Four different air purification conditions were established in a simulated 3-row 21-seat section of an aircraft cabin: no air purifier; a photocatalytic oxidation unit with an adsorptive prefilter; a second photocatalytic unit with an adsorptive prefilter; and a two-stage sorption-based air filter (gas-phase absorption and adsorption). The air purifiers placed in the cabin air recirculation system were commercial prototypes developed for use in aircraft cabin systems. The four conditions were established in balanced order on 4 successive days of each of 4 successive weeks during simulated 7-h flights with 17 occupants. Proton-transfer reaction mass spectrometry was used to assess organic gas-phase pollutants and the performance of each air purifier. The concentration of most organic pollutants present in aircraft cabin air was efficiently reduced by all three units. The photocatalytic units were found to incompletely oxidize ethanol released by the wet wipes commonly supplied with airline meals to produce unacceptably high levels of acetaldehyde and formaldehyde.