Tris[(triphenylphosphine)gold(I)]oxonium Dihydrogentrifluoride as the Product of an Attempted Preparation of [(Triphenylphosphine)gold(I)] Fluoride

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The reaction of equivalent quantities of (triphenylphosphine)gold chloride and silver fluoride in CH2Cl2/MeOH gives tris[(triphenylphosphine)gold(I)]oxonium dihydrogentrifluoride in good yield. This product is formed through the action of water in the reaction medium. Crystals of \{[(Ph3P)Au]3O^- [H2F3]^= 1.5 CH2Cl2 (monoclinic, space group P21/c, Z = 4)\} contain the cations as hexanuclear dimers with short intra- and intermolecular Au-Au contacts. The structural details are similar to those of related salts with different anions. The \[H2F3]^= anion is V-shaped with one symmetrical and one unsymmetrical F-H-F hydrogen bond and is best described as an addition compound of an HF molecule and a \[F-H-F]^= anion. The results indicate a high affinity of H2O/OH^- for (phosphine)gold fluorides and – by the same token – prove that tri(gold)oxonium cations are stable to anhydrous HF and F^- anions. By contrast, hydrochloric acid is known to degrade \{[(R3P)Au]3O]^+ affording (R3P)AuCl and water.