



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 25, 2020 – 03:17 PM BST

PDB ID : 4AKI
Title : Dynein Motor Domain - LuAc derivative
Authors : Schmidt, H.; Gleave, E.S.; Carter, A.P.
Deposited on : 2012-02-22
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 ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) 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 : 2.13
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) : 2.13

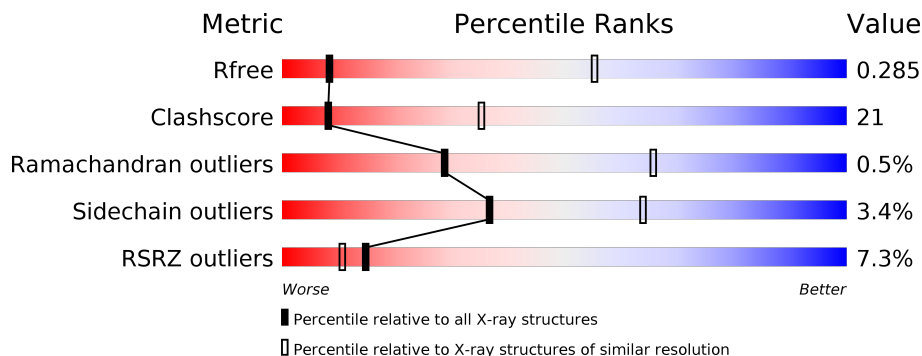
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION



The reported resolution of this entry is 3.70 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	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 on 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
3	SO4	A	5094	-	-	X	-
3	SO4	A	5095	-	-	X	-
3	SO4	A	5096	-	-	X	-
3	SO4	B	5095	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 41590 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.

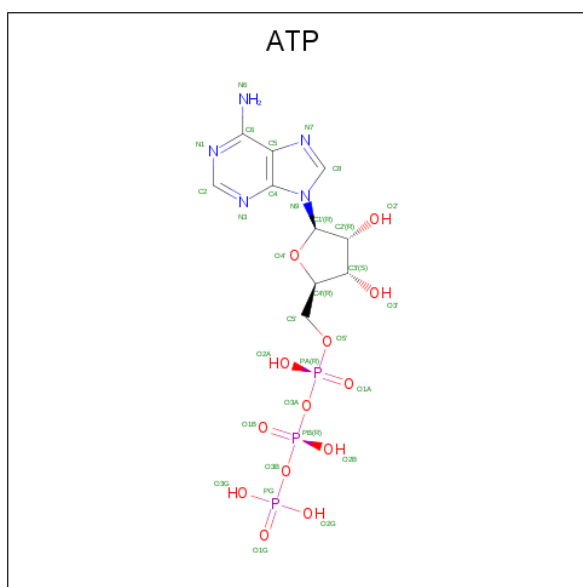
- Molecule 1 is a protein called GLUTATHIONE S-TRANSFERASE CLASS-MU 26 KDA ISOZYME, DYNEIN HEAVY CHAIN CYTOPLASMIC.

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: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

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

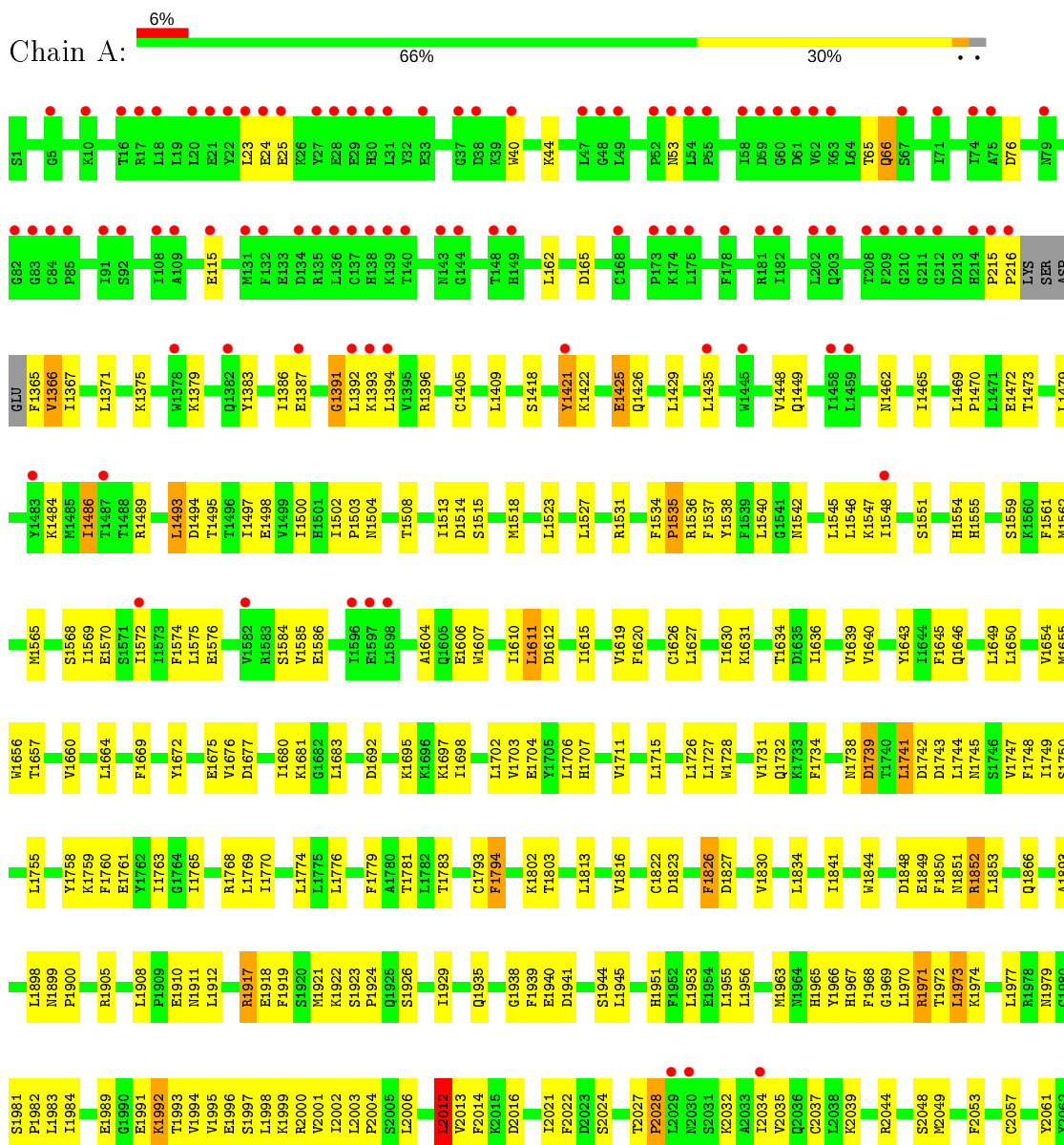
- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

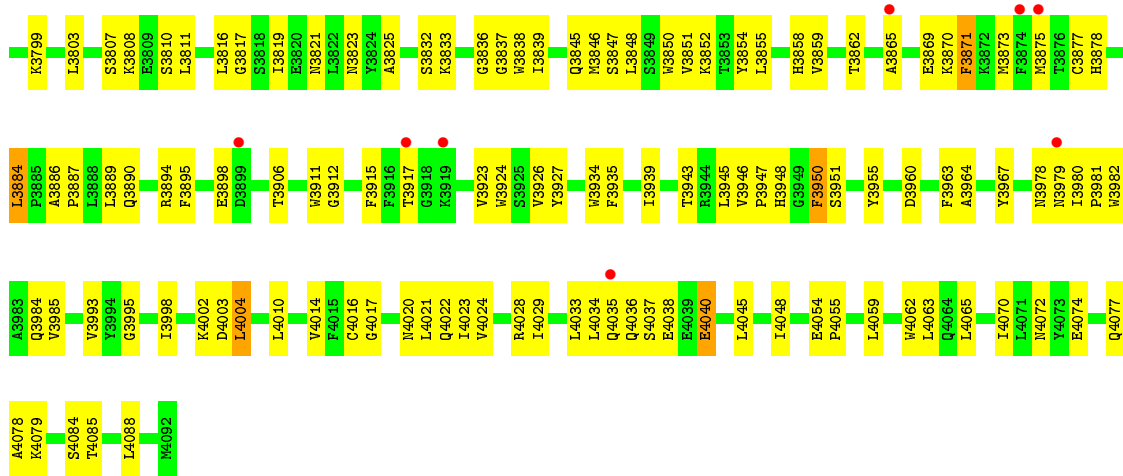
3 Residue-property plots

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.

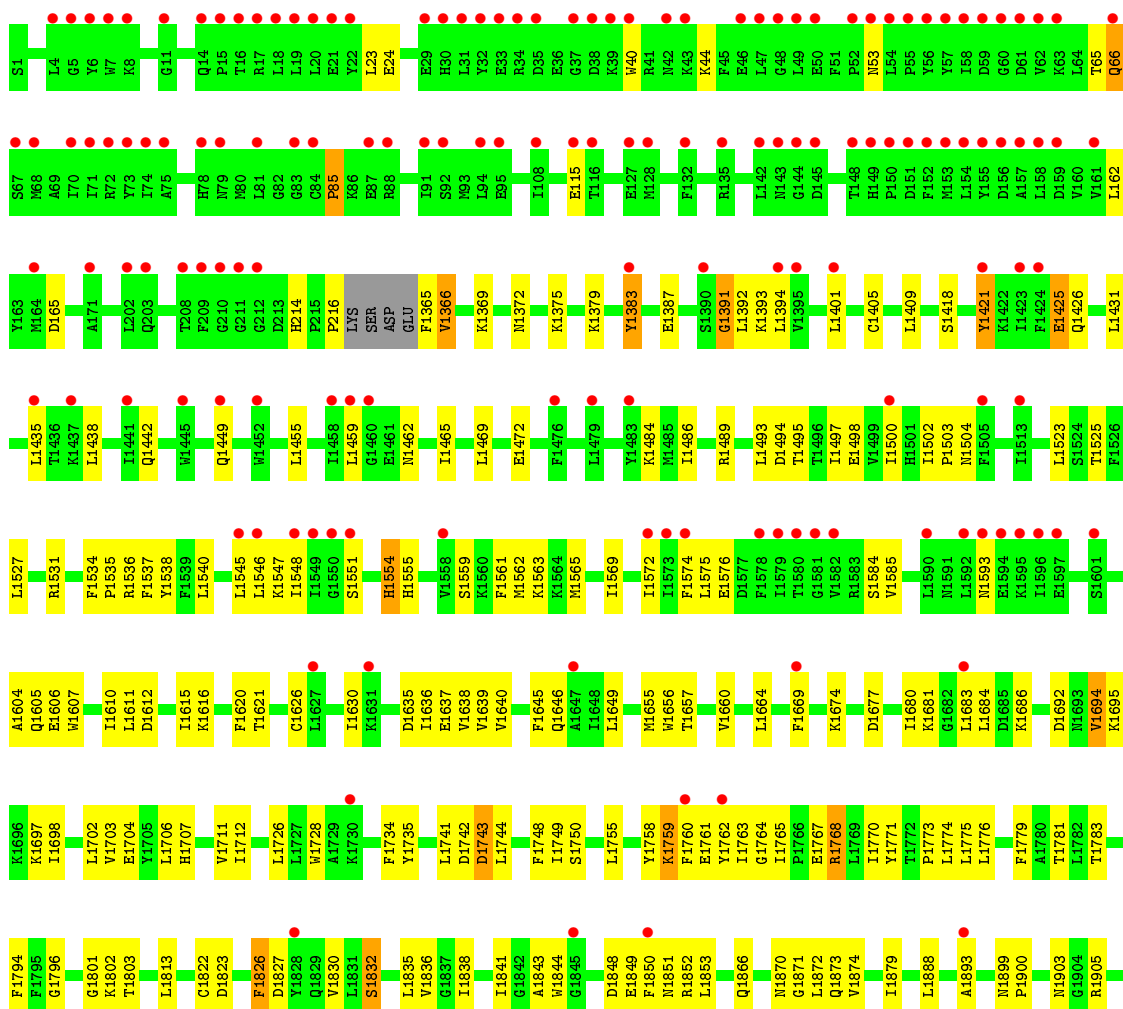
- Molecule 1: GLUTATHIONE S-TRANSFERASE CLASS-MU 26 KDA ISOZYME, DYNEIN HEAVY CHAIN CYTOPLASMIC



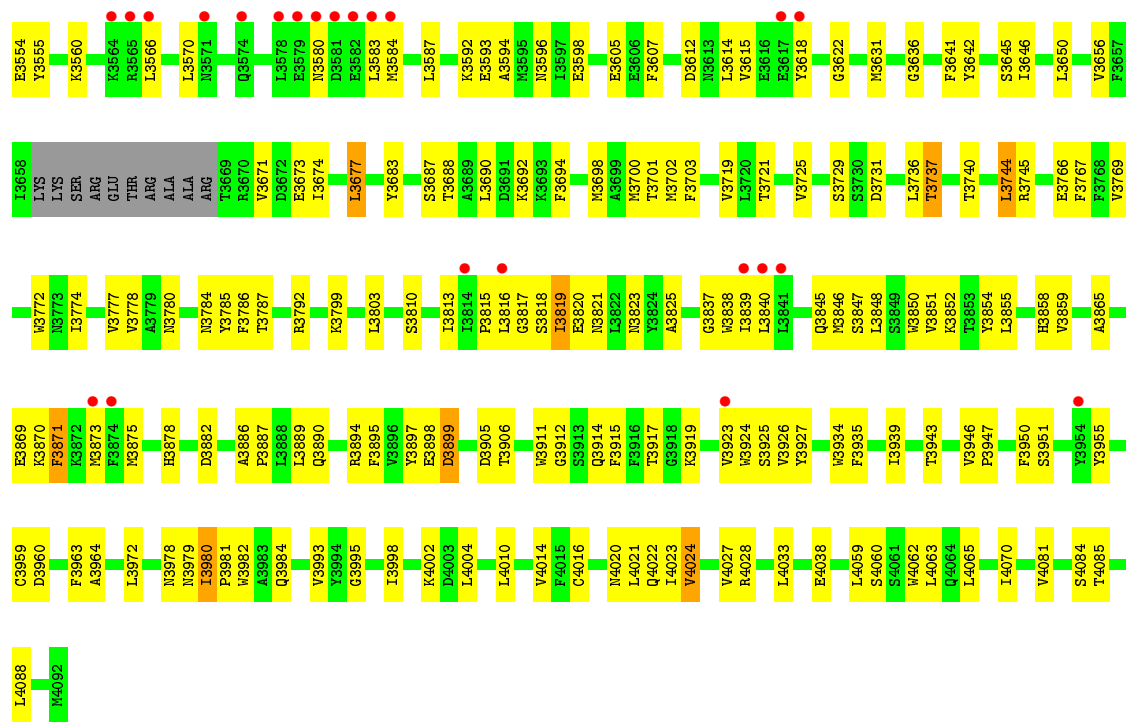
K3692	K3693	K3694	K3695	K3591	K3592	K3593	K3594	K3595	F3518	F3519	F3520	K3521	K3525	D3612	K3613	L3614	K3615	K3618	G3622	K3638	L3648	L3628	K3641	K3642	K3643	K3644	D3547	L3548	L3549	K3550	Y3555	K3556	K3561	E3562	K3563	K3564	K3565	K3566	L3567	E3568	E3569	K3570	K3571	K3572	K3573	K3577	K3578	E3579	K3580	K3581	E3582	L3583	L3690	D3691
I3587	M3588	M3589	L3590	K3591	K3592	E3593	A3594	M3595	M3596	L3601	F3607	D3612	M3613	L3614	V3615	Y3618	G3622	L3628	M3631	F3641	S3645	L3646	F3656	F3657	I3658	L3674	L3760	E3766	F3767	F3768	V3769	M3772	M3773	I3774	V3777	V3778	A3779	N3780	N3784	Y3785	S3687	L3690	D3691											
V3028	LEU	LVS	VAL	ASN	GLU	LEU	ASN	LVS	THR	LEU	SER	ILE	SER	VAL	K3297	S3298	L3299	F3300	F3301	E3302	L3303	L3304	K3305	W3306	L3307	N3308	T3310	K3311	Q3312	F3313	S3317	G3318	K3319	L3320	L3321	G3322	K3323	L3329	Y3330	E3331	F3332	F3333	F3334	M3338	E3341	L3346	L3481	D3482	L3483	L3353	G3354			
K3355	V3358	K3359	V3360	D3361	R3365	D3368	T3372	L3373	S3400	F3406	L3407	L3408	D3409	H3413	M3414	L3415	T3416	V3417	I3418	L3429	R3439	L3440	F3446	Q3453	D3459	P3460	I3461	I3462	S3463	R3464	L3465	I3466	S3467	F3470	A3473	G3474	N3475	R3476	L3481	L3482	D3483	V3488												
L3505	F3508	L3509	R3510	K3511	R3512	V3513	F3518	V3519	T3520	K3521	L3525	F3530	D3531	L3534	E3537	M3538	L3541	L3542	K3543	F3544	D3547	L3548	L3549	K3550	Y3555	K3556	K3561	E3562	K3563	K3564	K3565	K3566	L3567	E3568	E3569	K3570	K3571	K3572	S3573	K3577	L3578	E3579	N3580	N3581	E3582	L3583	L3690	D3691						
K3692	K3693	K3694	K3695	K3591	K3592	E3593	A3594	M3595	M3596	L3601	F3607	D3612	K3613	L3614	V3615	Y3618	G3622	L3628	M3631	F3641	S3645	L3646	F3656	F3657	I3658	L3674	L3760	E3766	F3767	F3768	V3769	M3772	M3773	I3774	V3777	V3778	A3779	N3780	N3784	Y3785	S3687	L3690	D3691											
C2982	M2903	L2902	L2903	L2808	C2535	C2536	R2543	L2544	R2549	R2552	Y2558	L2559	P2562	S2563	G2564	S2566	L2567	L2578	F2579	K2585	Y2571	Y2574	Y2575	L2578	F2579	K2580	R2586	Y2586	V2597	T2609	G2610	Q2611	Q2612	R2611	R2662	Y2630	T2631	A2632	T2635	G2636	P2637	R2638	Q2639	T2640	S2643	L2644	R2646							
F2795	L2799	L2808	R2812	T2813	I2816	L2817	D2818	E2819	S2820	M2821	L2822	L2828	E2829	N2832	T2833	L2834	L2835	D2839	L2840	P2841	D2842	L2843	F2844	Q2845	Q2846	Y2849	L2852	L2853	L2856	T2860	R2861	L2865	L2866	L2867	D2868	E2872	L2873	Y2874	D2875	Q2783	P2784	K2785	L2786	R2787	L2788	T2890	I2891							
C2982	M2903	L2902	L2903	L2808	C2535	C2536	R2543	L2544	R2549	R2552	Y2558	L2559	P2562	S2563	G2564	S2566	L2567	L2578	F2579	K2585	Y2571	Y2574	Y2575	L2578	F2579	K2580	R2586	Y2586	V2597	T2609	G2610	Q2611	Q2612	R2611	R2662	Y2630	T2631	A2632	T2635	G2636	P2637	R2638	Q2639	T2640	S2643	L2644	R2646							
F2795	L2799	L2808	R2812	T2813	I2816	L2817	D2818	E2819	S2820	M2821	L2822	L2828	E2829	N2832	T2833	L2834	L2835	D2839	L2840	P2841	D2842	L2843	F2844	Q2845	Q2846	Y2849	L2852	L2853	L2856	T2860	R2861	L2865	L2866	L2867	D2868	E2872	L2873	Y2874	D2875	Q2783	P2784	K2785	L2786	R2787	L2788	T2890	I2891							
V3028	LEU	LVS	VAL	ASN	GLU	LEU	ASN	LVS	THR	LEU	SER	ILE	SER	VAL	K3297	S3298	L3299	F3300	F3301	E3302	L3303	L3304	K3305	W3306	L3307	N3308	T3310	K3311	Q3312	F3313	S3317	G3318	K3319	L3320	L3321	G3322	K3323	L3329	Y3330	E3331	F3332	F3333	F3334	M3338	E3341	L3346	L3481	D3482	L3483	L3353	G3354			
K3355	V3358	K3359	V3360	D3361	R3365	D3368	T3372	L3373	S3400	F3406	L3407	L3408	D3409	H3413	M3414	L3415	T3416	V3417	I3418	L3429	R3439	L3440	F3446	Q3453	D3459	P3460	I3461	I3462	S3463	R3464	L3465	I3466	S3467	F3470	A3473	G3474	N3475	R3476	L3481	L3482	D3483	V3488												
L3505	F3508	L3509	R3510	K3511	R3512	V3513	F3518	V3519	T3520	K3521	L3525	F3530	D3531	L3534	E3537	M3538	L3541	L3542	K3543	F3544	D3547	L3548	L3549	K3550	Y3555	K3556	K3561	E3562	K3563	K3564	K3565	K3566	L3567	E3568	E3569	K3570	K3571	K3572	S3573	K3577	L3578	E3579	N3580	N3581	E3582	L3583	L3690	D3691						
K3692	K3693	K3694	K3695	K3591	K3592	E3593	A3594	M3595	M3596	L3601	F3607	D3612	K3613	L3614	V3615	Y3618	G3622	L3628	M3631	F3641	S3645	L3646	F3656	F3657	I3658	L3674	L3760	E3766	F3767	F3768	V3769	M3772	M3773	I3774	V3777	V3778	A3779	N3780	N3784	Y3785	S3687	L3690	D3691											
L3587	M3588	M3589	L3590	K3591	K3592	E3593	A3594	M3595	M3596	L3601	F3607	D3612	K3613	L3614	V3615	Y3618	G3622	L3628	M3631	F3641	S3645	L3646	F3656	F3657	I3658	L3674	L3760	E3766	F3767	F3768	V3769	M3772	M3773	I3774	V3777	V3778	A3779	N3780	N3784	Y3785	S3687	L3690	D3691											
K3692	K3693	K3694	K3695	K3591	K3592	E3593	A3594	M3595	M3596	L3601	F3607	D3612	K3613	L3614	V3615	Y3618	G3622	L3628	M3631	F3641	S3645	L3646	F3656	F3657	I3658	L3674	L3760	E3766	F3767	F3768	V3769	M3772	M3773	I3774	V3777	V3778	A3779	N3780	N3784	Y3785	S3687	L3690	D3691											



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



F3446	F3458	F3459	F3460	F3461	F3462	F3463	F3464	F3465	A3473	G3474	H3475	H3476	E3480	G3482	D3483	K3483	S3502	L3509	R3512	V3513	F3518	V3519	F3520	H3521	L3525	F3530	T3533	L3534	E3537	H3538	A3539	E3540	H3541	Q3542	R3543	K3544	D3547	L3548	L3549	R3550	R3439	L3440								
W3306	N3307	N3308	T3309	T3310	K3311	Q3312	Q3313	E3319	L3320	N3323	I3329	Y3330	F3334	R3342	A3343	L3346	V3347	K3350	L3353	R2987	V3358	K3359	L3360	D3361	T3372	L3391	E3392	N3393	S3400	F3406	L3407	D3409	H3413	V3417	L3429	S3430	F3431	F3436	R3439	L3440										
T2941	D2942	F2943	ILE	VAL	PRD	GLU	VAL	ASN	LYS	GLU	LEU	PHE	THR	GLU	PRD	ILE	GLN	T2960	I2961	R2962	D2963	V2982	G2983	V2984	N2985	F2986	S2988	F2989	L3010	V3017	L3024	V3028	LEU	VAL	ASN	GLU	LEU	ASN	LEU	LYS	THR	SER	ILE	SER	LEU	VAL	K3297	F3301	E3302	K3303
A2838	D2839	L2840	P2841	D2842	L2843	F2844	Q2845	G2846	Y2849	L2852	L2853	L2856	L2857	L2858	I2759	G2760	A2761	S2762	R2763	K2766	R2771	F2772	V2773	L2873	Y2874	D2875	V2876	K2883	F2889	L2890	C2892	P2894	K2902	L2903	L2908	R2911	C2912	W2916	M2917	G2918	D2919	W2920	T2924	L2936						
H2741	R2744	I2745	D2746	R2747	L2748	A2749	V2752	H2755	M2756	M2757	L2758	I2759	I2760	A2761	S2762	R2763	K2766	R2771	F2772	V2773	L2873	Y2874	D2875	V2876	K2883	F2889	L2890	C2892	P2894	K2902	L2903	L2908	R2911	C2912	W2916	M2917	G2918	D2919	W2920	T2924	L2936									
Y2574	Y2575	K2576	A2577	I2578	F2579	K2580	R2586	L2589	E2590	T2609	Q2612	S2613	R2620	R2627	Y2630	M2409	S2410	K2411	I2415	P2419	T2420	T2421	K2422	T2423	M2428	L2437	Y2438	D2439	F2445	S2446	K2447	D2448	T2449	E2452	L2455	M2463	Y2464	T2467	L2471	T2472	L2473	L2474	P2475							
K2476	S2477	D2478	E2488	I2489	W2490	L2491	L2492	K2493	L2494	D2495	Y2497	V2502	V2503	L2506	R2507	Q2508	K2512	Q2513	G2514	K2517	T2518	P2519	E2520	W2523	R2524	T2525	L2526	E2527	R2528	C2535	N2536	K2543	R2549	R2552	L2559	P2562	S2563	G2564	K2565	S2566	Y2571	E2572	L2573							
S2369	V2378	L2379	L2380	V2385	M2386	L2389	T3390	L2392	F2393	T3394	I2395	V2398	R2399	F2302	D2307	L2310	R2311	D2312	I2314	T2315	L2316	L2317	L2318	S2321	L2326	G2332	Q2335	R2336	L2339	F2346	Q2351	R2352	L2353	D2354	V2355	S2357	A2362	R2365												
F2266	R2274	L2275	L2276	T2280	K2283	L2284	E2285	L2290	H2293	G2181	E2182	R2183	L2184	P2185	I2186	L2193	D2197	H2198	L2199	D2200	H2201	G2026	T2027	P2028	L2029	R2030	S2031	K2032	A2033	L2034	V2035	R2044	F2047	S2048	M2049	E2051	G2057	Y2061	Y2062	M2063	Q2064	L2070	V2073	G2074						
C2076	T2081	A2082	T2083	W2084	K2085	I2088	M2091	L2092	L2093	F2094	D2095	G2096	H2097	A2098	M2099	Y2102	I2103	D2105	T2106	K2107	W2108	L2109	T2110	K2111	E2112	Y2115	L2116	S2117	W2125	R2126	D2127	G2128	L2129	F2130	T2131	V2137	M2138	L2141	F2145	R2149	I2150	M2151	W2152	V2153	D2154	L2155	S2156			
E2161	Y2162	V2169	L2170	W2173	K2174	L2175	L2176	T2177	L2178	F2179	M2180	E2182	R2183	L2184	P2185	I2186	L2193	D2197	H2198	L2199	D2200	H2201	G2026	T2027	P2028	L2029	R2030	S2031	K2032	A2033	L2034	V2035	R2044	F2047	S2048	M2049	E2051	G2057	Y2061	Y2062	M2063	Q2064	L2070	V2073	G2074					



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	175.77Å 118.19Å 202.68Å 90.00° 90.91° 90.00°	Depositor
Resolution (Å)	49.14 – 3.70 49.09 – 3.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (49.14-3.70) 99.9 (49.09-3.70)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.19 (at 3.67Å)	Xtrriage
Refinement program	REFMAC 5.7.0019	Depositor
R, R_{free}	0.231 , 0.289 0.226 , 0.285	Depositor DCC
R_{free} test set	4446 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	142.7	Xtrriage
Anisotropy	0.305	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 138.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtrriage
Estimated twinning fraction	0.035 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	41590	wwPDB-VP
Average B, all atoms (Å ²)	198.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.30% 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, SO4, ATP

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	0.58	1/21146 (0.0%)	0.80	12/28618 (0.0%)
1	B	0.47	0/21146	0.68	4/28618 (0.0%)
All	All	0.53	1/42292 (0.0%)	0.74	16/57236 (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	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	2872	GLU	CG-CD	7.57	1.63	1.51

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1741	LEU	CB-CG-CD1	8.44	125.34	111.00
1	A	1973	LEU	CB-CG-CD1	-7.38	98.45	111.00
1	A	2872	GLU	OE1-CD-OE2	-7.25	114.59	123.30
1	A	2866	LEU	CA-CB-CG	6.12	129.38	115.30
1	A	1769	LEU	CA-CB-CG	6.06	129.24	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1739	ASP	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	20748	0	20207	891	0
1	B	20748	0	20206	851	0
2	A	31	0	12	4	0
2	B	31	0	12	7	0
3	A	15	0	0	9	0
3	B	15	0	0	3	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
All	All	41590	0	40437	1741	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 21.

The worst 5 of 1741 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:C	1:A:3475:ASN:HB3	1.39	1.40
1:B:1620:PHE:HD1	1:B:1760:PHE:CZ	1.53	1.24
1:A:1620:PHE:HD1	1:A:1760:PHE:CZ	1.58	1.21
1:B:3534:LEU:CD1	1:B:3618:TYR:HE2	1.53	1.21
1:B:1409:LEU:HD21	1:B:1435:LEU:HB3	1.24	1.18

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%)	2519 (95%)	107 (4%)	14 (0%)	29	66
1	B	2640/2695 (98%)	2522 (96%)	104 (4%)	14 (0%)	29	66
All	All	5280/5390 (98%)	5041 (96%)	211 (4%)	28 (0%)	29	66

5 of 28 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1391	GLY
1	B	214	HIS
1	B	1366	VAL
1	B	1391	GLY
1	A	1366	VAL

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%)	2140 (96%)	78 (4%)	36	63
1	B	2218/2453 (90%)	2144 (97%)	74 (3%)	38	64
All	All	4436/4906 (90%)	4284 (97%)	152 (3%)	37	64

5 of 152 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3884	LEU
1	B	1554	HIS
1	B	3744	LEU
1	A	3917	THR
1	A	4040	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 70 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3624	HIS
1	B	1646	GLN
1	B	3780	ASN
1	A	3780	ASN
1	A	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
3	SO4	A	5094	-	4,4,4	0.49	0	6,6,6	0.49	0
3	SO4	B	5096	-	4,4,4	0.22	0	6,6,6	0.30	0
3	SO4	B	5095	-	4,4,4	0.35	0	6,6,6	0.27	0
2	ATP	A	5093	4	26,33,33	1.13	1 (3%)	31,52,52	1.88	6 (19%)
3	SO4	A	5095	-	4,4,4	0.48	0	6,6,6	0.72	0
3	SO4	B	5094	-	4,4,4	0.38	0	6,6,6	0.46	0
2	ATP	B	5093	4	26,33,33	0.95	2 (7%)	31,52,52	1.63	6 (19%)
3	SO4	A	5096	-	4,4,4	0.28	0	6,6,6	0.30	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	ATP	B	5093	4	-	7/18/38/38	0/3/3/3
2	ATP	A	5093	4	-	3/18/38/38	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	5093	ATP	C5-C4	2.35	1.47	1.40
2	A	5093	ATP	C2'-C1'	-2.26	1.50	1.53
2	B	5093	ATP	O4'-C1'	2.18	1.44	1.41

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	5093	ATP	PA-O3A-PB	-4.42	117.66	132.83
2	A	5093	ATP	PB-O3B-PG	-4.16	118.56	132.83
2	A	5093	ATP	N3-C2-N1	-4.11	122.25	128.68
2	A	5093	ATP	C3'-C2'-C1'	3.92	106.89	100.98
2	B	5093	ATP	PB-O3B-PG	-3.74	119.98	132.83

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	5093	ATP	C5'-O5'-PA-O1A
2	B	5093	ATP	O4'-C4'-C5'-O5'
2	B	5093	ATP	C3'-C4'-C5'-O5'
2	A	5093	ATP	O4'-C4'-C5'-O5'
2	A	5093	ATP	C3'-C4'-C5'-O5'

There are no ring outliers.

7 monomers are involved in 23 short contacts:

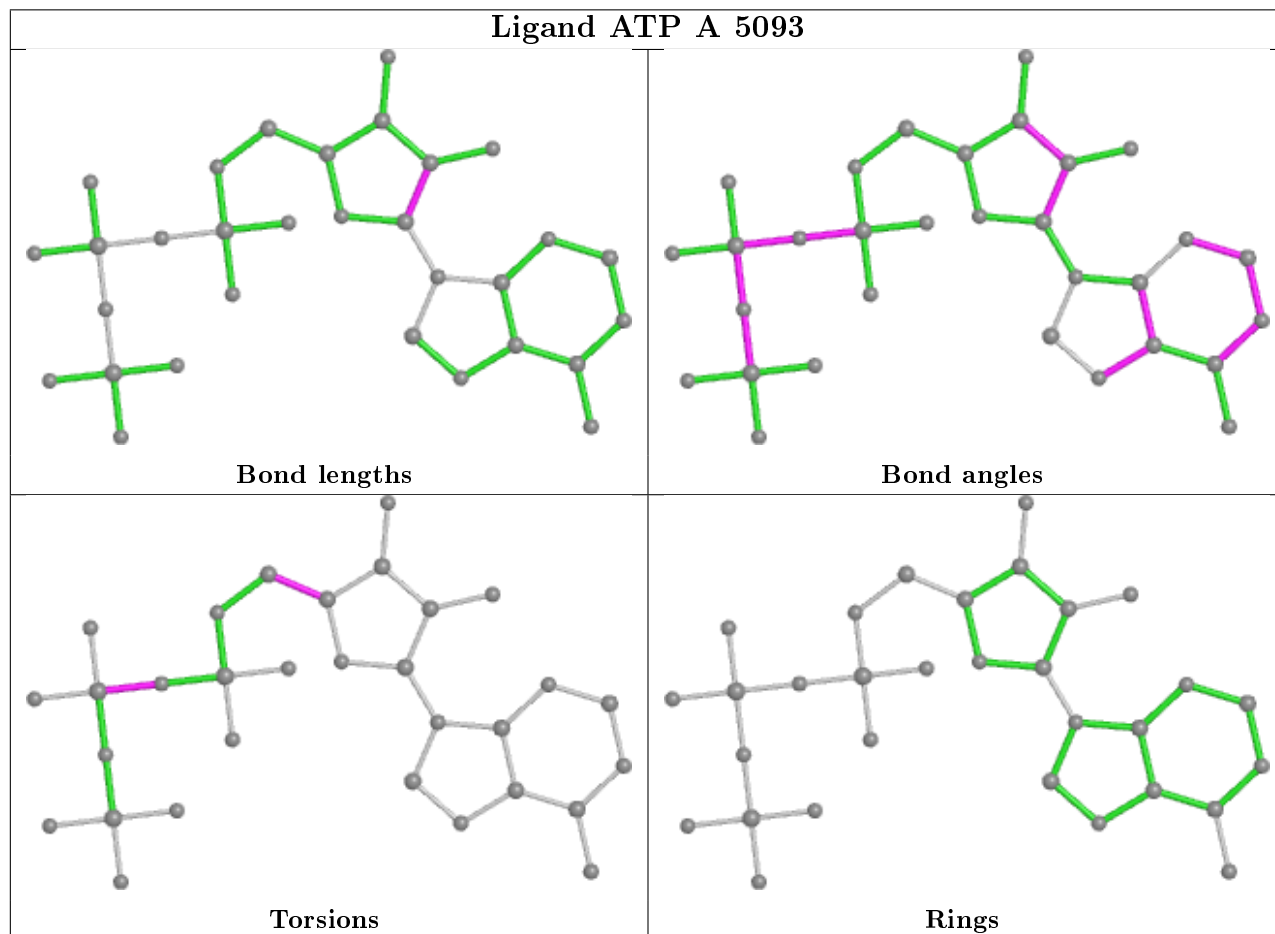
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5094	SO4	4	0
3	B	5096	SO4	1	0
3	B	5095	SO4	2	0
2	A	5093	ATP	4	0

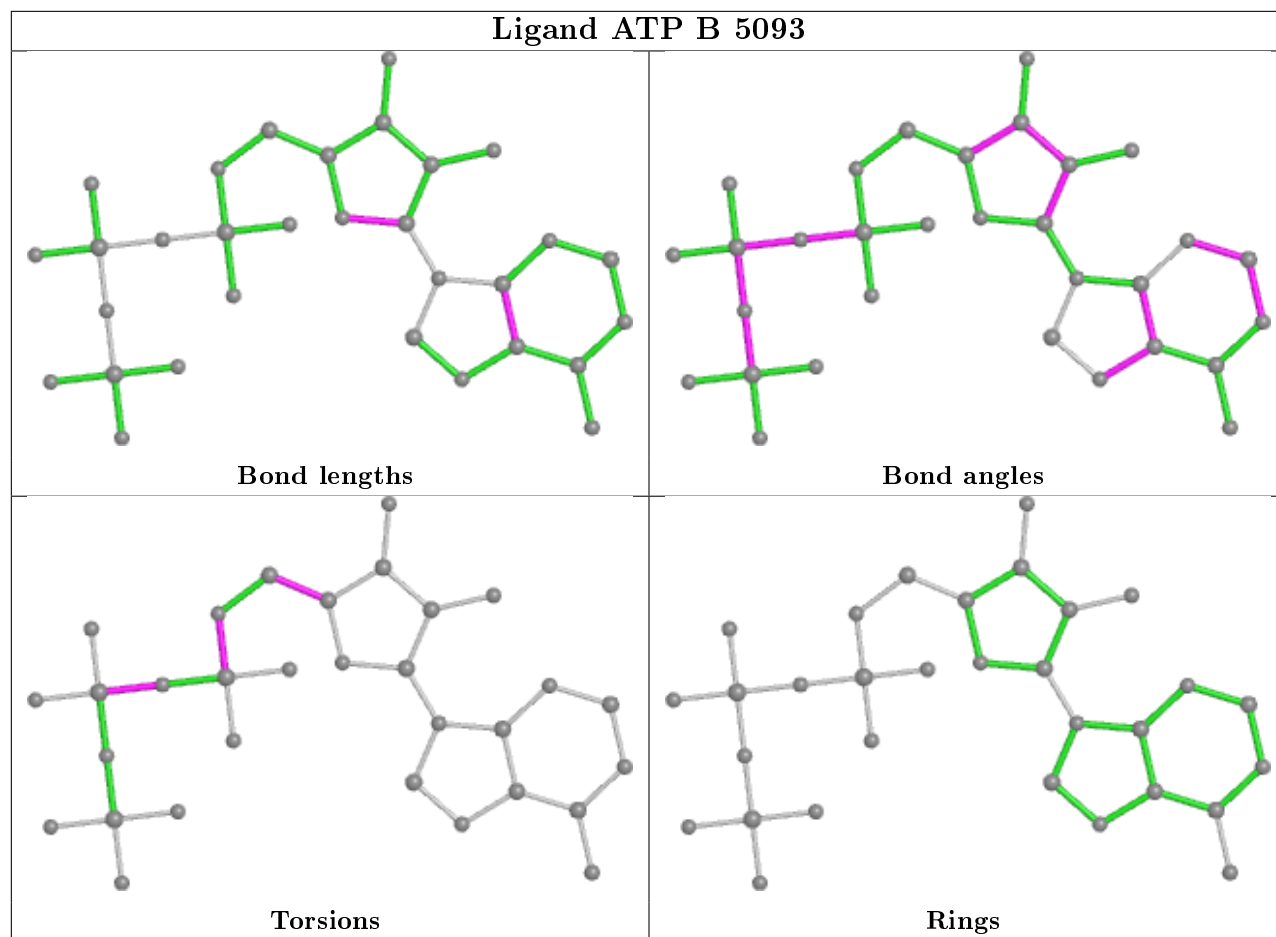
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5095	SO4	3	0
2	B	5093	ATP	7	0
3	A	5096	SO4	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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%)	0.14	157 (5%) 22 15	80, 163, 325, 500	0
1	B	2650/2695 (98%)	0.37	228 (8%) 10 8	117, 210, 355, 500	0
All	All	5300/5390 (98%)	0.25	385 (7%) 15 11	80, 189, 342, 500	0

The worst 5 of 385 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	148	THR	18.1
1	B	35	ASP	17.2
1	B	155	TYR	17.2
1	B	31	LEU	16.5
1	B	67	SER	16.1

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](#)

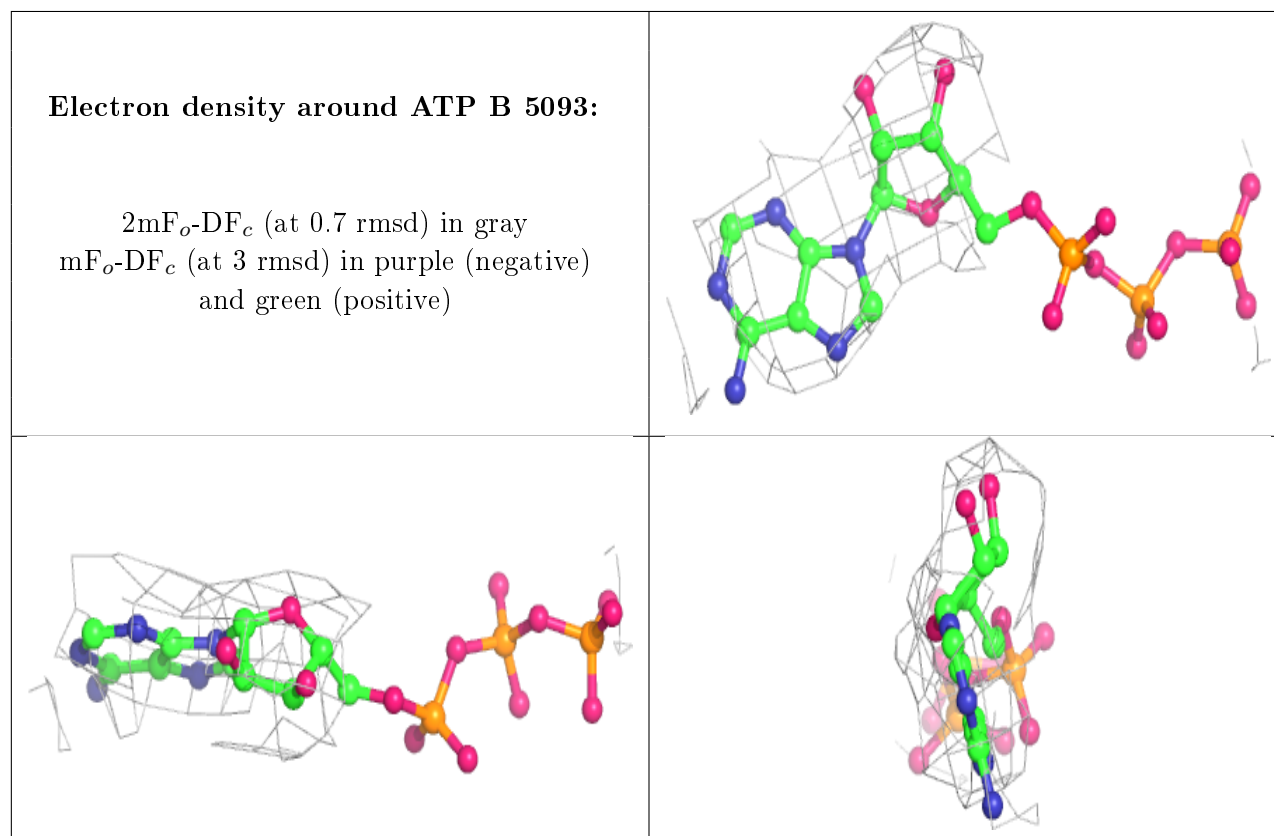
There are no monosaccharides in this entry.

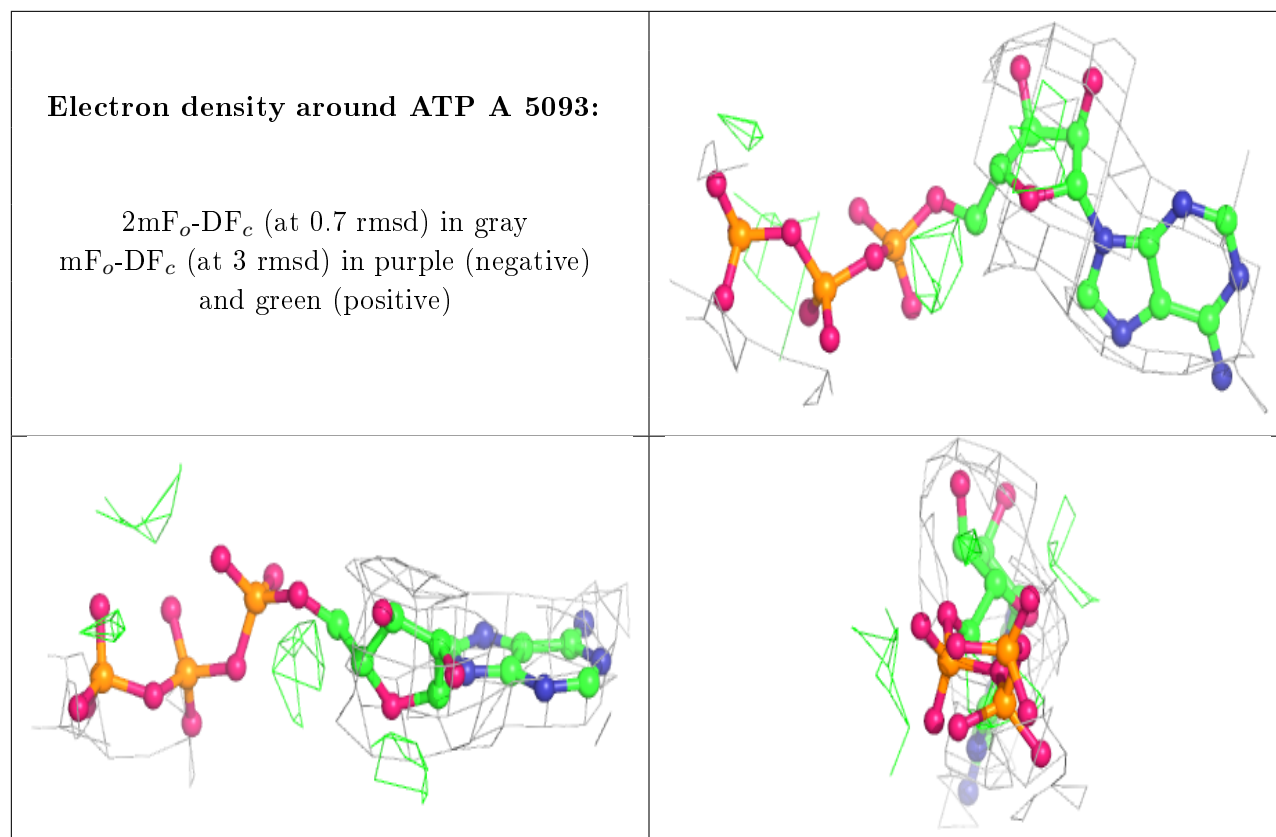
6.4 Ligands [i](#)

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
3	SO4	A	5096	5/5	0.83	0.22	128,136,144,154	0
3	SO4	B	5094	5/5	0.86	0.30	151,165,190,192	0
3	SO4	B	5095	5/5	0.90	0.24	155,178,186,207	0
2	ATP	B	5093	31/31	0.93	0.28	115,184,238,261	0
3	SO4	A	5094	5/5	0.95	0.29	109,114,153,161	0
2	ATP	A	5093	31/31	0.95	0.32	72,125,180,196	0
3	SO4	A	5095	5/5	0.95	0.40	108,128,132,133	0
3	SO4	B	5096	5/5	0.96	0.14	158,193,224,235	0
4	MG	B	5097	1/1	0.98	0.24	127,127,127,127	0
4	MG	A	5097	1/1	0.99	0.40	59,59,59,59	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.