Full wwPDB X-ray Structure Validation Report ⓘ

Nov 5, 2023 – 10:28 pm GMT

PDB ID	:	5LU4
Title	:	C4-type pyruvate phosphate dikinase: conformational intermediate of central domain in the swiveling mechanism
Authors	:	Minges, A.; Hoeppner, A.; Groth, G.
Deposited on	:	2016-09-08
Resolution	:	2.90 Å(reported)

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

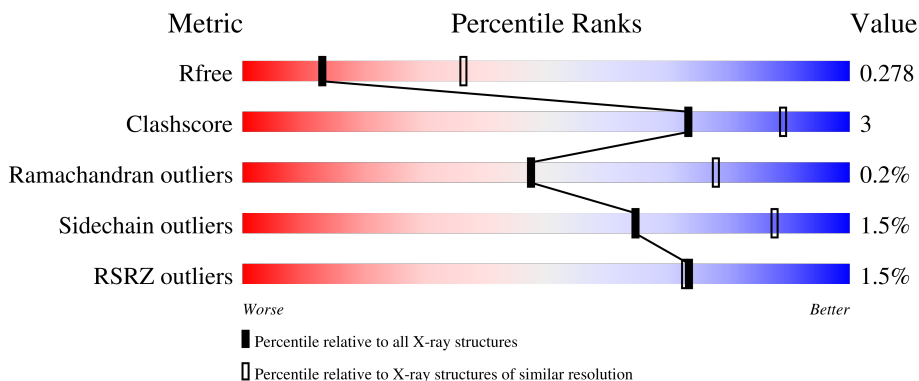|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.90 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	Percentile Ranks	Value
Rfree		0.278
Clashscore		3
Ramachandran outliers		0.2%
Sidechain outliers		1.5%
RSRZ outliers		1.5%

Worse *Better*

▌ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	874	87% 9% · ·
1	B	874	89% 7% · ·

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 12020 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, phosphate dikinase, chloroplastic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	850	Total	C	N	O	S	0	0	0
			6091	3819	1060	1172	40			
1	B	847	Total	C	N	O	S	0	0	0
			5863	3680	1024	1119	40			

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total 2	Mg 2	0	0
3	B	2	Total 2	Mg 2	0	0

- Molecule 4 is PYRUVIC ACID (three-letter code: PYR) (formula: $C_3H_4O_3$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 6	C 3	O 3	0	0

- Molecule 5 is water.

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

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 grap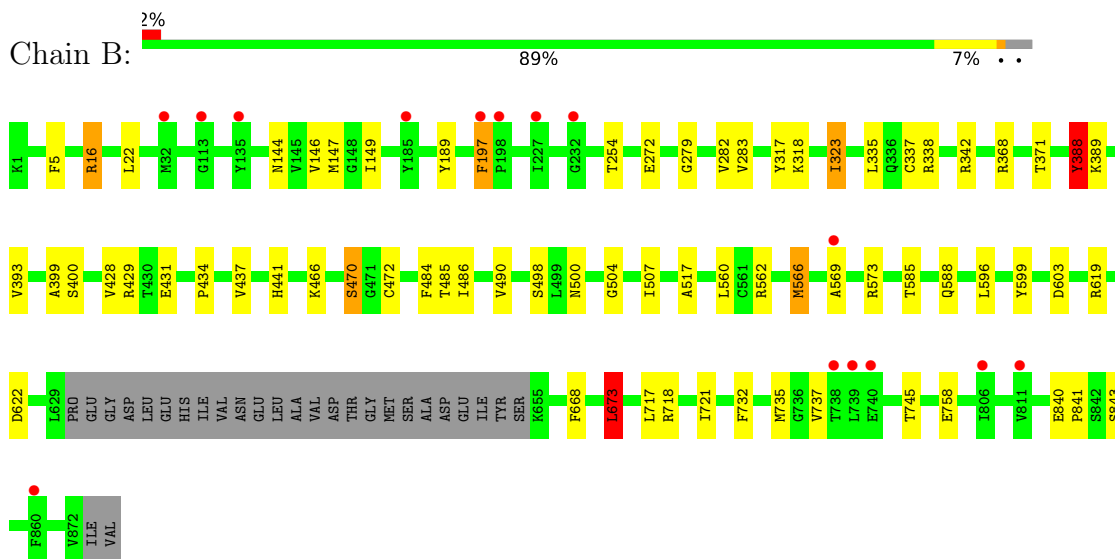hic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue 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, phosphate dikinase, chloroplastic

Chain A:

• Molecule 1: Pyruvate, phosphate dikinase, chloroplastic

Chain B:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	74.16Å 126.52Å 219.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	109.79 – 2.90 109.55 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.6 (109.79-2.90) 99.7 (109.55-2.90)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.19 (at 2.91Å)	Xtriage
Refinement program	REFMAC 5.8.0155, PHENIX dev_2499	Depositor
R, R_{free}	0.247 , 0.286 0.244 , 0.278	Depositor DCC
R_{free} test set	2229 reflections (4.80%)	wwPDB-VP
Wilson B-factor (Å^2)	83.0	Xtriage
Anisotropy	0.378	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 70.6	EDS
L-test for twinning[2]	$< |L| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	12020	wwPDB-VP
Average B, all atoms (Å^2)	99.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.90% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, MG, PYR

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	1.04	40/6201 (0.6%)	0.85	21/8435 (0.2%)
1	B	0.72	6/5973 (0.1%)	0.71	10/8155 (0.1%)
All	All	0.90	46/12174 (0.4%)	0.78	31/16590 (0.2%)

All (46) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	52	GLU	CD-OE1	11.26	1.38	1.25
1	A	324	GLU	CD-OE1	11.22	1.38	1.25
1	A	67	GLU	CD-OE2	10.34	1.37	1.25
1	A	342	ARG	CZ-NH2	9.37	1.45	1.33
1	A	388	TYR	CE1-CZ	-9.29	1.26	1.38
1	A	210	ASN	CG-OD1	-8.94	1.04	1.24
1	A	16	ARG	CZ-NH1	8.91	1.44	1.33
1	A	206	GLU	CD-OE2	7.57	1.33	1.25
1	A	311	GLU	CD-OE2	7.45	1.33	1.25
1	A	388	TYR	CG-CD2	-7.27	1.29	1.39
1	A	317	TYR	CG-CD2	-7.22	1.29	1.39
1	B	388	TYR	CG-CD2	-7.15	1.29	1.39
1	A	339	THR	C-O	-7.09	1.09	1.23
1	A	310	CYS	CB-SG	-7.02	1.70	1.82
1	A	206	GLU	CD-OE1	6.74	1.33	1.25
1	A	340	GLY	C-O	-6.69	1.12	1.23
1	A	15	ASN	CG-OD1	-6.48	1.09	1.24
1	A	17	ASP	CG-OD2	6.45	1.40	1.25
1	A	342	ARG	CZ-NH1	6.44	1.41	1.33
1	A	48	GLU	CD-OE2	6.37	1.32	1.25
1	B	472	CYS	CB-SG	-6.33	1.71	1.82
1	A	305	GLU	CD-OE1	6.23	1.32	1.25
1	A	235	GLY	C-O	-6.18	1.13	1.23
1	A	31	GLU	CD-OE2	-6.17	1.18	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	388	TYR	CE1-CZ	-6.17	1.30	1.38
1	A	7	PHE	CG-CD1	-6.10	1.29	1.38
1	A	305	GLU	CD-OE2	6.10	1.32	1.25
1	B	272	GLU	CD-OE2	5.93	1.32	1.25
1	A	324	GLU	CD-OE2	5.93	1.32	1.25
1	A	266	GLU	CD-OE1	5.88	1.32	1.25
1	A	53	TYR	CE2-CZ	-5.86	1.30	1.38
1	B	317	TYR	CG-CD1	-5.79	1.31	1.39
1	A	195	GLU	CD-OE1	5.78	1.32	1.25
1	A	308	GLU	CG-CD	5.66	1.60	1.51
1	A	311	GLU	CD-OE1	5.62	1.31	1.25
1	A	48	GLU	CG-CD	5.48	1.60	1.51
1	A	272	GLU	CD-OE2	5.42	1.31	1.25
1	A	195	GLU	CD-OE2	5.38	1.31	1.25
1	A	53	TYR	CG-CD2	-5.36	1.32	1.39
1	A	52	GLU	CD-OE2	5.34	1.31	1.25
1	A	147	MET	C-O	5.33	1.33	1.23
1	A	301	GLU	CD-OE1	5.27	1.31	1.25
1	A	272	GLU	CD-OE1	5.19	1.31	1.25
1	A	62	PRO	C-O	5.14	1.33	1.23
1	B	337	CYS	CB-SG	-5.10	1.73	1.81
1	A	1	LYS	N-CA	5.03	1.56	1.46

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	566	MET	CA-CB-CG	10.00	130.30	113.30
1	A	342	ARG	NE-CZ-NH1	-9.42	115.59	120.30
1	A	338	ARG	NE-CZ-NH2	-8.20	116.20	120.30
1	A	323	ILE	CG1-CB-CG2	-8.06	93.67	111.40
1	B	323	ILE	CG1-CB-CG2	-7.53	94.83	111.40
1	A	331	ARG	NE-CZ-NH1	-7.53	116.53	120.30
1	A	388	TYR	CB-CG-CD1	7.49	125.50	121.00
1	B	388	TYR	CB-CG-CD1	7.11	125.26	121.00
1	A	318	LYS	CD-CE-NZ	-6.81	96.04	111.70
1	A	342	ARG	NH1-CZ-NH2	6.79	126.87	119.40
1	A	3	ARG	NE-CZ-NH2	-6.78	116.91	120.30
1	A	260	ARG	NE-CZ-NH2	-6.71	116.94	120.30
1	B	429	ARG	NE-CZ-NH2	-6.68	116.96	120.30
1	A	322	ASP	CB-CG-OD1	6.53	124.17	118.30
1	A	16	ARG	NE-CZ-NH2	-6.43	117.08	120.30
1	A	353	ASP	CB-CG-OD2	6.27	123.94	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	136	ARG	NE-CZ-NH1	6.10	123.35	120.30
1	A	342	ARG	NE-CZ-NH2	-5.64	117.48	120.30
1	A	603	ASP	CB-CG-OD1	5.53	123.28	118.30
1	B	673	LEU	CA-CB-CG	5.47	127.89	115.30
1	B	562	ARG	NE-CZ-NH1	5.42	123.01	120.30
1	B	566	MET	CG-SD-CE	5.33	108.73	100.20
1	B	16	ARG	NE-CZ-NH2	-5.33	117.64	120.30
1	A	375	ASP	CB-CG-OD1	-5.33	113.51	118.30
1	A	197	PHE	CB-CG-CD1	-5.30	117.09	120.80
1	B	338	ARG	NE-CZ-NH1	5.29	122.95	120.30
1	A	5	PHE	CB-CG-CD2	5.27	124.49	120.80
1	A	673	LEU	CA-CB-CG	5.20	127.27	115.30
1	A	195	GLU	CG-CD-OE1	-5.13	108.04	118.30
1	A	170	ASP	CB-CG-OD2	-5.12	113.69	118.30
1	B	429	ARG	CA-CB-CG	5.04	124.49	113.40

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	6091	0	5649	35	0
1	B	5863	0	5203	42	0
2	A	27	0	12	2	0
2	B	27	0	12	1	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
4	A	6	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
All	All	12020	0	10876	76	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 (76) 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:146:VAL:HG12	1:A:147:MET:HE2	1.54	0.89
1:B:732:PHE:CD2	1:B:737:VAL:HG13	2.07	0.89
1:B:146:VAL:HG12	1:B:147:MET:HE2	1.53	0.88
1:B:393:VAL:HG12	1:B:486:ILE:HD13	1.59	0.85
1:A:718:ARG:HA	1:A:721:ILE:HG12	1.66	0.76
1:B:189:TYR:CD2	1:B:197:PHE:HB2	2.22	0.74
1:B:393:VAL:HG12	1:B:486:ILE:CD1	2.19	0.72
1:A:189:TYR:CD2	1:A:197:PHE:HB2	2.26	0.70
1:B:146:VAL:HG12	1:B:147:MET:CE	2.20	0.70
1:A:146:VAL:HG12	1:A:147:MET:CE	2.23	0.69
1:B:393:VAL:CG1	1:B:486:ILE:HD12	2.24	0.68
1:B:393:VAL:CG1	1:B:486:ILE:CD1	2.71	0.67
1:B:596:LEU:HD12	1:B:599:TYR:CB	2.26	0.65
1:B:318:LYS:O	1:B:368:ARG:NH1	2.29	0.64
1:B:393:VAL:HG11	1:B:486:ILE:HD12	1.81	0.62
1:B:718:ARG:HA	1:B:721:ILE:HG13	1.80	0.61
1:A:713:THR:OG1	1:A:716:GLU:HG3	2.00	0.61
1:B:399:ALA:HB2	1:B:470:SER:HB3	1.83	0.61
1:B:732:PHE:CG	1:B:737:VAL:HG13	2.36	0.60
1:A:335:LEU:HD22	2:A:901:ADP:C4	2.36	0.59
1:A:250:ASN:ND2	1:B:431:GLU:OE1	2.32	0.59
1:A:318:LYS:O	1:A:368:ARG:NH1	2.30	0.58
1:A:254:THR:HG21	1:A:279:GLY:O	2.05	0.57
1:B:282:VAL:HG23	1:B:283:VAL:HG23	1.86	0.56
1:B:388:TYR:CD2	1:B:507:ILE:HD13	2.41	0.55
1:B:254:THR:HG21	1:B:279:GLY:O	2.07	0.55
1:A:388:TYR:CD2	1:A:507:ILE:HD13	2.42	0.55
1:A:840:GLU:OE1	1:A:843:SER:N	2.39	0.55
1:B:189:TYR:CE2	1:B:197:PHE:HB2	2.43	0.52
1:B:585:THR:O	1:B:588:GLN:N	2.43	0.52
1:A:585:THR:O	1:A:588:GLN:N	2.43	0.52
1:B:732:PHE:CD2	1:B:737:VAL:CG1	2.89	0.52
1:B:5:PHE:CD2	1:B:22:LEU:HD21	2.46	0.51
1:A:189:TYR:CE2	1:A:197:PHE:HB2	2.47	0.50
1:A:619:ARG:NH2	1:A:622:ASP:OD2	2.45	0.50
1:B:840:GLU:OE1	1:B:843:SER:N	2.40	0.50
1:B:335:LEU:HD22	2:B:901:ADP:C4	2.47	0.49
1:B:619:ARG:NH2	1:B:622:ASP:OD2	2.46	0.48
1:B:717:LEU:HD13	1:B:745:THR:HG22	1.95	0.48
1:A:388:TYR:HD1	1:A:389:LYS:N	2.11	0.48
1:B:569:ALA:HB3	1:B:573:ARG:CB	2.45	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:441:HIS:O	1:A:466:LYS:NZ	2.48	0.47
1:A:717:LEU:HD13	1:A:745:THR:HG22	1.97	0.47
1:B:388:TYR:HD1	1:B:389:LYS:N	2.14	0.45
1:A:129:ARG:HH22	1:A:171:THR:HA	1.80	0.45
1:B:732:PHE:HB3	1:B:737:VAL:HG22	1.99	0.45
1:A:428:VAL:HG11	1:A:484:PHE:CD2	2.52	0.45
1:A:60:LEU:HD22	1:A:64:LEU:HD23	1.99	0.45
1:B:668:PHE:CE2	1:B:673:LEU:HB2	2.51	0.45
1:A:434:PRO:HA	1:A:437:VAL:HG23	1.98	0.44
1:B:434:PRO:HA	1:B:437:VAL:HG23	1.99	0.44
1:A:144:ASN:HA	1:A:149:ILE:O	2.18	0.44
1:B:441:HIS:O	1:B:466:LYS:NZ	2.50	0.44
1:B:428:VAL:HG11	1:B:484:PHE:CD2	2.52	0.43
1:B:498:SER:HB2	1:B:507:ILE:HB	2.00	0.43
1:B:371:THR:HG21	1:B:841:PRO:HG3	2.00	0.43
1:B:485:THR:HG22	1:B:490:VAL:HG22	1.99	0.43
1:B:500:ASN:O	1:B:504:GLY:N	2.49	0.43
1:A:474:ASP:N	1:A:474:ASP:OD1	2.52	0.43
1:A:858:SER:OG	1:A:859:PRO:HD2	2.19	0.42
1:A:4:VAL:CG2	1:A:67:GLU:HG2	2.48	0.42
1:A:500:ASN:O	1:A:504:GLY:N	2.48	0.42
1:B:560:LEU:HD11	1:B:619:ARG:HD2	2.01	0.42
1:A:129:ARG:HG3	1:A:178:LEU:HD12	2.01	0.42
1:A:388:TYR:CD1	1:A:388:TYR:C	2.93	0.42
1:A:489:ARG:HH22	1:A:508:LEU:HD11	1.85	0.42
1:B:144:ASN:HA	1:B:149:ILE:O	2.20	0.42
1:B:400:SER:OG	1:B:466:LYS:O	2.23	0.41
1:A:136:ARG:HG3	1:A:185:TYR:CE2	2.55	0.41
1:B:732:PHE:CB	1:B:737:VAL:HG13	2.50	0.41
1:A:668:PHE:CE2	1:A:673:LEU:HB2	2.56	0.41
1:B:566:MET:HG2	1:B:603:ASP:OD2	2.21	0.41
1:A:5:PHE:CD1	1:A:5:PHE:N	2.89	0.41
1:A:95:ARG:HB2	1:A:239:ASN:HB2	2.03	0.41
1:A:388:TYR:HD1	1:A:388:TYR:C	2.25	0.40
1:A:279:GLY:HA2	2:A:901:ADP:O3'	2.21	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	846/874 (97%)	824 (97%)	20 (2%)	2 (0%)	47	78
1	B	843/874 (96%)	820 (97%)	21 (2%)	2 (0%)	47	78
All	All	1689/1748 (97%)	1644 (97%)	41 (2%)	4 (0%)	47	78

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	517	ALA
1	B	517	ALA
1	A	735	MET
1	B	735	MET

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	576/715 (81%)	568 (99%)	8 (1%)	67	89
1	B	510/715 (71%)	502 (98%)	8 (2%)	62	86
All	All	1086/1430 (76%)	1070 (98%)	16 (2%)	65	87

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	ARG
1	A	169	LEU

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Mol	Chain	Res	Type
1	A	197	PHE
1	A	323	ILE
1	A	342	ARG
1	A	388	TYR
1	A	500	ASN
1	A	673	LEU
1	B	16	ARG
1	B	197	PHE
1	B	323	ILE
1	B	342	ARG
1	B	388	TYR
1	B	470	SER
1	B	673	LEU
1	B	758	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	168	HIS
1	A	500	ASN

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 ⓘ

Of 7 ligands modelled in this entry, 4 are monoatomic - leaving 3 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
4	PYR	A	903	3	5,5,5	1.41	0	3,6,6	1.62	1 (33%)
2	ADP	A	901	3	24,29,29	1.72	4 (16%)	29,45,45	1.41	7 (24%)
2	ADP	B	901	3	24,29,29	0.94	0	29,45,45	1.46	5 (17%)

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
4	PYR	A	903	3	-	2/4/4/4	-
2	ADP	A	901	3	-	4/12/32/32	0/3/3/3
2	ADP	B	901	3	-	4/12/32/32	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	901	ADP	C4-N3	-4.98	1.28	1.35
2	A	901	ADP	C8-N7	3.85	1.41	1.34
2	A	901	ADP	O4'-C1'	3.37	1.45	1.41
2	A	901	ADP	C2'-C1'	-2.17	1.50	1.53

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	901	ADP	N3-C2-N1	-3.46	123.28	128.68
2	B	901	ADP	O2A-PA-O1A	3.10	127.59	112.24
2	A	901	ADP	O2A-PA-O5'	-3.04	93.63	107.75
2	A	901	ADP	O4'-C4'-C3'	-2.92	99.33	105.11
2	A	901	ADP	C4-C5-N7	-2.54	106.75	109.40
2	B	901	ADP	PA-O3A-PB	-2.52	124.19	132.83
2	A	901	ADP	O4'-C1'-C2'	-2.34	103.51	106.93
2	A	901	ADP	O3B-PB-O3A	2.30	112.33	104.64
2	A	901	ADP	O2A-PA-O1A	2.29	123.54	112.24
2	A	901	ADP	N3-C2-N1	-2.21	125.23	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	901	ADP	N6-C6-N1	2.11	122.95	118.57
4	A	903	PYR	O3-CA-CB	2.02	124.21	119.73
2	B	901	ADP	C1'-N9-C4	-2.02	123.10	126.64

There are no chirality outliers.
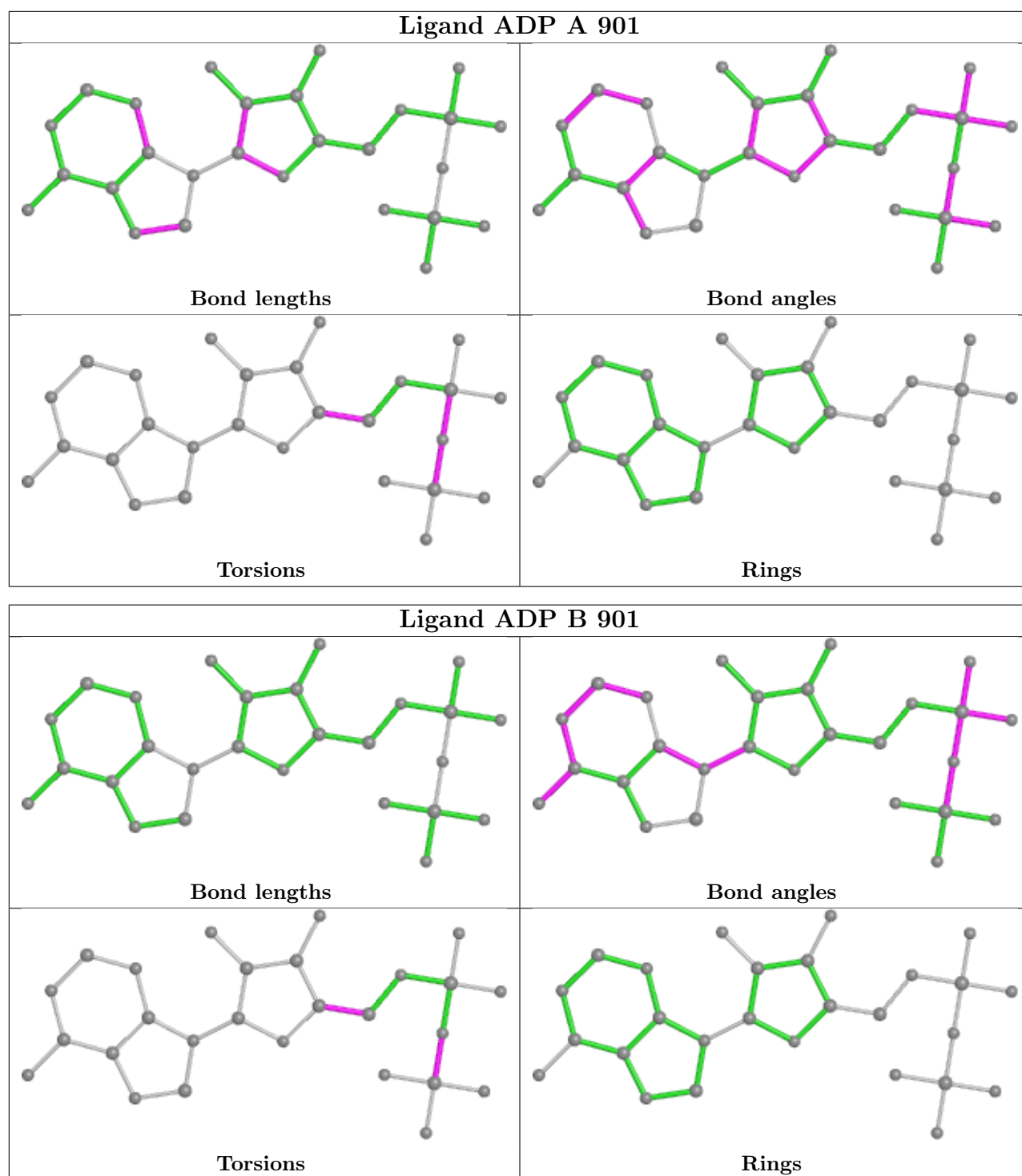
All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	901	ADP	PA-O3A-PB-O2B
2	A	901	ADP	O4'-C4'-C5'-O5'
2	B	901	ADP	PA-O3A-PB-O3B
4	A	903	PYR	OXT-C-CA-CB
2	A	901	ADP	C3'-C4'-C5'-O5'
2	B	901	ADP	O4'-C4'-C5'-O5'
4	A	903	PYR	O-C-CA-CB
2	B	901	ADP	C3'-C4'-C5'-O5'
2	B	901	ADP	PA-O3A-PB-O2B
2	A	901	ADP	PB-O3A-PA-O2A

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	901	ADP	2	0
2	B	901	ADP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand ADP A 901

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP B 901

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

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	850/874 (97%)	0.10	11 (1%)	77	77	46, 90, 181, 225	0
1	B	847/874 (96%)	0.08	15 (1%)	68	67	71, 99, 156, 202	0
All	All	1697/1748 (97%)	0.09	26 (1%)	73	73	46, 96, 165, 225	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	569	ALA	6.3
1	A	569	ALA	5.4
1	B	738	THR	4.6
1	B	740	GLU	3.4
1	B	232	GLY	3.3
1	A	602	SER	2.8
1	B	185	TYR	2.8
1	A	668	PHE	2.7
1	B	197	PHE	2.6
1	B	32	MET	2.6
1	B	198	PRO	2.5
1	B	227	ILE	2.5
1	B	860	PHE	2.5
1	A	5	PHE	2.4
1	A	567	PHE	2.3
1	A	664	PRO	2.3
1	A	689	PHE	2.3
1	B	113	GLY	2.3
1	A	517	ALA	2.2
1	B	135	TYR	2.2
1	B	739	LEU	2.2
1	A	442	ALA	2.2
1	A	491	ILE	2.2
1	A	738	THR	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	806	ILE	2.1
1	B	811	VAL	2.1

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 monosaccharides in this entry.

6.4 Ligands ⓘ

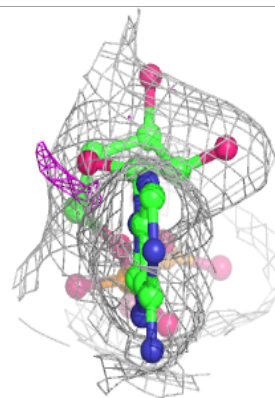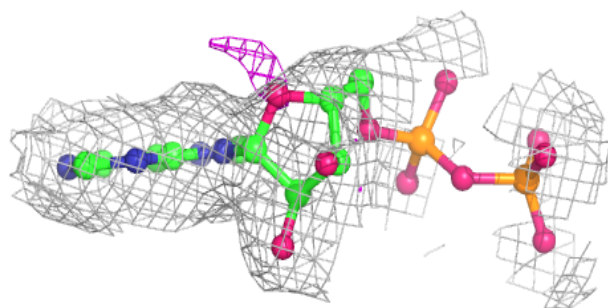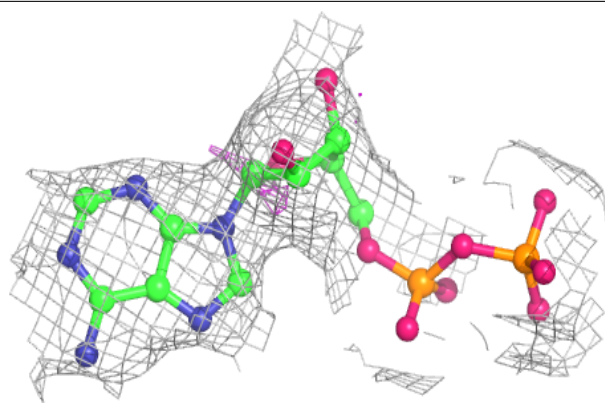In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

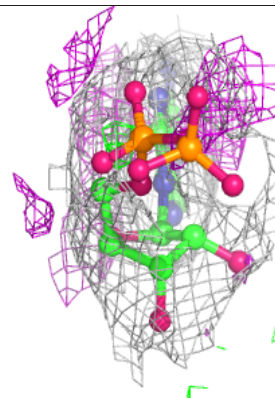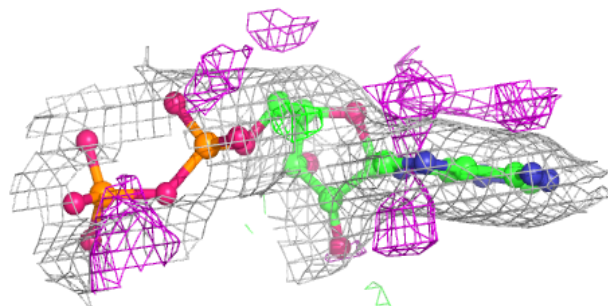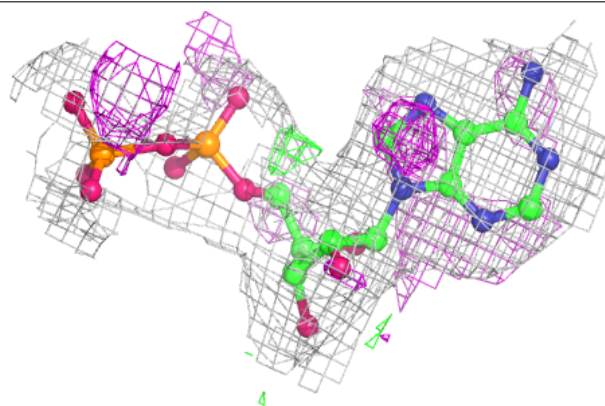| Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	PYR	A	903	6/6	0.73	0.17	84,99,107,112	0
3	MG	B	903	1/1	0.79	0.17	78,78,78,78	0
3	MG	B	902	1/1	0.89	0.12	64,64,64,64	0
2	ADP	B	901	27/27	0.93	0.16	57,74,97,121	0
2	ADP	A	901	27/27	0.95	0.20	18,35,75,110	0
3	MG	A	904	1/1	0.97	0.12	87,87,87,87	0
3	MG	A	902	1/1	0.98	0.18	40,40,40,40	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around ADP B 901:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around ADP A 901:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.