UNP P14618
C	-5	LEU	-	EXPRESSION TAG	UNP P14618
C	-4	TYR	-	EXPRESSION TAG	UNP P14618
C	-3	PHE	-	EXPRESSION TAG	UNP P14618
C	-2	GLN	-	EXPRESSION TAG	UNP P14618
C	-1	GLY	-	EXPRESSION TAG	UNP P14618
C	0	SER	-	EXPRESSION TAG	UNP P14618
D	-24	GLY	-	EXPRESSION TAG	UNP P14618
D	-23	SER	-	EXPRESSION TAG	UNP P14618
D	-22	MET	-	EXPRESSION TAG	UNP P14618
D	-21	LYS	-	EXPRESSION TAG	UNP P14618
D	-20	HIS	-	EXPRESSION TAG	UNP P14618
D	-19	HIS	-	EXPRESSION TAG	UNP P14618
D	-18	HIS	-	EXPRESSION TAG	UNP P14618
D	-17	HIS	-	EXPRESSION TAG	UNP P14618
D	-16	HIS	-	EXPRESSION TAG	UNP P14618
D	-15	HIS	-	EXPRESSION TAG	UNP P14618
D	-14	ASP	-	EXPRESSION TAG	UNP P14618
D	-13	TYR	-	EXPRESSION TAG	UNP P14618
D	-12	GLY	-	EXPRESSION TAG	UNP P14618
D	-11	ILE	-	EXPRESSION TAG	UNP P14618
D	-10	LEU	-	EXPRESSION TAG	UNP P14618
D	-9	THR	-	EXPRESSION TAG	UNP P14618
D	-8	THR	-	EXPRESSION TAG	UNP P14618
D	-7	GLU	-	EXPRESSION TAG	UNP P14618
D	-6	ASN	-	EXPRESSION TAG	UNP P14618
D	-5	LEU	-	EXPRESSION TAG	UNP P14618
D	-4	TYR	-	EXPRESSION TAG	UNP P14618
D	-3	PHE	-	EXPRESSION TAG	UNP P14618
D	-2	GLN	-	EXPRESSION TAG	UNP P14618
D	-1	GLY	-	EXPRESSION TAG	UNP P14618
D	0	SER	-	EXPRESSION TAG	UNP P14618

- Molecule 2 is SUGAR (BETA-FRUCTOSE-1,6-DIPHOSPHATE) (three-letter code: FBP) (formula: C₆H₁₄O₁₂P₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			20	6	12	2		
2	B	1	Total	C	O	P	0	0
			20	6	12	2		
2	C	1	Total	C	O	P	0	0
			20	6	12	2		
2	D	1	Total	C	O	P	0	0
			20	6	12	2		

- Molecule 3 is 2-(1H-BENZIMIDAZOL-1-YLMETHYL)-4H-PYRIDO[1,2-A]PYRIMIDIN-4-ONE (three-letter code: 1OX) (formula: C₁₆H₁₂N₄O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	B	1	Total	C	N	O	0	1
			42	32	8	2		
3	D	1	Total	C	N	O	0	1
			42	32	8	2		

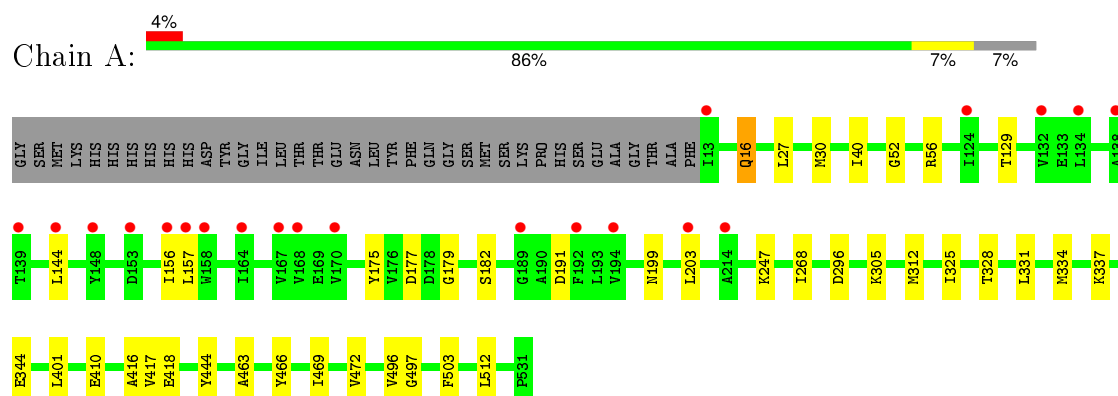
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	194	Total	O	0	0
			194	194		
4	B	184	Total	O	0	0
			184	184		
4	C	165	Total	O	0	0
			165	165		
4	D	151	Total	O	0	0
			151	151		

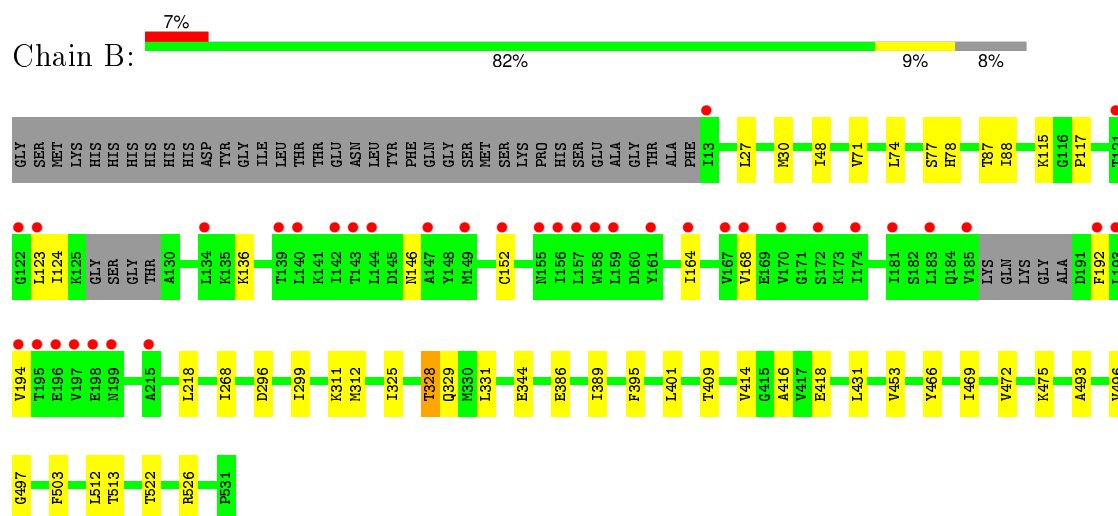
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

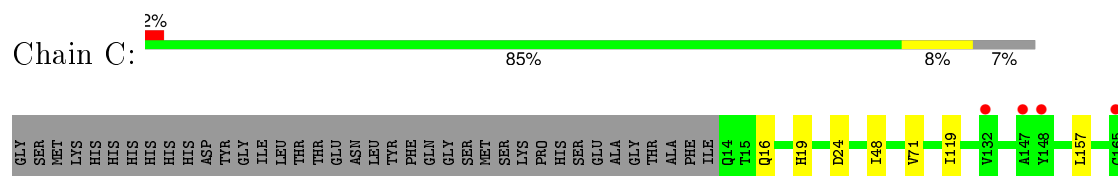
- Molecule 1: Pyruvate kinase isozymes M1/M2



- Molecule 1: Pyruvate kinase isozymes M1/M2

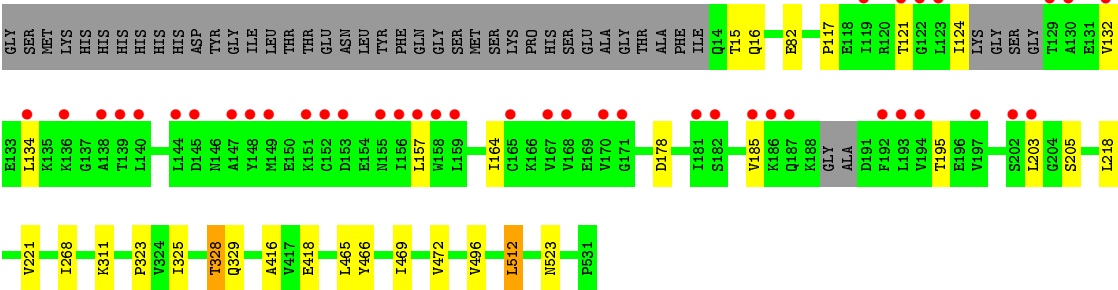
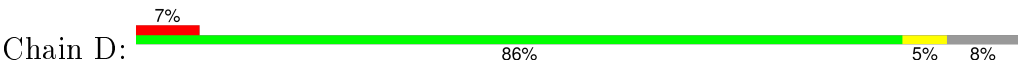


- Molecule 1: Pyruvate kinase isozymes M1/M2





● Molecule 1: Pyruvate kinase isozymes M1/M2



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	80.97Å 153.61Å 93.48Å 90.00° 103.45° 90.00°	Depositor
Resolution (Å)	45.46 – 2.33 45.46 – 2.33	Depositor EDS
% Data completeness (in resolution range)	99.6 (45.46-2.33) 99.7 (45.46-2.33)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.84 (at 2.34Å)	Xtriage
Refinement program	BUSTER 2.11.4	Depositor
R, R_{free}	0.177 , 0.219 0.180 , 0.226	Depositor DCC
R_{free} test set	4734 reflections (5.29%)	DCC
Wilson B-factor (Å ²)	43.7	Xtriage
Anisotropy	0.144	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 50.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 94305 reflections	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	16344	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.00% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: FBP, 1OX

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	0.52	0/3978	0.65	0/5389
1	B	0.51	0/3883	0.65	0/5264
1	C	0.50	0/3994	0.63	0/5410
1	D	0.48	0/3906	0.64	0/5292
All	All	0.50	0/15761	0.64	0/21355

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 [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	3905	0	3900	21	0
1	B	3816	0	3770	32	0
1	C	3921	0	3920	21	0
1	D	3844	0	3778	17	0
2	A	20	0	10	0	0
2	B	20	0	10	0	0
2	C	20	0	10	0	0
2	D	20	0	10	0	0
3	B	42	0	24	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	42	0	24	3	0
4	A	194	0	0	1	0
4	B	184	0	0	3	0
4	C	165	0	0	3	0
4	D	151	0	0	1	0
All	All	16344	0	15456	85	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 3.

All (85) 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:418[B]:GLU:HG3	1:D:418:GLU:HG2	1.37	1.06
1:B:466:TYR:HB2	1:B:469:ILE:HD12	1.65	0.79
1:B:418[B]:GLU:HG3	1:D:418:GLU:CG	2.21	0.69
1:D:472:VAL:HG11	1:D:496:VAL:HG11	1.80	0.64
1:B:497:GLY:HA3	1:B:503:PHE:CZ	2.37	0.60
1:C:187:GLN:HB2	1:C:194:VAL:HB	1.84	0.60
1:B:472:VAL:HG11	1:B:496:VAL:HG11	1.84	0.59
1:D:82:GLU:HG2	4:D:845:HOH:O	2.01	0.58
1:A:401:LEU:HD12	1:B:27:LEU:HD23	1.86	0.58
1:C:497:GLY:HA3	1:C:503:PHE:CZ	2.40	0.56
1:A:182:SER:HB3	1:A:199:ASN:HB2	1.86	0.56
1:A:466:TYR:HB2	1:A:469:ILE:HD12	1.87	0.56
1:A:175:TYR:HB3	1:A:179:GLY:HA2	1.88	0.56
4:C:865:HOH:O	3:D:602[B]:1OX:H6	2.06	0.56
1:B:311:LYS:HD3	3:B:602[A]:1OX:H3	1.88	0.56
1:C:175:TYR:HB3	1:C:179:GLY:HA2	1.88	0.54
1:A:157:LEU:HD13	1:A:203:LEU:HD21	1.91	0.53
1:A:52:GLY:O	1:A:56:ARG:HG3	2.09	0.53
1:A:305:LYS:NZ	4:A:892:HOH:O	2.42	0.52
1:D:466:TYR:HB2	1:D:469:ILE:HD12	1.91	0.52
1:C:416:ALA:HB2	1:C:512:LEU:HD21	1.93	0.51
1:B:453:VAL:HG21	1:B:493:ALA:HB2	1.93	0.50
1:B:74:LEU:HD11	1:B:88:ILE:HG13	1.93	0.50
1:A:463:ALA:HB1	1:A:469:ILE:HG21	1.94	0.50
1:D:121:THR:HB	1:D:157:LEU:HD11	1.94	0.49
1:B:416:ALA:HB2	1:B:512:LEU:HD21	1.94	0.49
1:D:311:LYS:HD3	3:D:602[A]:1OX:H3	1.95	0.49
1:C:19:His:HD2	4:C:712:HOH:O	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:77:SER:HA	1:B:115:LYS:HG3	1.95	0.48
1:B:192:PHE:HE1	1:B:194:VAL:HG23	1.77	0.48
1:B:328:THR:HG22	1:B:329:GLN:HG3	1.96	0.48
1:C:430:VAL:HG22	1:C:512:LEU:HD12	1.96	0.48
1:C:472:VAL:HG11	1:C:496:VAL:HG11	1.95	0.48
1:B:453:VAL:CG2	1:B:493:ALA:HB2	2.43	0.47
1:C:466:TYR:HB2	1:C:469:ILE:HD12	1.97	0.47
1:A:331:LEU:HD23	1:A:344:GLU:HB3	1.97	0.47
1:C:458:GLN:HG3	4:C:864:HOH:O	2.14	0.47
1:C:157:LEU:HD13	1:C:203:LEU:HD21	1.95	0.47
1:B:475:LYS:NZ	4:B:879:HOH:O	2.48	0.47
1:B:117:PRO:HB2	1:B:218:LEU:HD13	1.96	0.47
1:D:268:ILE:HG21	1:D:325:ILE:HD12	1.97	0.46
1:A:472:VAL:HG11	1:A:496:VAL:HG11	1.97	0.46
1:D:328:THR:HG22	1:D:329:GLN:HG3	1.98	0.46
1:B:74:LEU:HD22	1:B:87:THR:HG21	1.98	0.46
1:B:124:ILE:HG12	1:B:152:CYS:HB2	1.98	0.46
1:B:431:LEU:HD22	1:B:513:THR:HG22	1.98	0.46
3:B:602[B]:1OX:H6	4:B:702:HOH:O	2.16	0.45
1:D:117:PRO:HB2	1:D:218:LEU:HD13	1.99	0.45
1:A:417:VAL:HG21	1:A:444:TYR:HB2	1.99	0.45
1:C:16:GLN:NE2	1:C:447[A]:ARG:HD3	2.31	0.45
3:B:602[A]:1OX:H6	4:B:701:HOH:O	2.16	0.45
1:D:124:ILE:H	1:D:205:SER:HB2	1.82	0.44
1:A:268:ILE:HG21	1:A:325:ILE:HD12	1.99	0.44
1:C:470:PHE:CZ	1:C:500:ARG:HD2	2.53	0.44
1:A:334:MET:HA	1:A:337:LYS:O	2.17	0.44
1:A:144:LEU:HD12	1:A:191:ASP:HA	2.00	0.44
1:A:312:MET:HA	1:B:30:MET:O	2.18	0.44
1:D:185:VAL:HA	1:D:195:THR:HG22	2.00	0.43
1:D:134:LEU:HD11	1:D:203:LEU:HD22	2.00	0.43
1:A:16:GLN:HG2	1:A:40:ILE:HG23	2.00	0.43
1:D:323:PRO:HB3	1:D:465:LEU:O	2.18	0.43
1:C:48:ILE:HG12	1:C:71:VAL:HB	2.00	0.43
1:A:497:GLY:HA3	1:A:503:PHE:CZ	2.53	0.43
1:B:268:ILE:HG21	1:B:325:ILE:HD12	2.00	0.43
1:A:30:MET:O	1:B:312:MET:HA	2.19	0.42
1:B:414:VAL:HG13	1:D:418:GLU:HG3	2.01	0.42
1:C:311:LYS:HD3	3:D:602[B]:1OX:H3	2.01	0.42
1:C:317:CYS:HB3	1:C:322:LYS:O	2.20	0.42
1:C:119:ILE:HG22	1:C:209:VAL:HB	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:405:THR:HB	1:C:407:ASP:H	1.84	0.42
1:D:416:ALA:HB2	1:D:512:LEU:HD21	2.01	0.42
1:A:27:LEU:HD23	1:B:401:LEU:HD12	2.02	0.42
1:B:526:ARG:HA	1:D:523:ASN:O	2.19	0.42
1:A:416:ALA:HB2	1:A:512:LEU:HD21	2.02	0.42
1:B:48:ILE:HG12	1:B:71:VAL:HB	2.02	0.42
1:C:312:MET:SD	1:C:312:MET:C	2.98	0.41
1:B:192:PHE:CE1	1:B:194:VAL:HG23	2.54	0.41
1:B:395:PHE:CZ	1:B:418[B]:GLU:HG2	2.55	0.41
1:B:409[A]:THR:HG23	1:B:522:THR:HB	2.01	0.41
1:B:386:GLU:HA	1:B:389:ILE:HD12	2.03	0.41
1:A:418:GLU:HB2	1:C:418:GLU:HG2	2.03	0.41
1:B:331:LEU:HD23	1:B:344:GLU:HB3	2.01	0.41
1:C:409:THR:HG22	1:C:522:THR:O	2.21	0.41
1:C:431:LEU:HG	1:C:513:THR:HG22	2.04	0.40
1:B:296:ASP:HA	1:B:299:ILE:HD12	2.03	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	518/556 (93%)	508 (98%)	8 (2%)	2 (0%)	39	45
1	B	507/556 (91%)	496 (98%)	8 (2%)	3 (1%)	30	32
1	C	519/556 (93%)	507 (98%)	11 (2%)	1 (0%)	52	61
1	D	508/556 (91%)	493 (97%)	12 (2%)	3 (1%)	30	32
All	All	2052/2224 (92%)	2004 (98%)	39 (2%)	9 (0%)	39	45

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	136	LYS
1	B	146	ASN
1	D	15	THR
1	D	16	GLN
1	A	328	THR
1	B	328	THR
1	C	328	THR
1	A	177	ASP
1	D	328	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	409/458 (89%)	403 (98%)	6 (2%)	72	83
1	B	390/458 (85%)	386 (99%)	4 (1%)	82	90
1	C	410/458 (90%)	404 (98%)	6 (2%)	72	83
1	D	392/458 (86%)	387 (99%)	5 (1%)	76	86
All	All	1601/1832 (87%)	1580 (99%)	21 (1%)	76	86

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	GLN
1	A	129	THR
1	A	156	ILE
1	A	247	LYS
1	A	296	ASP
1	A	410	GLU
1	B	78	HIS
1	B	123	LEU
1	B	164	ILE
1	B	168	VAL
1	C	24	ASP
1	C	296	ASP
1	C	339	ARG

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Mol	Chain	Res	Type
1	C	498	LYS
1	C	516	ARG
1	C	525	MET
1	D	132	VAL
1	D	164	ILE
1	D	178	ASP
1	D	221	VAL
1	D	512	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	440	GLN
1	C	16	GLN
1	D	252	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

8 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	FBP	A	601	-	18,20,20	0.68	0	21,32,32	0.95	0
2	FBP	B	601	-	18,20,20	0.69	0	21,32,32	1.17	3 (14%)
3	1OX	B	602[A]	-	20,24,24	2.04	6 (30%)	21,34,34	1.59	5 (23%)
3	1OX	B	602[B]	-	20,24,24	2.09	6 (30%)	21,34,34	1.76	4 (19%)
2	FBP	C	601	-	18,20,20	0.82	1 (5%)	21,32,32	0.92	0
2	FBP	D	601	-	18,20,20	0.70	0	21,32,32	1.12	1 (4%)
3	1OX	D	602[A]	-	20,24,24	1.96	5 (25%)	21,34,34	1.66	4 (19%)
3	1OX	D	602[B]	-	20,24,24	2.03	5 (25%)	21,34,34	1.71	4 (19%)

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	FBP	A	601	-	-	0/13/32/32	0/1/1/1
2	FBP	B	601	-	-	0/13/32/32	0/1/1/1
3	1OX	B	602[A]	-	-	0/4/4/4	0/4/4/4
3	1OX	B	602[B]	-	-	0/4/4/4	0/4/4/4
2	FBP	C	601	-	-	0/13/32/32	0/1/1/1
2	FBP	D	601	-	-	0/13/32/32	0/1/1/1
3	1OX	D	602[A]	-	-	0/4/4/4	0/4/4/4
3	1OX	D	602[B]	-	-	0/4/4/4	0/4/4/4

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	602[B]	1OX	C11-C13	-3.33	1.33	1.39
3	B	602[A]	1OX	C11-C13	-3.20	1.34	1.39
3	D	602[A]	1OX	C11-C13	-3.17	1.34	1.39
3	D	602[B]	1OX	C11-C13	-3.16	1.34	1.39
3	B	602[A]	1OX	C16-N19	-2.99	1.44	1.49
3	B	602[B]	1OX	C16-N19	-2.58	1.45	1.49
3	D	602[B]	1OX	C16-N19	-2.47	1.45	1.49
3	D	602[A]	1OX	C16-N19	-2.42	1.45	1.49
3	B	602[B]	1OX	C12-C10	2.02	1.38	1.35
3	B	602[A]	1OX	C12-C10	2.04	1.38	1.35
2	C	601	FBP	O2-C2	2.32	1.44	1.41
3	B	602[A]	1OX	C13-N18	2.38	1.37	1.32
3	D	602[B]	1OX	C13-N18	2.54	1.37	1.32
3	D	602[A]	1OX	C13-N18	2.55	1.37	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	602[B]	1OX	C15-N20	2.71	1.42	1.37
3	B	602[B]	1OX	C13-N18	2.84	1.38	1.32
3	D	602[A]	1OX	C15-N20	2.91	1.43	1.37
3	B	602[A]	1OX	C15-N20	3.02	1.43	1.37
3	B	602[B]	1OX	C15-N20	3.05	1.43	1.37
3	D	602[A]	1OX	C14-N18	5.17	1.40	1.34
3	B	602[A]	1OX	C14-N18	5.24	1.40	1.34
3	B	602[B]	1OX	C14-N18	5.58	1.41	1.34
3	D	602[B]	1OX	C14-N18	5.74	1.41	1.34

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	602[B]	1OX	C13-C16-N19	-4.87	105.42	112.25
3	D	602[B]	1OX	C13-C16-N19	-4.38	106.10	112.25
3	D	602[A]	1OX	C13-C16-N19	-4.33	106.17	112.25
3	B	602[A]	1OX	C13-C16-N19	-3.79	106.93	112.25
3	D	602[B]	1OX	C1-C3-C6	-2.63	115.85	120.06
3	D	602[A]	1OX	C1-C3-C6	-2.58	115.92	120.06
3	B	602[A]	1OX	C2-C4-C7	-2.47	114.26	119.32
3	B	602[A]	1OX	C1-C3-C6	-2.42	116.18	120.06
3	B	602[B]	1OX	C2-C4-C7	-2.39	114.43	119.32
3	D	602[A]	1OX	C2-C4-C7	-2.35	114.50	119.32
3	D	602[B]	1OX	C2-C4-C7	-2.34	114.52	119.32
2	D	601	FBP	O3P-P1-O1	-2.29	99.98	106.56
3	B	602[B]	1OX	C1-C3-C6	-2.25	116.47	120.06
2	B	601	FBP	O1-P1-O1P	-2.08	101.86	107.14
3	B	602[A]	1OX	C1-C2-C4	2.01	123.38	120.45
2	B	601	FBP	O3P-P1-O1P	2.06	117.21	110.58
3	D	602[B]	1OX	C11-C13-N18	2.11	125.34	122.96
3	B	602[B]	1OX	C11-C13-N18	2.17	125.41	122.96
2	B	601	FBP	O5P-P2-O4P	2.25	117.84	110.58
3	B	602[A]	1OX	C11-C13-N18	2.30	125.55	122.96
3	D	602[A]	1OX	C11-C13-N18	2.40	125.67	122.96

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	602[A]	1OX	2	0
3	B	602[B]	1OX	1	0
3	D	602[A]	1OX	1	0
3	D	602[B]	1OX	2	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	519/556 (93%)	0.07	21 (4%)	42	54	33, 46, 85, 106	0
1	B	510/556 (91%)	0.19	37 (7%)	18	27	35, 48, 100, 113	0
1	C	518/556 (93%)	0.01	11 (2%)	67	78	36, 50, 74, 94	0
1	D	512/556 (92%)	0.32	41 (8%)	15	23	37, 50, 107, 125	0
All	All	2059/2224 (92%)	0.15	110 (5%)	30	43	33, 49, 92, 125	0

All (110) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	197	VAL	7.0
1	D	192	PHE	6.9
1	B	123	LEU	6.1
1	D	168	VAL	5.9
1	D	203	LEU	5.9
1	D	148	TYR	5.8
1	D	139	THR	5.4
1	D	159	LEU	5.4
1	B	192	PHE	5.3
1	D	144	LEU	5.0
1	D	138	ALA	4.8
1	B	140	LEU	4.6
1	B	193	LEU	4.6
1	D	158	TRP	4.6
1	B	122	GLY	4.6
1	A	124	ILE	4.5
1	D	145	ASP	4.5
1	A	132	VAL	4.5
1	D	152	CYS	4.5
1	D	194	VAL	4.4
1	B	170	VAL	4.4

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Mol	Chain	Res	Type	RSRZ
1	B	183	LEU	4.3
1	B	134	LEU	4.3
1	A	203	LEU	4.2
1	A	189	GLY	4.2
1	B	195	THR	4.1
1	D	197	VAL	4.0
1	A	194	VAL	4.0
1	B	174	ILE	4.0
1	D	140	LEU	4.0
1	A	170	VAL	3.9
1	B	198	GLU	3.9
1	D	123	LEU	3.9
1	B	167	VAL	3.8
1	B	156	ILE	3.8
1	B	185	VAL	3.8
1	B	143	THR	3.7
1	B	194	VAL	3.6
1	A	13	ILE	3.6
1	B	139	THR	3.6
1	A	139	THR	3.6
1	B	147	ALA	3.6
1	B	196	GLU	3.5
1	B	149	MET	3.5
1	D	193	LEU	3.5
1	A	214	ALA	3.5
1	B	13	ILE	3.5
1	B	157	LEU	3.4
1	D	186	LYS	3.4
1	A	148	TYR	3.4
1	D	170	VAL	3.3
1	D	156	ILE	3.3
1	D	121	THR	3.3
1	C	194	VAL	3.3
1	C	192	PHE	3.3
1	C	132	VAL	3.3
1	D	155	ASN	3.3
1	A	134	LEU	3.3
1	A	167	VAL	3.2
1	A	157	LEU	3.2
1	D	165	CYS	3.1
1	A	168	VAL	3.1
1	A	158	TRP	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	192	PHE	3.0
1	D	157	LEU	3.0
1	D	130	ALA	3.0
1	B	155	ASN	3.0
1	C	147	ALA	3.0
1	C	193	LEU	2.9
1	D	171	GLY	2.9
1	B	158	TRP	2.9
1	B	121	THR	2.9
1	B	161	TYR	2.9
1	D	119	ILE	2.9
1	C	190	ALA	2.8
1	D	134	LEU	2.8
1	A	156	ILE	2.7
1	D	202	SER	2.7
1	D	167	VAL	2.7
1	B	215	ALA	2.7
1	D	153	ASP	2.7
1	D	151	LYS	2.6
1	D	136	LYS	2.6
1	B	172	SER	2.6
1	B	159	LEU	2.5
1	A	153	ASP	2.5
1	C	215	ALA	2.5
1	D	149	MET	2.4
1	D	187	GLN	2.4
1	B	181	ILE	2.4
1	B	199	ASN	2.4
1	C	170	VAL	2.4
1	D	132	VAL	2.4
1	B	164	ILE	2.3
1	D	182	SER	2.3
1	C	165	CYS	2.2
1	D	122	GLY	2.2
1	B	144	LEU	2.2
1	C	488	LEU	2.2
1	D	147	ALA	2.2
1	B	142	ILE	2.2
1	C	148	TYR	2.2
1	B	152	CYS	2.2
1	A	138	ALA	2.2
1	D	181	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	164	ILE	2.1
1	A	144	LEU	2.1
1	D	129	THR	2.1
1	B	168	VAL	2.0
1	D	185	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
3	1OX	D	602[B]	21/21	0.88	0.29	6.84	21,40,51,52	21
3	1OX	D	602[A]	21/21	0.88	0.29	5.75	22,30,37,40	21
3	1OX	B	602[B]	21/21	0.92	0.24	5.52	20,30,43,44	21
3	1OX	B	602[A]	21/21	0.92	0.24	2.80	23,29,39,41	21
2	FBP	B	601	20/20	0.98	0.11	0.03	36,40,54,56	0
2	FBP	A	601	20/20	0.98	0.10	-0.58	41,49,52,54	0
2	FBP	D	601	20/20	0.98	0.10	-0.77	41,44,52,54	0
2	FBP	C	601	20/20	0.98	0.09	-1.42	45,53,61,62	0

6.5 Other polymers [i](#)

There are no such residues in this entry.