

## Preparation and formulation of bird repellent pesticide

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*Received 25/6/2006; accepted 4/9/2006*

### Abstract

In this research, Anthraquinone was prepared from the oxidation of anthracene (obtained from coal tar) by sodium perchlorate in presence of vanadium pentoxide as a catalyst in a good yield and high purity. Anthraquinone was formulated as a wettable powder (w.p.) to prepare a bird repellent pesticide, which leave no toxic residue in crop plants.

### تحضير وتركيب مبيد طارد للطيور

نعيم تقى فيلي

### المستخلص

حضر مبيد طارد للطيور باستخدام الأنثراكوينون كمادة فعالة والتي حضرت من أكسدة مادة الأنثراسين بوساطة بيروكلورات الصوديوم بنسبة ناتج ونقاوة عاليتين، ركب المبيد على هيئة مسحوق قابل للبل Watable Powder باستخدام مواد محلية وقد اثبت المبيد مطابقته للمواصفات القياسية المنبذة في صناعة المبيدات.

## Introduction

Anthraquinone, a poly cyclic hydrocarbon containing two opposite carbonyl group (C=O) at 9,10 position, is yellow or light gray to gray-green crystal powder, insoluble in water or alcohol, but dissolves in nitrobenzene and aniline<sup>(1)</sup>. Anthraquinone is starting material for the production of coloring compounds, antioxidants, and polymerization inhibitors. Its derivatives are widely used as intermediates for dyes<sup>(2)</sup>, pigments, photographic chemicals, and paints. Anthraquinone is used in paper industry as a catalyst to increase the pulp production yield and to improve the fiber strength through reduction of cellulose to carboxylic acid. Anthraquinone is produced industrially from phthalic anhydride and benzene in the presence of AlCl<sub>3</sub> by Fredalcrafts reaction<sup>(3)</sup> or by oxidation of anthracene with chromic acid<sup>(4)</sup> and Diels-Alder reaction from naphthquinone and 1,3diene<sup>(5)</sup>. As a result, for the large losses caused by agrigluture disease especially birds which eating the seeds (rice, wheat, barely) many ways are followed to prevent this case like scaring device<sup>(6)</sup> radionics method<sup>(7)</sup> and chemical repellent<sup>(8)</sup>. There are many problems in finding chemicals which the animals will learn to avoid, leave no toxic residue, stick to the target food, and which do not harm crop plant either directly or by photosensitizing it. Residue analyses found that the level of anthraquinone reduced from 2.02kg/ha at application to 0.22kg/ha one week later<sup>(9)</sup>.

## Experimental

**Material:** chemicals including anthracene, sodium perchlorate, sulfuric acid, and vanadium pentoxide were used. Anthraquinone was dried at 110C° infrared and U.V spectra were recorded. All chemical are pure and supply by fluka, BDH Company.

### Formulation Material

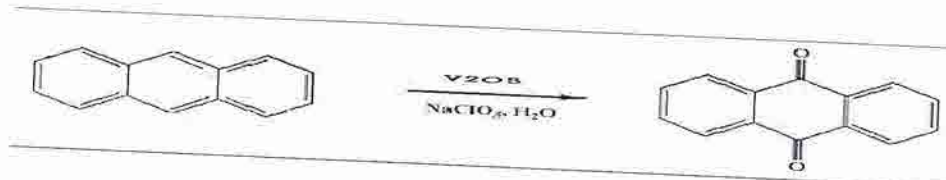
- 1- Anthraquinone (Active ingredient)
- 2- Kaolin (Carrier)
- 3- Sodium laurel sulfate (Wetting agent)
- 4- St- White (Dispersion agent)
- 5- Pentonight (Coagulating agent)

### Apparatus

- 1- Grinder (Karl koalb)
- 2- Sieve 5-25 micron ( Gilson)
- 3- Mixer (Karl koalb)
- 4- Oven Thelco (Karl koalb)
- 5- Balance (Shimadzu)
- 6- Different glass wares

### Experiment

**Procedure:-A/** Synthesis of Anthraquinone mixture of 9gm (0.015mole) of finely powdered pure anthracene, 0.05 gm of vanadium pentoxide, 7.6gm of sodium perchlorate, 100ml of glacial acetic acid and 20ml of 2 percent sulfuric acid was warmed under reflex until vigorous reaction commences. The source of the heat was removed, and the reaction allowed to proceed for a bout 20 min. The mixture was refluxed for one hour longer and then cooled in ice. The light yellow solid is filtered with section, washed well with water, and dried at 110C°. An IR and U.V spectrum for the pure and dried product was recorded.



**Procedure:-B/** Formulation of the repellent pesticide. the following steps were carried out for the formulation of the repellent pesticide. All materials were grinded each one alone and sieves at 5-25 micron. The recommended amounts of ground materials were transferred into a mixer and mix for 30 minutes at 500 r.p.m. Four formulas were prepared according to table (1). Each formula was subjected to a fundamental test<sup>(10,11,12)</sup>. Formula No.4 was found to be the most correct one.

#### Laboratory checking and analysis

The physical & chemical laboratory checking and analysis was accomplished on three steps<sup>(10, 11, 12)</sup>

- 1- Step one includes the formulation process of the product.
- 2- Step two was carried out after the storage of the formulated product for 72hr at 0C<sup>0</sup>.
- 3- Step three is carried out after the storage of the formulated product for 14 days at 54C<sup>0</sup>.

**Note/** that steps 2&3 are necessary for those formulas that passed the test carried out after the first step. Table (2) shows the results obtained.

#### Results and discussion

Anthraquinone is a derivative of anthracene, the oxidation of the later by sodium perchlorate gives a good yield of Anthraquinone. The product was recrystilazed from ethanol. U.V light shows the following absorbance.

$\lambda_{max} = 251nm, \lambda_{max} = 271nm, \lambda_{max} = 324nm$

While the I.R spectra showed the following peaks.

C=O at 1681cm<sup>-1</sup> aromatic bond at 1600-1587cm<sup>-1</sup> Moreover, the gas chromatography gives purity about 98%.

The U.V and I.R spectra are identical to the original compound.

The addition of an adhesive to the formulation to enhance retention of anthraquinone to vegetation and seeds should be investigated. Another advantage of anthequinone compared to the avian repellents (such as methiocarb) is that it has low toxicity and has no odor or grass discoloration associated with materials such as methyl anthranilate<sup>(13)</sup>. There were no phototoxic effects from the anthraquinone as rice seeding and seed counts were both similar treated and untreated exclosure. The slight consumption of flight control at the 1% level had adverse physiological effects or caused the birds to generalize the repellency to untreated food<sup>(8)</sup>. There is another advantage over other repellents such as methiocarb where untreated foods continue to be grazed<sup>(14)</sup>. This was also found with rice - eating bird<sup>(15)</sup>. They also suggest that anthraquinone irritates the birds' digestive tract sufficiently to suppress the birds appetite overall. This theory was supported by rating that birds avoided consuming flight control treated rice or repeated encounters<sup>(16)</sup>.

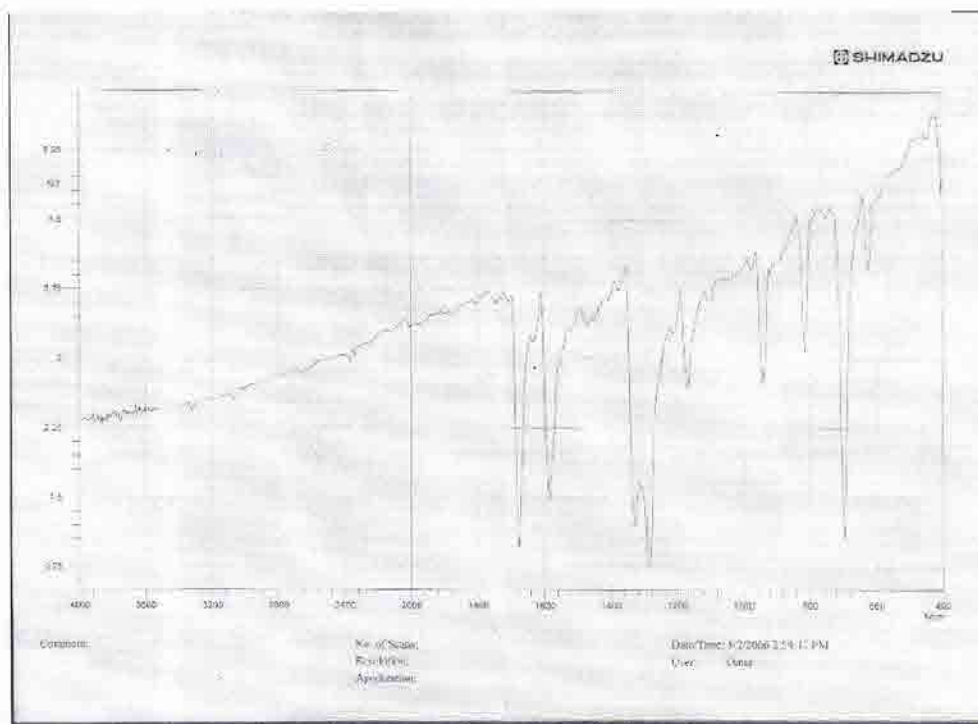


Fig. (1) IR spectrum for Anthraquinone

Table (1) Percentage of each component in the formula

No. of formula	F1	F2	F3	F4
Active gradient	80	80	80	80
Carrier	10	10	11	12
Wetting agent	5	5	4	4
Dispersion agent	3	2	3	2
Coagulating agent	2	3	2	2

Table (2) Test results of the correct formula

Time	Temp.	purity	coagulant	dispersions	Wetting time sec.	Suspension time	result
24hr	25	80	-	+	Less than 60 min.	More than 60	compatible
72hr	0	80	-	+	=	=	compatible
14 day	14	80	-	+	=	=	compatible

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