ACUTE TOXICITY OF THREE TYPES OF REFINERY PRODUCTS TO MOSQUITO FISH *Gambusia affinis*

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ABSTRACT

The mosquito fish *Gambusia affinis* was export to different concentration (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1, 2 and 4) mL/L of refinery products (kerosene, gasoline, and motor oil) under the laboratory condition. Values median lethal concentration LD50 was indicated that the fish were more sensitive to gasoline than kerosene. While least sensitivity was to motor oil. The toxicity curves indicate the gasoline was more toxicity to mosquito fish than kerosene and motor oil respectively.

INTRODUCTION

Oil pollution in aquatic environment is danger to living organisms. Many studies have been amide to determine the toxicity of oil and their dissolution. Farid (1998) was summarized these effects; Low boiling, saturated hydrocarbons of oil caused cells damage and death, especially in Larval and Juvenile stages of aquatic organisms. But olefin hydrocarbons, found in gasoline and other refined products, will combine with chlorine and other elements to produce toxic mixtures. And Low-boiling aromatic hydrocarbons are probably the most acutely toxic to aquatic organisms including gasoline (benzene), toluene and phenols. (Al-Saad, et.al1997a, Gesamp, 1993, and Turcynowiez, 1998)

Oil and their products may be enter the Shatt-Al-arab river through normal operation of oil tankers, accidental spill, disposal of oil waste material, and offshore production (GESAMP, 1990).

Fish as well as other organisms of Shatt-al-Arab River can be adversely affected by oil pollution. The mosquito fish *Gambusia affinis* is commonest and dominant organism in the

most local fresh water ecosystem including Shatt-Al-arab river. *Gambusia affinis* from family of peocillidae and order of Cyprinodonts, its recoded the important organisms in aquatic environment, for its role in control of malaria mesquites, Hoy. (1971) study the effect of it on the quantity of larvae of mosquitoes in aquatic environment.

The aim of present study was determined and compares the immediate lethal toxicity of refinery products of oil (Kerosene, gasoline, and motor oil) on the mosquito's fish.

MATERIAL AND METHODS

COLLECTION AND ACCLIMATION OF TEST ORGANISMS

Mosquito fish *Gambusia affinis* were caught by seine net from rearing ponds. The specimens were kept in aquarium from one week for acclimation to laboratory condition prior to start of the test, temperature 20± 2°C. The pH (7-7.9), Salinity was 1.55 ppt.

PREPARATION OF TEST SOLUTIONS

Test solution were prepared by adding a graded volume of the refined oil (kerosene, gasoline, and motor oil) to volumetric flask containing about 150mL of fresh water which was filtered and boiled before use. The resulting mixture was then mixed for about 15 minutes by using shaker. After that, one litter from solution x was allowed to equilibrate before the adding of fish experimental. The pH (7-7.9), Salinity was 1.55 ppt.

SHORT TERM LETHAL TOXICITY TESTS

Renewal toxicity tests were conducted by exposing the fish to different concentrations of(kerosene, gasoline, and motor oil) for 72 hr , after that 10 individuals were placed in glass Jar containing of the test solution. The mortality was recorded after 3 hours. In all cases the test solution was changed daily. The test was set up in three replicates together with three controls (untreated). Each replicated were exposure from 3-72hr.

CALCULATION OF LC50 VALUES

The median lethal concentration LC50and upper and lower 95% confidence limits was calculated by method of (UNEP, 1989)

RESULTS AND DISCUSSION

Percentage of mortality of mosquito fish *Gambusia affinis* after exposed to different concentrations of refined oils (gasoline kerosene,, and motor oil), are shown in table (1).

Table (1): percentage of mortality of mosquito *Gambusia affinis* exposed to different concentration of refined oils (kerosene, gasoline, and motor oil) during 72hs.

Concentration	Gasoline			Kerosene			Motor oil		
	24	48	72	24	48	72	24	48	72
0.1	0	0	0	0	0	0	0	0	0
0.2	10	20	40	0	0	0	0	0	0
0.3	15	20	40	0	0	0	0	0	0
0.4	20	33	35	20	21	28	0	10	10
0.5	28	40	46	22	24	24	0	12	14
0.6	33	60	100	30	30	30	0	14	14
0.8	40	100	100	40	40	40	10	15	20
1	100	100	100	40	100	100	40	50	55
2	100	100	100	80	100	100	70	100	100

The mortality was not observed in experimental fish during 3hs when it exposure to both gasoline and motor oil, due to the ability of organism to above the oil during the prior time of exposure (Sastery and Miller, 1981).

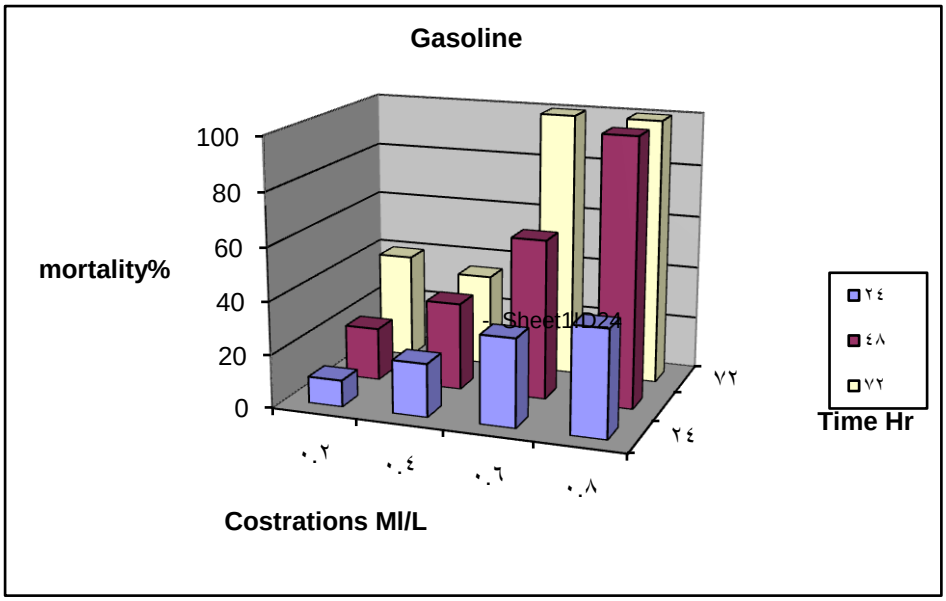

Figure (1): percentage of mortality of the mosquito fish exposed to different concentrations (0.2, 0.4,0.6,0.8)ML/L of gasoline for 72

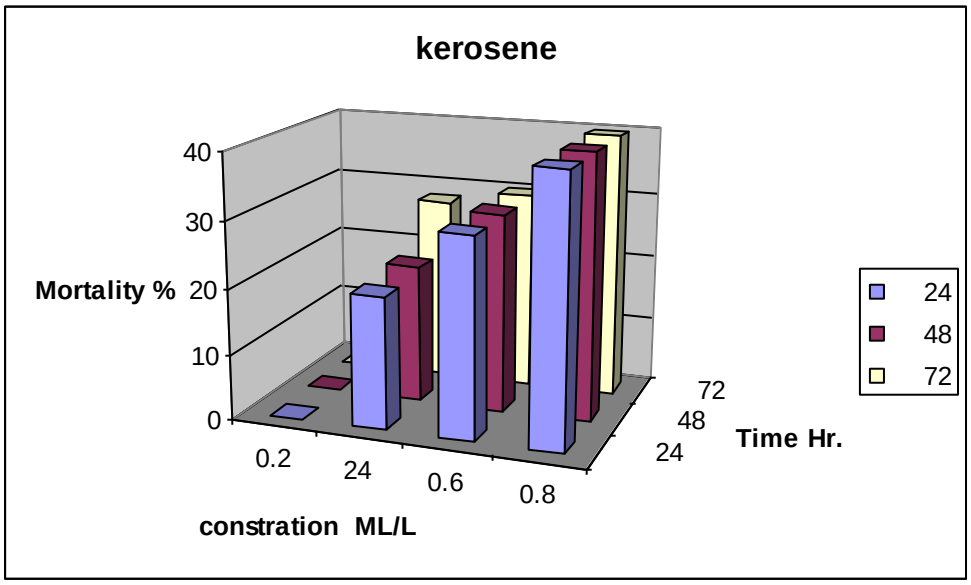

Figure (2): percentage of mortality of the mosquito fish exposed to different concentrations (0.2,0.4,0.6,0.8)ML/L of kerosene for 72

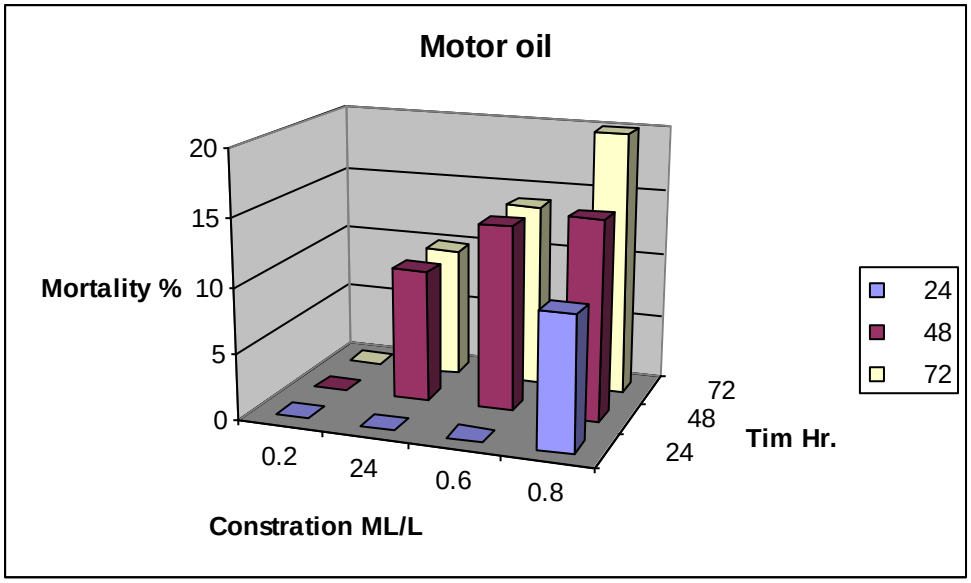

Figure (3): percentage of mortality of the mosquito fish exposed to different concentrations (0.2, 0.4, 0.6, 0.8) ML/L of motor oil for 72

The mortality of fish, was generally increased with increasing concentration and exposure time of refined oils,figures (1,2and3), this is agreement with Al-Saad et.al, (1997a) which recorde the effect of different concentrations of crude oil on tissue of fish. And the same results were found by (Glamuzinea, 1992). It is clear, after 24, 48,72hr. LC_{50} values of gasoline and their upper and lower 95%confidence limits were lowest than LC_{50} of other refinery product comparison with the same exposure time and concentration.

Table (2): Values of medium lethal concentration (LC_{50}) and their upper and lower 95% confidence limits to mosquito fish after exposed to different concentrations of refined oils to 72 hr.

	Gasoline			Kerosene			Motor oil		
	24	48	72	24	48	72	24	48	72
LC_{50}	0.6	0.52	0.46	0.7	0.62	0.6	1.2	1.1	1
Upper 95%	0.96	0.76	0.7	0.99	1.04	0.99	2.24	1.32	2.07
Lower 95%	0.37	0.34	0.3	0.49	0.35	0.36	0.64	0.91	0.5

It has been shown that the medium lethal time (LT_{50}) values to the mosquito fish after exposure of gasoline are lower than the LT_{50} values same fish exposed to kerosene and motor oil respectively with the same concentrations are shown in table (3).

Table (3): Values of medium lethal times LT_{50} to mosquito fish after exposed to different concentrations of refined oils.

Concentration mL/L	Gasoline	Kerosene	Motor oil
1	5	23	30
2	2	17	22
4	1	13	20

The experimental fish were more sensitive to gasoline comparison kerosene and motor oil. Farid (2003) found the gasoline was more toxic to the three types of snails than kerosene.

The toxicity curves show that different types of oils (gasoline, kerosene and motor oil)was appeared vary in their toxicity to the fish. The gasoline is clearly the most toxic fraction. Kerosene is the next, But motor oil less toxic, fig (2) this is agreement with Al-Azawii (2004) studied the effect of crude oil and three of its products to the shrimp. It was found that the gasoline was more toxic than other oil products. It is possible that the difference in fish sensitivity to varying toxicants cants due to the difference in chemical toxic effect oil. Aromatic hydrocarbons of gasoline (benzene) were associated with their lipids and other tissues to produce the abnormal activities and die. Similar observations on these toxic acute effects of gasoline of aquatic organisms were also reported by Thomas; et.al (1995), they found that aromatic hydrocarbons like gasoline were acute toxic to aquatic organisms.

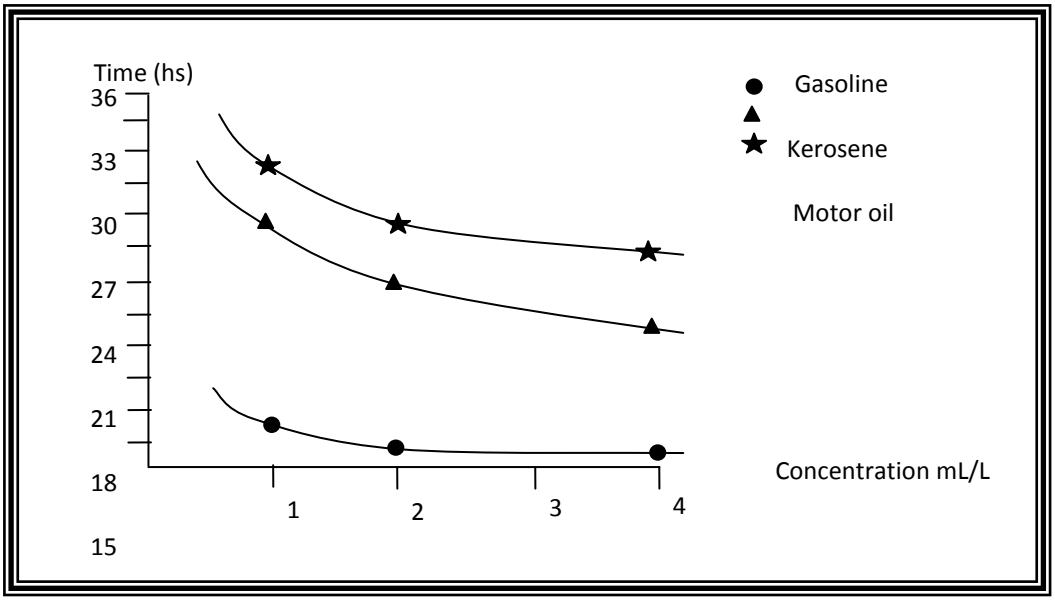

Figure (2): Toxicity curves of refined oils (kerosene, gasoline, and motor oil) from1 to 4 mL/L concentration during 36 hrs. against mosquito fish.

The total acute effects of three types of refined oils on the mosquito fish are: restrict its normal activities, bring narcosis and anesthesia and finally lead it to die. A similar observation on these toxic acute effects of refined oils on many other of aquatic organisms were also reported by (Machey and Hodgminson, 1996, GESMP, 1993)

In conclusion the gasoline oil is more toxic to *Gambusia affinis* fish than kerosene and motor oil.

السمية الحادة لثلاثة انواع من منتجات التكرير تجاه اسماك الكمبوزيا

Mosquito fish Gambusia affinis

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الخلاصة

المتواجدة في المياه العذبة الى المشتقات النفطية (الكازولين، النفط الابيض، Mosquito fish عرض اسماك مل /لتر وفي نظام متجدد للاختبار (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1, 2 and 4)وزيت المحركات) وبتراكيز تحت الظروف المختبرية.

اشارات قيم متوسط التركيز المميت الى ان الاسماك اكثر حساسية اتجاه الكازولين ثم النفط الابيض ويليه زيت المحركات واوضحت منحنيات السمية ان الكازولين اكثر سمية تجاه الاسماك من النفط الابيض ينما كان الاخير اكثر سمية من زيت المحركات .

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