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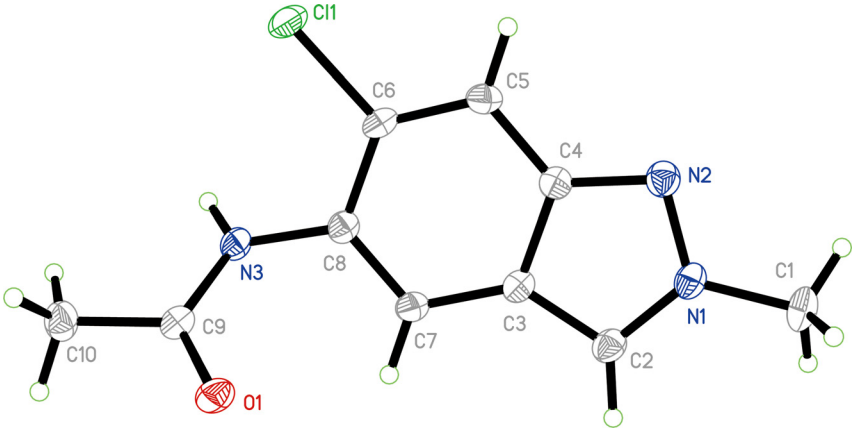
The crystal structure of *N*-(6-chloro-2-methyl-2H-indazol-5-yl)acetamide, $C_{10}H_{10}ClN_3O$



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Abstract

$C_{10}H_{10}ClN_3O$, monoclinic, $P2_1/c$ (no. 14), a = 4.7273(7) Å, b = 10.2148(16) Å, c = 21.283(3) Å, β = 91.458(4)°, V = 1027.4(3) Å^3, Z = 4, $R_{gt}(F)$ = 0.0623, wR_{ref} (F^2) = 0.1287, T = 193 K.

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Table 1 contains crystallographic data and Table 2 contains the list of the atoms including atomic coordinates and displacement parameters.

Table 1: Data collection and handling.

Crystal:	Colourless block
Size:	0.23 × 0.20 × 0.15 mm
Wavelength:	Mo *K*α radiation (0.71073 Å)
μ:	0.35 mm^{-1}
Diffractometer, scan mode:	Rigaku Mercury, Graphite Monochromator
θ_{max}, completeness:	27.5°, >99%
$N(hkl)_{measured}$, $N(hkl)_{unique}$, R_{int}:	6853, 2344, 0.046
Criterion for I_{obs}, $N(hkl)_{gt}$:	$I_{obs} > 2\sigma(I_{obs})$, 1706
$N(param)_{refined}$:	142
Programs:	CrystalClear [1], Olex2 [2], SHELX [3, 4]

1 Source of material

The title compound was prepared by the reaction of 6-chloro-2-methyl-2H-indazol-5-amine (10 mmol) and acetic acid (10 mL) under reflux for 3 h. After the reaction was completed, the solution was put into ice water (20 mL), and filtered. The residue was purified by flash column chromatography. Colorless block crystals of the title compound were obtained by slow evaporation from a solution of ethyl acetate at room temperature.

2 Experimental details

Using Olex2 [2], the structure was solved with the ShelXT [3] package and refined with the ShelXL [4] program. H atoms bound to C and N atoms were positioned geometrically and allowed to ride on their parent atoms, with C–H = 0.95 Å (phenyl), 0.98 Å (methyl) and with U_{iso}(H) = 1.5U_{eq}(C), and N–H = 0.85 Å and U_{iso}(H) = 1.3U_{eq}(N).

3 Comment

The well known 2*H*-indazoles, an important class of *N*-heterocycles, is a frequently found motif in drug substances

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Table 2: Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å^2).

Atom	*x*	*y*	*z*	U_{iso}*/U_{eq}
Cl1	0.11780 (17)	0.08569 (8)	0.57527 (4)	0.0408 (2)
O1	0.7893 (4)	0.2507 (2)	0.42905 (10)	0.0362 (5)
N1	0.9433 (5)	0.4723 (2)	0.69723 (13)	0.0319 (6)
N2	0.7694 (5)	0.3748 (3)	0.71506 (12)	0.0343 (6)
N3	0.3650 (5)	0.2464 (3)	0.47584 (12)	0.0305 (6)
H3	0.188 (7)	0.235 (3)	0.4717 (15)	0.039 (10)*
C1	1.1173 (7)	0.5388 (3)	0.74463 (16)	0.0411 (8)
H1A	1.0272	0.5324	0.7855	0.062*
H1B	1.1375	0.6312	0.7331	0.062*
H1C	1.3045	0.4977	0.7472	0.062*
C2	0.9421 (6)	0.4946 (3)	0.63565 (16)	0.0330 (7)
H2	1.0504	0.5584	0.6145	0.040*
C3	0.7509 (6)	0.4060 (3)	0.60817 (14)	0.0281 (6)
C4	0.6502 (6)	0.3339 (3)	0.65979 (14)	0.0284 (6)
C5	0.4476 (6)	0.2349 (3)	0.65020 (15)	0.0320 (7)
H5	0.3740	0.1870	0.6844	0.038*
C6	0.3610 (6)	0.2103 (3)	0.58970 (15)	0.0288 (7)
C7	0.6556 (6)	0.3789 (3)	0.54654 (15)	0.0298 (7)
H7	0.7239	0.4278	0.5121	0.036*
C8	0.4634 (6)	0.2811 (3)	0.53708 (14)	0.0281 (6)
C9	0.5340 (6)	0.2300 (3)	0.42641 (15)	0.0294 (7)
C10	0.3925 (7)	0.1819 (4)	0.36700 (16)	0.0413 (8)
H10A	0.4596	0.2329	0.3313	0.062*
H10B	0.1871	0.1921	0.3699	0.062*
H10C	0.4383	0.0893	0.3609	0.062*

with important biological activities such as antitumor [5, 6], insecticidal [7], antiprotozoal [8] and antiviral [9].

Single-crystal structure analysis revealed that the asymmetric unit consists of one *N*-(6-chloro-2-methyl-2H-indazol-5-yl)acetamide molecule. The indazole moiety (N1–N2/C2–C8) is planar with an r.m.s. deviation from the mean plane of 0.0692 Å. The acetamino group (N3/C9–C10/O1) and indazole ring are not in the same plane, which is similar to some reported structures of 2H-indazols derivatives [10–13]. The dihedral angle of them is 43.9 Å. In the solid state structure, classical N–H ⋯ O and weak C–H ⋯ N and C–H ⋯ O hydrogen-bonding interactions result in a chain along [100].

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References

1. Rigaku. *CrystalClear*; Rigaku Corporation: Tokyo, Japan, 2007.
2. Dolomanov O. V., Bourhis L. J., Gildea R. J., Howard J. A. K., Puschmann H. OLEX2: a complete structure solution, refinement and analysis program. *J. Appl. Crystallogr.* 2009, *42*, 339–341.
3. Shelddrick G. M. *SHELXTL*–integrated space-group and crystal-structure determination. Acta Crystallogr. 2015, *A71*, 3–8.
4. Shelddrick G. M. Crystal structure refinement with SHELXL. *Acta Crystallogr.* 2015, *C71*, 3–8.
5. Matadamas-Martinez F., Yepez–Mulia L., Perez-Koldenkova V., Cortes–Benitez F., Leyte–Lugo M., Palacios-Espinosa J. F., Rodriguez-Villar K., Soria-Arteche O., Perez-Villanueva J. Synthesis and antitumor activity of 2,3-diphenyl-2*H*-indazole derivatives as potent antitubulin agents. *ChemistrySelect* 2022, *7*, e202202056.
6. Panchangam R. L., Rao R. N., Balamurali M. M., Hingamire T. B., Shanmugam D., Manickam V., Chanda K. Antitumor effects of Ir(III)-2*H*-indazole complexes for triple negative breast cancer. *Inorg. Chem.* 2022, *23*, 17593–17607.
7. Guo B., Jiang B., Dong Y., Jin X., Cui L., Zhang L., Yang X. Design, synthesis and insecticidal activity of novel 4,5,6,7-tetrahydro-2*H*-indazole hydrazide derivatives targeting ecdysone receptor. *Chin. J. Pestic. Sci.* 2022, *24*, 39–48.
8. Rodriguez-Villar K., Yepez-Mulia L., Cortes-Gines M., Aguilera-Perdomo J. D., Quintana-Salazar E. A., Del Angel K. S. O., Cortes-Benitez F., Palacios-Espinosa J. F., Soria-Arteche O., Perez-Villanueva J. Synthesis, antiprotozoal activity, and cheminformatic analysis of 2-phenyl-2*H*-indazole derivatives. *Molecules* 2021, *26*, 2145.
9. Shimizu R., Sonoyama T., Fukuhara T., Kuwata A., Matsuo Y., Kubota R. Safety, tolerability, and pharmacokinetics of the novel antiviral agent ensitrelvir fumaric acid, a SARS–CoV-2 3CL protease inhibitor, in healthy adults. *Antimicrob. Agents Chemother.* 2022, *66*, e006322.
10. Cui B., Mi X., Zhang J. Crystal structure of 2-(2-(4-methoxyphenyl)-2*H*-indazol-3-yl)acetonitrile, $C_{16}H_{13}N_3O$. *Z. Kristallogr. N. Cryst. Stuct.* 2023, *238*, 361–362.
11. Alotaibi M. H., Abdel-Wahab B. F., Aldosari O. F., Hegazy A. S., Kariuki B. M., El-Hiti G. A. The crystal structure of *N*-(7-(4-fluorobenzylidene)-3-(4-fluorophenyl)-3,3a,4,5,6,7-hexahydro-2*H*-indazole-2-carbonothioyl)benzamide, $C_{28}H_{23}F_2N_3OS$. *Z. Kristallogr. N. Cryst. Stuct.* 2019, *234*, 1083–1085.
12. Boulhaoua M., Essaghouani A., Benchidmi M., Essassi E. M., Mague J. T. 1-(5-Nitro-1*H*-indazol-1-yl)ethanone. *IUCrData* 2016, *1*, x160939.
13. Rejouani F. Z., Mojahidi S., Rakib E. M., Alaoui A. M., Saadi M., Ammar L. E. Ethyl 2-(6-nitro-2*H*-indazol-2-yl)acetate. *IUCrData* 2016, *1*, x161074.