Full wwPDB X-ray Structure Validation Report (i)

Jun 26, 2024 – 03:22 AM EDT

PDB ID	:	7AKA
Title	:	Structure of DYRK1A in complex with compound 54
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Deposited on	:	2020-09-30
Resolution	:	1.90 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 (i)) were used in the production of this report:

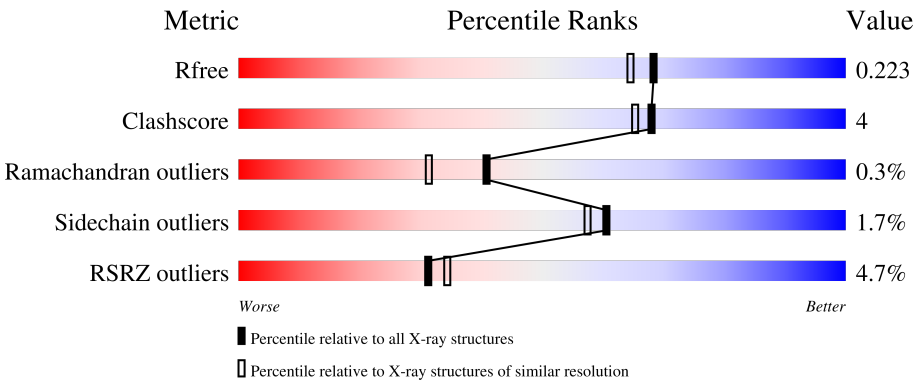
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 1.90 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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	359	3% 85% 6% • 7%
1	B	359	6% 85% 8% • 6%

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
4	PO4	B	502	-	-	X	-

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 5813 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 Dual specificity tyrosine-phosphorylation-regulated kinase 1A.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	333	2716	1748	470	477	3	18	0	1	0
1	B	336	2713	1744	468	481	2	18	0	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	127	MET	-	initiating methionine	UNP Q13627
A	128	GLY	-	expression tag	UNP Q13627
A	129	SER	-	expression tag	UNP Q13627
A	130	SER	-	expression tag	UNP Q13627
A	131	HIS	-	expression tag	UNP Q13627
A	132	HIS	-	expression tag	UNP Q13627
A	133	HIS	-	expression tag	UNP Q13627
A	134	HIS	-	expression tag	UNP Q13627
A	135	HIS	-	expression tag	UNP Q13627
A	136	HIS	-	expression tag	UNP Q13627
A	137	SER	-	expression tag	UNP Q13627
A	138	SER	-	expression tag	UNP Q13627
A	139	GLY	-	expression tag	UNP Q13627
A	140	LEU	-	expression tag	UNP Q13627
A	141	VAL	-	expression tag	UNP Q13627
A	142	PRO	-	expression tag	UNP Q13627
A	143	ARG	-	expression tag	UNP Q13627
A	144	GLY	-	expression tag	UNP Q13627
A	145	SEP	-	expression tag	UNP Q13627
A	146	HIS	-	expression tag	UNP Q13627
A	147	MET	-	expression tag	UNP Q13627
B	127	MET	-	initiating methionine	UNP Q13627
B	128	GLY	-	expression tag	UNP Q13627
B	129	SER	-	expression tag	UNP Q13627
B	130	SER	-	expression tag	UNP Q13627

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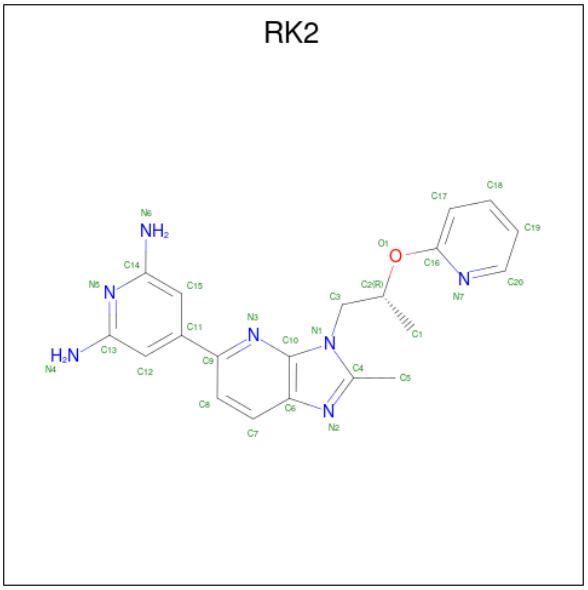
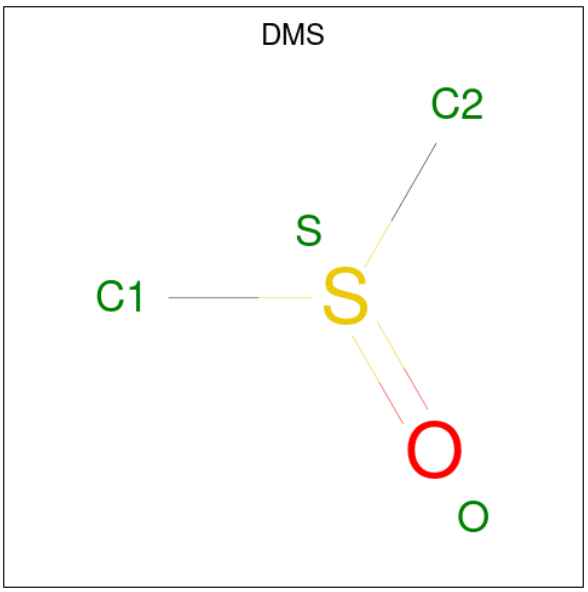
Chain	Residue	Modelled	Actual	Comment	Reference
B	131	HIS	-	expression tag	UNP Q13627
B	132	HIS	-	expression tag	UNP Q13627
B	133	HIS	-	expression tag	UNP Q13627
B	134	HIS	-	expression tag	UNP Q13627
B	135	HIS	-	expression tag	UNP Q13627
B	136	HIS	-	expression tag	UNP Q13627
B	137	SER	-	expression tag	UNP Q13627
B	138	SER	-	expression tag	UNP Q13627
B	139	GLY	-	expression tag	UNP Q13627
B	140	LEU	-	expression tag	UNP Q13627
B	141	VAL	-	expression tag	UNP Q13627
B	142	PRO	-	expression tag	UNP Q13627
B	143	ARG	-	expression tag	UNP Q13627
B	144	GLY	-	expression tag	UNP Q13627
B	145	SEP	-	expression tag	UNP Q13627
B	146	HIS	-	expression tag	UNP Q13627
B	147	MET	-	expression tag	UNP Q13627

- Molecule 2 is 4-[2-methyl-3-[(2 {R})-2-pyridin-2-yloxypropyl]imidazo[4,5-b]pyridin-5-yl]pyridine-2,6-diamine (three-letter code: RK2) (formula: $C_{20}H_{21}N_7O$) (labeled as "Ligand of Interest" by depositor).



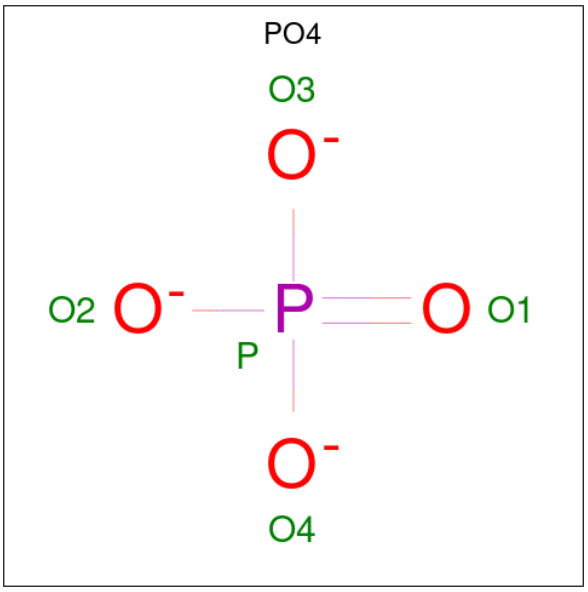
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	28	20	7	1	0	0
			Total	C	N	O		
2	B	1	28	20	7	1	0	0

- Molecule 3 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C_2H_6OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	S		
3	A	1	4	2	1	1	0	0

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
4	B	1	5	4	1	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
5	B	1	1	1	0	0

- Molecule 6 is water.

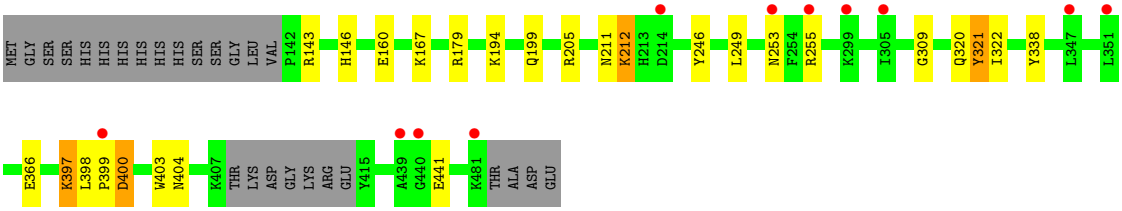
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	169	169	169	0	0
			Total	O		
6	B	149	149	149	0	0

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.

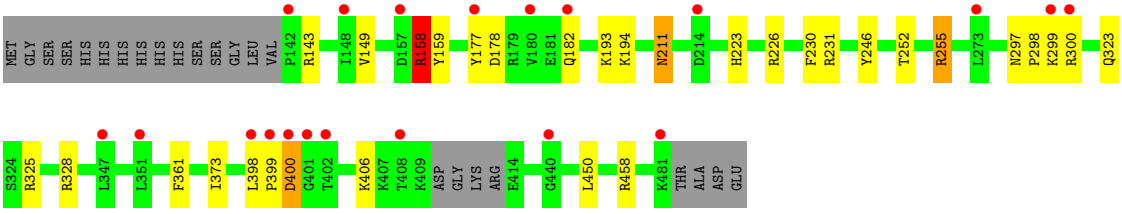
• Molecule 1: Dual specificity tyrosine-phosphorylation-regulated kinase 1A

Chain A:



• Molecule 1: Dual specificity tyrosine-phosphorylation-regulated kinase 1A

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	57.83Å 84.62Å 84.24Å 90.00° 107.68° 90.00°	Depositor
Resolution (Å)	25.00 – 1.90 24.97 – 1.90	Depositor EDS
% Data completeness (in resolution range)	97.7 (25.00-1.90) 97.7 (24.97-1.90)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.15 (at 1.90Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.172 , 0.211 0.187 , 0.223	Depositor DCC
R_{free} test set	2902 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å^2)	32.2	Xtriage
Anisotropy	0.121	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 40.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.028 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	5813	wwPDB-VP
Average B, all atoms (Å^2)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.57% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: RK2, PO4, DMS, SEP, CL, PTR

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	0.69	1/2738 (0.0%)	0.82	0/3687
1	B	0.69	0/2748	0.84	4/3705 (0.1%)
All	All	0.69	1/5486 (0.0%)	0.83	4/7392 (0.1%)

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	B	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	366	GLU	CD-OE2	6.61	1.32	1.25

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	325	ARG	NE-CZ-NH2	-6.19	117.20	120.30
1	B	406	LYS	CB-CA-C	5.59	121.57	110.40
1	B	325	ARG	NE-CZ-NH1	5.55	123.07	120.30
1	B	458	ARG	NE-CZ-NH2	-5.06	117.77	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	158	ARG	Peptide

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	2716	0	2729	26	0
1	B	2713	0	2707	21	0
2	A	28	0	0	0	0
2	B	28	0	0	0	0
3	A	4	0	6	0	0
4	B	5	0	0	2	0
5	B	1	0	0	0	0
6	A	169	0	0	4	0
6	B	149	0	0	1	0
All	All	5813	0	5442	42	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 4.

All (42) 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:321[A]:PTR:O2P	1:A:321[A]:PTR:HE1	1.76	0.84
1:B:158:ARG:HG2	1:B:158:ARG:HH11	1.50	0.76
1:B:211:ASN:HD21	1:B:223:HIS:HD2	1.33	0.74
1:A:205:ARG:NE	6:A:601:HOH:O	1.83	0.72
1:A:321[A]:PTR:O2P	1:A:321[A]:PTR:CE1	2.46	0.62
1:A:146:HIS:NE2	1:A:167:LYS:HE2	2.14	0.61
1:B:211:ASN:HD21	1:B:223:HIS:CD2	2.16	0.61
1:A:400:ASP:N	1:A:400:ASP:OD1	2.33	0.60
1:A:143:ARG:HD2	1:B:246:TYR:CE1	2.38	0.59
1:A:160:GLU:OE2	1:A:179:ARG:HD3	2.04	0.58
1:A:404:ASN:HB2	6:A:726:HOH:O	2.03	0.58
1:B:255:ARG:HG3	6:B:691:HOH:O	2.05	0.57
1:B:158:ARG:HG2	1:B:158:ARG:NH1	2.17	0.54
1:B:400:ASP:N	1:B:400:ASP:OD1	2.42	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:146:HIS:CE1	1:A:167:LYS:HE3	2.46	0.51
1:A:321[B]:PTR:O3P	1:B:194:LYS:N	2.44	0.51
1:A:146:HIS:NE2	1:A:167:LYS:CE	2.73	0.51
1:A:199:GLN:HG3	1:A:309:GLY:O	2.11	0.50
1:A:246:TYR:CE1	1:B:143:ARG:HD2	2.46	0.50
1:A:146:HIS:CE1	1:A:167:LYS:CE	2.96	0.49
1:A:212:LYS:O	1:A:212:LYS:HG3	2.13	0.48
1:A:321[B]:PTR:O3P	1:B:193:LYS:HA	2.14	0.48
1:A:253:ASN:HD22	1:A:255:ARG:HH21	1.62	0.47
1:B:328:ARG:HH22	4:B:502:PO4:P	2.37	0.47
1:B:159:TYR:OH	1:B:226:ARG:NH2	2.47	0.47
1:A:397:LYS:HE3	1:A:403:TRP:CE2	2.50	0.46
1:B:297:ASN:HB2	1:B:298:PRO:CD	2.45	0.46
1:A:211:ASN:ND2	6:A:602:HOH:O	2.23	0.46
1:A:143:ARG:CD	1:B:246:TYR:CE1	3.00	0.45
1:A:205:ARG:NH2	6:A:601:HOH:O	2.51	0.44
1:B:361:PHE:CE1	1:B:373:ILE:HA	2.54	0.43
1:B:450:LEU:HD23	1:B:450:LEU:HA	1.91	0.43
1:B:230:PHE:CE2	1:B:231:ARG:HG3	2.55	0.41
1:B:299:LYS:O	1:B:300:ARG:HG3	2.20	0.41
1:A:194:LYS:N	4:B:502:PO4:O3	2.40	0.41
1:A:398:LEU:HB3	1:A:399:PRO:HD2	2.02	0.41
1:A:249:LEU:HD23	1:A:249:LEU:HA	1.93	0.41
1:A:397:LYS:HE3	1:A:397:LYS:HB2	1.85	0.41
1:B:252:THR:HB	1:B:255:ARG:HD3	2.03	0.41
1:A:322:ILE:CD1	1:A:338:TYR:CZ	3.04	0.41
1:B:178:ASP:O	1:B:182:GLN:N	2.54	0.40
1:B:398:LEU:HB3	1:B:399:PRO:HD2	2.04	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	327/359 (91%)	316 (97%)	10 (3%)	1 (0%)	41	31
1	B	330/359 (92%)	313 (95%)	16 (5%)	1 (0%)	41	31
All	All	657/718 (92%)	629 (96%)	26 (4%)	2 (0%)	41	31

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	441	GLU
1	B	323	GLN

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	288/315 (91%)	284 (99%)	4 (1%)	67	65
1	B	288/315 (91%)	282 (98%)	6 (2%)	53	48
All	All	576/630 (91%)	566 (98%)	10 (2%)	60	57

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	212	LYS
1	A	320	GLN
1	A	397	LYS
1	A	400	ASP
1	B	149	VAL
1	B	158	ARG
1	B	177	TYR
1	B	211	ASN
1	B	255	ARG
1	B	400	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	151	ASN
1	A	201	GLN
1	A	251	ASN
1	A	320	GLN
1	A	387	GLN
1	A	469	GLN
1	B	198	ASN
1	B	201	GLN
1	B	223	HIS
1	B	251	ASN
1	B	320	GLN
1	B	425	ASN
1	B	469	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

5 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	$\#\|Z\| > 2$
1	SEP	B	145	1	8,9,10	0.60	0	8,12,14	0.94	0
1	PTR	A	321[B]	-	15,16,17	0.82	1 (6%)	19,22,24	1.32	2 (10%)
1	SEP	A	145	1	8,9,10	0.73	0	8,12,14	0.98	0
1	PTR	A	321[A]	-	15,16,17	0.46	0	19,22,24	0.66	0
1	PTR	B	321	1	15,16,17	0.46	0	19,22,24	0.95	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	SEP	B	145	1	-	1/5/8/10	-
1	PTR	A	321[B]	-	-	1/10/11/13	0/1/1/1
1	SEP	A	145	1	-	2/5/8/10	-
1	PTR	A	321[A]	-	-	1/10/11/13	0/1/1/1
1	PTR	B	321	1	-	0/10/11/13	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	321[B]	PTR	P-O3P	-2.06	1.46	1.54

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	321[B]	PTR	OH-CZ-CE2	2.95	128.00	119.23
1	A	321[B]	PTR	OH-CZ-CE1	-2.65	111.35	119.23

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	145	SEP	CB-OG-P-O2P
1	A	321[A]	PTR	CZ-OH-P-O1P
1	A	145	SEP	CA-CB-OG-P
1	A	321[B]	PTR	CZ-OH-P-O1P
1	B	145	SEP	CA-CB-OG-P

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	321[B]	PTR	2	0
1	A	321[A]	PTR	2	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 5 ligands modelled in this entry, 1 is monoatomic - leaving 4 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	$\#\|Z\| > 2$
3	DMS	A	502	-	3,3,3	0.24	0	3,3,3	0.13	0
2	RK2	B	501	-	29,31,31	0.69	0	31,44,44	1.08	4 (12%)
4	PO4	B	502	-	4,4,4	0.77	0	6,6,6	0.59	0
2	RK2	A	501	-	29,31,31	0.78	0	31,44,44	1.96	8 (25%)

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	RK2	B	501	-	-	0/10/12/12	0/4/4/4
2	RK2	A	501	-	-	5/10/12/12	0/4/4/4

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	501	RK2	O1-C2-C3	5.73	112.85	106.08
2	A	501	RK2	C1-C2-C3	-5.50	102.63	111.36
2	A	501	RK2	O1-C16-C17	3.98	120.83	115.89
2	B	501	RK2	C11-C15-C14	3.22	119.95	117.38
2	A	501	RK2	C11-C15-C14	3.09	119.86	117.38
2	A	501	RK2	C11-C12-C13	2.70	119.54	117.38
2	B	501	RK2	C8-C7-C6	-2.67	117.48	120.84
2	B	501	RK2	C11-C12-C13	2.64	119.49	117.38
2	A	501	RK2	C20-N7-C16	2.54	117.86	115.71
2	B	501	RK2	O1-C2-C3	2.41	108.92	106.08
2	A	501	RK2	C16-O1-C2	2.21	121.44	118.19
2	A	501	RK2	C8-C7-C6	-2.18	118.09	120.84

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	RK2	N7-C16-O1-C2
2	A	501	RK2	C17-C16-O1-C2
2	A	501	RK2	C1-C2-C3-N1
2	A	501	RK2	C1-C2-O1-C16
2	A	501	RK2	O1-C2-C3-N1

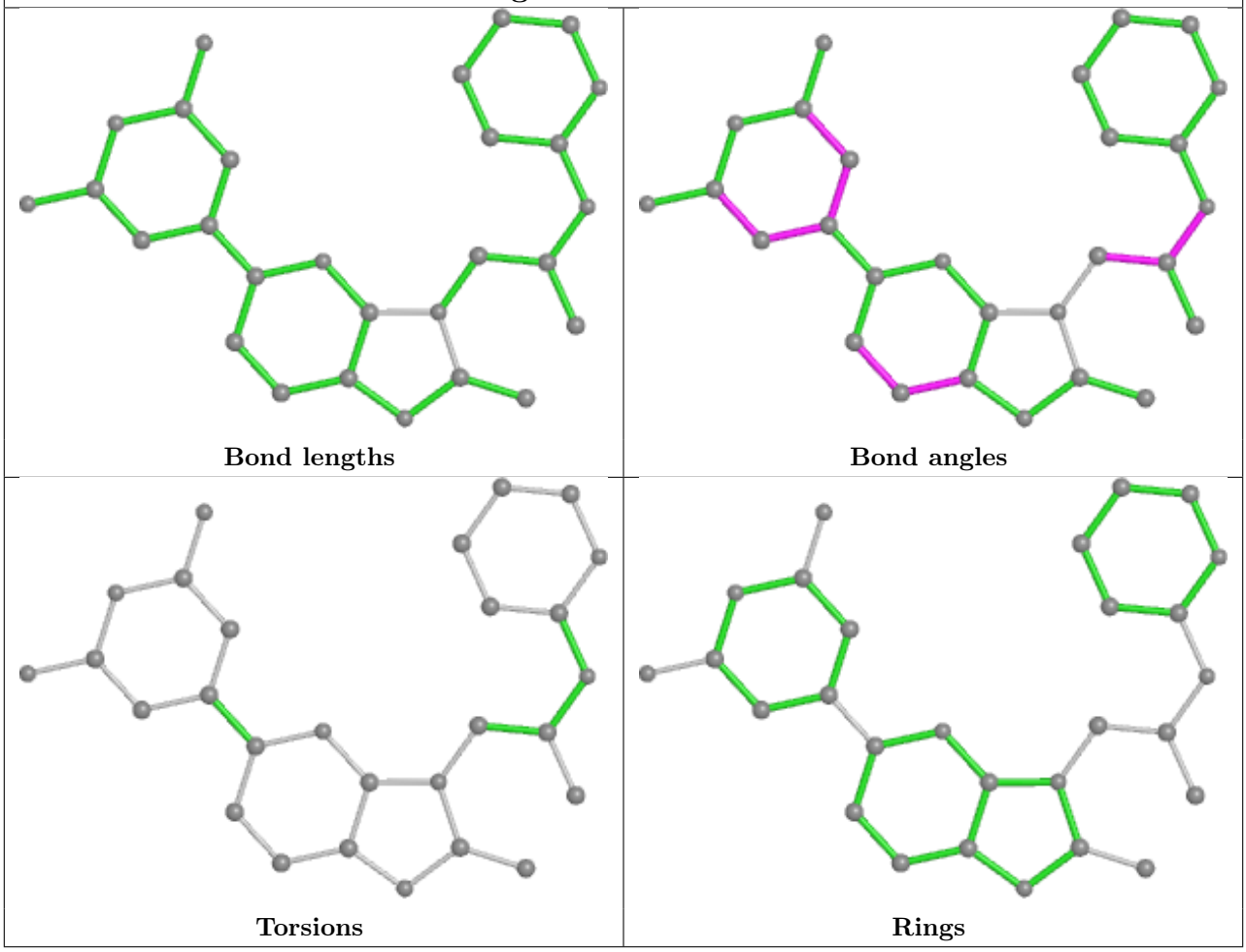
There are no ring outliers.

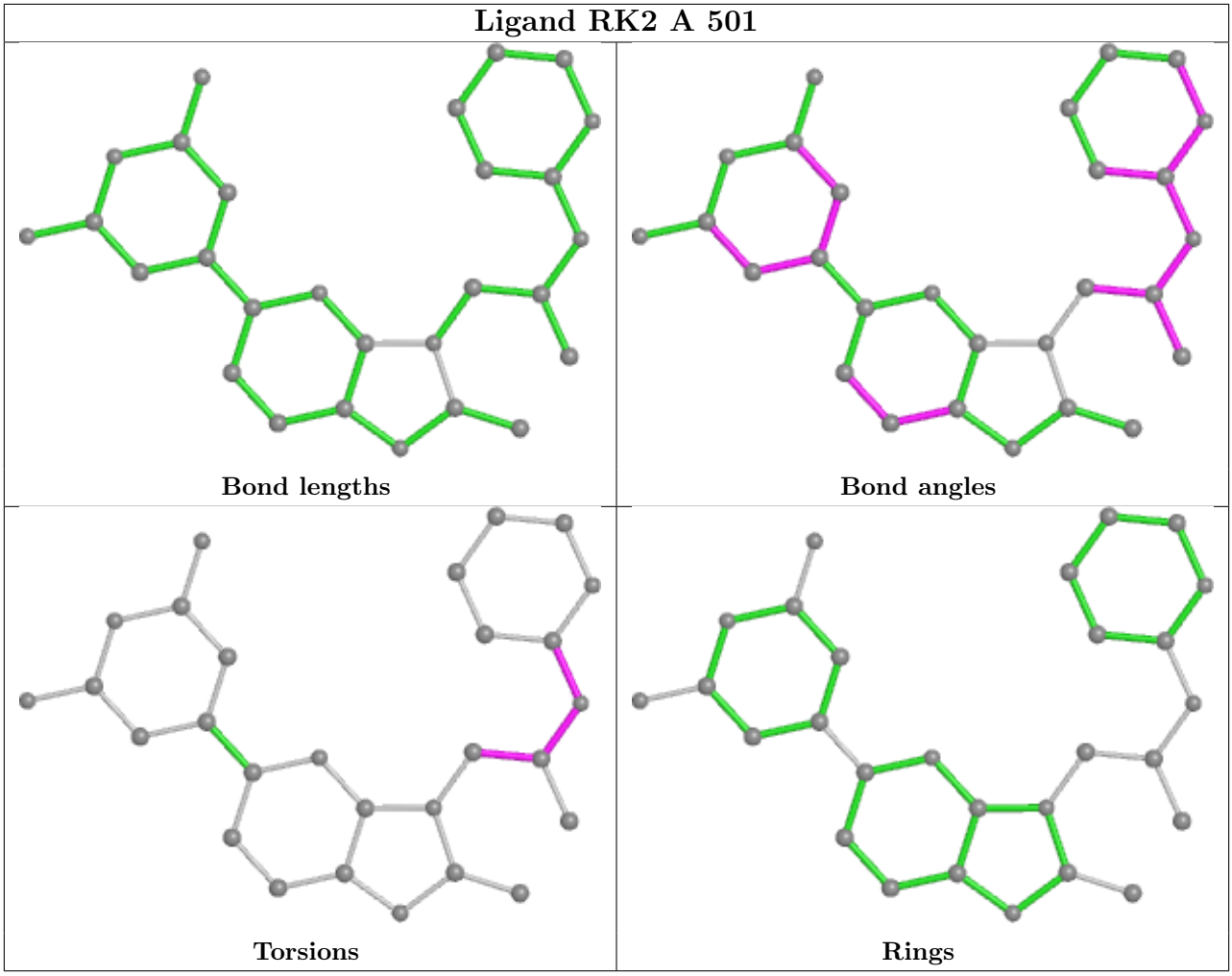
1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	502	PO4	2	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 RK2 B 501





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 (i)

6.1 Protein, DNA and RNA chains (i)

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	331/359 (92%)	-0.08	11 (3%)	46	49	23, 34, 59, 76	0
1	B	334/359 (93%)	0.09	20 (5%)	21	24	25, 38, 73, 89	0
All	All	665/718 (92%)	0.01	31 (4%)	31	34	23, 36, 68, 89	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	214	ASP	5.4
1	B	148	ILE	4.7
1	B	440	GLY	4.6
1	B	299	LYS	3.8
1	B	481	LYS	3.8
1	B	214	ASP	3.8
1	A	440	GLY	3.6
1	B	398	LEU	3.6
1	B	399	PRO	3.5
1	B	402	THR	3.4
1	B	177	TYR	3.3
1	A	351	LEU	3.2
1	B	180	VAL	3.1
1	A	439	ALA	3.0
1	B	408	THR	2.9
1	B	400	ASP	2.9
1	A	253	ASN	2.8
1	A	399	PRO	2.7
1	B	142	PRO	2.5
1	B	300	ARG	2.5
1	A	305	ILE	2.4
1	A	255	ARG	2.3
1	A	347	LEU	2.3
1	B	351	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	273	LEU	2.3
1	A	481	LYS	2.2
1	A	299	LYS	2.1
1	B	182	GLN	2.1
1	B	347	LEU	2.1
1	B	401	GLY	2.0
1	B	157	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (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, 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
1	SEP	B	145	10/11	0.84	0.14	53,70,72,79	5
1	PTR	A	321[B]	16/17	0.90	0.17	34,40,47,49	13
1	PTR	A	321[A]	16/17	0.90	0.17	34,36,50,53	13
1	SEP	A	145	10/11	0.92	0.13	35,52,81,82	0
1	PTR	B	321	16/17	0.94	0.10	39,52,66,66	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

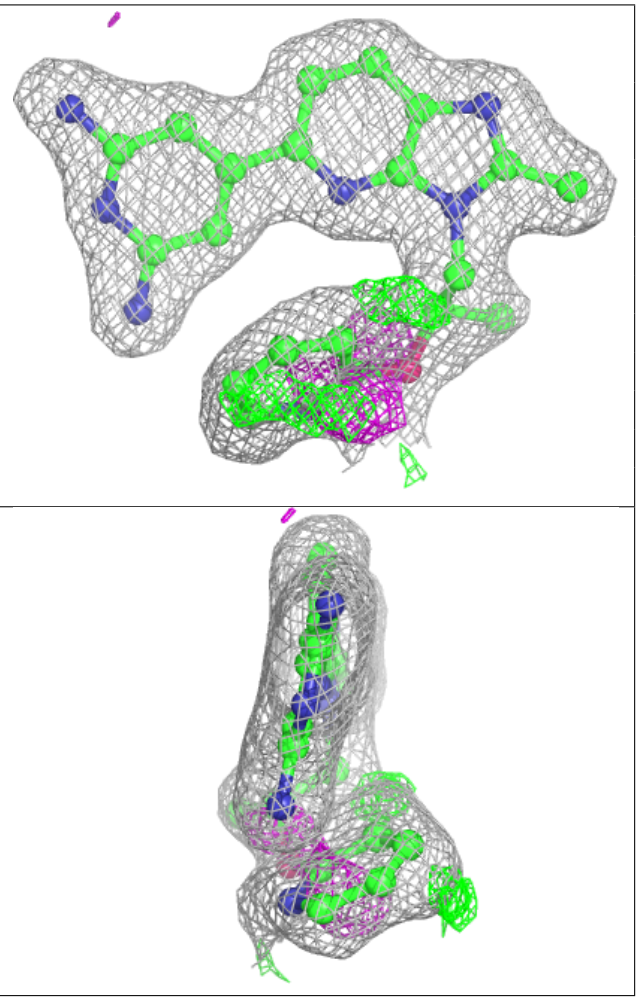
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	DMS	A	502	4/4	0.87	0.17	80,82,85,96	0
4	PO4	B	502	5/5	0.88	0.27	80,81,103,108	0
2	RK2	A	501	28/28	0.93	0.10	21,26,54,60	0
2	RK2	B	501	28/28	0.95	0.11	27,30,38,42	0
5	CL	B	503	1/1	0.99	0.09	50,50,50,50	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.

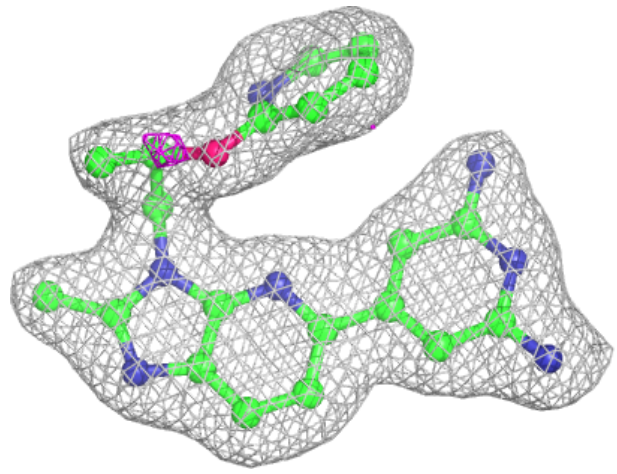
Electron density around RK2 A 501:

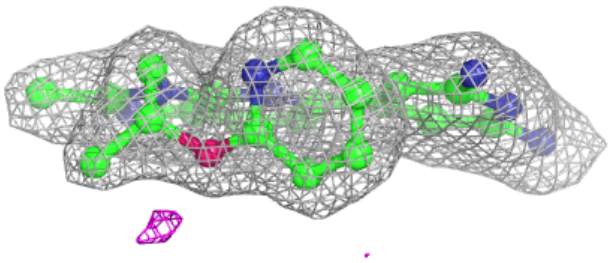
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

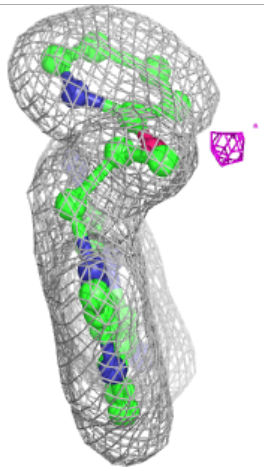


Electron density around RK2 B 501:

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 (i)

There are no such residues in this entry.