

Interactive comment on “Optimization shallow groundwater quality by the application of photocatalysis treatment technique in El Obour city, Egypt” by El-Montser M. Seleem et al.

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Dear Reviewer Thank you very much for your efforts in reviewing this work and for your valuable comments which assist us to improve our article quality.

Replay to comments In this paper groundwater samples are taken and mainly analysed for heavy metals and pathogenic micro-organisms. Furthermore a treatment with doped TiO₂ and solar light is proposed to remove the micro-organisms for drinking water purposes. The paper is scientifically of a low level, since photocatalysis is mainly interesting for the reduction of organic micro-pollutants that are not taken into account. In addition, there is no optimization performed as suggested by the title. General com-

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ments: - The objective (and knowledge gap) at the end of the introduction is not clear. The collected groundwater samples were completely analyzed (table 1&2). COD was measured in two representative samples (Table 4, page 3 line 20-21, page 5 line 22) to indicate the organic content.

Is it the purpose to use the water infiltration, for drinking or for irrigation? This determines the relevant parameters and treatment needs. - Since the rest of the paper focuses on drinking water application, the suitability for irrigation is e.g. not relevant (pg3, line 22-27) - When treatment with photocatalysis for drinking water purposes is the main topic of the filter, heavy metal concentrations are not relevant, since they are not removed by photocatalysis (pg 5, line 1-5). The study area needs drinking and irrigation water because it contains settlement, industrial and agricultural sectors. The collected water was full characterized and the concentrations of heavy metals in the studied samples nearly were the preferred limit for drinking and irrigation. So, it weren't the target of treatment (Page 5, line 2-6). Also, the studied samples are suitable for irrigation according their SAR (page 4, line 25-26). The photocatalytic treatment processes involved in degradation and mineralization of dissolved organics as well as bacteria in presence of UV-Visible irradiation.

The discussion in the manuscript is poor, since the results are not related to previous work. - It is concluded that photocatalysis is a promising technology for disinfection, but it is not related to alternative treatment, e.g. UV without catalyst (which is common practice). With respect to previous work in the study area, it is the first time to deal with water treatment the previous studies concerned with the abstraction of water and injection of it into the underline aquifer (page 2, line 31-34). Egypt characterized by sunlight all the year so, the use of solar energy is more relevant in our study, especially we target huge volume of water. This study represents the start in this topic and more studies and construction of pilot unit is our current research topic.

- Recommendations section should not be part of the manuscript – Recommendations will be merged into Conclusion

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Check quality of the figures, the lines between the data points have no meaning. – The figures will be enhanced

Check language, including tenses. Done

- Specific comments: - Pg 1, line 11, delete “work” from abstract. - Pg1, line 19-20, how can this be concluded since “organic residuals” were not measured. COD was measured in two representative samples (Table 4, page 3 line 20-21, page 5 line 22)

- Pg 1, line 22, “became important in recent years..” - Pg 1, line 24, “popular” = “severe”
- Pg 1, line 26, “consequence of an: : :” - Pg 2, line 2, delete “in the water” - Pg 2, line 2, “Pathogenic bacteria can cause: : : : :” - Pg 2, line 3, delete sentence - Pg 2, line 7-9, avoid repetition - Pg2, line 11, “interaction” – All required corrections were done

Page 2, line 10-16, strange sentence, since chlorine is meant to have an residual in the network (unlike photocatalysis) - Pg 2, line 15, bromate is a consequence of disinfection with ozone and not chlorine. - Pg 2, line 21, what organic pollutants are of importance? - Chlorine is the applied reagent for disinfection in the Egyptian drinking water stations due to its low cost. Chlorination process can produce many harmful disinfection by-products (DBPs), as a result of interaction with organic compounds in the water (Zhang et al., 2018). Carbamate, organochlorine and organophosphorus pesticides were observed in many groundwater samples collected from the Nile aquifer in Egypt (Abdel-Shafy & Kamel, 2016). The most widespread DBPs are trihalomethanes (THMs) such as chloroform that is a carcinogenic (WHO, 2005; Murray et al., 2012). Page 2, line 22-24 was deleted

- Pg 2, line 29, sentence should be completed – The complete sentence is “In the last years, anion doping of TiO₂ films and powders with elements like nitrogen has been investigated”

Pg 2, line 31, what is meant by “since years ago”? - Pg 2, line 31, what is the reason for raising groundwater tables? This problem appears recently as a result of desert

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cultivation and the new settlements construction in and around the study area

- Pg 2, line 32, delete “dangerous” - Pg 3, line 2-3, relevant in this context? - Pg 3, line 18 “estimated” = “determined” - Pg 2, line 34, “underline”? - Pg 2, line 34 “plenty of” = “many” – Pg 4, line 7, mention if the catalyst is a powder. - Pg 4, line 15-19, give “doses”. - Pg 4, line 22-24, water is drinkable or not, so explain how many samples comply (and what type of treatment is needed to produce drinking water). - Pg 5, line 19, explain what needs to be removed to obtain what type of water quality. – All the required corrections were done. The water can be used for drinking and irrigation after physical and chemical treatment for removing suspended, organics and bacterial content. The final catalyst is powder

Pg 5, line 24, which “organic residuals” are meant? - Pg 5, line 29-31, not relevant here: : : - Pg 6, line 6-8, how can this be concluded since “organic residuals” were not measured. Page 5, line 24, “organic residuals” replaced with “organic content” Page 5, line 29-31, were removed Page 6, line 8, “organic residuals” replaced with “organic content, respectively”

Please also note the supplement to this comment:

<https://www.drink-water-eng-sci-discuss.net/dwes-2018-41/dwes-2018-41-SC2-supplement.pdf>

Interactive comment on Drink. Water Eng. Sci. Discuss., <https://doi.org/10.5194/dwes-2018-41>, 2018.

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