Jordanian Journal of Engineering and Chemical Industries (JJECI) **Research Paper**

**The High Frequency of Ultrasound Wave for the Degradation Of Dissolved Diazinon Pesticide In Water**

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This article aims to apply the Ultrasound technique in the field of clean technology to protect environment. The principle of sonochemistry is conducted here to degrade pesticides in simulated industrial wastewater resulted from the pesticide factory manufacturing (VAPCO). Diazinon pesticide selected in this study for degradation under high frequency ultrasound wave. Three different initial concentrations of diazinon (800, 1200, and 1800 ppm), at different solution volumes are investigated in this study to degrade diazinon in water. Ultrasound device with 1.7 MHz, and 0.044 cm diameter, was used to study the degradation.

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**Keywords**: Ultrasound, High frequency, Pesticide, Diazon, Pesticide, Environmental pollution, kinetics,

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**Main Text:** main headings will be followed after abstract by

**Introduction, Materials and Methods, Results and Discussion, Coclusion,Acknowledgments, and References**. Leave a blank line above and below each main heading.

**Introduction**

**1 Materials and Methods**

**2 Results and Discussion**

**Coclusion**

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distinct regions: the inactive region, where fluid elements are mostly stagnant and no mixing is occurring, and the ac- tive region, where fluid elements are in motion and proper mixing is occurring. It is the aim of the present study to investigate how manipulating the tank aspect ratio and jet nozzle orientation aﬀects the transition from inactive vol- ume to active volume in jet recirculation mixing.

**1.　Methodology**

The working fluid employed in the present study was a 0.5 wt% xanthan gum Keltrol T (XGKT) solution. It is non- Newtonian in nature with a yield stress and shear thinning characteristics. A Newtonian fluid, of constant viscosity, would not display the kind of non-linear response to shear that is seen in wastewater sludge that results in the forma- tion of mixing dead zones. XGKT can be considered as a Herschel–Bulkley fluid, whose behavior can be described by the equation below.

 *τ* = *τ y* +*kγ**n* (1)

Herein, *τ* is the shear stress [Pa], *τ*y is the yield stress [Pa], *k* is the consistency index [Pa · sn], *γ*̇ is the shear rate [s−1] and n is the flow index, which is less than 1 in this case, indicative of shear thinning behavior. **Figure 1** shows the shear stress-shear rate relationship, demonstrating the Herschel–Bulkley behavior. The 0.5 wt% XGKT solution has been shown previously (Kennedy *et al.*, 2016) to simulate digester sludge with around 5–6 wt% solids found in an- aerobic digesters in wastewater treatment plants. The eﬀect of varying XGKT concentration and, therefore, the eﬀect of varying viscosity, has been explored by the authors else- where (Kennedy *et al.*, 2015). It was found that for a given patterns for the DF and UF nozzles in the 3 : 1 tank explains the lack of diﬀerence in the decay of inactive volume. Figure 4(c) compares the decay of inactive volume in 1 : 1 and 3 : 1 tanks for a fixed DF nozzle configuration. This figure shows that the diﬀerence in the active volume decay for the two tanks is very small. It is just discernible that the 3 : 1 tank performs slightly better than the 1 : 1 tank. This can be explained through the similarities in flow patterns that occur for a DF nozzle regardless of the tank aspect ratio, which results from a large amount of energy being wasted in pumping against the tank floor. 3 : 1 DF and 1 : 1 DF in this order.

**Tables**

All tables should be numbered with Arabic numerals. Headings should be placed above tables, left justified. Leave one line space between the heading and the table. Only horizontal lines should be used within a table, to distinguish the column headings from the body of the table, and immediately above and below the table. Tables must be embedded into the text and not supplied separately. Below is an example which authors may find useful.

Table 1. An example of a table

|  |  |  |
| --- | --- | --- |
| An example of a column heading | Column A (t) | Column B (T) |
| And an entry | 1 | 2 |
| And another entry | 3 | 4 |
| And another entry | 5 | 6 |

**Figures**

All figures should be numbered with Arabic numerals (1,2,...n). All photographs, schemas, graphs and diagrams are to be referred to as figures. Line drawings should be good quality scans or true electronic output. Low-quality scans are not acceptable. Figures must be embedded into the text and not supplied separately. Lettering and symbols should be clearly defined either in the caption or in a legend provided as part of the figure. Figures should be placed at the top or bottom of a page wherever possible, as close as possible to the first reference to them in the paper.

The figure number and caption should be typed below the illustration in 8pt and left justified.

Fig. 1. (a) first picture; (b) second picture

**Conclusions**

 The present study has investigated the eﬀects of ……

d.

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**Nomenclature**

*D*T = tank diameter [m]

*d*n = nozzle diameter [m]

*H* = liquid height [m]

 *k* = consistency index [Pa · sn]

*N*t = dimensionless time scale [—]

*n* = flow index [—]

*Q* = recirculation rate [m3s−1]

 *t* = process time [s]

*V*i = inactive volume [m3]

*V*T = total tank volume [m3]

 *v*n = injection velocity [ms−1]

*γ*̇ = shear rate [s−1]

*τ* = shear stress [Pa]

*τ*y = yield stress [Pa]

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