Full wwPDB X-ray Structure Validation Report (i)

Oct 14, 2023 – 08:34 PM EDT

PDB ID	:	8EQ1
Title	:	Escherichia coli pyruvate kinase D127N
Authors	:	Donovan, K.A.; Coombes, D.; Dobson, R.C.J.; Cooper, T.F.
Deposited on	:	2022-10-07
Resolution	:	2.32 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:

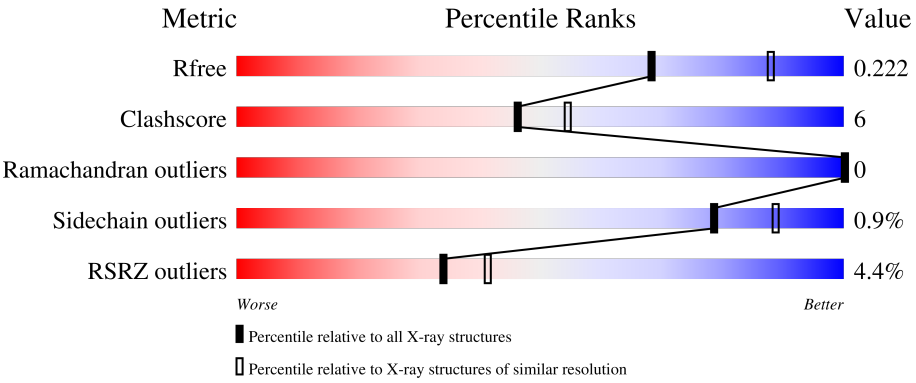
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.32 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	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)
RSRZ outliers	127900	5855 (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 <=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	470	83% 15%
1	B	470	8% 80% 18%
1	C	470	88% 11%
1	D	470	7% 85% 13%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 28195 atoms, of which 14203 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.

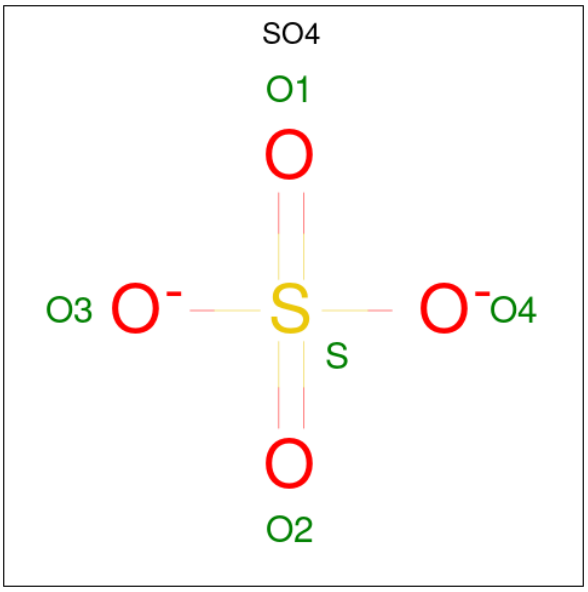
- Molecule 1 is a protein called Pyruvate kinase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	464	Total	C	H	N	O	S	0	0	0
			7044	2167	3566	605	682	24			
1	C	464	Total	C	H	N	O	S	0	0	0
			7014	2161	3544	603	682	24			
1	B	464	Total	C	H	N	O	S	0	0	0
			7020	2161	3548	605	682	24			
1	D	464	Total	C	H	N	O	S	0	0	0
			7009	2159	3545	604	677	24			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	127	ASN	ASP	engineered mutation	UNP A0A0A0G552
C	127	ASN	ASP	engineered mutation	UNP A0A0A0G552
B	127	ASN	ASP	engineered mutation	UNP A0A0A0G552
D	127	ASN	ASP	engineered mutation	UNP A0A0A0G552

- 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	C	1	Total O S 5 4 1	0	0
2	B	1	Total O S 5 4 1	0	0
2	D	1	Total O S 5 4 1	0	0

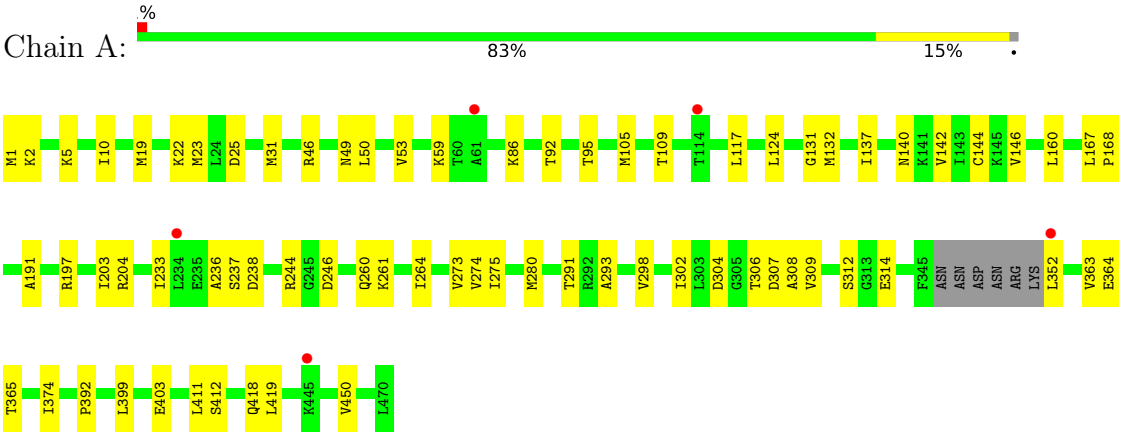
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	20	Total O 20 20	0	0
3	C	22	Total O 22 22	0	0
3	B	30	Total O 30 30	0	0
3	D	16	Total O 16 16	0	0

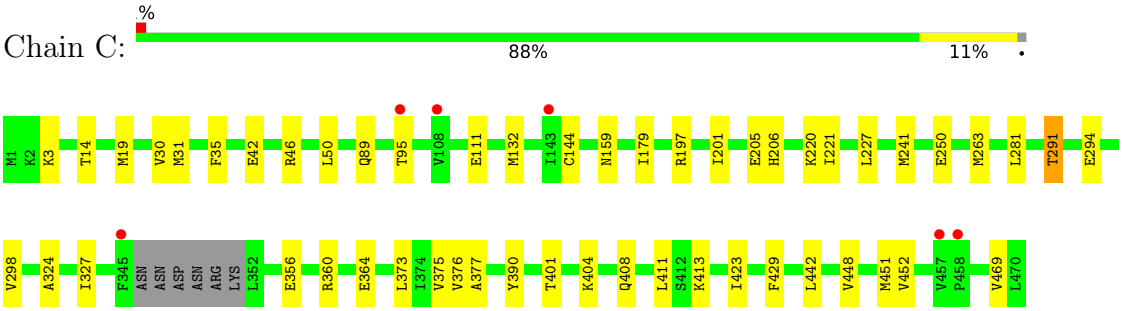
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

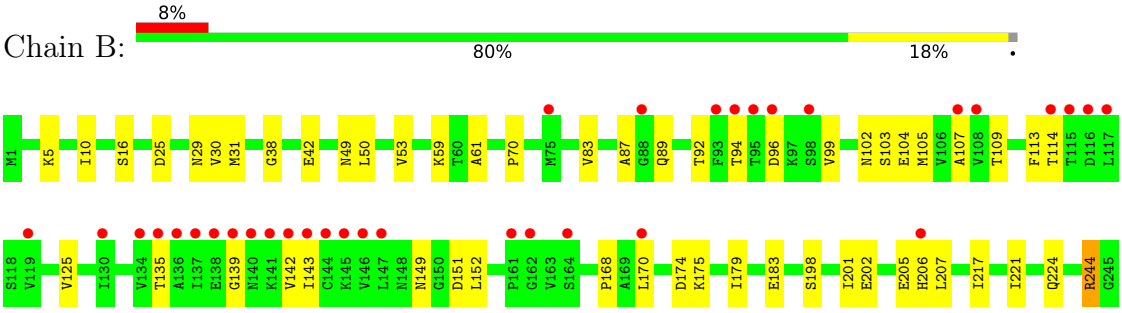
• Molecule 1: Pyruvate kinase

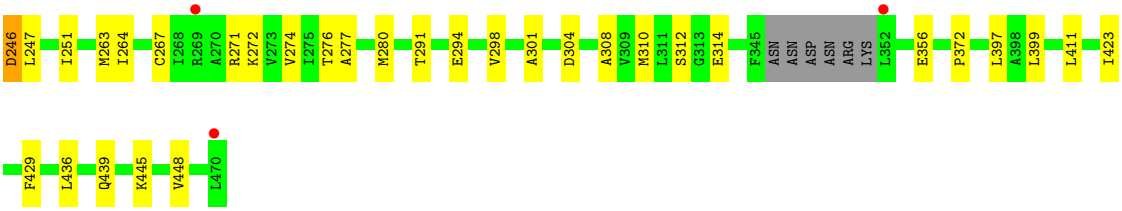


• Molecule 1: Pyruvate kinase

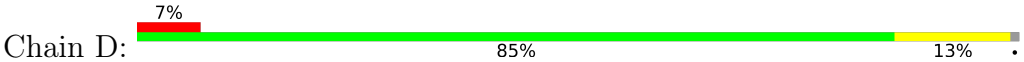


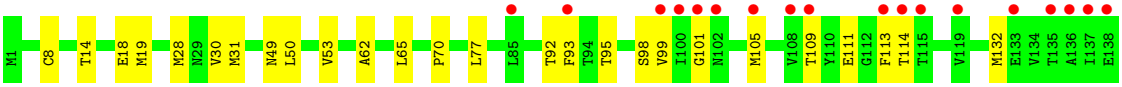
• Molecule 1: Pyruvate kinase

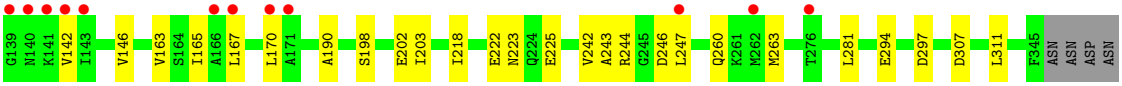


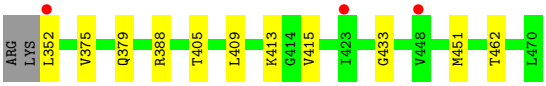


• Molecule 1: Pyruvate kinase









4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	76.26Å 131.75Å 129.09Å 90.00° 107.18° 90.00°	Depositor
Resolution (Å)	42.63 – 2.32 48.86 – 2.32	Depositor EDS
% Data completeness (in resolution range)	99.9 (42.63-2.32) 99.7 (48.86-2.32)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.80 (at 2.32Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.207 , 0.224 0.207 , 0.222	Depositor DCC
R_{free} test set	3342 reflections (3.17%)	wwPDB-VP
Wilson B-factor (Å^2)	39.7	Xtriage
Anisotropy	0.044	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 43.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.167 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	28195	wwPDB-VP
Average B, all atoms (Å^2)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.22% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.29	0/3512	0.60	0/4737
1	B	0.29	0/3506	0.59	0/4729
1	C	0.30	0/3504	0.59	0/4729
1	D	0.28	0/3498	0.60	0/4719
All	All	0.29	0/14020	0.59	0/18914

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3478	3566	3566	45	0
1	B	3472	3548	3548	52	0
1	C	3470	3544	3544	34	0
1	D	3464	3545	3545	45	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
2	C	5	0	0	0	0
2	D	5	0	0	0	0
3	A	20	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	30	0	0	1	0
3	C	22	0	0	0	0
3	D	16	0	0	0	0
All	All	13992	14203	14203	176	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 6.

All (176) 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:D:222:GLU:C	1:D:247:LEU:HD23	1.93	0.89
1:D:170:LEU:HD11	1:D:203:ILE:HG12	1.60	0.82
1:B:291:THR:HG23	1:B:294:GLU:H	1.49	0.76
1:A:25:ASP:OD1	1:A:59:LYS:NZ	2.22	0.73
1:A:280:MET:HE3	1:A:298:VAL:HG22	1.72	0.70
1:B:280:MET:HG3	1:B:310:MET:O	1.92	0.69
1:D:222:GLU:C	1:D:247:LEU:CD2	2.62	0.68
1:A:280:MET:CE	1:A:298:VAL:HG22	2.24	0.67
1:A:31:MET:HE3	1:A:50:LEU:HD22	1.76	0.67
1:B:207:LEU:HD12	1:B:217:ILE:HD11	1.78	0.66
1:C:377:ALA:HB2	1:C:429:PHE:CE1	2.33	0.64
1:C:373:LEU:HD11	1:C:442:LEU:HB2	1.78	0.64
1:D:222:GLU:O	1:D:247:LEU:HD23	1.99	0.63
1:B:102:ASN:OD1	1:B:105:MET:N	2.33	0.61
1:D:307:ASP:HA	1:D:413:LYS:HB2	1.83	0.61
1:B:25:ASP:OD1	1:B:59:LYS:NZ	2.33	0.61
1:A:291:THR:HG22	1:A:293:ALA:H	1.66	0.61
1:C:376:VAL:HG22	1:C:452:VAL:HB	1.81	0.60
1:B:92:THR:O	1:B:105:MET:HA	2.00	0.60
1:B:38:GLY:HA2	1:B:42:GLU:OE1	2.02	0.59
1:D:77:LEU:HD23	1:D:101:GLY:HA3	1.85	0.59
1:C:221:ILE:HG21	1:C:263:MET:CE	2.33	0.59
1:A:204:ARG:NH2	1:A:238:ASP:OD1	2.30	0.59
1:A:95:THR:HB	1:A:140:ASN:HB2	1.84	0.59
1:A:233:ILE:O	1:A:237:SER:OG	2.12	0.59
1:C:30:VAL:HG21	1:C:411:LEU:HD13	1.85	0.58
1:C:360:ARG:NH1	1:C:364:GLU:OE1	2.37	0.57
1:C:377:ALA:HB2	1:C:429:PHE:CD1	2.39	0.57
1:B:30:VAL:HG21	1:B:411:LEU:HD13	1.86	0.57
1:B:83:VAL:HG11	1:B:103:SER:HA	1.87	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:223:ASN:N	1:D:247:LEU:HD23	2.19	0.57
1:D:31:MET:HE3	1:D:50:LEU:HD22	1.86	0.56
1:B:294:GLU:O	1:B:298:VAL:HG23	2.06	0.55
1:C:31:MET:HE3	1:C:50:LEU:HB2	1.87	0.55
1:B:312:SER:N	1:B:314:GLU:OE1	2.39	0.55
1:A:19:MET:SD	1:A:22:LYS:HE3	2.47	0.55
1:A:275:ILE:HG12	1:A:308:ALA:HB3	1.88	0.54
1:C:423:ILE:HG21	1:C:429:PHE:HB2	1.88	0.54
1:B:170:LEU:HD22	1:B:174:ASP:HB3	1.89	0.54
1:D:223:ASN:N	1:D:247:LEU:CD2	2.71	0.54
1:A:1:MET:HG2	1:A:2:LYS:N	2.23	0.54
1:C:14:THR:HA	1:C:19:MET:HG2	1.90	0.54
1:C:375:VAL:O	1:C:451:MET:HA	2.08	0.54
1:D:30:VAL:HG22	1:D:62:ALA:HB3	1.89	0.54
1:C:221:ILE:HG21	1:C:263:MET:HE2	1.89	0.53
1:B:224:GLN:OE1	1:B:251:ILE:HG22	2.08	0.53
1:D:132:MET:HG2	1:D:146:VAL:HA	1.91	0.53
1:A:197:ARG:HG3	1:A:236:ALA:HB2	1.90	0.52
1:A:19:MET:SD	1:A:22:LYS:CE	2.97	0.52
1:A:280:MET:HE2	1:A:309:VAL:HB	1.90	0.52
1:C:291:THR:HB	1:C:294:GLU:H	1.75	0.52
1:A:49:ASN:O	1:A:53:VAL:HG23	2.09	0.51
1:A:137:ILE:HG12	1:A:142:VAL:HG13	1.93	0.51
1:C:294:GLU:O	1:C:298:VAL:HG23	2.08	0.51
1:A:132:MET:HG2	1:A:146:VAL:HG22	1.91	0.51
1:B:135:THR:OG1	1:B:143:ILE:HG22	2.10	0.51
1:A:291:THR:HG22	1:A:293:ALA:N	2.25	0.51
1:B:113:PHE:HD2	1:B:142:VAL:HG21	1.75	0.51
1:B:246:ASP:OD1	1:B:246:ASP:N	2.44	0.51
1:A:92:THR:O	1:A:105:MET:HA	2.10	0.51
1:C:201:ILE:O	1:C:205:GLU:HG2	2.11	0.50
1:C:197:ARG:CZ	1:C:201:ILE:HD11	2.42	0.50
1:C:281:LEU:HD23	1:C:294:GLU:HB3	1.92	0.50
1:A:399:LEU:HD23	1:A:418:GLN:HB3	1.94	0.50
1:B:201:ILE:O	1:B:205:GLU:HG2	2.11	0.49
1:D:281:LEU:HD12	1:D:311:LEU:HD21	1.93	0.49
1:D:8:CYS:HB2	1:D:28:MET:SD	2.52	0.49
1:A:364:GLU:HG3	1:A:365:THR:N	2.28	0.49
1:D:95:THR:CG2	1:D:111:GLU:HG2	2.43	0.49
1:D:281:LEU:HD23	1:D:294:GLU:HB3	1.95	0.49
1:D:113:PHE:HD2	1:D:142:VAL:HG21	1.78	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1:MET:HG2	1:A:2:LYS:H	1.79	0.48
1:B:114:THR:HG21	1:B:139:GLY:O	2.14	0.48
1:B:31:MET:HE3	1:B:50:LEU:HD22	1.94	0.48
1:B:291:THR:HG22	1:B:294:GLU:OE1	2.14	0.48
1:B:267:CYS:HB3	1:B:272:LYS:O	2.13	0.48
1:B:271:ARG:NE	1:B:356:GLU:OE2	2.39	0.48
1:D:99:VAL:HG11	1:D:105:MET:CE	2.44	0.48
1:D:114:THR:HG22	1:D:142:VAL:HG22	1.96	0.48
1:B:221:ILE:HB	1:B:263:MET:HE1	1.96	0.47
1:B:175:LYS:HG2	1:B:206:HIS:NE2	2.29	0.47
1:D:244:ARG:HH12	1:D:297:ASP:CG	2.18	0.47
1:C:356:GLU:CD	1:C:390:TYR:HH	2.18	0.47
1:B:5:LYS:O	1:B:308:ALA:HA	2.15	0.47
1:D:92:THR:HA	1:D:142:VAL:O	2.15	0.47
1:B:244:ARG:NH2	1:B:280:MET:CE	2.77	0.47
1:A:117:LEU:HD21	1:A:160:LEU:HD22	1.96	0.46
1:C:324:ALA:O	1:C:327:ILE:HG22	2.14	0.46
1:A:124:LEU:HD23	1:A:131:GLY:HA2	1.96	0.46
1:D:93:PHE:O	1:D:142:VAL:N	2.48	0.46
1:D:244:ARG:HD3	1:D:260:GLN:OE1	2.15	0.46
1:B:221:ILE:O	1:B:247:LEU:HD11	2.16	0.46
1:C:220:LYS:HG2	1:C:241:MET:HB3	1.97	0.46
1:C:42:GLU:HG2	1:C:46:ARG:CZ	2.45	0.46
1:C:401:THR:CG2	1:C:401:THR:O	2.63	0.46
1:B:49:ASN:O	1:B:53:VAL:HG23	2.15	0.46
1:D:70:PRO:HB2	1:D:167:LEU:HD23	1.98	0.46
1:A:261:LYS:NZ	1:A:304:ASP:OD1	2.48	0.45
1:D:190:ALA:HA	1:D:218:ILE:O	2.16	0.45
1:A:132:MET:HB3	1:A:144:CYS:HB3	1.98	0.45
1:D:198:SER:O	1:D:202:GLU:HG3	2.16	0.45
1:A:260:GLN:HG2	1:A:264:ILE:HD12	1.97	0.45
1:A:109:THR:O	1:A:109:THR:HG22	2.17	0.45
1:B:83:VAL:HG11	1:B:103:SER:CA	2.47	0.45
1:B:423:ILE:HG21	1:B:429:PHE:HB2	1.98	0.45
1:D:388:ARG:NE	1:D:413:LYS:HB3	2.32	0.45
1:C:220:LYS:HG2	1:C:241:MET:SD	2.57	0.44
1:C:356:GLU:OE2	1:C:390:TYR:OH	2.28	0.44
1:B:96:ASP:HB3	1:B:99:VAL:HG23	1.99	0.44
1:B:277:ALA:HB1	1:B:310:MET:CE	2.48	0.44
1:D:244:ARG:NH2	1:D:297:ASP:OD2	2.36	0.44
1:D:375:VAL:O	1:D:451:MET:HA	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:280:MET:HE1	1:A:298:VAL:HG13	1.99	0.44
1:B:267:CYS:SG	1:B:274:VAL:HB	2.58	0.44
1:B:29:ASN:O	1:B:61:ALA:HB1	2.17	0.44
1:D:31:MET:HE1	1:D:50:LEU:HB2	1.99	0.44
1:A:19:MET:SD	1:A:22:LYS:NZ	2.87	0.43
1:C:281:LEU:HD21	1:C:298:VAL:HG21	1.99	0.43
1:B:70:PRO:HG3	1:B:168:PRO:O	2.18	0.43
1:B:264:ILE:HG23	1:B:274:VAL:HG11	2.00	0.43
1:C:448:VAL:HG22	1:C:469:VAL:HG22	2.01	0.43
1:B:87:ALA:N	1:B:149:ASN:OD1	2.39	0.43
1:D:163:VAL:O	1:D:165:ILE:HD12	2.18	0.43
1:A:10:ILE:HG22	1:A:46:ARG:HD3	1.99	0.43
1:A:273:VAL:HG21	1:A:411:LEU:HG	2.00	0.43
1:B:109:THR:HG22	1:B:109:THR:O	2.17	0.43
1:B:179:ILE:O	1:B:183:GLU:HG3	2.18	0.43
1:A:274:VAL:N	1:A:307:ASP:OD2	2.50	0.43
1:C:159:ASN:ND2	1:C:250:GLU:OE2	2.42	0.43
1:C:404:LYS:O	1:C:408:GLN:HG3	2.19	0.43
1:B:38:GLY:CA	1:B:42:GLU:OE1	2.66	0.43
1:A:312:SER:N	1:A:314:GLU:OE1	2.49	0.42
1:D:109:THR:O	1:D:109:THR:HG22	2.18	0.42
1:A:302:ILE:HA	1:A:306:THR:HG22	2.00	0.42
1:B:16:SER:N	3:B:601:HOH:O	2.47	0.42
1:D:18:GLU:O	1:D:18:GLU:OE1	2.38	0.42
1:B:301:ALA:HA	1:B:304:ASP:OD2	2.19	0.42
1:B:10:ILE:CG1	1:B:31:MET:HG3	2.50	0.42
1:B:198:SER:O	1:B:202:GLU:HG3	2.20	0.42
1:A:31:MET:HE1	1:A:50:LEU:HB2	2.02	0.42
1:A:167:LEU:HB3	1:A:168:PRO:HD2	2.01	0.42
1:A:374:ILE:HA	1:A:450:VAL:O	2.20	0.42
1:D:92:THR:O	1:D:105:MET:HA	2.20	0.42
1:A:191:ALA:HB1	1:A:203:ILE:CD1	2.50	0.41
1:C:3:LYS:HB2	1:C:413:LYS:HE3	2.02	0.41
1:C:132:MET:HB3	1:C:144:CYS:HB3	2.03	0.41
1:C:227:LEU:HD23	1:C:263:MET:HE3	2.01	0.41
1:B:94:THR:HG22	1:B:107:ALA:HA	2.00	0.41
1:C:95:THR:HG23	1:C:111:GLU:HA	2.02	0.41
1:B:125:VAL:HG11	1:B:152:LEU:HD13	2.02	0.41
1:A:363:VAL:HG13	1:A:392:PRO:HB3	2.03	0.41
1:D:95:THR:HG21	1:D:111:GLU:HG2	2.03	0.41
1:B:244:ARG:HD2	1:B:276:THR:HG23	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:49:ASN:O	1:D:53:VAL:HG23	2.20	0.41
1:A:273:VAL:HA	1:A:307:ASP:OD2	2.20	0.41
1:A:403:GLU:HA	1:A:419:LEU:HD13	2.03	0.41
1:B:372:PRO:HD2	1:B:448:VAL:O	2.20	0.41
1:A:244:ARG:HD3	1:A:260:GLN:OE1	2.21	0.41
1:C:179:ILE:HG13	1:C:206:HIS:HE2	1.85	0.41
1:D:352:LEU:HD12	1:D:352:LEU:N	2.36	0.41
1:D:409:LEU:HB3	1:D:415:VAL:HG11	2.03	0.41
1:A:5:LYS:NZ	1:A:412:SER:O	2.48	0.41
1:A:19:MET:O	1:A:23:MET:HG2	2.21	0.41
1:B:94:THR:CG2	1:B:107:ALA:HA	2.51	0.41
1:B:397:LEU:HG	1:B:399:LEU:CD1	2.51	0.41
1:B:102:ASN:OD1	1:B:104:GLU:N	2.49	0.40
1:B:399:LEU:HD21	1:B:436:LEU:HD12	2.02	0.40
1:D:93:PHE:HZ	1:D:132:MET:HE1	1.86	0.40
1:D:433:GLY:HA3	1:D:451:MET:HE1	2.03	0.40
1:C:221:ILE:HG13	1:C:263:MET:HE2	2.03	0.40
1:D:14:THR:HA	1:D:19:MET:HG2	2.02	0.40
1:D:65:LEU:C	1:D:65:LEU:HD23	2.42	0.40
1:D:379:GLN:O	1:D:405:THR:OG1	2.23	0.40
1:D:223:ASN:OD1	1:D:225:GLU:N	2.53	0.40
1:D:242:VAL:HG22	1:D:263:MET:HE2	2.04	0.40
1:D:243:ALA:HB1	1:D:246:ASP:OD2	2.20	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	460/470 (98%)	447 (97%)	13 (3%)	0	100	100
1	B	460/470 (98%)	448 (97%)	12 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	460/470 (98%)	446 (97%)	14 (3%)	0	100	100
1	D	460/470 (98%)	450 (98%)	10 (2%)	0	100	100
All	All	1840/1880 (98%)	1791 (97%)	49 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	380/389 (98%)	377 (99%)	3 (1%)	81	90
1	B	378/389 (97%)	372 (98%)	6 (2%)	62	77
1	C	378/389 (97%)	375 (99%)	3 (1%)	81	90
1	D	376/389 (97%)	374 (100%)	2 (0%)	88	95
All	All	1512/1556 (97%)	1498 (99%)	14 (1%)	78	89

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	86	LYS
1	A	246	ASP
1	A	352	LEU
1	C	35	PHE
1	C	89	GLN
1	C	291	THR
1	B	89	GLN
1	B	151	ASP
1	B	244	ARG
1	B	246	ASP
1	B	439	GLN
1	B	445	LYS
1	D	98	SER
1	D	462	THR

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

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	SO4	A	501	-	4,4,4	0.15	0	6,6,6	0.07	0
2	SO4	D	501	-	4,4,4	0.15	0	6,6,6	0.08	0
2	SO4	C	501	-	4,4,4	0.15	0	6,6,6	0.07	0
2	SO4	B	501	-	4,4,4	0.16	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.

No monomer is involved in short contacts.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	464/470 (98%)	0.33	5 (1%)	80	85	23, 41, 60, 77	0
1	B	464/470 (98%)	0.66	37 (7%)	12	16	18, 43, 87, 95	0
1	C	464/470 (98%)	0.33	6 (1%)	77	81	26, 43, 61, 79	0
1	D	464/470 (98%)	0.67	33 (7%)	16	21	21, 43, 83, 94	0
All	All	1856/1880 (98%)	0.50	81 (4%)	34	41	18, 42, 79, 95	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	119	VAL	8.4
1	B	134	VAL	8.0
1	B	137	ILE	7.3
1	B	142	VAL	7.2
1	D	113	PHE	6.0
1	B	94	THR	5.9
1	B	144	CYS	5.5
1	D	170	LEU	5.4
1	D	141	LYS	5.3
1	D	137	ILE	5.3
1	B	135	THR	4.9
1	D	167	LEU	4.9
1	B	143	ILE	4.7
1	D	143	ILE	4.6
1	D	142	VAL	4.6
1	D	114	THR	4.5
1	B	116	ASP	4.5
1	B	146	VAL	4.4
1	D	352	LEU	4.3
1	D	119	VAL	4.3
1	D	85	LEU	4.3

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Mol	Chain	Res	Type	RSRZ
1	B	108	VAL	4.3
1	B	136	ALA	4.2
1	D	136	ALA	4.0
1	B	141	LYS	4.0
1	B	352	LEU	3.9
1	B	470	LEU	3.8
1	D	100	ILE	3.7
1	B	130	ILE	3.7
1	B	95	THR	3.7
1	D	140	ASN	3.6
1	D	108	VAL	3.6
1	B	98	SER	3.6
1	B	145	LYS	3.5
1	D	102	ASN	3.5
1	B	140	ASN	3.4
1	D	99	VAL	3.4
1	D	423	ILE	3.3
1	B	107	ALA	3.3
1	D	101	GLY	3.2
1	C	458	PRO	3.1
1	B	139	GLY	3.1
1	D	139	GLY	3.0
1	D	247	LEU	2.9
1	B	114	THR	2.9
1	B	93	PHE	2.9
1	C	345	PHE	2.8
1	B	117	LEU	2.8
1	D	133	GLU	2.7
1	D	166	ALA	2.6
1	B	170	LEU	2.6
1	B	138	GLU	2.5
1	B	88	GLY	2.5
1	D	135	THR	2.5
1	B	162	GLY	2.4
1	B	115	THR	2.4
1	B	147	LEU	2.3
1	D	448	VAL	2.3
1	C	108	VAL	2.3
1	D	138	GLU	2.3
1	C	457	VAL	2.3
1	B	161	PRO	2.3
1	D	262	MET	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	445	LYS	2.2
1	C	95	THR	2.2
1	B	269	ARG	2.2
1	B	206	HIS	2.2
1	B	75	MET	2.2
1	B	96	ASP	2.2
1	C	143	ILE	2.2
1	D	115	THR	2.1
1	A	352	LEU	2.1
1	D	109	THR	2.1
1	D	171	ALA	2.1
1	B	164	SER	2.1
1	D	105	MET	2.1
1	D	93	PHE	2.1
1	A	234	LEU	2.0
1	A	61	ALA	2.0
1	D	276	THR	2.0
1	A	114	THR	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	SO4	A	501	5/5	0.89	0.22	53,54,58,74	5
2	SO4	C	501	5/5	0.91	0.31	57,57,60,76	5
2	SO4	D	501	5/5	0.91	0.34	53,56,62,73	5
2	SO4	B	501	5/5	0.92	0.35	54,56,60,73	5

6.5 Other polymers (i)

There are no such residues in this entry.