



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 10:15 AM UTC

PDB ID : 4M8L / pdb_00004m8l
Title : crystal structure of RpiA-R5P complex
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Otwinowski, Z.; Center for Structural Genomics of Infectious Diseases (CS-
GID)
Deposited on : 2013-08-13
Resolution : 2.37 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

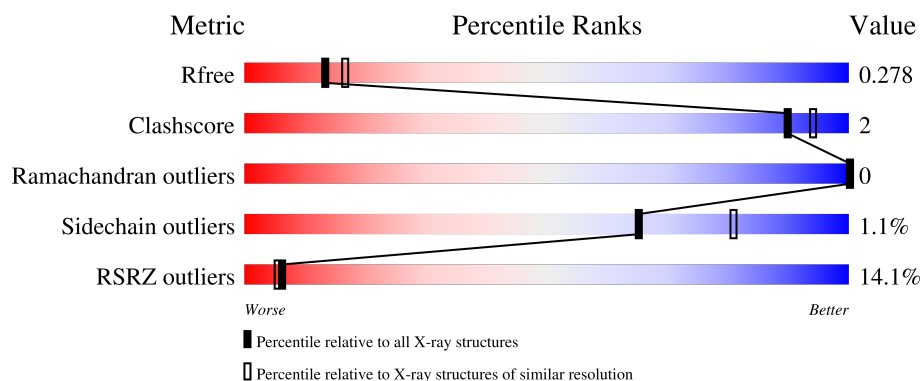
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.37 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}	180053	7164 (2.40-2.36)
Clashscore	190562	7722 (2.40-2.36)
Ramachandran outliers	187476	7626 (2.40-2.36)
Sidechain outliers	187428	7627 (2.40-2.36)
RSRZ outliers	180081	7170 (2.40-2.36)

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 $\leq 5\%$. 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	224	5% 97% ..
1	B	224	6% 93% ..
1	C	224	12% 93% ..
1	D	224	31% 92% 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	CL	B	315	-	-	X	-

2 Entry composition [i](#)

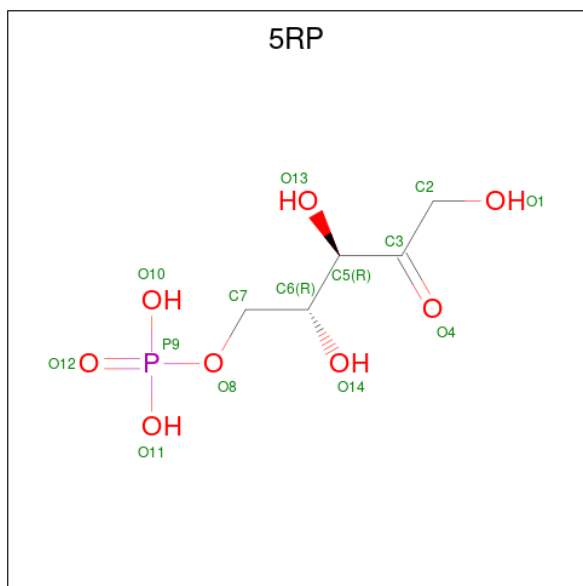
There are 5 unique types of molecules in this entry. The entry contains 7188 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Ribose-5-phosphate isomerase A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	220	Total	C	N	O	S	0	1	0
			1690	1069	284	332	5			
1	B	217	Total	C	N	O	S	0	2	0
			1675	1059	282	329	5			
1	C	217	Total	C	N	O	S	0	2	0
			1672	1059	279	329	5			
1	D	218	Total	C	N	O	S	0	1	0
			1670	1057	278	330	5			

- Molecule 2 is RIBULOSE-5-PHOSPHATE (CCD ID: 5RP) (formula: C₅H₁₁O₈P).



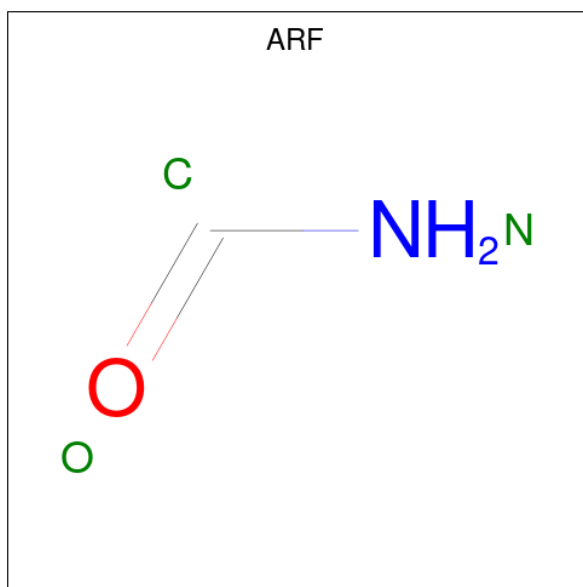
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			14	5	8	1		
2	B	1	Total	C	O	P	0	0
			14	5	8	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	C	1	Total	C	O	P	0	0
			14	5	8	1		
2	D	1	Total	C	O	P	0	0
			14	5	8	1		

- Molecule 3 is FORMAMIDE (CCD ID: ARF) (formula: CH₃NO).



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

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total 3	C 1	N 1	O 1	0	0
3	A	1	Total 3	C 1	N 1	O 1	0	0
3	A	1	Total 3	C 1	N 1	O 1	0	0
3	A	1	Total 3	C 1	N 1	O 1	0	0
3	A	1	Total 3	C 1	N 1	O 1	0	0
3	A	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	B	1	Total 3	C 1	N 1	O 1	0	0
3	C	1	Total 3	C 1	N 1	O 1	0	0
3	C	1	Total 3	C 1	N 1	O 1	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	C	1	Total	C	N	O	0	0
			3	1	1	1		
3	D	1	Total	C	N	O	0	0
			3	1	1	1		
3	D	1	Total	C	N	O	0	0
			3	1	1	1		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		
4	B	3	Total	Cl	0	0
			3	3		
4	C	1	Total	Cl	0	0
			1	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	104	Total	O	0	1
			105	105		
5	B	86	Total	O	0	2
			88	88		
5	C	57	Total	O	0	1
			58	58		

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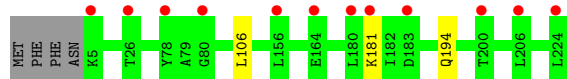
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	45	Total	O	0	1
			46	46		

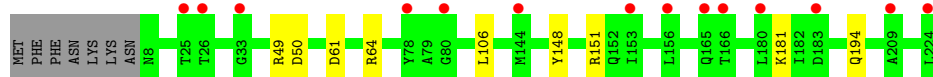
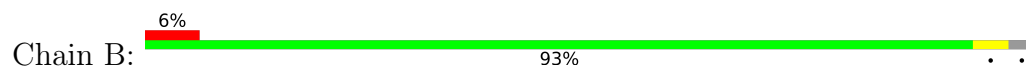
3 Residue-property plots [i](#)

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.

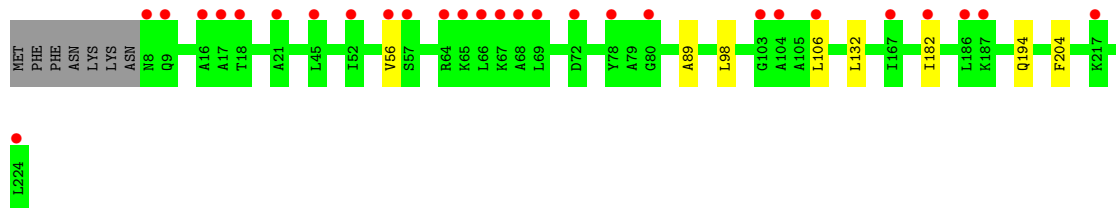
- Molecule 1: Ribose-5-phosphate isomerase A



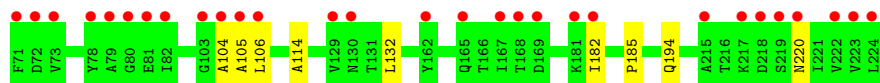
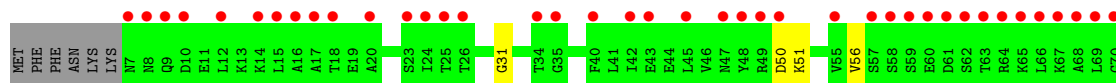
- Molecule 1: Ribose-5-phosphate isomerase A



- Molecule 1: Ribose-5-phosphate isomerase A



- Molecule 1: Ribose-5-phosphate isomerase A



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	168.20Å 151.96Å 36.29Å 90.00° 93.98° 90.00°	Depositor
Resolution (Å)	36.75 – 2.37 36.75 – 2.37	Depositor EDS
% Data completeness (in resolution range)	92.9 (36.75-2.37) 93.4 (36.75-2.37)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.68 (at 2.37Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.237 , 0.274 0.241 , 0.278	Depositor DCC
R_{free} test set	1728 reflections (4.67%)	wwPDB-VP
Wilson B-factor (Å ²)	33.2	Xtriage
Anisotropy	0.075	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 40.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	7188	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 6.32% 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: 5RP, ARF, CL

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	0.43	0/1708	0.67	0/2309
1	B	0.44	0/1693	0.68	0/2290
1	C	0.42	0/1690	0.67	0/2287
1	D	0.46	0/1687	0.73	1/2283 (0.0%)
All	All	0.44	0/6778	0.69	1/9169 (0.0%)

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	D	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	D	105	ALA	N-CA-C	6.54	120.91	112.41

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	104	ALA	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	1690	0	1754	3	0
1	B	1675	0	1734	7	0
1	C	1672	0	1732	10	0
1	D	1670	0	1732	10	0
2	A	14	0	9	0	0
2	B	14	0	9	0	0
2	C	14	0	9	0	0
2	D	14	0	9	0	0
3	A	45	0	45	0	0
3	B	39	0	39	1	0
3	C	33	0	33	1	0
3	D	6	0	6	0	0
4	A	1	0	0	0	0
4	B	3	0	0	2	0
4	C	1	0	0	0	0
5	A	105	0	0	0	0
5	B	88	0	0	0	0
5	C	58	0	0	0	0
5	D	46	0	0	0	0
All	All	7188	0	7111	25	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 2.

All (25) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:182[B]:ILE:HG13	1:D:182[B]:ILE:O	1.61	0.99
1:C:182[B]:ILE:O	1:C:182[B]:ILE:HG13	1.65	0.93
1:B:49[B]:ARG:O	1:B:49[B]:ARG:HD3	1.77	0.83
1:D:182[B]:ILE:O	1:D:182[B]:ILE:CG1	2.35	0.74
1:A:194:GLN:HE21	1:C:194:GLN:HE21	1.41	0.67
1:B:49[B]:ARG:HD3	1:B:49[B]:ARG:C	2.24	0.62
1:C:182[B]:ILE:O	1:C:182[B]:ILE:CG1	2.45	0.61
1:B:61:ASP:OD1	4:B:315:CL:CL	2.57	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:132:LEU:O	1:C:182[B]:ILE:HG23	2.07	0.55
1:B:194:GLN:HE21	1:D:194:GLN:HE21	1.54	0.54
1:C:89:ALA:HB2	1:C:98:LEU:HD23	1.89	0.53
1:D:182[B]:ILE:HD11	1:D:185:PRO:HG3	1.94	0.49
1:C:56:VAL:HG13	3:C:303:ARF:H	1.96	0.47
1:D:31:GLY:HA2	1:D:56:VAL:HG22	1.97	0.47
1:B:64:ARG:NE	4:B:315:CL:CL	2.75	0.46
1:B:151:ARG:HG2	3:B:314:ARF:N	2.32	0.45
1:D:132:LEU:HB2	1:D:182[B]:ILE:HG12	1.99	0.45
1:A:194:GLN:HE21	1:C:194:GLN:NE2	2.13	0.45
1:B:148:TYR:CZ	1:D:114:ALA:HB1	2.53	0.44
1:A:194:GLN:NE2	1:C:194:GLN:HE21	2.11	0.43
1:C:98:LEU:HB2	1:C:204:PHE:HB2	2.01	0.42
1:D:132:LEU:HB2	1:D:182[B]:ILE:CG1	2.49	0.42
1:D:50:ASP:OD1	1:D:51:LYS:HG2	2.20	0.42
1:C:132:LEU:HB2	1:C:182[B]:ILE:HG12	2.02	0.41
1:D:132:LEU:O	1:D:182[B]:ILE:HG23	2.20	0.41

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	219/224 (98%)	213 (97%)	6 (3%)	0	100	100
1	B	217/224 (97%)	211 (97%)	6 (3%)	0	100	100
1	C	217/224 (97%)	210 (97%)	7 (3%)	0	100	100
1	D	217/224 (97%)	211 (97%)	6 (3%)	0	100	100
All	All	870/896 (97%)	845 (97%)	25 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	188/191 (98%)	186 (99%)	2 (1%)	65	81
1	B	186/191 (97%)	183 (98%)	3 (2%)	55	74
1	C	186/191 (97%)	185 (100%)	1 (0%)	81	90
1	D	186/191 (97%)	184 (99%)	2 (1%)	65	81
All	All	746/764 (98%)	738 (99%)	8 (1%)	65	81

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	106	LEU
1	A	181	LYS
1	B	50	ASP
1	B	106	LEU
1	B	181	LYS
1	C	106	LEU
1	D	106	LEU
1	D	220	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	165	GLN
1	A	194	GLN
1	B	152	GLN
1	B	193	ASN
1	C	193	ASN
1	D	95	HIS
1	D	152	GLN
1	D	194	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 50 ligands modelled in this entry, 5 are monoatomic - leaving 45 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	ARF	C	307	-	2,2,2	0.41	0	1,1,1	0.83	0
3	ARF	A	306	-	2,2,2	0.42	0	1,1,1	0.89	0
2	5RP	B	301	-	13,13,13	0.60	0	12,18,18	0.92	1 (8%)
2	5RP	A	301	-	13,13,13	0.52	0	12,18,18	1.13	0
3	ARF	A	310	-	2,2,2	0.41	0	1,1,1	0.88	0
3	ARF	A	304	-	2,2,2	0.41	0	1,1,1	0.87	0
3	ARF	C	302	-	2,2,2	0.44	0	1,1,1	0.84	0
3	ARF	A	307	-	2,2,2	0.41	0	1,1,1	0.87	0
3	ARF	C	304	-	2,2,2	0.41	0	1,1,1	0.94	0
3	ARF	C	308	-	2,2,2	0.41	0	1,1,1	0.88	0
3	ARF	B	310	-	2,2,2	0.45	0	1,1,1	0.81	0
3	ARF	B	311	-	2,2,2	0.44	0	1,1,1	0.89	0
3	ARF	C	309	-	2,2,2	0.38	0	1,1,1	0.89	0
3	ARF	A	315	-	2,2,2	0.40	0	1,1,1	0.89	0
2	5RP	C	301	-	13,13,13	0.57	0	12,18,18	0.81	0
3	ARF	B	306	-	2,2,2	0.48	0	1,1,1	0.77	0
3	ARF	B	305	-	2,2,2	0.40	0	1,1,1	0.91	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	ARF	B	308	-	2,2,2	0.41	0	1,1,1	0.84	0
3	ARF	B	314	-	2,2,2	0.47	0	1,1,1	0.82	0
3	ARF	B	307	-	2,2,2	0.41	0	1,1,1	0.86	0
3	ARF	A	313	-	2,2,2	0.42	0	1,1,1	0.89	0
3	ARF	A	308	-	2,2,2	0.44	0	1,1,1	0.75	0
3	ARF	A	314	-	2,2,2	0.42	0	1,1,1	0.91	0
3	ARF	B	313	-	2,2,2	0.43	0	1,1,1	0.83	0
3	ARF	C	310	-	2,2,2	0.41	0	1,1,1	0.84	0
3	ARF	B	309	-	2,2,2	0.43	0	1,1,1	0.84	0
3	ARF	B	312	-	2,2,2	0.40	0	1,1,1	0.90	0
3	ARF	A	309	-	2,2,2	0.42	0	1,1,1	0.83	0
3	ARF	A	305	-	2,2,2	0.41	0	1,1,1	0.85	0
3	ARF	C	312	-	2,2,2	0.40	0	1,1,1	0.88	0
3	ARF	D	302	-	2,2,2	0.42	0	1,1,1	0.79	0
3	ARF	C	305	-	2,2,2	0.40	0	1,1,1	0.90	0
3	ARF	A	311	-	2,2,2	0.39	0	1,1,1	0.95	0
3	ARF	A	303	-	2,2,2	0.41	0	1,1,1	0.87	0
3	ARF	B	304	-	2,2,2	0.43	0	1,1,1	0.81	0
3	ARF	A	312	-	2,2,2	0.41	0	1,1,1	0.86	0
3	ARF	C	303	-	2,2,2	0.40	0	1,1,1	0.64	0
3	ARF	D	303	-	2,2,2	0.38	0	1,1,1	0.91	0
3	ARF	A	302	-	2,2,2	0.41	0	1,1,1	0.72	0
2	5RP	D	301	-	13,13,13	0.65	0	12,18,18	0.84	0
3	ARF	B	303	-	2,2,2	0.43	0	1,1,1	0.78	0
3	ARF	C	311	-	2,2,2	0.41	0	1,1,1	0.85	0
3	ARF	C	306	-	2,2,2	0.41	0	1,1,1	0.88	0
3	ARF	B	302	-	2,2,2	0.43	0	1,1,1	0.89	0
3	ARF	A	316	-	2,2,2	0.42	0	1,1,1	0.81	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
2	5RP	B	301	-	-	2/16/16/16	-
2	5RP	C	301	-	-	2/16/16/16	-
2	5RP	A	301	-	-	6/16/16/16	-
2	5RP	D	301	-	-	9/16/16/16	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	5RP	O10-P9-O11	2.00	115.30	107.80

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	5RP	C3-C5-C6-O14
2	A	301	5RP	C3-C5-C6-C7
2	A	301	5RP	O13-C5-C6-O14
2	A	301	5RP	O13-C5-C6-C7
2	C	301	5RP	O4-C3-C5-O13
2	D	301	5RP	O1-C2-C3-O4
2	D	301	5RP	O14-C6-C7-O8
2	D	301	5RP	C7-O8-P9-O10
2	D	301	5RP	C5-C6-C7-O8
2	D	301	5RP	C7-O8-P9-O12
2	D	301	5RP	C7-O8-P9-O11
2	A	301	5RP	C2-C3-C5-O13
2	B	301	5RP	C2-C3-C5-O13
2	D	301	5RP	C2-C3-C5-O13
2	A	301	5RP	O4-C3-C5-O13
2	B	301	5RP	O4-C3-C5-O13
2	D	301	5RP	O4-C3-C5-O13
2	D	301	5RP	O1-C2-C3-C5
2	C	301	5RP	C2-C3-C5-O13

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	314	ARF	1	0
3	C	303	ARF	1	0

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	220/224 (98%)	0.73	12 (5%) 30 30	16, 29, 53, 74	1 (0%)
1	B	217/224 (96%)	0.81	14 (6%) 25 23	16, 30, 49, 65	2 (0%)
1	C	217/224 (96%)	0.98	28 (12%) 7 6	21, 39, 72, 96	2 (0%)
1	D	218/224 (97%)	1.52	69 (31%) 1 1	22, 44, 89, 117	1 (0%)
All	All	872/896 (97%)	1.01	123 (14%) 6 5	16, 34, 73, 117	6 (0%)

All (123) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	104	ALA	7.7
1	D	105	ALA	5.0
1	D	68	ALA	5.0
1	D	34	THR	4.8
1	D	167	ILE	4.6
1	D	66	LEU	4.4
1	D	182[A]	ILE	4.2
1	C	68	ALA	4.0
1	D	64	ARG	4.0
1	D	78	TYR	3.8
1	D	65	LYS	3.8
1	C	80	GLY	3.8
1	D	106	LEU	3.8
1	D	43	GLU	3.7
1	B	180	LEU	3.7
1	D	8	ASN	3.7
1	D	69	LEU	3.7
1	D	80	GLY	3.7
1	C	78	TYR	3.7
1	C	224	LEU	3.6
1	C	182[A]	ILE	3.6

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Mol	Chain	Res	Type	RSRZ
1	D	67	LYS	3.6
1	D	59	SER	3.5
1	D	47	ASN	3.5
1	D	130	ASN	3.5
1	C	67	LYS	3.4
1	A	180	LEU	3.3
1	B	80	GLY	3.3
1	D	71	PHE	3.3
1	A	181	LYS	3.2
1	D	63	THR	3.2
1	B	26	THR	3.2
1	C	104	ALA	3.1
1	D	58	SER	3.1
1	D	222	VAL	3.1
1	D	82	ILE	3.0
1	C	187	LYS	2.9
1	D	18	THR	2.9
1	C	56	VAL	2.9
1	D	219	SER	2.9
1	C	18	THR	2.9
1	D	62	SER	2.9
1	D	169	ASP	2.9
1	D	165	GLN	2.9
1	D	24	ILE	2.9
1	A	183	ASP	2.9
1	D	9	GLN	2.8
1	D	45	LEU	2.8
1	A	224	LEU	2.8
1	D	23	SER	2.8
1	D	81	GLU	2.8
1	D	15	LEU	2.8
1	B	25	THR	2.7
1	D	7	ASN	2.7
1	D	70	GLY	2.7
1	A	26	THR	2.7
1	D	10	ASP	2.7
1	D	61	ASP	2.7
1	D	217	LYS	2.7
1	D	42	ILE	2.6
1	C	66	LEU	2.6
1	C	8	ASN	2.6
1	B	183	ASP	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	49	ARG	2.5
1	C	57	SER	2.5
1	D	223	VAL	2.5
1	C	167	ILE	2.5
1	C	21	ALA	2.5
1	C	217	LYS	2.5
1	D	57	SER	2.5
1	D	48	TYR	2.5
1	B	156	LEU	2.5
1	D	79	ALA	2.5
1	D	25	THR	2.5
1	D	168	THR	2.4
1	D	73	VAL	2.4
1	C	106	LEU	2.4
1	B	165	GLN	2.4
1	D	218	ASP	2.4
1	D	16	ALA	2.4
1	B	33	GLY	2.3
1	C	69	LEU	2.3
1	D	20	ALA	2.3
1	C	9	GLN	2.3
1	D	224	LEU	2.3
1	C	65	LYS	2.3
1	A	78	TYR	2.3
1	C	72	ASP	2.3
1	D	103	GLY	2.3
1	B	78	TYR	2.3
1	A	5	LYS	2.3
1	C	64	ARG	2.2
1	D	35	GLY	2.2
1	D	162	TYR	2.2
1	A	206	LEU	2.2
1	B	224	LEU	2.2
1	D	50	ASP	2.2
1	D	14	LYS	2.2
1	A	156	LEU	2.2
1	C	186	LEU	2.2
1	D	129	VAL	2.2
1	C	103	GLY	2.2
1	D	72	ASP	2.2
1	D	220	ASN	2.2
1	A	164	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	200	THR	2.2
1	B	144	MET	2.1
1	C	16	ALA	2.1
1	D	12	LEU	2.1
1	D	17	ALA	2.1
1	D	55	VAL	2.1
1	B	209	ALA	2.1
1	C	17	ALA	2.1
1	D	215	ALA	2.1
1	D	60	GLU	2.1
1	C	45	LEU	2.1
1	A	80	GLY	2.1
1	D	40	PHE	2.1
1	B	166	THR	2.0
1	B	153	ILE	2.0
1	D	26	THR	2.0
1	C	52	ILE	2.0
1	D	181	LYS	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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	ARF	C	308	3/3	0.45	0.30	61,61,62,65	0
3	ARF	C	303	3/3	0.52	0.29	38,38,45,46	0
3	ARF	C	305	3/3	0.67	0.14	56,56,58,59	0
3	ARF	A	306	3/3	0.68	0.17	54,54,56,56	0
3	ARF	B	314	3/3	0.69	0.33	43,43,44,49	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	ARF	A	303	3/3	0.69	0.20	40,40,46,47	0
3	ARF	A	302	3/3	0.70	0.21	24,24,28,32	0
3	ARF	A	310	3/3	0.70	0.17	44,44,47,49	0
3	ARF	B	311	3/3	0.71	0.22	35,35,40,41	0
3	ARF	C	302	3/3	0.72	0.19	33,33,38,39	0
3	ARF	B	308	3/3	0.72	0.18	45,45,48,49	0
4	CL	B	316	1/1	0.72	0.14	61,61,61,61	0
3	ARF	B	310	3/3	0.73	0.22	38,38,38,41	0
3	ARF	B	307	3/3	0.75	0.17	49,49,49,52	0
3	ARF	C	306	3/3	0.75	0.15	40,40,45,46	0
3	ARF	B	313	3/3	0.76	0.25	49,49,54,57	0
3	ARF	D	303	3/3	0.76	0.12	32,32,34,37	0
3	ARF	B	303	3/3	0.76	0.19	22,22,25,25	0
3	ARF	C	309	3/3	0.77	0.15	38,38,41,42	0
3	ARF	A	307	3/3	0.77	0.17	48,48,52,52	0
3	ARF	A	304	3/3	0.77	0.21	52,52,53,54	0
3	ARF	C	307	3/3	0.79	0.13	36,36,39,39	0
3	ARF	B	305	3/3	0.79	0.16	44,44,46,48	0
3	ARF	B	306	3/3	0.79	0.23	34,34,36,39	0
3	ARF	B	302	3/3	0.79	0.21	36,36,43,44	0
3	ARF	A	308	3/3	0.79	0.22	33,33,39,41	0
2	5RP	D	301	14/14	0.81	0.14	44,51,57,62	0
3	ARF	D	302	3/3	0.81	0.19	37,37,43,43	0
3	ARF	B	309	3/3	0.82	0.13	41,41,42,42	0
3	ARF	A	309	3/3	0.82	0.14	49,49,52,53	0
3	ARF	A	316	3/3	0.82	0.15	38,38,41,41	0
3	ARF	C	312	3/3	0.83	0.15	49,49,53,56	0
3	ARF	C	310	3/3	0.83	0.15	44,44,45,46	0
4	CL	B	315	1/1	0.84	0.13	59,59,59,59	0
3	ARF	A	313	3/3	0.84	0.14	50,50,54,55	0
3	ARF	C	304	3/3	0.86	0.15	37,37,37,39	0
2	5RP	C	301	14/14	0.87	0.12	35,40,45,46	0
4	CL	C	313	1/1	0.87	0.14	67,67,67,67	0
3	ARF	A	311	3/3	0.88	0.14	37,37,39,39	0
3	ARF	C	311	3/3	0.89	0.10	52,52,54,57	0
3	ARF	A	312	3/3	0.89	0.14	33,33,36,37	0
4	CL	A	317	1/1	0.89	0.12	44,44,44,44	0
4	CL	B	317	1/1	0.90	0.14	60,60,60,60	0
3	ARF	B	312	3/3	0.90	0.13	24,24,26,27	0
3	ARF	A	315	3/3	0.91	0.10	30,30,34,37	0
3	ARF	B	304	3/3	0.91	0.12	40,40,42,44	0
3	ARF	A	314	3/3	0.93	0.09	44,44,46,49	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	ARF	A	305	3/3	0.93	0.11	37,37,40,40	0
2	5RP	A	301	14/14	0.94	0.09	26,31,36,37	0
2	5RP	B	301	14/14	0.95	0.08	29,34,41,42	0

6.5 Other polymers [i](#)

There are no such residues in this entry.