Full wwPDB X-ray Structure Validation Report (i)

Mar 23, 2024 – 07:40 PM EDT

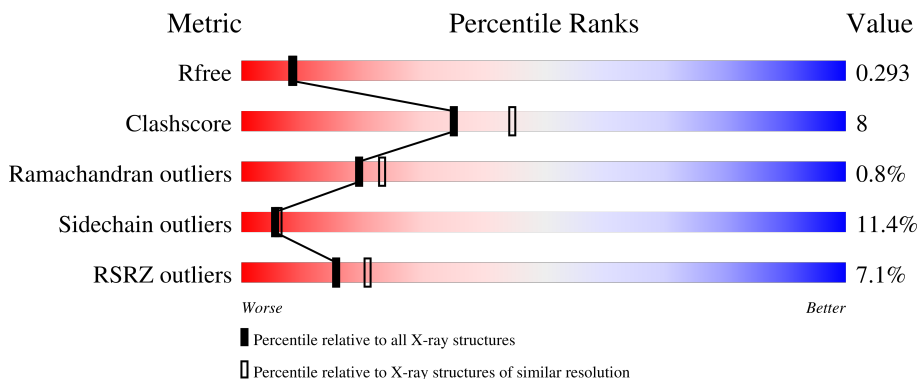|		
PDB ID	:	1Q4K
Title	:	The polo-box domain of Plk1 in complex with a phospho-peptide
Authors	:	Cheng, K.; Lowe, E.D.; Sinclair, J.; Nigg, E.A.; Johnson, L.N.
Deposited on	:	2003-08-04
Resolution	:	2.30 Å(reported)

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 2.30 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		0.293
Clashscore		8
Ramachandran outliers		0.8%
Sidechain outliers		11.4%
RSRZ outliers		7.1%

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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	259	7% / 64% 18% · 14%
1	B	259	3% / 63% 20% · 14%
1	C	259	8% / 59% 21% · 17%
2	D	6	50% 50%
2	E	6	67% 33%

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Mol	Chain	Length	Quality of chain
2	F	6	

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 5707 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 Serine/threonine-protein kinase PLK.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	224	Total	C	N	O	S	0	0	0
			1822	1153	317	341	11			
1	A	222	Total	C	N	O	S	0	0	0
			1803	1143	312	337	11			
1	C	214	Total	C	N	O	S	0	0	0
			1744	1108	300	325	11			

- Molecule 2 is a protein called Phospho-peptide sequence Met.Gln.Ser.pThr.Pro.Leu.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	D	6	Total	C	N	O	P	S	0	0	0
			49	28	7	12	1	1			
2	E	6	Total	C	N	O	P	S	0	0	0
			49	28	7	12	1	1			
2	F	6	Total	C	N	O	P	S	0	0	0
			49	28	7	12	1	1			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	78	Total	O	0	0
			78	78		
3	A	55	Total	O	0	0
			55	55		
3	C	43	Total	O	0	0
			43	43		
3	D	2	Total	O	0	0
			2	2		
3	E	8	Total	O	0	0
			8	8		
3	F	5	Total	O	0	0
			5	5		

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: Serine/threonine-protein kinase PLK
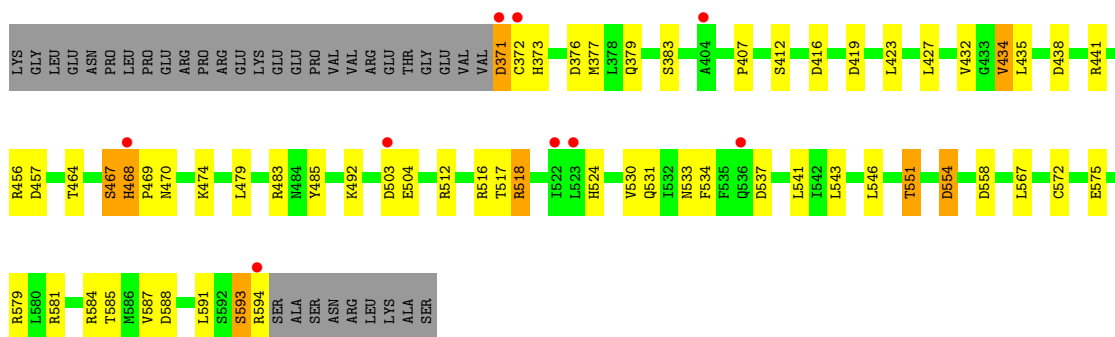
- Molecule 1: Serine/threonine-protein kinase PLK

- Molecule 1: Serine/threonine-protein kinase PLK

S450 E455 R456 D457 Y462 L463 T464 V465 H468 P469 N470 S471 L472 M473 K474 K475 I476 T477 L478 L479 K480 Y481 F482 R483 N484 Y485 L490 L491 K492 A493 G494 ALA ASN ILE THR PRO ARG GLU GLY D503 F504 L505 L508 R518 S519 I522 L523 H524 V530 Q531 I532 N533

Q536 D537 H538 T539 K540 L541 I542 L543 T551 Y552 I553 R557 D558 F559 K574 E575 R579 R584 T585 M586 V587 D588 K589 L590 L591 S592 S593 ARG SER ALA SER ASN ARG LEU LYS ALA SER
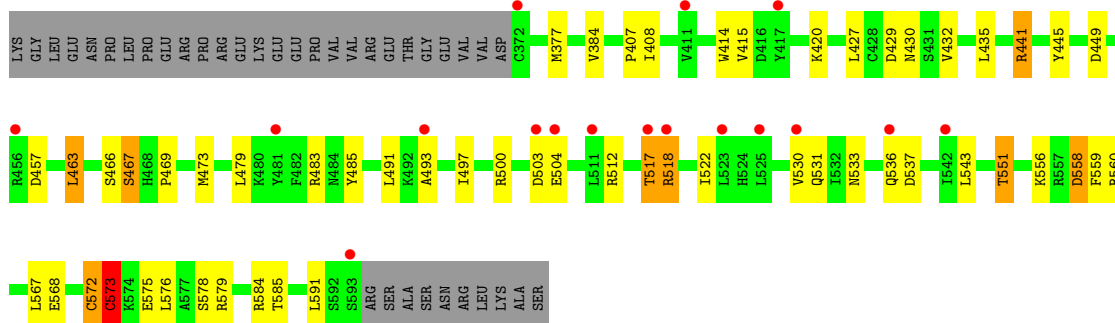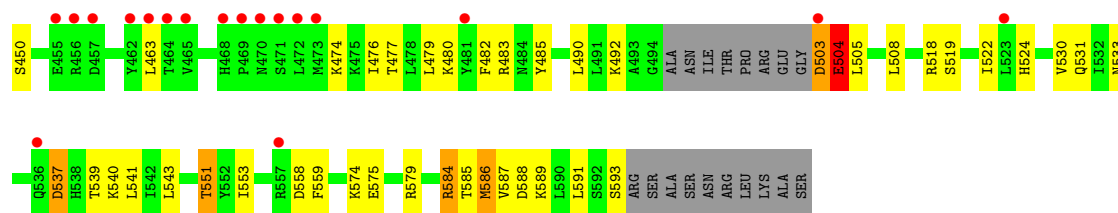
• Molecule 2: Phospho-peptide sequence Met.Gln.Ser.pThr.Pro.Leu

Chain D:

50% 50%

M1 Q2 S3 T4 P5 L6

• Molecule 2: Phospho-peptide sequence Met.Gln.Ser.pThr.Pro.Leu

Chain E:

67% 33%

M1 Q2 S3 T4 P5 L6

• Molecule 2: Phospho-peptide sequence Met.Gln.Ser.pThr.Pro.Leu

Chain F:

17%

33% 33% 33%

M1 Q2 S3 T4 P5 L6

4 Data and refinement statistics ⓘ

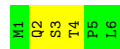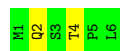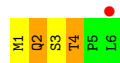| Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	57.07Å 56.89Å 85.05Å 91.45° 103.21° 118.50°	Depositor
Resolution (Å)	29.36 – 2.30 29.31 – 2.30	Depositor EDS
% Data completeness (in resolution range)	96.2 (29.36-2.30) 96.2 (29.31-2.30)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	4.04 (at 2.31Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.245 , 0.312 0.237 , 0.293	Depositor DCC
R_{free} test set	1943 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	41.8	Xtriage
Anisotropy	0.077	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 48.0	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.019 for -h-k,k,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	5707	wwPDB-VP
Average B, all atoms (Å^2)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.96% 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 ⓘ

5.1   Standard geometry ⓘ

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

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	0.58	0/1841	0.85	6/2489 (0.2%)
1	B	0.59	0/1860	0.88	9/2514 (0.4%)
1	C	0.47	0/1780	0.80	5/2404 (0.2%)
2	D	0.56	0/37	0.76	0/46
2	E	0.75	0/37	1.13	0/46
2	F	0.60	0/37	0.68	0/46
All	All	0.55	0/5592	0.84	20/7545 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2

There are no bond length outliers.

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	537	ASP	CB-CG-OD2	6.85	124.46	118.30
1	C	376	ASP	CB-CG-OD2	6.68	124.31	118.30
1	B	554	ASP	CB-CG-OD2	6.46	124.12	118.30
1	A	537	ASP	CB-CG-OD2	6.37	124.03	118.30
1	C	416	ASP	CB-CG-OD2	6.29	123.96	118.30
1	C	588	ASP	CB-CG-OD2	6.00	123.70	118.30
1	B	503	ASP	CB-CG-OD2	5.84	123.56	118.30
1	A	558	ASP	CB-CG-OD2	5.81	123.53	118.30
1	B	371	ASP	CB-CG-OD2	5.71	123.44	118.30
1	B	558	ASP	CB-CG-OD2	5.66	123.40	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	457	ASP	CB-CG-OD2	5.65	123.38	118.30
1	B	376	ASP	CB-CG-OD2	5.61	123.35	118.30
1	C	503	ASP	CB-CG-OD2	5.44	123.20	118.30
1	B	588	ASP	CB-CG-OD1	5.38	123.15	118.30
1	A	573	CYS	CB-CA-C	-5.28	99.84	110.40
1	B	438	ASP	CB-CG-OD2	5.21	122.99	118.30
1	A	517	THR	N-CA-C	5.17	124.95	111.00
1	C	558	ASP	CB-CG-OD2	5.09	122.88	118.30
1	A	449	ASP	CB-CG-OD2	5.05	122.85	118.30
1	B	457	ASP	CB-CG-OD2	5.04	122.83	118.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	517	THR	Peptide
1	A	572	CYS	Peptide

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	1803	0	1789	35	1
1	B	1822	0	1806	27	1
1	C	1744	0	1730	29	1
2	D	49	0	48	2	0
2	E	49	0	48	1	0
2	F	49	0	48	3	0
3	A	55	0	0	1	0
3	B	78	0	0	6	1
3	C	43	0	0	3	0
3	D	2	0	0	0	0
3	E	8	0	0	0	0
3	F	5	0	0	0	0
All	All	5707	0	5469	90	2

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 8.

All (90) 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:463:LEU:HD21	1:A:469:PRO:HD2	1.54	0.89
1:B:517:THR:C	3:B:36:HOH:O	2.16	0.82
1:A:493:ALA:O	3:A:21:HOH:O	2.04	0.75
1:B:432:VAL:HG12	1:B:479:LEU:HD11	1.69	0.74
1:A:384:VAL:HA	1:A:568:GLU:HG2	1.72	0.71
1:C:537:ASP:HB3	1:C:539:THR:HG23	1.71	0.70
1:B:531:GLN:HE21	1:B:533:ASN:HD21	1.41	0.69
1:B:416:ASP:OD2	1:B:516:ARG:NH1	2.27	0.67
1:A:463:LEU:HD21	1:A:469:PRO:CD	2.25	0.66
1:A:518:ARG:NE	1:A:518:ARG:H	1.93	0.66
1:C:374:LEU:HD21	1:C:524:HIS:ND1	2.11	0.66
1:A:377:MET:CE	1:A:543:LEU:HD13	2.29	0.63
1:A:432:VAL:HG12	1:A:479:LEU:HD11	1.82	0.61
1:B:377:MET:CE	1:B:543:LEU:HD13	2.29	0.61
1:C:476:ILE:O	1:C:480:LYS:HG3	2.00	0.60
1:C:377:MET:CE	1:C:543:LEU:HD13	2.31	0.60
1:A:531:GLN:HE21	1:A:533:ASN:HD21	1.49	0.60
1:A:377:MET:HE1	1:A:543:LEU:HB2	1.84	0.59
1:B:407:PRO:HD3	1:B:551:THR:HG21	1.86	0.58
1:A:522:ILE:N	1:A:522:ILE:HD12	2.19	0.57
1:A:567:LEU:HD22	1:A:572:CYS:HB3	1.90	0.54
1:A:435:LEU:HD13	1:A:441:ARG:HD3	1.89	0.54
1:B:434:VAL:HG12	1:B:479:LEU:HD13	1.90	0.54
1:B:534:PHE:CE1	1:B:579:ARG:HD2	2.43	0.54
1:C:531:GLN:HE21	1:C:533:ASN:HD21	1.55	0.54
1:A:573:CYS:HB3	1:A:576:LEU:H	1.74	0.53
1:C:377:MET:HE2	1:C:587:VAL:HG21	1.91	0.53
1:A:485:TYR:OH	2:D:2:GLN:NE2	2.43	0.52
1:C:586:MET:HA	1:C:586:MET:CE	2.39	0.52
1:B:468:HIS:N	1:B:468:HIS:ND1	2.57	0.52
1:A:518:ARG:H	1:A:518:ARG:CD	2.19	0.52
1:B:469:PRO:HD2	3:B:23:HOH:O	2.09	0.52
1:B:377:MET:HE3	1:B:543:LEU:HD13	1.92	0.52
1:A:463:LEU:CD2	1:A:469:PRO:HD2	2.35	0.51
1:C:485:TYR:OH	2:F:2:GLN:NE2	2.44	0.51
1:C:585:THR:HG21	3:C:73:HOH:O	2.10	0.51
1:B:377:MET:SD	1:B:530:VAL:HG13	2.51	0.50
1:C:522:ILE:HG12	1:C:586:MET:HG2	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:518:ARG:N	3:B:36:HOH:O	2.43	0.49
1:A:377:MET:HE3	1:A:543:LEU:HD13	1.95	0.49
1:B:575:GLU:O	1:B:579:ARG:HG2	2.12	0.49
1:A:497:ILE:HG13	1:A:559:PHE:CD1	2.48	0.49
1:C:374:LEU:HD21	1:C:524:HIS:CE1	2.48	0.48
1:B:373:HIS:CD2	1:B:546:LEU:HD21	2.49	0.48
1:A:466:SER:O	1:A:467:SER:CB	2.62	0.47
1:A:429:ASP:O	1:A:430:ASN:HB2	2.14	0.47
1:A:432:VAL:HG21	1:A:483:ARG:HG3	1.95	0.47
1:B:377:MET:HE2	1:B:587:VAL:HG21	1.95	0.47
1:B:432:VAL:HG12	1:B:479:LEU:CD1	2.42	0.47
1:C:414:TRP:CD1	2:F:3:SER:HB3	2.49	0.47
1:C:415:VAL:HG21	1:C:482:PHE:HD2	1.80	0.47
1:B:485:TYR:OH	2:E:2:GLN:NE2	2.46	0.47
1:C:575:GLU:O	1:C:579:ARG:HG2	2.16	0.46
1:C:522:ILE:HG12	1:C:586:MET:CG	2.46	0.46
1:C:407:PRO:CD	1:C:551:THR:HG21	2.46	0.45
1:C:477:THR:HA	1:C:480:LYS:HE3	1.99	0.45
1:C:463:LEU:N	1:C:463:LEU:HD12	2.31	0.45
1:B:593:SER:HB2	3:B:55:HOH:O	2.15	0.45
1:C:413:LYS:HD3	1:C:490:LEU:HB2	1.98	0.45
1:A:432:VAL:HG21	1:A:483:ARG:CG	2.47	0.45
1:B:373:HIS:NE2	1:B:546:LEU:HD21	2.32	0.44
1:C:540:LYS:NZ	2:F:4:TPO:O1P	2.49	0.44
1:A:384:VAL:HA	1:A:568:GLU:CG	2.46	0.44
1:C:553:ILE:HD11	1:C:559:PHE:CE1	2.53	0.44
1:B:468:HIS:HA	3:B:23:HOH:O	2.18	0.43
1:A:466:SER:O	1:A:466:SER:OG	2.32	0.43
1:B:518:ARG:NH1	1:A:568:GLU:O	2.48	0.42
1:A:377:MET:HE1	1:A:543:LEU:CB	2.49	0.42
1:B:567:LEU:HD22	1:B:572:CYS:HB3	2.01	0.42
1:A:377:MET:SD	1:A:530:VAL:HG13	2.59	0.42
1:C:382:HIS:ND1	1:C:584:ARG:NH2	2.68	0.42
1:C:503:ASP:O	1:C:505:LEU:N	2.44	0.42
1:C:503:ASP:C	1:C:504:GLU:HG3	2.40	0.42
1:C:586:MET:HA	1:C:586:MET:HE2	2.01	0.42
1:B:464:THR:O	1:B:467:SER:O	2.38	0.41
1:A:407:PRO:CD	1:A:551:THR:HG21	2.50	0.41
1:A:415:VAL:HG23	1:A:415:VAL:O	2.19	0.41
1:C:377:MET:SD	1:C:530:VAL:HG13	2.60	0.41
1:C:432:VAL:HG12	1:C:479:LEU:CD1	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:512:ARG:HB2	1:B:524:HIS:CD2	2.55	0.41
1:A:575:GLU:OE1	1:A:579:ARG:NH2	2.54	0.41
1:A:408:ILE:HD13	1:A:500:ARG:CG	2.51	0.41
1:A:435:LEU:HD13	1:A:441:ARG:HH11	1.86	0.41
1:A:522:ILE:N	1:A:522:ILE:CD1	2.83	0.41
1:C:551:THR:HG22	3:C:46:HOH:O	2.20	0.41
1:A:414:TRP:CD1	2:D:3:SER:HB3	2.56	0.40
1:C:504:GLU:OE1	3:C:3:HOH:O	2.22	0.40
1:A:407:PRO:HD3	1:A:551:THR:HG21	2.02	0.40
1:B:524:HIS:CD2	1:B:524:HIS:C	2.95	0.40
1:B:581:ARG:NH1	3:B:58:HOH:O	2.54	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:589:LYS:NZ	3:B:13:HOH:O[1_554]	1.91	0.29
1:B:419:ASP:OD2	1:A:445:TYR:OH[1_455]	2.19	0.01

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	220/259 (85%)	206 (94%)	11 (5%)	3 (1%)	11	11
1	B	222/259 (86%)	206 (93%)	15 (7%)	1 (0%)	29	35
1	C	210/259 (81%)	198 (94%)	11 (5%)	1 (0%)	29	35
2	D	3/6 (50%)	3 (100%)	0	0	100	100
2	E	3/6 (50%)	3 (100%)	0	0	100	100
2	F	3/6 (50%)	3 (100%)	0	0	100	100
All	All	661/795 (83%)	619 (94%)	37 (6%)	5 (1%)	19	23

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	467	SER
1	A	504	GLU
1	A	573	CYS
1	C	504	GLU
1	B	504	GLU

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	201/234 (86%)	182 (90%)	19 (10%)	8	10
1	B	203/234 (87%)	177 (87%)	26 (13%)	4	4
1	C	195/234 (83%)	172 (88%)	23 (12%)	5	5
2	D	5/5 (100%)	5 (100%)	0	100	100
2	E	5/5 (100%)	5 (100%)	0	100	100
2	F	5/5 (100%)	3 (60%)	2 (40%)	0	0
All	All	614/717 (86%)	544 (89%)	70 (11%)	5	6

All (70) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	371	ASP
1	B	372	CYS
1	B	379	GLN
1	B	383	SER
1	B	412	SER
1	B	423	LEU
1	B	427	LEU
1	B	434	VAL
1	B	435	LEU
1	B	441	ARG
1	B	456	ARG
1	B	467	SER

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Mol	Chain	Res	Type
1	B	468	HIS
1	B	470	ASN
1	B	474	LYS
1	B	483	ARG
1	B	492	LYS
1	B	518	ARG
1	B	541	LEU
1	B	551	THR
1	B	554	ASP
1	B	584	ARG
1	B	585	THR
1	B	591	LEU
1	B	593	SER
1	B	594	ARG
1	A	420	LYS
1	A	427	LEU
1	A	441	ARG
1	A	463	LEU
1	A	473	MET
1	A	491	LEU
1	A	503	ASP
1	A	512	ARG
1	A	518	ARG
1	A	536	GLN
1	A	551	THR
1	A	556	LYS
1	A	558	ASP
1	A	560	ARG
1	A	573	CYS
1	A	578	SER
1	A	584	ARG
1	A	585	THR
1	A	591	LEU
1	C	392	ARG
1	C	398	GLU
1	C	412	SER
1	C	420	LYS
1	C	423	LEU
1	C	427	LEU
1	C	449	ASP
1	C	450	SER
1	C	474	LYS

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Mol	Chain	Res	Type
1	C	483	ARG
1	C	492	LYS
1	C	504	GLU
1	C	508	LEU
1	C	518	ARG
1	C	519	SER
1	C	537	ASP
1	C	541	LEU
1	C	551	THR
1	C	574	LYS
1	C	584	ARG
1	C	586	MET
1	C	591	LEU
1	C	593	SER
2	F	1	MET
2	F	2	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	489	HIS
1	B	524	HIS
1	B	533	ASN
1	A	524	HIS
1	A	533	ASN
1	C	468	HIS
1	C	524	HIS
1	C	533	ASN
2	D	2	GLN
2	E	2	GLN
2	F	2	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

3 non-standard protein/DNA/RNA residues 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	TPO	E	4	2	8,10,11	3.19	4 (50%)	10,14,16	2.68	4 (40%)
2	TPO	F	4	2	8,10,11	3.57	4 (50%)	10,14,16	2.83	3 (30%)
2	TPO	D	4	2	8,10,11	3.43	4 (50%)	10,14,16	2.80	5 (50%)

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	TPO	E	4	2	-	0/9/11/13	-
2	TPO	F	4	2	-	1/9/11/13	-
2	TPO	D	4	2	-	2/9/11/13	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	4	TPO	P-O1P	6.20	1.70	1.50
2	D	4	TPO	P-O1P	5.80	1.69	1.50
2	F	4	TPO	O-C	5.65	1.42	1.19
2	E	4	TPO	O-C	5.62	1.42	1.19
2	D	4	TPO	O-C	5.54	1.42	1.19
2	E	4	TPO	P-O1P	5.10	1.67	1.50
2	F	4	TPO	P-O3P	3.89	1.69	1.54
2	F	4	TPO	P-O2P	3.71	1.69	1.54
2	D	4	TPO	P-O2P	3.68	1.69	1.54
2	D	4	TPO	P-O3P	3.55	1.68	1.54
2	E	4	TPO	P-O3P	3.51	1.68	1.54
2	E	4	TPO	P-O2P	3.34	1.67	1.54

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	4	TPO	O2P-P-OG1	-6.26	77.96	105.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	4	TPO	O2P-P-OG1	-5.36	81.96	105.99
2	E	4	TPO	O3P-P-O2P	4.83	126.10	107.64
2	F	4	TPO	O3P-P-O2P	4.45	124.63	107.64
2	D	4	TPO	O-C-CA	-4.16	113.87	124.78
2	E	4	TPO	O2P-P-OG1	-4.00	88.06	105.99
2	E	4	TPO	O-C-CA	-3.76	114.93	124.78
2	E	4	TPO	O3P-P-OG1	-3.42	90.68	105.99
2	F	4	TPO	O-C-CA	-3.31	116.11	124.78
2	D	4	TPO	O3P-P-O2P	2.90	118.72	107.64
2	D	4	TPO	O3P-P-O1P	2.86	121.89	110.68
2	D	4	TPO	O3P-P-OG1	-2.25	95.91	105.99

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	4	TPO	CB-OG1-P-O2P
2	F	4	TPO	CB-OG1-P-O2P
2	D	4	TPO	CB-OG1-P-O3P

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	F	4	TPO	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

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(Å²)	Q<0.9
1	A	222/259 (85%)	0.39	17 (7%)	13	17	30, 45, 59, 67	0
1	B	224/259 (86%)	0.19	9 (4%)	38	45	27, 41, 57, 65	0
1	C	214/259 (82%)	0.62	21 (9%)	7	10	35, 53, 91, 95	0
2	D	5/6 (83%)	0.62	0	100	100	51, 53, 55, 57	0
2	E	5/6 (83%)	0.10	0	100	100	38, 40, 42, 44	0
2	F	5/6 (83%)	1.57	1 (20%)	1	1	48, 52, 56, 57	0
All	All	675/795 (84%)	0.40	48 (7%)	16	21	27, 46, 65, 95	0

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	372	CYS	6.6
1	B	372	CYS	6.0
1	C	469	PRO	5.3
1	C	465	VAL	5.1
1	C	463	LEU	5.0
2	F	6	LEU	4.4
1	C	464	THR	4.2
1	A	417	TYR	4.2
1	C	456	ARG	4.0
1	A	536	GLN	4.0
1	B	468	HIS	3.9
1	C	481	TYR	3.8
1	A	517	THR	3.7
1	C	471	SER	3.7
1	B	594	ARG	3.6
1	A	411	VAL	3.6
1	A	372	CYS	3.6
1	B	371	ASP	3.6
1	C	403	PRO	3.3

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Mol	Chain	Res	Type	RSRZ
1	C	503	ASP	3.2
1	C	468	HIS	3.0
1	A	503	ASP	2.7
1	C	462	TYR	2.7
1	A	530	VAL	2.7
1	A	481	TYR	2.7
1	C	557	ARG	2.6
1	A	542	ILE	2.6
1	A	493	ALA	2.5
1	C	404	ALA	2.5
1	C	457	ASP	2.5
1	C	470	ASN	2.4
1	C	472	LEU	2.4
1	B	536	GLN	2.4
1	A	456	ARG	2.4
1	C	523	LEU	2.3
1	C	473	MET	2.3
1	A	504	GLU	2.3
1	C	536	GLN	2.2
1	A	525	LEU	2.2
1	B	503	ASP	2.2
1	B	522	ILE	2.2
1	A	511	LEU	2.2
1	A	518	ARG	2.2
1	B	523	LEU	2.2
1	A	593	SER	2.1
1	A	523	LEU	2.0
1	C	455	GLU	2.0
1	B	404	ALA	2.0

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

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
2	TPO	D	4	11/12	0.95	0.12	47,49,50,51	0
2	TPO	F	4	11/12	0.96	0.10	44,47,49,49	0
2	TPO	E	4	11/12	0.99	0.13	32,35,36,37	0

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.