



wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 12, 2023 – 01:00 pm GMT

PDB ID : 4AKH
Title : Dynein Motor Domain - AMPPNP complex
Authors : Schmidt, H.; Gleave, E.S.; Carter, A.P.
Deposited on : 2012-02-22
Resolution : 3.60 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 ⓘ 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

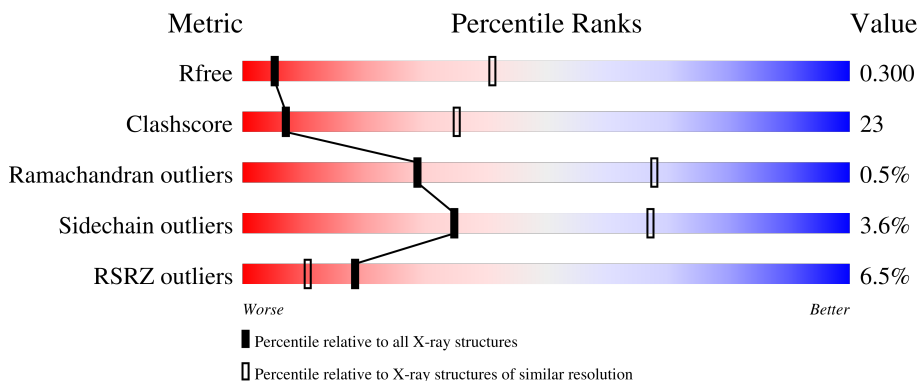
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.60 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	1257 (3.70-3.50)
Clashscore	141614	1353 (3.70-3.50)
Ramachandran outliers	138981	1307 (3.70-3.50)
Sidechain outliers	138945	1307 (3.70-3.50)
RSRZ outliers	127900	1161 (3.70-3.50)

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 $\leq 5\%$. 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	2695	
1	B	2695	

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	ATP	B	5093	-	-	X	-
4	SO4	A	5095	-	-	X	-
4	SO4	B	5096	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 41642 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 GLUTATHIONE S-TRANSFERASE CLASS-MU 26 KDA ISOZYME, DYNEIN HEAVY CHAIN CYTOPLASMIC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	2650	20748	13268	3472	3915	93	0	0	0
1	B	2650	20748	13268	3472	3915	93	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

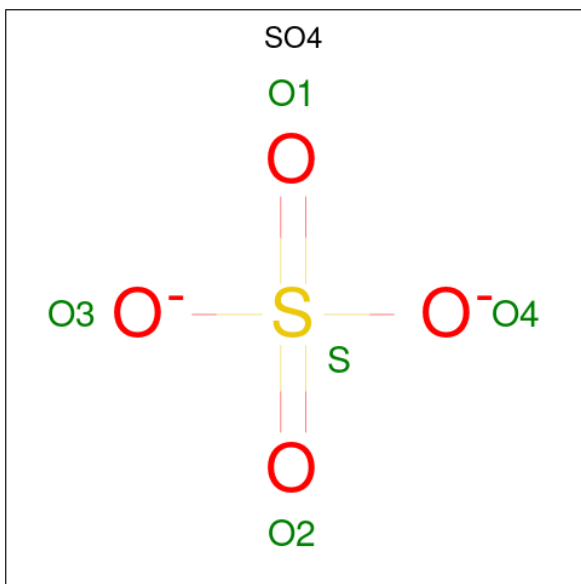
Chain	Residue	Modelled	Actual	Comment	Reference
A	218	SER	-	linker	UNP P36022
A	219	ASP	-	linker	UNP P36022
A	1630	ILE	LEU	conflict	UNP P36022
A	3782	ASP	GLU	conflict	UNP P36022
B	218	SER	-	linker	UNP P36022
B	219	ASP	-	linker	UNP P36022
B	1630	ILE	LEU	conflict	UNP P36022
B	3782	ASP	GLU	conflict	UNP P36022

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
3	B	1	31	10	6	12	3	0	0

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

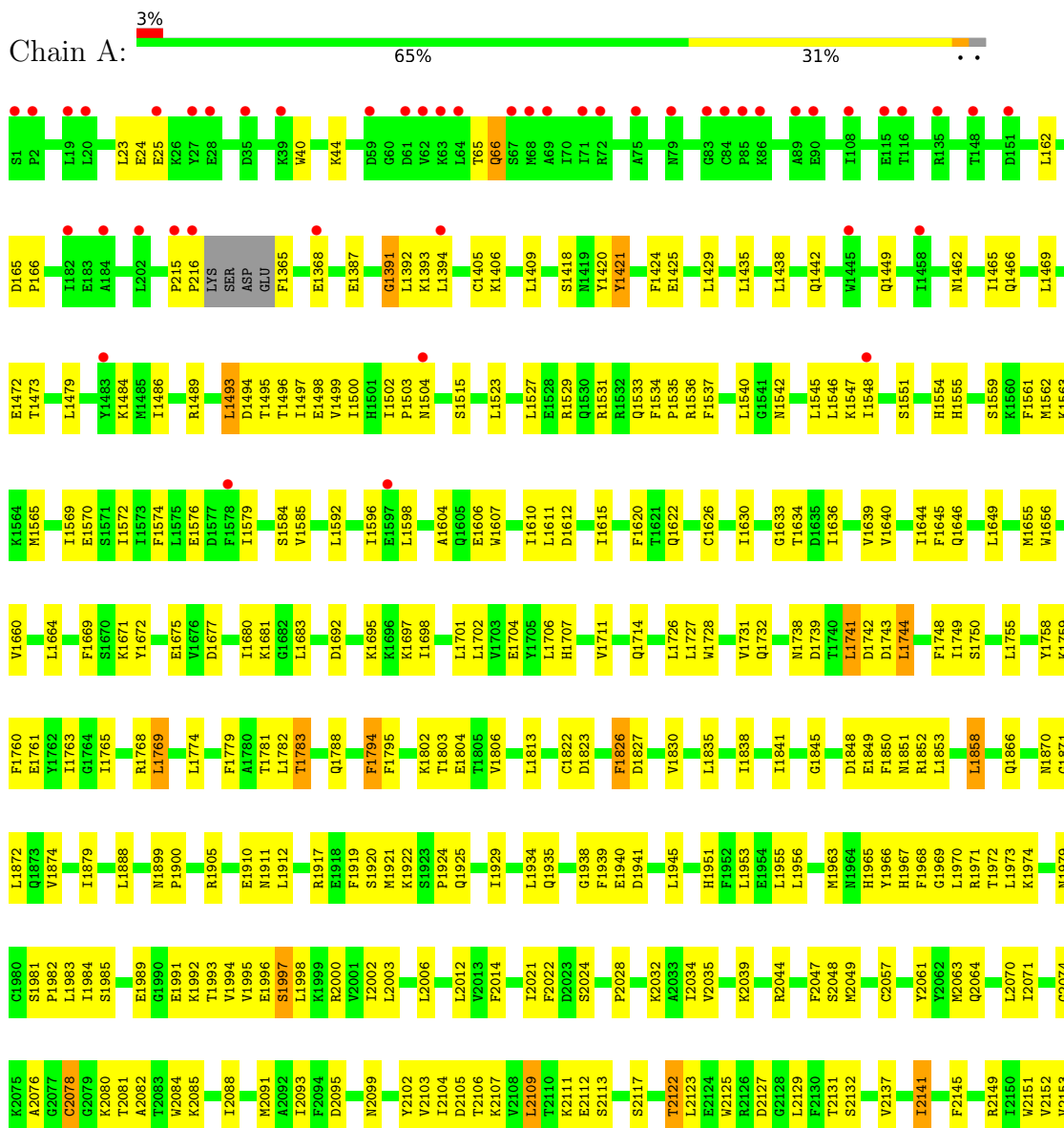
- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
5	A	1	1	1	0	0
5	B	1	1	1	0	0

3 Residue-property plots

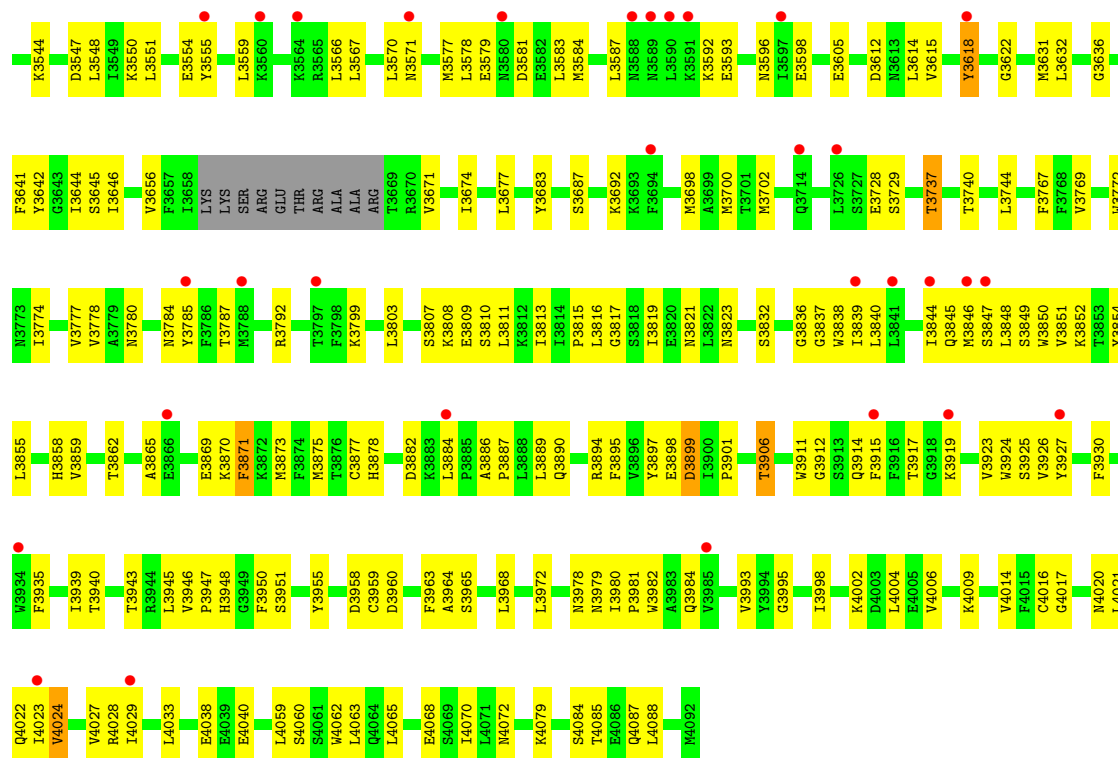
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: GLUTATHIONE S-TRANSFERASE CLASS-MU 26 KDA ISOZYME, DYNEIN HEAVY CHAIN CYTOPLASMIC



R3792	F2154	F2257	A3362	F2445	E2548	V2677	R2812	I2913	L3024	L3353	V3477	T3569	R3792
G3796	D2155	L2262	N2363	S2446	R2549	L2681	T2813	I2914	V3028	V3358	T3478	R3670	G3796
T3797	E2161	F2266	D2447	D2448	R2552	L2686	I2817	M2915	L3359	K3359	I3481	E3579	T3797
K3799	V2169	H2274	K2365	T2449	A2555	L2689	D2818	G2918	VAL	D3361	G3482	E3673	K3799
L3800	L2170		F2368		L2556	L2694	E2819	M2920	ASN	R3365	V3488	L3674	L3800
L3801	M2173	R2279	I2375	M2463	L2559	L2694	T2822	T2924	LEU	F3366	V3488	L3677	L3801
E3802	K2174	P2376	S2377	G2470	P2562	L2694	T2825	V2928	ASN	I3367	K3493	L3678	E3802
L3803	L2175	F2280	S2377	P2475	M2282	V2707	L2828	L2936	LYS	D3368	L3494	E3592	L3803
A3804	L2176	T2281	V2378	K2476	N2282	M2708	E2829	THR	THR	V3371	F3495	E3593	A3804
K3805	T2177	K2283	S2379		K2283	K2709	E2830	P2987	SER	T3372	I3505	N3596	K3805
A3806	L2178	L2284	L2380	L2482	K2565		E2833	M2938	ILE	L3373	L3509	K3600	A3806
K3807	G2181	V2288	E2381	E2488	S2566	L2712	T2833	T2941	VAL	D3374	R3509	L3601	K3807
K3808	A2382	P2376	H2383	I2488		V2713	L2834	T2942	LEU	E3375	R3510	S3602	K3808
E3809	R2182	F2280	E2384	I2489		L2713	L2835	F2943	VAL	E3375	R3510	E3603	E3809
S3810	R2183	F2281	V2385	I2490		L2728	L2835	F2943	VAL	M3393	V3513	E3603	S3810
K3811	L2184	T2282	M2386	L2491		S2737	A2838	ILE	THR	S3400	F3518	F3607	K3811
K3812	F2186	H2293	M2387	L2492		H2741	D2839	VAL	THR	F3406	V3519	D3612	K3812
L3813	L2186	L2294	R2387	P2492		K2576	I2840	PRU	GLU	P3406	K3303	N3613	L3813
L3814	L2193	L2295	I2390	K2493		A2577	P2841	GLU	GLU	D3409	K3304	L3614	L3814
L3815	F2194	I2299	V2391	L2494		L2742	D2842	ASN	ASN	P3410	R3305	V3615	L3815
E3820	P2199	F2302	P2395	L2495		L2743	L2843	LYS	LYS		L3307		E3820
L3821	D2200	F2302	I2396	G2498		R2744	F2844	GLU	GLU	T3418	L3307	Y3618	L3821
L3822	H2201	F2302	D2396	S2499		R2747	G2846	LEU	LEU	L3429	T3309	G3622	L3822
L3823	T2202	F2302	T2397	V2502		H2755	I2745	VAL	PHE	S3430	K3311	L3628	L3823
L3824	T2202	F2302	I2398	V2502		M2756	D2746	THR	THR	R3439	K3312	F3629	L3824
L3825	T2203	F2302	K2399	K2508		M2757	G2846	GLU	GLU	L3440	F3313	S3630	L3825
L3826	P2204	F2302	H2400	L2514		L2758	L2853	GLU	GLU	F3446	F3313	N3638	L3826
L3827	A2205	F2302	E2401	F2515		L2766	L2856	ILE	ILE		S3317	M3541	L3827
L3828	T2206	F2302	I2207	E2511		K2766	T2860	GLN	GLN	A3443	Q3318	K3544	L3828
L3829	T2208	F2302	L2316	K2512		A2761	T2860	T2960	T2961	V3449	E3319	R3545	L3829
L3830	R2209	F2302	L2317	L2514		S2762	L2865	I2961	R2962	V3450	L3320	E3546	L3830
L3831	L2212	F2302	L2318	G2514		R2763	L2866	D2963	D2963	V3450	I3321	E3546	L3831
L3832	F2215	F2302	R2412	T2519		F2771	E2870	N2967	V2982	Q3453	K3324	K3550	L3832
C2220	G2220	F2302	R2412	E2520		F2773	L2873	V2982	V2984	Q3453	K3324	K3550	L3832
S2221	S2221	F2302	I2415	E2520		V2773	V2878	V2984	V2984	D3459	L3326	Y3555	L3832
I2222	I2222	F2302	I2415	E2520		L2779	L2881	I2985	I2985	P3460	I3329	K3556	L3832
S2223	S2223	F2302	P2420	V2523		K2780	I2881	P2986	P2986	I3461	Y3330	L3557	L3832
S2224	S2224	F2302	G2421	T2526		P2784	L2885	S2987	S2987	I3462	E3331	K3567	L3832
K2225	K2225	F2302	S2422	E2527		K2785	L2885	P2989	P2989	S3463	S3463	E3568	L3832
L2226	L2226	F2302	G2423	R2528		L2786	L2891	G2990	G2990	L3465	F3334	E3563	L3832
L2229	L2229	F2302	K2424	R2528		H2787	C2892	L2999	L2999	L3465	L3465	K3564	L3832
L2230	L2230	F2302	T2425	C2535		R2788	M2902	L3002	L3002	F3470	E3341	R3565	L3832
L2241	L2241	F2302	M2426	N2536		H2788	L2903	L3002	L3002	N3471	R3342	L3566	L3832
L2249	L2249	F2302	I2427	I2536		F2795	I2903	L3002	L3002	H3472	H3472	L3567	L3832
L2252	L2252	F2302	M2428	R2543		L2799	F2809	L5010	L5010	A3473	A3473	E3569	L3832
L2359	L2359	F2302	A2431	I2544		L2910	M2910	L5010	L5010	G3474	G3474	L3570	L3832
L2359	L2359	F2302	L2437	S2547		C2912	R2911	V3017	V3017	R3476	R3476	S3573	L3832

K3297	S5400	R3426	P2841	K2565	S2477	D3889	K2283	S2156	K2085	L1998	R1917
K3303	F9406	F3427	D2842	S2566	D2478	D2389	L2284	E2161	I2088	K1999	E1918
E3304	F3406	V3428	Q2845	Y2571	L2479	V2391	E2285	Y2162	I2091	R2000	F1919
R3305	D9409	L3428	G2846	E2572	L2482	T2394	Q2288	M2091	M2092	V2001	S1920
M3306	K3426	L3429	R2849	L2573	L2484	L2395	L2289	A2092	L2003	L2002	M1921
L3307	T3426	S3430	Y2849	Y2574	F2485	D2396	L2290	L2093	P2004	K1922	K1922
L3308	T3427	F3431	L2853	A2577	E2488	T2397	H2293	F2094	S2005	P1924	S1933
L3309	V3427	F3431	L2854	I2578	L2489	F2404	L2294	D2095	L2006	Q1925	P1925
L3310	L3428	F3431	L2855	E2590	L2490	L2407	L2295	G2007	S1926	S1926	S1926
L3311	L3429	F3431	T2860	E2599	L2491	L2407	F2302	D2008	G2008	G2008	G2008
L3312	L3430	F3431	L2865	R2620	F2492	L2466	Y2102	L2012	L2012	I1929	I1929
L3313	F3431	F3431	L2866	T2623	K2493	N2409	G2181	V2101	V2101	V2100	V2100
E3319	R3439	R3439	L2867	T2623	L2494	S2410	E2182	Y2102	Y2102	V2103	V2103
L3320	L3440	L3440	L2867	D2495	D2495	K2411	R2183	I2104	I2104	F2014	F2014
G3321	F3458	F3458	L2867	R2627	K2496	R2412	R2183	T2106	T2106	F2022	F2022
G3322	D3459	D3459	E2870	P2637	K2496	R2412	R2183	T2106	T2106	D2023	D2023
N3323	P3460	P3460	E2870	P2637	K2496	R2412	R2183	T2106	T2106	D2023	D2023
C3324	I3461	I3461	Q2871	Y2630	G2497	I2415	I2186	K2107	K2107	S2024	S2024
I3325	I3462	I3462	L2872	T2635	V2503	P2420	L2193	L2106	L2106	A2025	A2025
I3326	I3462	I3462	L2873	T2635	V2503	G2421	L2193	T2110	T2110	G2026	G2026
S3327	S3463	S3463	L2873	P2636	L2506	S2422	E2195	F2110	F2110	T2027	T2027
S3328	R3464	R3464	V2878	G2637	L2506	S2422	E2195	K2111	K2111	P2028	P2028
I3329	L3465	L3465	V2878	G2637	L2506	S2422	E2195	K2111	K2111	P2028	P2028
Y3330	I3466	I3466	V2878	G2637	L2506	S2422	E2195	K2111	K2111	P2028	P2028
F3334	A3473	A3473	K2883	R2638	L2506	S2422	E2195	K2111	K2111	P2028	P2028
N3338	R3476	R3476	K2883	R2638	L2506	S2422	E2195	K2111	K2111	P2028	P2028
E3341	I3481	I3481	K2883	R2638	L2506	S2422	E2195	K2111	K2111	P2028	P2028
L3346	G3482	G3482	H2886	T2640	Q2508	T2425	H2201	G2116	G2116	V2035	V2035
I3348	D3483	D3483	H2886	T2640	Q2508	T2425	H2201	G2116	G2116	V2035	V2035
K3350	S3502	S3502	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
R3351	I3505	I3505	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
L3352	L3509	L3509	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
L3353	R3510	R3510	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
F3356	V3513	V3513	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
F3358	F3518	F3518	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
K3359	V3518	V3518	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
Y3360	F3520	F3520	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
D3361	N3521	N3521	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
L3370	I3525	I3525	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
F3371	F3530	F3530	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
T3372	L3534	L3534	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
E3375	E3537	E3537	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
L3380	N3538	N3538	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
L3391	E3392	E3392	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
E3392	N3393	N3393	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
N3393	M3541	M3541	F2889	L2660	L2510	I2427	T2202	T2202	T2202	L2034	L2034
VAL			VAL				VAL			VAL	



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	175.56Å 118.13Å 201.02Å 90.00° 90.29° 90.00°	Depositor
Resolution (Å)	50.00 – 3.60 70.46 – 3.60	Depositor EDS
% Data completeness (in resolution range)	99.0 (50.00-3.60) 99.2 (70.46-3.60)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.88 (at 3.58Å)	Xtrriage
Refinement program	REFMAC 5.7.0019	Depositor
R, R_{free}	0.241 , 0.302 0.236 , 0.300	Depositor DCC
R_{free} test set	4767 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	127.5	Xtrriage
Anisotropy	0.330	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 117.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.25$	Xtrriage
Estimated twinning fraction	0.074 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	41642	wwPDB-VP
Average B, all atoms (Å ²)	182.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.13% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ATP, ANP, SO4

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	0.53	0/21146	0.77	7/28618 (0.0%)
1	B	0.46	2/21146 (0.0%)	0.68	5/28618 (0.0%)
All	All	0.49	2/42292 (0.0%)	0.73	12/57236 (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	B	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	3306	TRP	CE3-CZ3	-6.25	1.27	1.38
1	B	3306	TRP	CE2-CZ2	-5.22	1.30	1.39

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	2012	LEU	CA-CB-CG	7.99	133.67	115.30
1	A	1741	LEU	CB-CG-CD1	6.69	122.38	111.00
1	A	3792	ARG	NE-CZ-NH1	5.72	123.16	120.30
1	A	1782	LEU	CB-CG-CD2	-5.54	101.59	111.00
1	B	2460	ARG	NE-CZ-NH2	-5.52	117.54	120.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	2119	LEU	Peptide
1	B	2620	ARG	Sidechain

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	20748	0	20206	952	0
1	B	20748	0	20206	909	0
2	A	31	0	12	8	0
2	B	31	0	12	17	0
3	A	31	0	13	7	0
3	B	31	0	13	7	0
4	A	10	0	0	3	0
4	B	10	0	0	3	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
All	All	41642	0	40462	1861	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 23.

The worst 5 of 1861 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:216:PRO:CB	1:A:1365:PHE:CE1	2.05	1.38
1:B:3303:LYS:HD2	1:B:3306:TRP:CD1	1.67	1.28
1:B:1620:PHE:HD1	1:B:1760:PHE:CZ	1.53	1.25
1:A:1368:GLU:HG2	1:A:1424:PHE:CZ	1.69	1.24
1:B:2467:THR:HB	1:B:2473:LEU:CD1	1.66	1.23

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	2640/2695 (98%)	2518 (95%)	110 (4%)	12 (0%)	29	68
1	B	2640/2695 (98%)	2515 (95%)	111 (4%)	14 (0%)	29	68
All	All	5280/5390 (98%)	5033 (95%)	221 (4%)	26 (0%)	29	68

5 of 26 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1391	GLY
1	B	1391	GLY
1	B	3578	LEU
1	A	24	GLU
1	A	1633	GLY

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	2218/2453 (90%)	2138 (96%)	80 (4%)	35	67
1	B	2218/2453 (90%)	2137 (96%)	81 (4%)	34	66
All	All	4436/4906 (90%)	4275 (96%)	161 (4%)	35	67

5 of 161 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	2479	ILE

Continued on next page...

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Mol	Chain	Res	Type
1	B	3737	THR
1	B	2574	TYR
1	B	3329	ILE
1	B	3917	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 76 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	2753	GLN
1	B	3890	GLN
1	B	2896	ASN
1	B	3542	GLN
1	B	4077	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](#)

Of 10 ligands modelled in this entry, 2 are monoatomic - leaving 8 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
4	SO4	B	5095	-	4,4,4	0.33	0	6,6,6	0.46	0
3	ANP	A	5094	-	29,33,33	2.43	5 (17%)	31,52,52	1.56	7 (22%)
4	SO4	B	5096	-	4,4,4	0.35	0	6,6,6	0.20	0
4	SO4	A	5095	-	4,4,4	0.52	0	6,6,6	0.69	0
4	SO4	A	5096	-	4,4,4	0.45	0	6,6,6	0.24	0
2	ATP	A	5093	5	26,33,33	1.01	1 (3%)	31,52,52	1.65	5 (16%)
3	ANP	B	5094	-	29,33,33	2.48	5 (17%)	31,52,52	1.52	4 (12%)
2	ATP	B	5093	5	26,33,33	1.02	2 (7%)	31,52,52	1.65	5 (16%)

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	ANP	A	5094	-	-	8/14/38/38	0/3/3/3
2	ATP	B	5093	5	-	7/18/38/38	0/3/3/3
2	ATP	A	5093	5	-	5/18/38/38	0/3/3/3
3	ANP	B	5094	-	-	6/14/38/38	0/3/3/3

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	5094	ANP	PG-O1G	9.66	1.61	1.46
3	A	5094	ANP	PG-O1G	9.47	1.61	1.46
3	B	5094	ANP	PG-N3B	4.66	1.75	1.63
3	A	5094	ANP	PG-N3B	4.66	1.75	1.63
3	B	5094	ANP	PB-N3B	4.60	1.75	1.63

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	5093	ATP	C3'-C2'-C1'	3.97	106.96	100.98
2	B	5093	ATP	C3'-C2'-C1'	3.77	106.65	100.98
2	B	5093	ATP	PB-O3B-PG	-3.71	120.08	132.83
2	B	5093	ATP	PA-O3A-PB	-3.69	120.16	132.83
2	A	5093	ATP	PB-O3B-PG	-3.60	120.49	132.83

There are no chirality outliers.

5 of 26 torsion outliers are listed below:

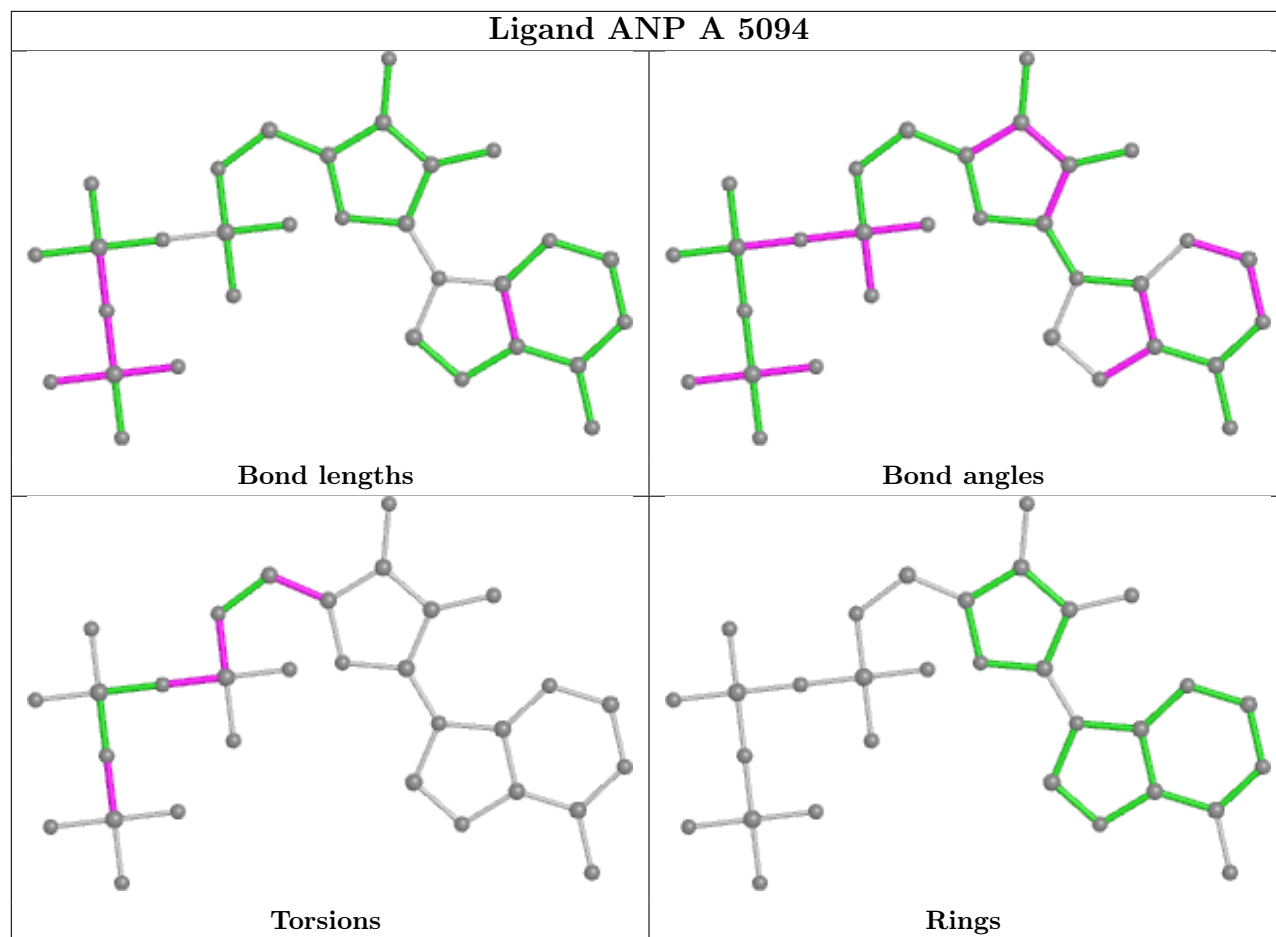
Mol	Chain	Res	Type	Atoms
2	B	5093	ATP	C5'-O5'-PA-O1A
3	A	5094	ANP	PB-N3B-PG-O1G
3	A	5094	ANP	C5'-O5'-PA-O2A
3	B	5094	ANP	PB-N3B-PG-O1G
3	B	5094	ANP	C5'-O5'-PA-O1A

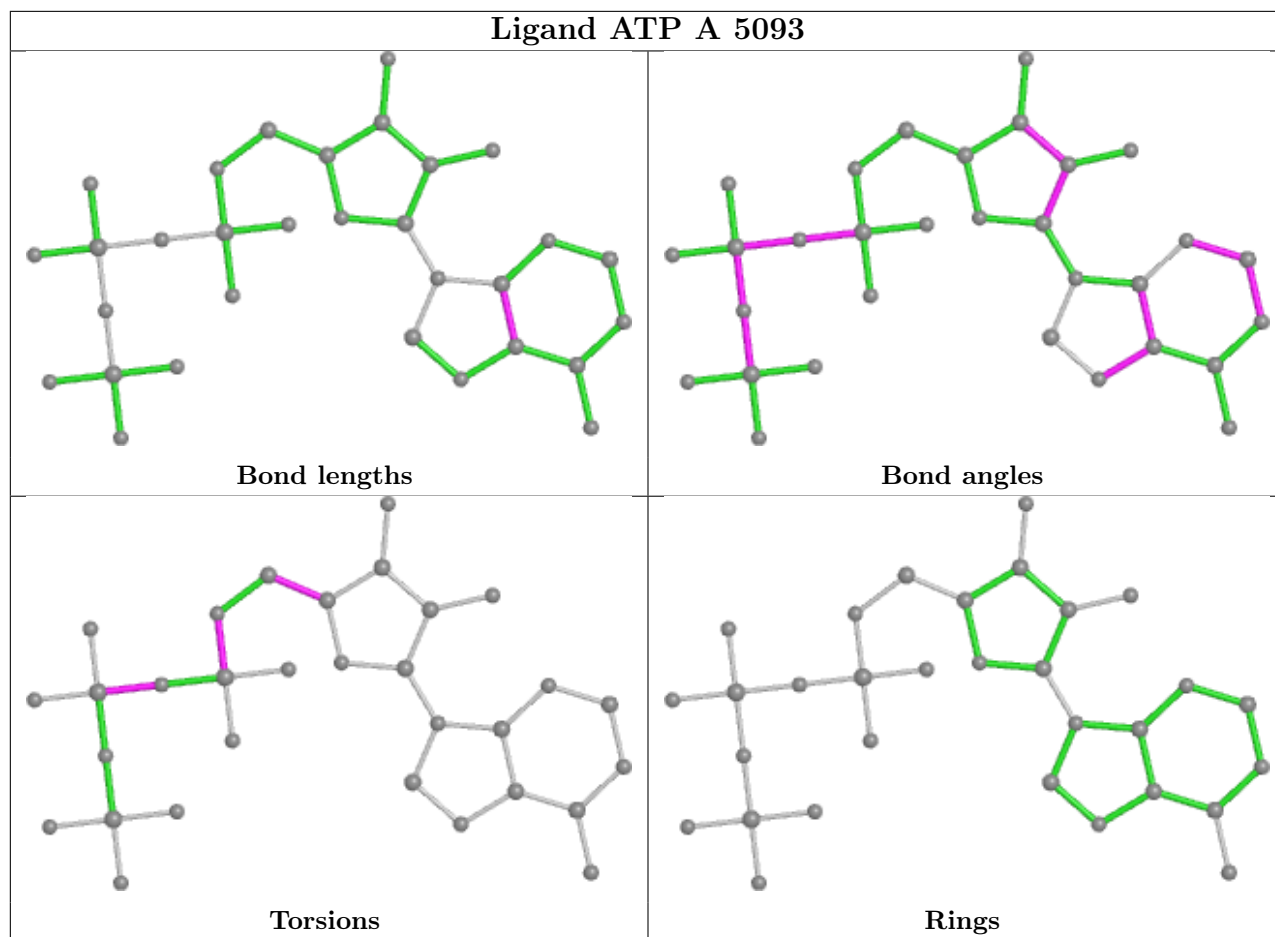
There are no ring outliers.

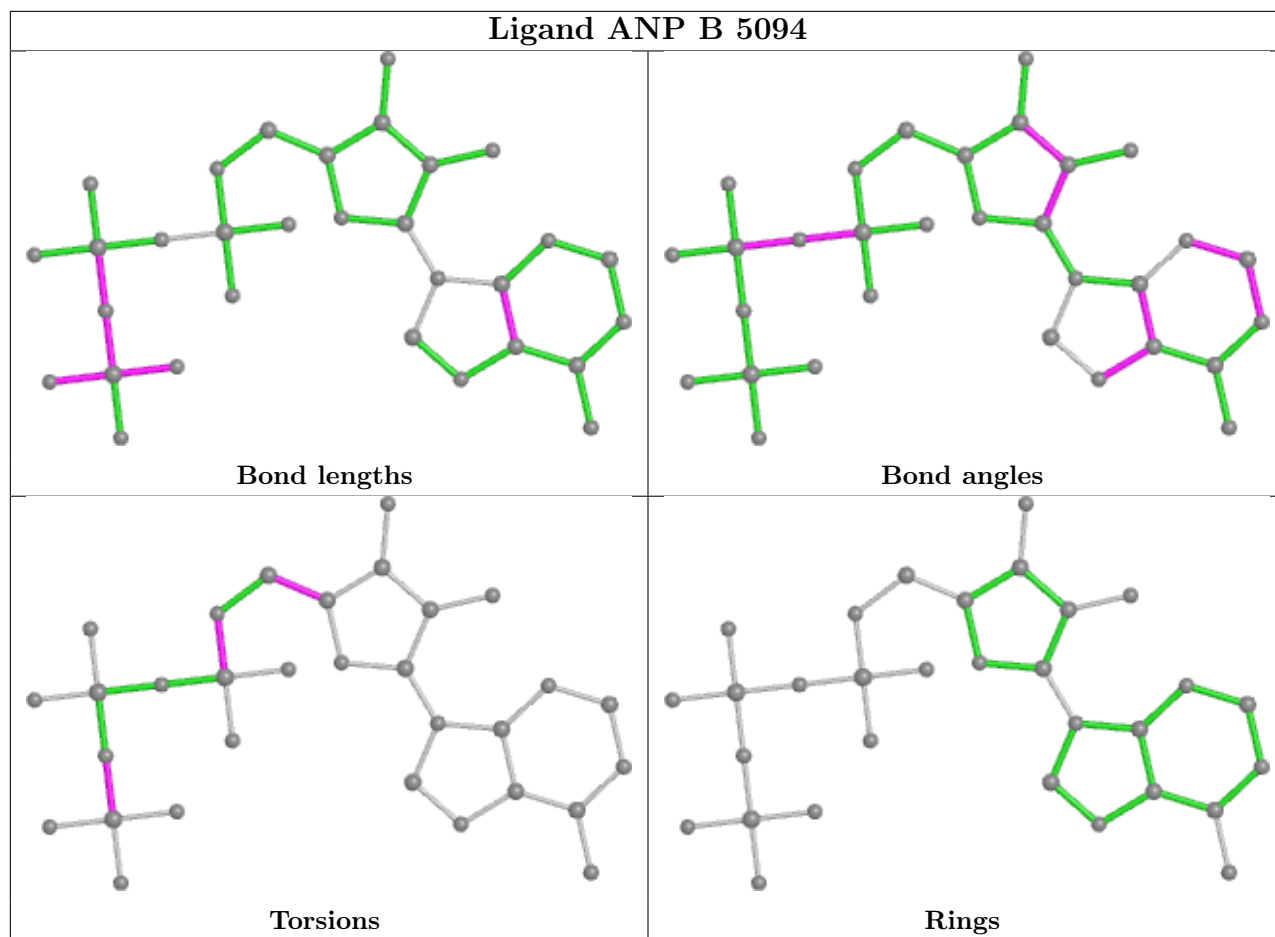
6 monomers are involved in 45 short contacts:

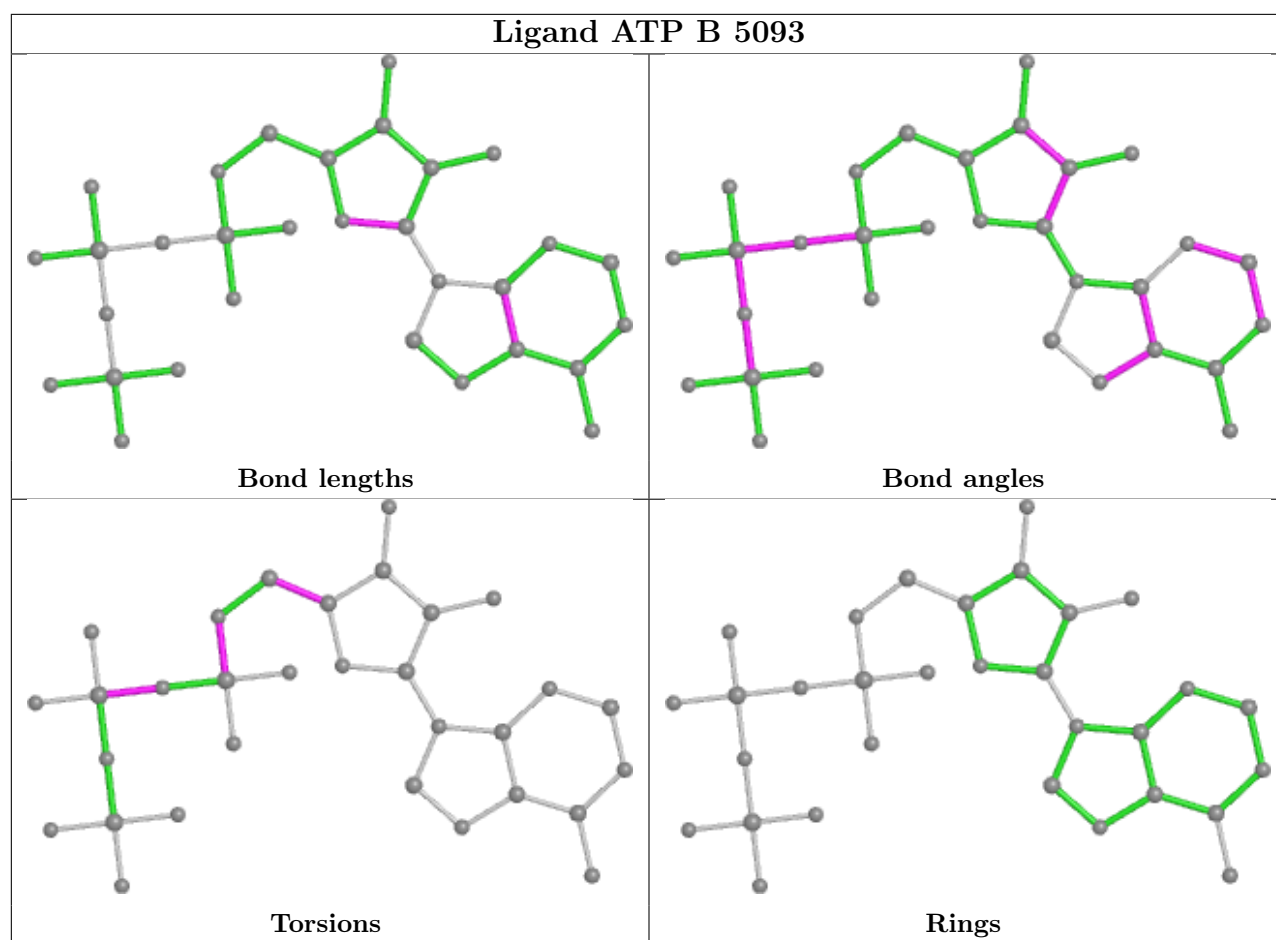
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5094	ANP	7	0
4	B	5096	SO4	3	0
4	A	5095	SO4	3	0
2	A	5093	ATP	8	0
3	B	5094	ANP	7	0
2	B	5093	ATP	17	0

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 than 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, 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	2650/2695 (98%)	0.11	69 (2%) 56 40	69, 151, 281, 423	0
1	B	2650/2695 (98%)	0.64	277 (10%) 6 3	92, 193, 357, 500	0
All	All	5300/5390 (98%)	0.37	346 (6%) 18 11	69, 172, 321, 500	0

The worst 5 of 346 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	165	ASP	24.7
1	B	164	MET	22.6
1	B	213	ASP	20.8
1	B	29	GLU	19.9
1	B	163	TYR	19.7

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](#)

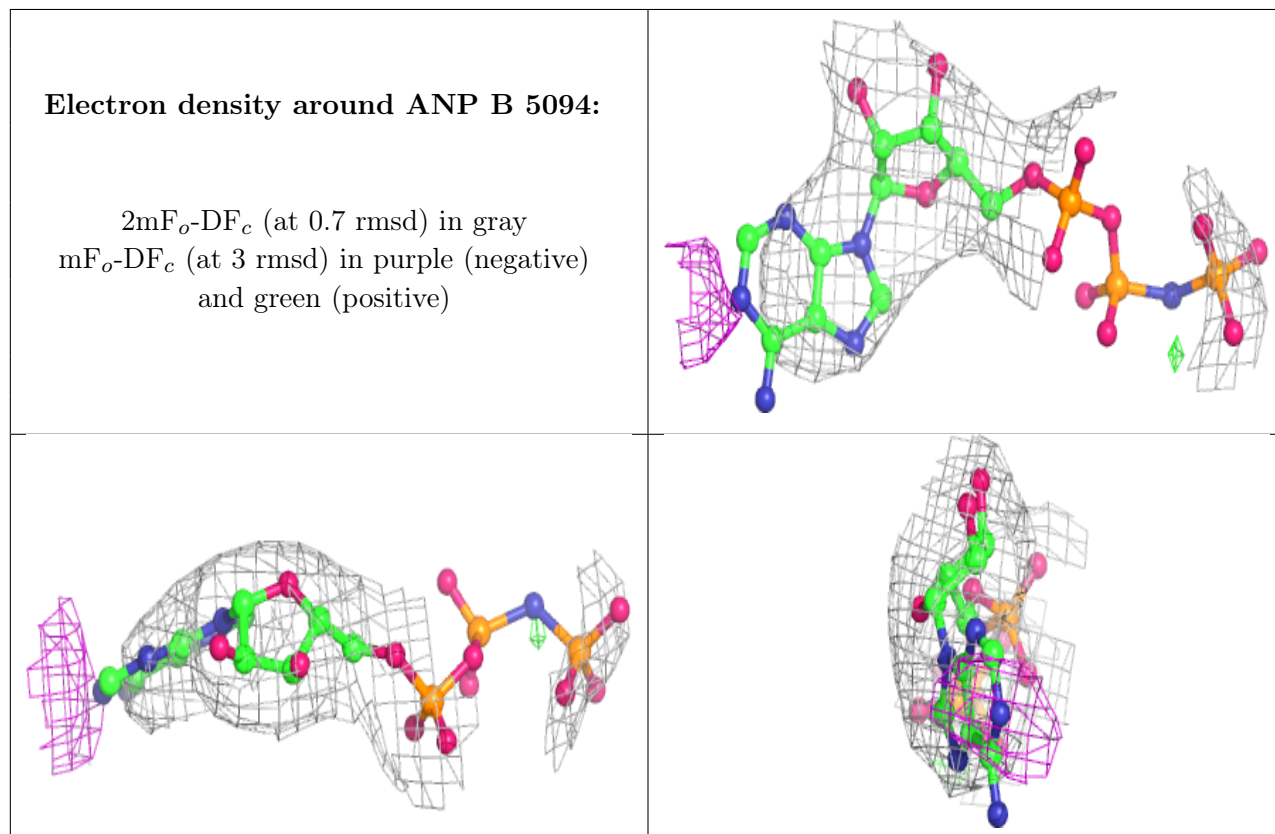
There are no monosaccharides in this entry.

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, 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.

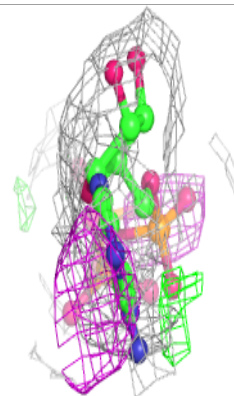
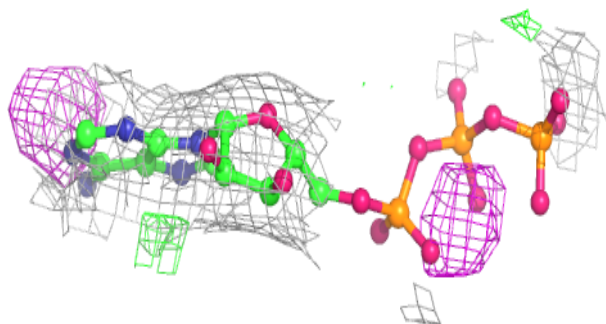
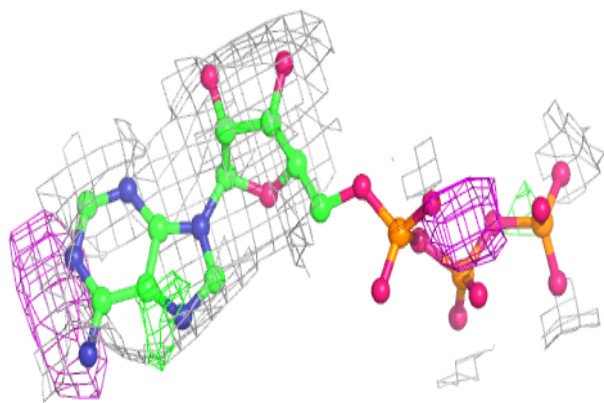
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	SO4	B	5095	5/5	0.84	0.18	152,154,166,167	0
3	ANP	B	5094	31/31	0.89	0.29	112,145,237,257	0
2	ATP	B	5093	31/31	0.92	0.24	99,141,184,200	0
3	ANP	A	5094	31/31	0.94	0.27	111,140,238,248	0
2	ATP	A	5093	31/31	0.95	0.29	88,123,185,204	0
4	SO4	B	5096	5/5	0.95	0.14	155,168,174,176	0
4	SO4	A	5095	5/5	0.96	0.25	84,98,104,105	0
4	SO4	A	5096	5/5	0.96	0.20	115,130,143,145	0
5	MG	B	5097	1/1	0.97	0.18	66,66,66,66	0
5	MG	A	5097	1/1	0.99	0.22	62,62,62,62	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.

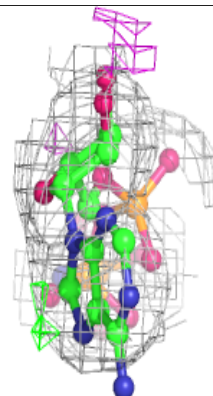
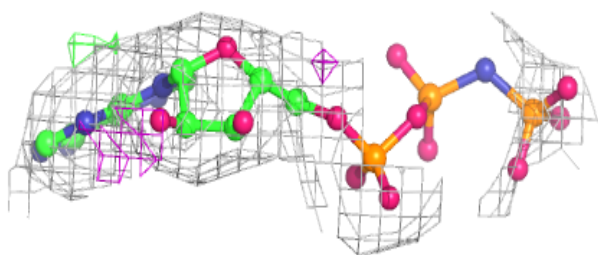
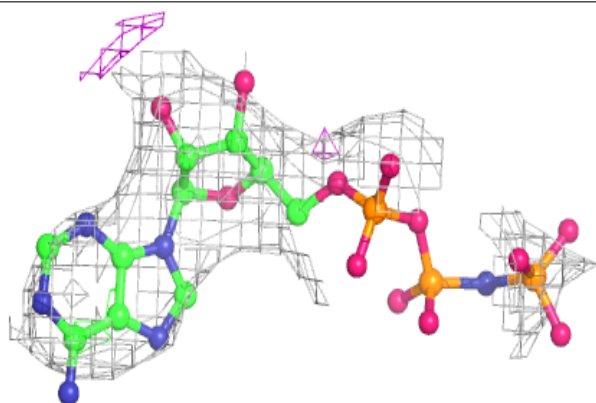


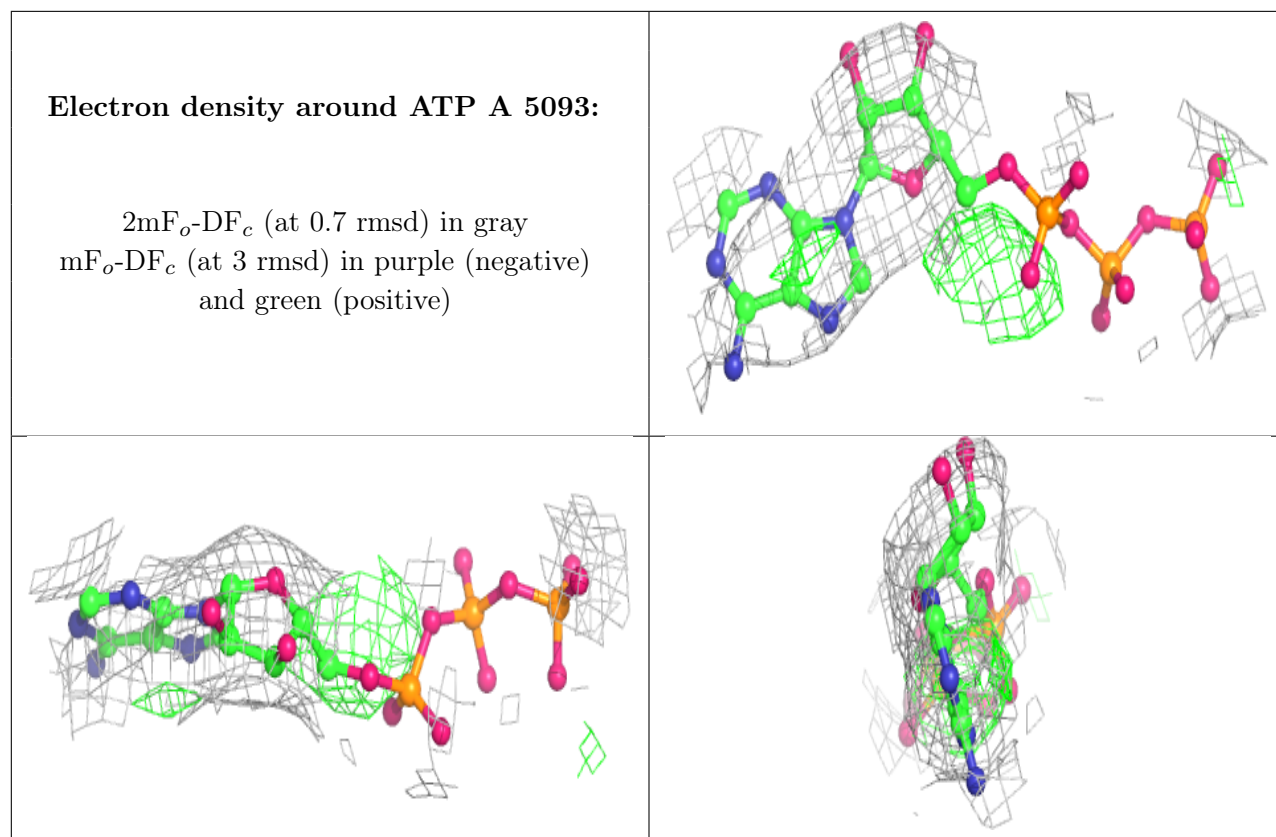
Electron density around ATP B 5093:

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

**Electron density around ANP A 5094:**

$2mF_o-DF_c$ (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.