

# Studies on some fish and its products

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This work was carried out to study the possibility of smoke condensates production via the distillative distillation for some Egyptian woods which included; Orange tree, Musky and Mulberry wood sawdusts. Then, preparing of the smoke condensates to obtain liquid smokes. Besides, the effect of wood moisture content, combustion temperature, particle size and wood sources on yield, composition and properties of smoke condensates were evaluated. As well as, possibility of smoking of Cat fish (*Clarius anguilaris*) and Bayad fish (*Bagrus bayad*)- either whole fish or fillets-with liquid smoke, then, it compared to the same products smoked with cold-smoking (traditional smoking), the smoked products were evaluated chemically, physically, nutritionally, microbiologically and organoleptically immediately after smoking, then, it stored at room temp. (32°C) and at 6°C to evaluate the effect of storage temperature on microbiological quality attributes. Also, the smoked herring collected from local market compared with the smoked products under this study. The obtained results could be summarized in the following:

- 1- Conditions of smoke condensate production: 1- The results pointed that there is a reversible relationship between moisture content of sawdust and smoke condensate yield, phenols, acids and carbonyls. While, a positive correlation between tar content of condensate and moisture content of sawdust. Also, the results recorded that the optimum moisture content of Orange tree sawdust under this investigation was 180/0. At this content, it could be produced smoke condensate with higher yield (42.120/0) and had the best quality characteristics.
- 2- Using the optimum moisture content, the results revealed that with increasing the combustion temperature from 250 to 350°C, the smoke condensate yield, phenols, acids and carbonyls were increased, the percent increase were 29.37, 40.00, 24.78 and 68.70, respectively. Then these parameters decreased when the combustion temperature raised from 350 to 450°C, the percent decrease were: 10.89, 11.56, 20.5 and 34.78, respectively. While, the results appeared that tar content was decreased by 20.770/0 when the temperature increased from 250 to 350°C then increased by 6.57% with increasing temperature up to 450°C, thus, the optimum combustion temperature was 350°C.
- 3- Sawdust sources could be arranged descendingly according to their effect on smoke condensate yield as follows: Orange tree, Mulberry then Musky wood sawdust. But with regard to the effect of particles size, powder sawdust recorded higher yield value than flakes for all wood sources.
- 4- According to the effect of wood sources and particles size on the specific gravity of condensate, all samples could be arranged ascendingly: Orange flakes, Musky flakes, Orange powder, Musky powder, Mulberry flakes then Mulberry powder sawdust condensate. However, the specific gravity values for all smoke condensates under this study were accorded to the allowance limits.
- 5- The results appeared a relationship between tar content and specific gravity of condensates where, the smoke condensate which had high tar content, also, it had high specific gravity.
- 6- In respect of the effective compounds related to smoke condensate quality; total acidity, phenols and carbonyls, the results revealed that flakes sawdust condensates had higher content of acetic acid than powder sawdust condensates for all wood sources where the Mulberry flakes and Orange flakes had the highest contents of acetic acid. According to the total phenols and carbonyls contents of condensates, Orange sawdust condensate had the highest values of phenols and carbonyls, as well as, flakes sawdust condensate contained higher phenols and carbonyls than powder condensate.
- 7- The results pointed that when summation of effective compounds increased, tar content and specific gravity decreased.
- 8- The results showed that tar content of liquid smoke recorded higher decrease compared to the content for

corresponding condensate, and the percent decrease for tar content of all liquid smokes ranging about 90-96%.

9- According to the effect of wood source and particle size on liquid smoke composition and properties, the results showed similar trend and arrangement that recorded for smoke condensates.

10- The results showed that specific gravity ( $\text{g/cm}^3$ ), tar content %, total acidity 0/0, phenols ( $\text{mg/100 g}$ ), carbonyls ( $\text{mg/100 g}$ ) and pH values for all smoke condensates under this study can be summarized as follows: 1.2520-1.290, 8.06-11.2, 7.59-12.00, 100-635, 720-3880 and 2.15-2.75 corresponding to 1.0453- 1.0500, 0.35-1.15, 1.54-2.40, 65-630, 460-2901 and 3.97-408 for all liquid smoke samples.

11- All wood sources under this study (Musky, Mulberry and Orange tree wood sawdust) are successfully used for preparing Egyptian liquid smoke on a large scale with high quality characteristics. Thus, utilization of it in food technology as substitute of the imported commercial liquid smoke for saving the hard currency.

12- The results recorded that Orange tree flakes sawdust condensate was the best one among smoke condensates where it had phenols content equal to 1.94 times than for Mulberry flakes sawdust condensate and 6.95 times than for Mulberry powder sawdust condensate, while it had carbonyls content equal to 4.86 and 5.34 times than for Musky flakes and Musky powder sawdust condensates respectively, in addition, it had the lowest tar content. Also, the liquid smoke of Orange tree wood sawdust was the best one among liquid smokes under this study. Thus, Orange flakes liquid smoke was subjected to fish smoking treatments.

11- Filleting yield of fresh fish: The results revealed that: 1- Cat fish (*Clarius anguilaris*) had lower filleting (47.26%) than Bayad fish (59.93%) although the average weight of whole fish (g) for the former (952.5) was higher than the latter (652.5).

2- When filleting yield was calculated, some values were not related to the weight of whole fish where, cat fish which had 46.740/0, while, Bayad which had whole weight of 450 and 600 g showed the same filleting yield (58.33%).