

### wwPDB X-ray Structure Validation Summary Report (i)

#### Jun 23, 2024 – 10:04 AM EDT

PDB ID	:	5D4W
Title	:	Crystal structure of Hsp104
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Deposited on	:	2015-08-09
Resolution	:	3.70  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 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 (1)) 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:  $X\text{-}RAY \, DIFFRACTION$ 

The reported resolution of this entry is 3.70 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	$egin{array}{c} { m Whole \ archive} \ (\#{ m Entries}) \end{array}$	${f Similar\ resolution}\ (\#{ m Entries,\ resolution\ range}({ m \AA}))$
R <sub>free</sub>	130704	1049 (3.88-3.52)
Clashscore	141614	1027 (3.86-3.54)
Ramachandran outliers	138981	1069 (3.88-3.52)
Sidechain outliers	138945	1065 (3.88-3.52)
RSRZ outliers	127900	1578(3.90-3.50)

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	А	926	.%	35%	6%	26%	_				
1	В	926	32%	37%	6%	26%	_				
1	С	926	.%	34%	6%	26%	_				

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
2	ADP	А	1001	-	-	Х	-
2	ADP	В	1001	-	-	Х	-



### 2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 16269 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.

Mol	Chain	Residues		1	Atom	s		ZeroOcc	AltConf	Trace		
1	Δ	688	Total	С	Ν	Ο	S	Se	0	0	0	
1	Л	088	5369	3354	985	1009	5	16	0	0	0	
1	В	688	Total	С	Ν	Ο	S	Se	0	0	0	
1	D	088	5369	3354	985	1009	5	16	0	0	0	
1	С	688	Total	С	Ν	Ο	S	Se	0	0	0	
1		088	5369	3354	985	1009	5	16	0	0	U	

• Molecule 1 is a protein called Putative heat shock protein.

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
А	1	MSE	-	initiating methionine	UNP G0S4G4
А	296	ALA	GLU	engineered mutation	UNP G0S4G4
А	707	ALA	GLU	engineered mutation	UNP G0S4G4
В	1	MSE	-	initiating methionine	UNP G0S4G4
В	296	ALA	GLU	engineered mutation	UNP G0S4G4
В	707	ALA	GLU	engineered mutation	UNP G0S4G4
С	1	MSE	-	initiating methionine	UNP G0S4G4
С	296	ALA	GLU	engineered mutation	UNP G0S4G4
С	707	ALA	GLU	engineered mutation	UNP G0S4G4

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





Mol	Chain	Residues		Ato	oms			ZeroOcc	AltConf
9	Δ	1	Total	С	Ν	Ο	Р	0	0
	A	1	27	10	5	10	2	0	0
0	Δ	1	Total	С	Ν	Ο	Р	0	0
	A	1	27	10	5	10	2	0	0
9	В	1	Total	С	Ν	Ο	Р	0	0
	D	1	27	10	5	10	2	0	0
9	В	1	Total	С	Ν	Ο	Р	0	0
	D	1	27	10	5	10	2	0	0
9	С	1	Total	С	Ν	Ο	Р	0	0
	U	1	27	10	5	10	2	0	0
9	С	1	Total	С	Ν	Ο	Р	0	0
			27	10	5	10	2	0	U



### 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: Putative heat shock protein



# N775 N775 1777 1777 1777 1775 1777 1775 1777 1775 1775 1775 1775 1775 1775 1775 1776 1775 1775 1783 1776 1795 1778 1783 1778 1810 1786 1810 1805 1810 1816 1814 1820 1816 1816 1816 1817 1818 1820 1837 1821 1816 1822 1837</

### R849 R849 R851 R855 R865 R866 R867 R867 R867 R867 R867 R867 R867 R866 R867 R868 R87 R87 </

#### ALA PRO ASP SER MSE ASP GLU GLU ASP TYR ASN ASP

• Molecule 1: Putative heat shock protein

С	ha	in	В	: •					32	2%												379	%						69	%				2	6%	)						
MSE	ASN SER	LYS	GLU	PHE	ASP	ARG AT A	LYS	LYS	ALA LEU	GLU	ASP	ALA MSF	ALA	LEU	ALA	GLN	TYR	GLN	TEU	GLN	LEU	PRO	VAL	HIS	ALA	VAL AT A	LEU	LEU	PRO	THR	PRO	PRO	SER	ASP	GLN	SER TLE	ALA	PRO CI V	THR	THR	THR	LEU
PHE	ARG GLN	VAL	GLU	ARG	SIH	GLY	ALA	GLN	ALA PHE	ASP	ARG	ALA L'EU	LYS	LYS	LYS	VAL	ARG	LEU	SER	GLN	ASP	PRO	PRO	ASP GLN	VAL	SER	SER	ALA	CYS	SER	ASN	LEU	ARG	ALA	ASN	GLU LEU	GLN	LYS	GLN	LYS	SER	TYR
ILE	ALA VAL	ASP	LEU	ILE AT A	ALA	LEU AT A	GLU	ASP	ALS	ILE	GLN	GLU AL.A	LEU	LYS	GLU AT A	ASN	ILE	PRO TVC	PRO	LYS	LEU	GLN	ASP	ALA TLE	GLN	ALA	ARG	GLY	LYS	ARG	VAL	SER	ARG	ALA	ASP	GI.U	<mark>q173</mark>	1178		F181 C182	1183 1183	D184
M185	M188	A189	G192	K193 T194	D195	P196 V197	1198	G199	K200	E203	1204	R205 R206	V207	I 208	R209	1210 L211	S212	R213	T215	K216	N217 N218	N219 P219	V220	E224	P225	G226 V777	G228	K229	1230 T231	1232	V233 E224	G235	L236	0238 0238	R239	I240 V241	N242	A243 D244	V245	A 76 0	A251	C252
K253	L254 L255	\$256 1 257	D258	V259 C260	A261	L262 V763	A264	G265	S266	G270	E271	F272	R275	M276			1283	2007	N26/	12 <mark>90</mark>	1291 1200	L292 F293	V294	но <mark>сн</mark>	L299	L300 M301	G302	<mark>A303</mark>	SER	SER	GLY GLY	GLY	GLY M211	D312	A313	A314 N315	L316	D310	M320	L321	R323	G324
<b>Q325</b>	L326 H327	C328	1329 (330	A331 T332	T333	наза В	Y337	R338	K339 V340	1341	E342	K343 D344	A345	A346	F347 E240	E349 R349	R350	F351	0353	V354	L355 V256	K357	E358	P359 8360	1361	5362 17363	T364	1365 1365	1367 1367	L368	R369	L371	1207	Y375		H378 H379		1383 1384	D385	A386	<b>A390</b>	A391
A392	N393 L394	A395	A390 R397	Y398 1300	T400	8401 8402	R403	L404	P405	S407	A408	V409 D410	L411	1412	D413	E415 A415		A418 17/10	V419 R420	V421	A422 B403	E424	S425	0426 P427	E428	1429 1430		L433	1434	L437	114 41	1442	E443	1711 H445	A446	K456	A457	R458 1459	A460	0461	K463	<mark>Q464</mark>
-	Q467 N468	V469 E470	E470 E471	E472 1 473	D F	L476	Y480	E481	R482 E483	R484	Q485	R486	1490		A493	K496	L497	E498	A499 L500		K503	D506		R509 M510		R515 A516	A517	D518		A523	I524	E526	Q527	1530	I531	K532 R533	L534	<b>F537</b>	K538	AEA1	D542	A543
A544	L545 N546	UL CO	1000 D559	V560 V561	<b>G562</b>	P563	0565	1566	N567 F568	1569	V570	A571 R572	W573		P577 vc 70	T579	R580	L581	K586	GLU	LYS	TEU	H591	DF 94		8597 VE08	1599 1599	N600	0603	K604	E605	V607	008 008	V610	S611	N612 A613	I614	R615 1616	0617 0617	R618	L621	S622
N623	P627	P628	5029 F630	L631 F630	C633	G634	K640	T641	L642	T644		L651 F652	D653		S657 MEEO	1659 I 659	R660	F661 Deeo	N663	S664	E665	1 000 0667		S671	P679	VERA	7001	A687	0690	L691	T692	A694	L695 D202	R697		F700 S701	1702	F705	D706	A707 V708	E709	K710
-	V715 L716	T717 W718	v/ 18 L7 19	L720	L722	M723 D724	D7 25	GLY	ARG TLE	T7 29		U732 G733	R734		K739	1742	V743	V7 44 M7 46	M/ 45 T7 46	S747	N748 TEII	GLY	ALA	GLU TVR	TEU	SER	ALA	ASN	GLY	LYS	ASP	LYS	ILE	P767	T768	T769 R770	E771	L772	M774	N775 T776		R778
-	F781 L782	P783	E/ 04 F785	L786 N787	R788	I789	V792	L Carte	4 <mark>67.4</mark>	L798		R801 F.802	1803		R810	1814	Q815	K816 Pet7	K01/ L818	T819	D820 N921	D822	R823	TROF	1827	K828 V870	S830	E831	E032 A833	K834	D835 Ve26	L837	<mark>G838</mark>	G841	Y842	S843 P844	V845	Y846 C847	-	L851 D857	4002 R853	L854



## TYR ASN ASP • Molecule 1: Putative heat shock protein Chain C: 34% 34% 6% 26% 1209 1210 1211 1212 1212 1213 1213 1214 2224 2225 2226 2228 2228 2228 233 233 233 233 233 233 196 197 198 198 199 204 205 206 A303 GLY SER SER GLY GLY GLY GLY 361 GLU LEU LEU S747 N748 LEU GLV GLV TYR ALA CLU LEU SER ALA ASN ASN ASN CLY CLYS CLY CLYS CLY CLYS CLY CLYS CLY GLY ARG TLE



### 4 Data and refinement statistics (i)

Property	Value	Source			
Space group	P 1 21 1	Depositor			
Cell constants	144.92Å 93.17Å 144.42Å	Deneriten			
a, b, c, $\alpha$ , $\beta$ , $\gamma$	$90.00^{\circ}$ $119.72^{\circ}$ $90.00^{\circ}$	Depositor			
$\mathbf{Posolution}(\mathbf{\hat{A}})$	47.58 - 3.70	Depositor			
Resolution (A)	47.58 - 3.60	EDS			
% Data completeness	98.7 (47.58-3.70)	Depositor			
(in resolution range)	97.0(47.58-3.60)	EDS			
$R_{merge}$	0.19	Depositor			
$R_{sym}$	(Not available)	Depositor			
$< I/\sigma(I) > 1$	1.14 (at 3.57 Å)	Xtriage			
Refinement program	PHENIX (dev_2356: ???)	Depositor			
D D	0.237 , $0.277$	Depositor			
$\mathbf{R},  \mathbf{R}_{free}$	0.223 , $0.253$	DCC			
$R_{free}$ test set	1929 reflections $(5.01\%)$	wwPDB-VP			
Wilson B-factor $(Å^2)$	116.6	Xtriage			
Anisotropy	0.248	Xtriage			
Bulk solvent $k_{sol}(e/A^3)$ , $B_{sol}(A^2)$	0.19, 239.2	EDS			
L-test for twinning <sup>2</sup>	$<  L  > = 0.34, < L^2 > = 0.17$	Xtriage			
	0.259 for l,k,-h-l				
	0.259 for -h-l,k,h				
Estimated twinning fraction	0.167 for -h-l,-k,l	Xtriage			
	0.157 for h,-k,-h-l				
	0.166 for l,-k,h				
$F_o, F_c$ correlation	0.95	EDS			
Total number of atoms	16269	wwPDB-VP			
Average B, all atoms $(Å^2)$	210.0	wwPDB-VP			

Xtriage's analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 2.69% of the height of the origin peak. No significant pseudotranslation is detected.

<sup>&</sup>lt;sup>2</sup>Theoretical 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.



<sup>&</sup>lt;sup>1</sup>Intensities estimated from amplitudes.

### 5 Model quality (i)

#### 5.1 Standard geometry (i)

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

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).

Mal	Chain	Bond	lengths	Bond angles								
MIOI	Unam	RMSZ	# Z  > 5	RMSZ	# Z  > 5							
1	А	0.31	0/5414	0.54	2/7262~(0.0%)							
1	В	0.38	0/5414	0.61	3/7262~(0.0%)							
1	С	0.32	0/5414	0.55	1/7262~(0.0%)							
All	All	0.34	0/16242	0.57	6/21786~(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	А	0	2
1	В	0	3
1	С	0	1
All	All	0	6

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	$Observed(^{o})$	$Ideal(^{o})$
1	С	653	ASP	C-N-CA	-6.95	104.33	121.70
1	В	368	LEU	CA-CB-CG	6.87	131.10	115.30
1	В	653	ASP	C-N-CA	-6.72	104.90	121.70
1	В	195	ASP	CB-CG-OD2	5.64	123.38	118.30
1	А	653	ASP	C-N-CA	-5.50	107.96	121.70

There are no chirality outliers.

5 of 6 planarity outliers are listed below:



Mol	Chain	Res	Type	Group
1	А	266	SER	Peptide
1	А	402	ARG	Peptide
1	В	243	ALA	Peptide
1	В	385	ASP	Peptide
1	В	402	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	А	5369	0	5537	323	0
1	В	5369	0	5537	397	0
1	С	5369	0	5537	331	0
2	А	54	0	24	11	0
2	В	54	0	24	18	0
2	С	54	0	24	4	0
All	All	16269	0	16683	994	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 30.

The worst 5 of 994 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	$\begin{array}{c} \text{Interatomic} \\ \text{distance} \ (\text{\AA}) \end{array}$	Clash overlap (Å)
1:C:216:LYS:HB3	1:C:352:GLN:HB3	1.46	0.97
1:A:216:LYS:HB3	1:A:352:GLN:HB3	1.46	0.97
1:B:562:GLY:H	1:B:565:GLN:HB2	1.29	0.96
1:B:379:HIS:HA	1:B:420:ARG:HH12	1.31	0.91
1:B:200:ARG:HG3	1:B:232:ILE:HD11	1.55	0.89

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	Perce	ntiles
1	А	678/926~(73%)	585~(86%)	91 (13%)	2 (0%)	41	74
1	В	678/926~(73%)	594 (88%)	83 (12%)	1 (0%)	51	83
1	С	678/926~(73%)	587 (87%)	89 (13%)	2 (0%)	41	74
All	All	2034/2778~(73%)	1766 (87%)	263 (13%)	5 (0%)	47	78

All (5) Ramachandran outliers are listed below:

Mol	Chain	$\operatorname{Res}$	Type
1	С	403	ARG
1	А	403	ARG
1	А	525	PRO
1	С	359	PRO
1	В	426	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	А	571/751~(76%)	501 (88%)	70 (12%)		4	24
1	В	571/751~(76%)	494 (86%)	77 (14%)		4	21
1	С	571/751~(76%)	493 (86%)	78 (14%)		3	21
All	All	1713/2253~(76%)	1488 (87%)	225 (13%)		4	22

5 of 225 residues with a non-rotameric sidechain are listed below:



Mol	Chain	Res	Type
1	В	545	LEU
1	С	871	GLN
1	В	871	GLN
1	С	856	GLU
1	С	605	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	С	871	GLN
1	С	690	GLN
1	В	852	GLN
1	В	690	GLN
1	В	871	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)

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

#### 5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

#### 5.6 Ligand geometry (i)

6 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).



Mal	Turne	Type Chain Res		Type Chain		Tink	Bo	ond leng	$_{\rm ths}$	E	ond ang	gles
IVIOI	туре	Unam	nes		Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z >2		
2	ADP	С	1002	-	24,29,29	1.00	1 (4%)	$29,\!45,\!45$	1.45	4 (13%)		
2	ADP	А	1001	-	$24,\!29,\!29$	1.03	2 (8%)	$29,\!45,\!45$	1.42	4 (13%)		
2	ADP	С	1001	-	24,29,29	1.10	2 (8%)	29,45,45	1.44	4 (13%)		
2	ADP	В	1002	-	24,29,29	0.99	1 (4%)	29,45,45	1.46	4 (13%)		
2	ADP	А	1002	-	24,29,29	0.98	1 (4%)	$29,\!45,\!45$	1.47	4 (13%)		
2	ADP	В	1001	-	24,29,29	1.50	2 (8%)	$29,\!45,\!45$	2.31	12 (41%)		

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	ADP	С	1002	-	-	3/12/32/32	0/3/3/3
2	ADP	А	1001	-	-	1/12/32/32	0/3/3/3
2	ADP	С	1001	-	-	0/12/32/32	0/3/3/3
2	ADP	В	1002	-	-	2/12/32/32	0/3/3/3
2	ADP	А	1002	-	-	4/12/32/32	0/3/3/3
2	ADP	В	1001	-	-	5/12/32/32	0/3/3/3

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	В	1001	ADP	O4'-C1'	4.32	1.47	1.41
2	В	1001	ADP	C5-C4	3.04	1.49	1.40
2	С	1001	ADP	C5-C4	2.84	1.48	1.40
2	А	1001	ADP	C5-C4	2.76	1.48	1.40
2	С	1002	ADP	C5-C4	2.66	1.48	1.40

The worst 5 of 32 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	$Observed(^{o})$	$Ideal(^{o})$
2	В	1001	ADP	C4-C5-N7	-4.69	104.51	109.40
2	В	1001	ADP	N3-C2-N1	-4.59	121.51	128.68
2	В	1001	ADP	O2'-C2'-C3'	-3.76	99.67	111.82
2	В	1001	ADP	PA-O3A-PB	3.57	145.09	132.83
2	А	1002	ADP	PA-O3A-PB	-3.47	120.90	132.83

There are no chirality outliers.

5 of 15 torsion outliers are listed below:



Mol	Chain	Res	Type	Atoms
2	А	1001	ADP	C5'-O5'-PA-O1A
2	А	1002	ADP	C5'-O5'-PA-O2A
2	А	1002	ADP	C5'-O5'-PA-O3A
2	В	1001	ADP	C5'-O5'-PA-O1A
2	В	1001	ADP	C5'-O5'-PA-O2A

There are no ring outliers.

6 monomers are involved in 33 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	С	1002	ADP	1	0
2	А	1001	ADP	10	0
2	С	1001	ADP	3	0
2	В	1002	ADP	2	0
2	А	1002	ADP	1	0
2	В	1001	ADP	16	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.













### 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,  $95^{th}$  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	А	672/926~(72%)	-0.67	12 (1%) 68 57	133, 225, 282, 313	10 (1%)
1	В	672/926~(72%)	-0.82	4 (0%) 89 83	1, 205, 268, 309	10 (1%)
1	С	672/926~(72%)	-0.85	6 (0%) 84 76	38, 219, 272, 294	10 (1%)
All	All	2016/2778~(72%)	-0.78	22 (1%) 80 71	1, 218, 275, 313	30 (1%)

The worst 5 of 22 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	А	825	VAL	4.1
1	А	681	GLY	3.8
1	В	671	SER	3.5
1	А	636	SER	3.2
1	С	883	VAL	2.9

#### 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 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,  $95^{th}$  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	ADP	А	1001	27/27	0.94	0.15	173,225,244,252	0
2	ADP	С	1002	27/27	0.94	0.11	198,227,236,239	0
2	ADP	А	1002	27/27	0.95	0.12	197,248,253,257	0
2	ADP	С	1001	27/27	0.96	0.15	169,220,243,244	0
2	ADP	В	1002	27/27	0.96	0.12	214,240,243,245	0
2	ADP	В	1001	27/27	0.99	0.15	2,6,13,16	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.

















### 6.5 Other polymers (i)

There are no such residues in this entry.

