1,3,5-Triaza-7-phosphaadamantane-7-oxide (PTA=O): new diamondoid building block for design of three-dimensional metal-organic frameworks.

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Streszczenie

The facile self-assembly reactions of 1,3,5-triaza-7-phosphaadamantane-7-oxide (PTA=O) with $AgNO_3$ or Ag_2SO_4 give rise to the generation of two new distinct silver–organic frameworks $[Ag(NO_3)(\mu_3\text{-PTA=O})]_n$ (**1**) and $[Ag_2(\mu_2\text{-}SO_4)(\mu_5\text{-PTA=O})(H_2O)]_n$ (**2**), respectively. They have been characterized by IR, ^1H and $^{31}P\{^1H\}$ NMR spectroscopies, electrospray ionization-mass spectrometry (ESI-MS)(±), and elemental and single-crystal X-ray diffraction analyses, the latter featuring infinite three-dimensional (3D) non-interpenetrating networks driven by multiply bridging PTA=O spacers that adopt undocumented N_2O- or N_3O-coordination modes. The topological analysis of **1** reveals a uninodal 3-connected net with the point (Schläfli) symbol of (10^3) and the **srs** topological type, whereas **2** shows a rare trinodal 3,4,5-connected net with the unprecedented topology defined by the point symbol of $(5.6.7)(5^4.6.8)(5^4.6^3.8^3)$. Compounds **1** and **2** represent the first 3D metal–organic frameworks (MOFs) derived from PTA=O or any cage-like PTA derivative, thus opening up their underexplored applications as versatile building blocks in crystal engineering. Furthermore, **1** and **2** exhibit significant antibacterial and antifungal activities studied in vitro against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Candida albicans*.

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