Supplementary material

SiO_2/TiO_2-composite coating on light substrates for photocatalytic decontamination of water

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Estimation of the photocatalyst performance under real environmental conditions

Outdoor experiment in 40 dm^3 photoreactor (Figure 11b)

Measured energy of solar radiation (over 3 days): 13.38 $kWh \cdot m^{-2}$

5% corresponding to UV radiation (over 3 days): 0.669 $kWh \cdot m^{-2}$, i.e., $2.4 \cdot 10^6$ $J \cdot m^{-2}$

Energy of a photon of 380 nm wavelength: $5.23 \cdot 10^{-19}$ J

Number of incident photons (over 3 days): 7.62 $mol \cdot m^{-2}$

Parameters of the outdoor reactor: Area 0.162 m^2; Volume: 25 dm^3

Number of incident photons in the outdoor reactor (over 3 days): 1.23 moles

Decrease of OA: from $3.5 \cdot 10^{-3}$ $mol \cdot dm^{-3}$ to $0.17 \cdot 10^{-3}$ $mol \cdot dm^{-3}$, i.e., 0.082 moles

Quantum efficiency: 0.082/1.23 = 6.67%

Conditions in Vietnam:

Tabulated energy of solar radiation in central Vietnam: 5.0 $kWh \cdot m^{-2} \cdot day^{-1}$

5% corresponding to UV radiation: 0.25 $kWh \cdot m^{-2} \cdot day^{-1}$, i.e., $9.0 \cdot 10^5$ $J \cdot m^{-2} \cdot day^{-1}$

Energy of a photon of 380 nm wavelength: $5.23 \cdot 10^{-19}$ J

Avogadro´s number: $6.022 \cdot 10^{23}$ mol^{-1}

The average photon flux: $9.0 \cdot 10^5 / (5.23 \cdot 10^{-19} \cdot 6.022 \cdot 10^{23}) = 2.86$ $mol \cdot m^{-2} \cdot day^{-1}$

Quantum efficiency of TiO_2/SiO_2 composite coated on Liapor (see above): 6.67%

Average number of photons required for mineralization of one organic carbon atom: 2

Water reservoir: Area: 1 m^2; Depth: 1 m; Volume: 1 m^3

Total moles of transformed organic carbon atoms in the reservoir: (2.86 · 0.0667 · 1)/2 =

0.095 $mol \cdot m^{-3} \cdot day^{-1}$

In mg of C: 0.095·12 = 1.14 $g \cdot m^{-3} \cdot day^{-1}$, i.e. 1.14 $ppm \cdot day^{-1}$