# Supplementary Information for Manuscript:

**Synthesis and Characterization of New Eco-Friendly Fire-Retardants Based on Soda-Silicate Glass**

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# Synthesis of Na2O.4SiO2

A solution of sulfuric acid (2M) was slowly added to a solution of Na2SiO3 in a 1000 mL glass beaker. The mixed solution was stirred continuously at a speed of 120 rpm. Metasilicic acid H2SiO3 was formed and precipiated out during mixing the solutions, following Reaction (S1).

H2SO4 + Na2SiO3 = Na2SO­4 + H2SiO3 ↓ (S1)

The H2SiO3 precipiate was filled and washed thoroughly. The washing was stopped when the filtrate did not form BaSO4 precipitate with 1 M solution of BaCl2.

In the next stage, the washed H2SiO3 precipitate was dissolved in solution of Na2SiO3 at 80°C and under contiuous stirring conditions (using a heating plate magnetic stirrer). By this way, we were able to produce a solution of Na2O.*n*SiO2 with various values of *n*.

The molar concentration of Na2O was determined by a standard acid-base titration using a HCl solution of 0.1N as a titrator. To determine the molar concentration of SiO2 (in the form of SiO32-), a 50 ml volume of the solution was poured into a glass beaker. A solution of HCl (1M) was slowly added until the reacting medium turned acidic (tested by pH paper). A precipitate occurred following Reaction (S2).

SiO32- + 2HCl = H2SiO­3↓ + 2Cl- (S2)

The H2SiO3 precipitate was filtered and washed carefully. Then the washed precipitate was heated at 900°C in 30 minutes, yielding to SiO2 through Reaction (S3).

H2SiO3 = H2O + SiO2 (S3)

The resulting SiO2 was weighed. Then the molar amount of SiO2 in the initial solution was calculated. Hence, the ratio between SiO2 (that is SiO32-) and Na2O in the initial solution was calculated.