



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 16, 2017 – 08:19 PM EDT

PDB ID : 5JR7
Title : Crystal structure of an ACRDYS heterodimer [RIa(92-365):C] of PKA
Authors : Bruystens, J.G.H.; Wu, J.; Taylor, S.S.
Deposited on : unknown
Resolution : 3.56 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20029824
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20029824

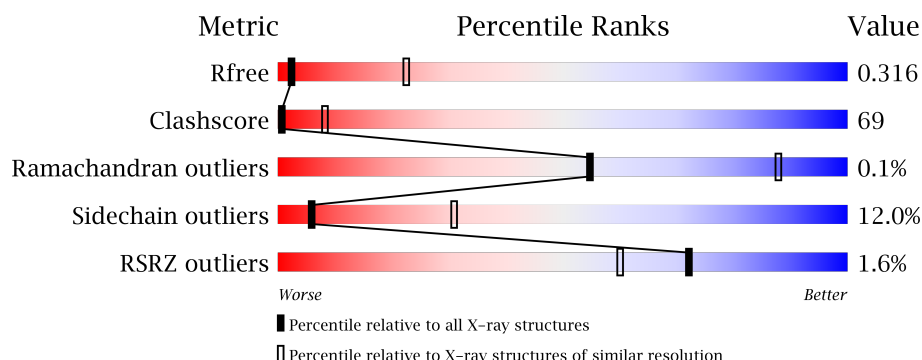
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.56 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}	100719	1072 (3.70-3.42)
Clashscore	112137	1003 (3.66-3.46)
Ramachandran outliers	110173	1153 (3.70-3.42)
Sidechain outliers	110143	1153 (3.70-3.42)
RSRZ outliers	101464	1098 (3.70-3.42)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	350	<div> <div>42%</div> <div>48%</div> <div>6%</div> <div>•</div> </div>
1	C	350	<div>2%</div> <div>37%</div> <div>52%</div> <div>8%</div> <div>•</div>
2	B	275	<div>%</div> <div>37%</div> <div>53%</div> <div>6%</div> <div>•</div>
2	D	275	<div>3%</div> <div>32%</div> <div>52%</div> <div>13%</div> <div>•</div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	ADP	C	400	-	-	-	X

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 9665 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.

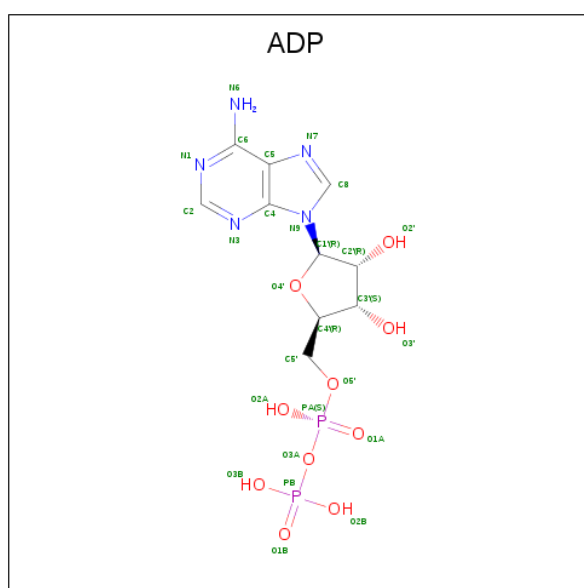
- Molecule 1 is a protein called cAMP-dependent protein kinase catalytic subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	338	Total	C	N	O	P	S	6	0	0
			2734	1773	451	499	3	8			
1	C	338	Total	C	N	O	P	S	0	0	0
			2729	1767	451	500	3	8			

- Molecule 2 is a protein called cAMP-dependent protein kinase type I-alpha regulatory subunit.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	267	Total	C	N	O	S		1	0	0
			2079	1321	354	397	7				
2	D	266	Total	C	N	O	S		1	0	0
			2069	1317	353	392	7				

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).

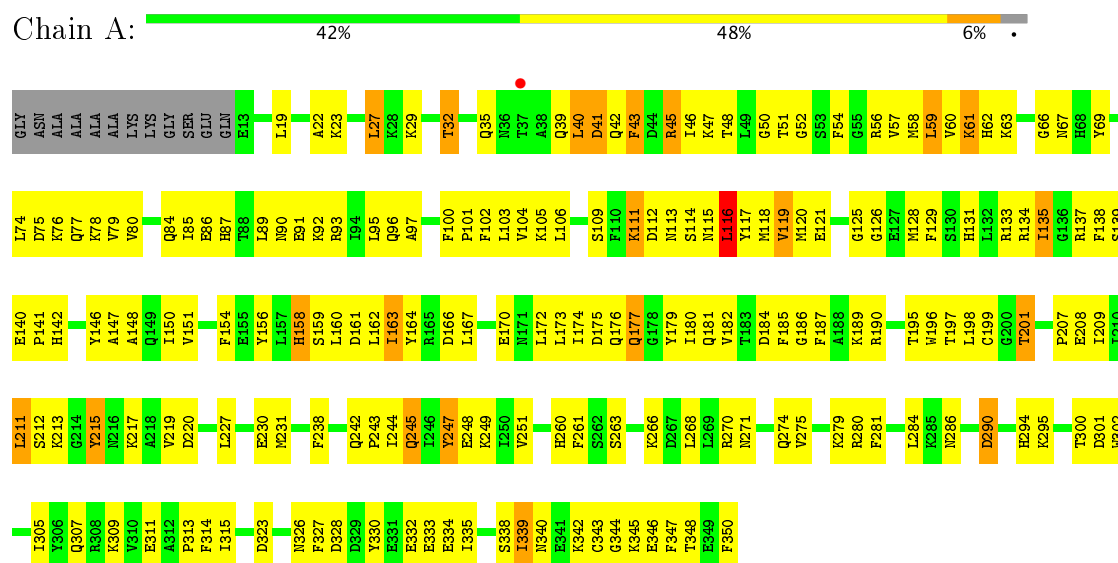


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

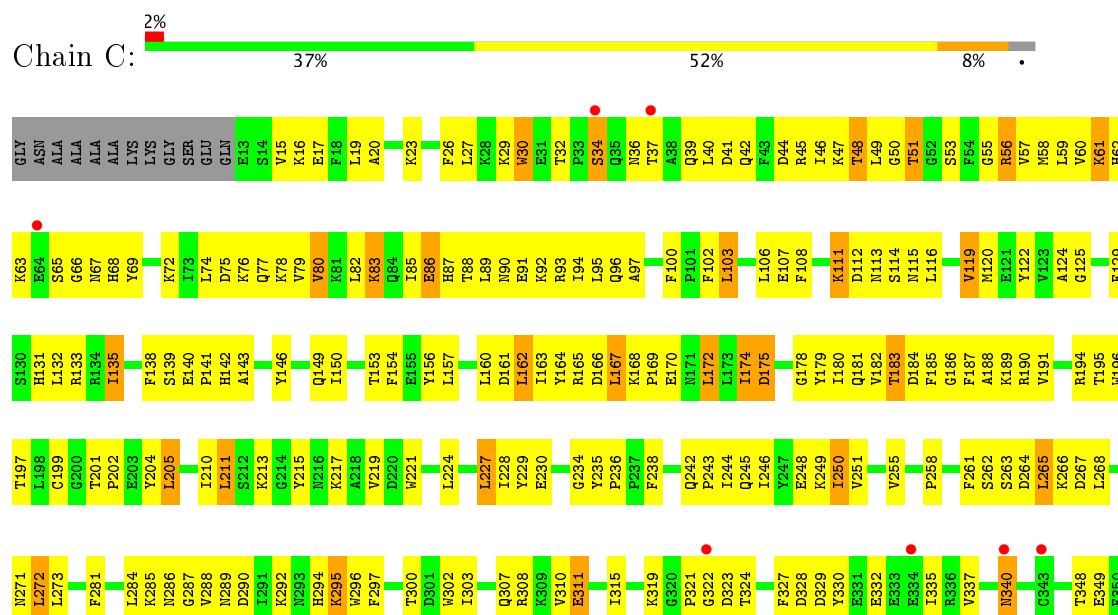
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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.

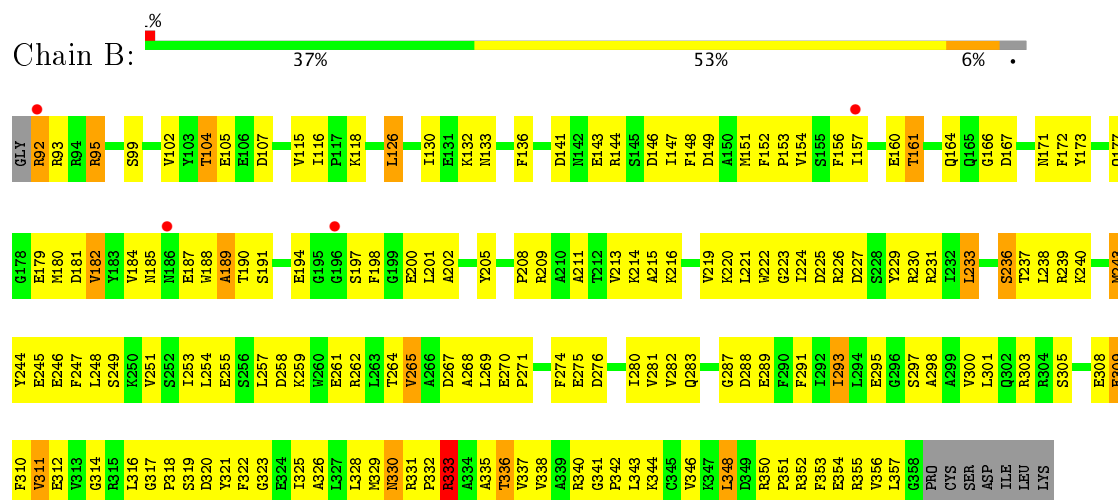
- Molecule 1: cAMP-dependent protein kinase catalytic subunit alpha



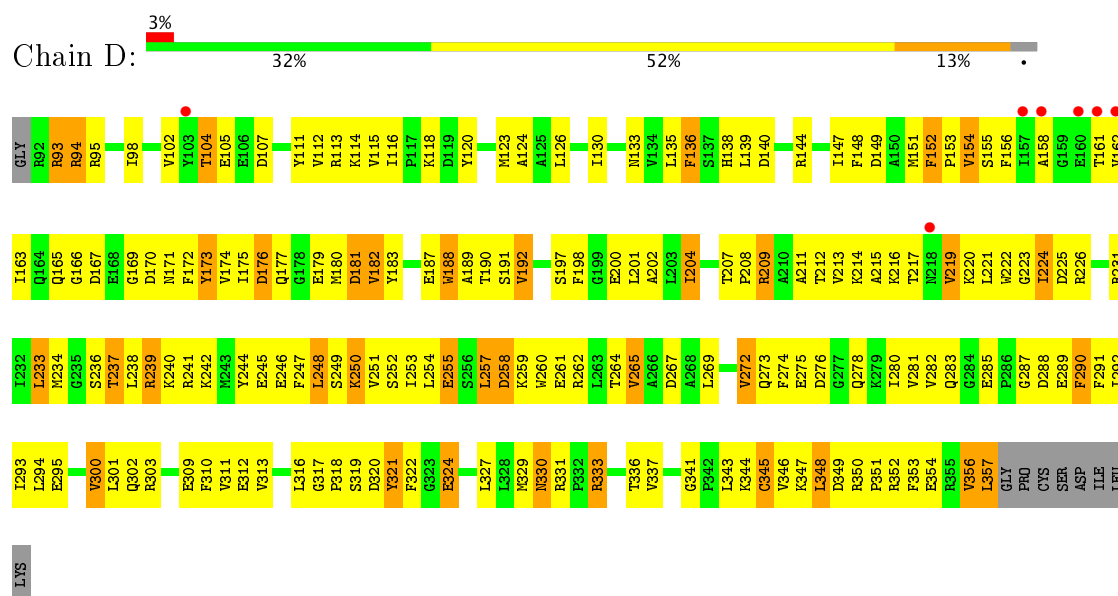
- Molecule 1: cAMP-dependent protein kinase catalytic subunit alpha



● Molecule 2: cAMP-dependent protein kinase type I-alpha regulatory subunit



● Molecule 2: cAMP-dependent protein kinase type I-alpha regulatory subunit



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	60.15Å 66.79Å 87.93Å 101.76° 89.37° 105.27°	Depositor
Resolution (Å)	49.11 – 3.56 49.10 – 3.51	Depositor EDS
% Data completeness (in resolution range)	97.4 (49.11-3.56) 90.3 (49.10-3.51)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.55 (at 3.48Å)	Xtriage
Refinement program	PHENIX 1.7 _650	Depositor
R, R_{free}	0.266 , 0.322 0.253 , 0.316	Depositor DCC
R_{free} test set	765 reflections (5.09%)	DCC
Wilson B-factor (Å ²)	82.1	Xtriage
Anisotropy	0.109	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 100.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	9665	wwPDB-VP
Average B, all atoms (Å ²)	109.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.61% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 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, ADP, SEP

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	0.48	1/2771 (0.0%)	0.92	5/3745 (0.1%)
1	C	0.41	1/2765 (0.0%)	0.76	3/3736 (0.1%)
2	B	0.51	1/2116 (0.0%)	0.94	4/2857 (0.1%)
2	D	0.57	4/2106 (0.2%)	0.92	5/2845 (0.2%)
All	All	0.49	7/9758 (0.1%)	0.88	17/13183 (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
2	B	0	1

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	333	ARG	NE-CZ	12.59	1.49	1.33
2	D	333	ARG	NE-CZ	12.46	1.49	1.33
2	D	181	ASP	CB-CG	-9.06	1.32	1.51
2	D	188	TRP	CZ3-CH2	-7.05	1.28	1.40
1	A	111	LYS	CE-NZ	-7.00	1.31	1.49

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	181	ASP	CB-CG-OD1	-23.64	97.02	118.30
2	D	181	ASP	CB-CG-OD2	18.74	135.17	118.30
1	C	61	LYS	CD-CE-NZ	-18.02	70.25	111.70
1	A	27	LEU	CB-CG-CD1	-17.41	81.41	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	227	LEU	CB-CG-CD1	-13.11	88.71	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	189	ALA	Mainchain

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	2734	0	2640	372	0
1	C	2729	0	2630	366	0
2	B	2079	0	2030	264	0
2	D	2069	0	2023	351	0
3	A	27	0	12	4	0
3	C	27	0	12	1	0
All	All	9665	0	9347	1314	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 69.

The worst 5 of 1314 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:79:VAL:HA	1:A:84:GLN:NE2	1.38	1.36
1:A:116:LEU:HD12	1:A:117:TYR:N	1.48	1.27
1:C:150:ILE:HG22	1:C:154:PHE:CE2	1.71	1.24
1:A:48:THR:HG21	1:A:330:TYR:HB2	1.20	1.16
1:A:175:ASP:HB3	1:A:181:GLN:NE2	1.60	1.15

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	333/350 (95%)	323 (97%)	10 (3%)	0	100	100
1	C	333/350 (95%)	296 (89%)	36 (11%)	1 (0%)	44	80
2	B	265/275 (96%)	255 (96%)	10 (4%)	0	100	100
2	D	264/275 (96%)	234 (89%)	30 (11%)	0	100	100
All	All	1195/1250 (96%)	1108 (93%)	86 (7%)	1 (0%)	55	88

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	229	TYR

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	278/302 (92%)	254 (91%)	24 (9%)	12	47
1	C	277/302 (92%)	240 (87%)	37 (13%)	4	27
2	B	212/230 (92%)	192 (91%)	20 (9%)	10	43
2	D	210/230 (91%)	174 (83%)	36 (17%)	2	16
All	All	977/1064 (92%)	860 (88%)	117 (12%)	6	31

5 of 117 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	83	LYS
1	C	211	LEU
2	D	300	VAL
1	C	103	LEU
1	C	162	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	181	GLN
1	A	307	GLN
1	C	87	HIS
1	A	158	HIS
1	A	326	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

6 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	A	139	1	9,9,10	1.61	2 (22%)	9,12,14	2.25	2 (22%)
1	TPO	A	197	1	9,10,11	1.41	1 (11%)	10,14,16	0.84	0
1	SEP	A	338	1	9,9,10	1.39	1 (11%)	9,12,14	1.69	2 (22%)
1	SEP	C	139	1	9,9,10	1.43	1 (11%)	9,12,14	1.66	3 (33%)
1	TPO	C	197	1	9,10,11	1.50	1 (11%)	10,14,16	1.19	1 (10%)
1	SEP	C	338	1	9,9,10	1.53	2 (22%)	9,12,14	1.70	2 (22%)

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	A	139	1	-	0/5/8/10	0/0/0/0
1	TPO	A	197	1	-	0/8/11/13	0/0/0/0
1	SEP	A	338	1	-	0/5/8/10	0/0/0/0
1	SEP	C	139	1	-	0/5/8/10	0/0/0/0
1	TPO	C	197	1	-	0/8/11/13	0/0/0/0
1	SEP	C	338	1	-	0/5/8/10	0/0/0/0

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	338	SEP	CA-C	2.03	1.52	1.50
1	A	139	SEP	CA-C	2.59	1.53	1.50
1	A	338	SEP	P-O1P	3.08	1.61	1.50
1	C	197	TPO	P-O1P	3.09	1.61	1.50
1	A	139	SEP	P-O1P	3.13	1.61	1.50

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	139	SEP	P-OG-CB	-4.93	104.72	118.30
1	A	338	SEP	P-OG-CB	-3.58	108.44	118.30
1	C	139	SEP	P-OG-CB	-3.08	109.80	118.30
1	C	338	SEP	P-OG-CB	-2.69	110.89	118.30
1	C	139	SEP	O-C-CA	-2.36	118.51	125.02

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	139	SEP	1	0
1	A	197	TPO	5	0
1	A	338	SEP	2	0
1	C	139	SEP	2	0
1	C	197	TPO	2	0

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

2 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	$\# Z > 2$
3	ADP	A	400	-	25,29,29	1.00	1 (4%)	24,45,45	1.58	2 (8%)
3	ADP	C	400	-	25,29,29	1.03	1 (4%)	24,45,45	1.54	2 (8%)

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
3	ADP	A	400	-	-	0/12/32/32	0/3/3/3
3	ADP	C	400	-	-	0/12/32/32	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	400	ADP	C5-C4	3.16	1.47	1.40
3	A	400	ADP	C5-C4	3.16	1.47	1.40

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	400	ADP	N3-C2-N1	-5.75	123.85	128.86
3	C	400	ADP	N3-C2-N1	-5.73	123.87	128.86
3	A	400	ADP	C4-C5-N7	-2.94	106.57	109.41
3	C	400	ADP	C4-C5-N7	-2.76	106.75	109.41

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	400	ADP	4	0
3	C	400	ADP	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [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	335/350 (95%)	-0.24	1 (0%) 93 89	33, 84, 183, 220	1 (0%)
1	C	335/350 (95%)	-0.14	7 (2%) 64 51	29, 101, 194, 292	0
2	B	267/275 (97%)	-0.05	4 (1%) 74 62	54, 100, 185, 222	1 (0%)
2	D	266/275 (96%)	0.06	7 (2%) 56 44	51, 119, 214, 254	2 (0%)
All	All	1203/1250 (96%)	-0.11	19 (1%) 72 60	29, 100, 196, 292	4 (0%)

The worst 5 of 19 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	161	THR	8.4
2	D	158	ALA	4.8
2	B	196	GLY	3.8
1	C	64	GLU	3.8
1	C	343	CYS	3.6

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
1	SEP	C	139	10/11	0.92	0.10	-	43,85,92,195	0
1	SEP	A	338	10/11	0.70	0.22	-	153,180,183,187	0
1	SEP	C	338	10/11	0.26	0.67	-	214,238,337,355	0
1	TPO	C	197	11/12	0.93	0.19	-	51,90,107,164	0
1	SEP	A	139	10/11	0.93	0.16	-	50,70,84,155	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
1	TPO	A	197	11/12	0.97	0.17	-	35,83,96,186	0

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
3	ADP	C	400	27/27	0.74	0.50	1.86	101,118,305,311	0
3	ADP	A	400	27/27	0.88	0.23	-0.38	57,103,213,304	0

6.5 Other polymers [i](#)

There are no such residues in this entry.