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Discussions

Interactive comment on "Optimized photodegradation of Bisphenol A in water using ZnO, TiO_2 and SnO_2 photocatalysts under UV radiation as a decontamination procedure" *by* Rudy Abo et al.

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Dear Mr. A. H. Knol, We are very grateful to you for your constructive comments and suggestions, which will certainly improve the quality of our manuscript. Specific questions are responded one by one below:

1- Page 2, line 20: The statement "Metal oxides have been widely used as catalysts for Photo degradation in recent years" asks for recent references. Authors: new reference added to the manuscript.

2- Page 3, line 3: If oxygen is a strong oxidant, why not first saturate the water with

oxygen before applying photolysis?

Authors: The author agree. We can expect significant acceleration of the photodegradation process by pre-saturation of contaminated water with oxygen. The combination of different techniques such as ozonation could be also more efficient than ordinary approach. Thus, we suggested to use of ozone as disinfection/ oxidation agent instead of NaOCl in the future.

3- Page 3, line 31: Explain why these lamps with these wavelengths and intensity range mimics solar radiation. This is an important issue regarding the objective of the study (P1, line 8). Is the unit $\mu W/m^3$ correct?

Authors: The solar ultraviolet UV-C, UV-B and UV-A wide range exposure are difficult to achieve in the lab (100-280, 280-315, and 315-400 nm, respectively). Considering the fact, that UV wavelength below 200 nm exists only in the vacuum, and the effective UV spectrum (250-340 nm), so we assumed UV irradiation source between 254 and 365 nm can simulate more or less the solar UV irradiation. This statement was added to the text. Regarding the unit of UV- intensity, the correct unit is μW/cm2

4- P4, line 2: During the experiments of 15 hours, every hour 5 ml is extracted from the sample. Did that effect the UV-dose of the remaining sample and could that effect the results? Authors: Interesting question! Unfortunately, the effect of residual amount of the contaminated water under the same UV- exposure wasn't investigated.

5- Page 4, line 9: "BPA in 100 ml ultra-pure water were prepared and mixed for 15 min using a magnetic stirrer at 400 rpm rotation speed in order to allow maximal sorption of BPA on the catalysts' surface". The samples were not stirred during irradiation? Did the catalyst settle and did that effect the experiments?

Authors: The suspension was stirred at 250 rpm during the photocatalytic process to prevent catalyst- deposition and ensure the continuity of degradation. With concern to that, new paragraph was added to the text explaining the mentioned point.

6- Page 5, line 23: Can you explain why the photo-Fries reaction rearrangement of BPA starts after about 240 minutes?

Authors: The adsorption of shortwave UV irradiation of 254 nm induces disintegration of CO-O bond forming two main derivative compounds as pheynlsalicylate and dihydroxybenzophenone. The high concentration of dihydroxybenzophenone near the surface may slow the degradation as efficient UV absorber and delayed the breakthrough of BPA. However, the long photolyses-time requires more investigation by means of FTIR spectroscopy.

7- P5, line 26: Do you have an explanation for the concentration dependency in degradation rate?

Authors: A great number of studies have linked the initial concentration and the photodegradation rate of polycarbonate compounds, which can be described in terms of time as follows: Degradation rate= - ∂C/∂t ; where ∂C is the relative change in concentration The lower the initial concentration the higher the degradation rate since photooxidation of POC will work faster at lower amount of contaminants. The degradation dependency on the initial concentration is described by the kinetic model of Langmuir-Hinshelwood (Chen and Ray, 1998; Poulios and Tsachpinis, 1999). In this study the photodegradation rate % was calculated using the following equation: Photodegradation% = [(C0-C)/C0]*100 ; where C0 is the initial concentration.

8- P6, line 7&8: Does the value of the gap has a unit?

Authors: The band gap unit is eV (Electron volt) updated in the corresponding paragraph.

9- P6, line 18: The mentioned percentages do not match with Fig. 8. If the numbers in Fig. 8 are correct, than the relative increase in degradation is the same for SnOâĆĆ and ZnO, namely about 55%. Could that influence your conclusions about this experiment?

Authors: We agree the reviewer. The percent increase was miscalculated for the SnO2 and TiO2. The percent increase was simply calculated as follows: Percent increase in degradation efficiency= [(new concentration – original concentration)/ original concentration]*100. Thus the relative percent increase the degradation efficiency is 54, 37 and 6.7% for the catalyst SnO2, TiO2 and ZnO, respectively. The changes were compared to the previous version of the text (Results, and conclusion) and there are no conflict by the interpretation. We proofed the corresponding paragraph for better reading.

10- Page 7, line 13: “The other degradation byproducts were investigated using GC-MS”. Which byproduct(s) was(were) discussed earlier in this paragraph? For readability it is to consider to start a new paragraph about byproducts.

Authors: Degradation byproducts was discussed briefly in the induction in terms of Photo-fries reactions. In any case, tracing of resulting derivatives and the kinetic of disintegration during the advanced photocatalytic oxidation requires further investigation. We agree the reviewer. A new paragraph added to the manuscript entitled: Byproducts of photocatalytic oxidation.

11- Page 7, line 1: The applied NaOCl doses were high, till 37.5 mg/L. Do you agree that, depending on the water quality of surface and groundwater, a considerable amount of DBPs can be formed, also with toxic properties (as BPA). To avoid that the “remedy is worse than the disease”, could a footnote be of importance?

Authors: The authors agree the reviewer. Yes! 0.5 or even 0.3 mM is reality high dosage of NaOCl, particularly if we considered that sodium hypochlorite is a dangerous and corrosive oxidizing material. Thus we recommended to use it at minimal effective concentration of 0.1 mM or less (e.g. 0.05 nM). Advantage and disadvantage of using NaOCl were added to the modified version of the paper as well as the recommended dosage.

12- Page 7, line 17: “The results show, that BPA reacts rapidly with sodium hypochlorite. It is likely that a chlorination dominates the degradation process by the electrophilic

attack of HOCl on the phenoxide ions". This stat ement seems in conflict with the statement in the Introduction (Page 2, line 33). Can you comment?

Authors: Yes! At elevated concentration of NaOCl

13- Page 7, line 18: Which part of the degradation efficiency of BPA is caused by the reaction with HOCl and which part by the catalyst?

Authors: The oxidation process with HOCl dominate the first part of the reaction and advanced by the catalyst effect over the second stage. Change made to the corresponding paragraph to clarify that point.

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