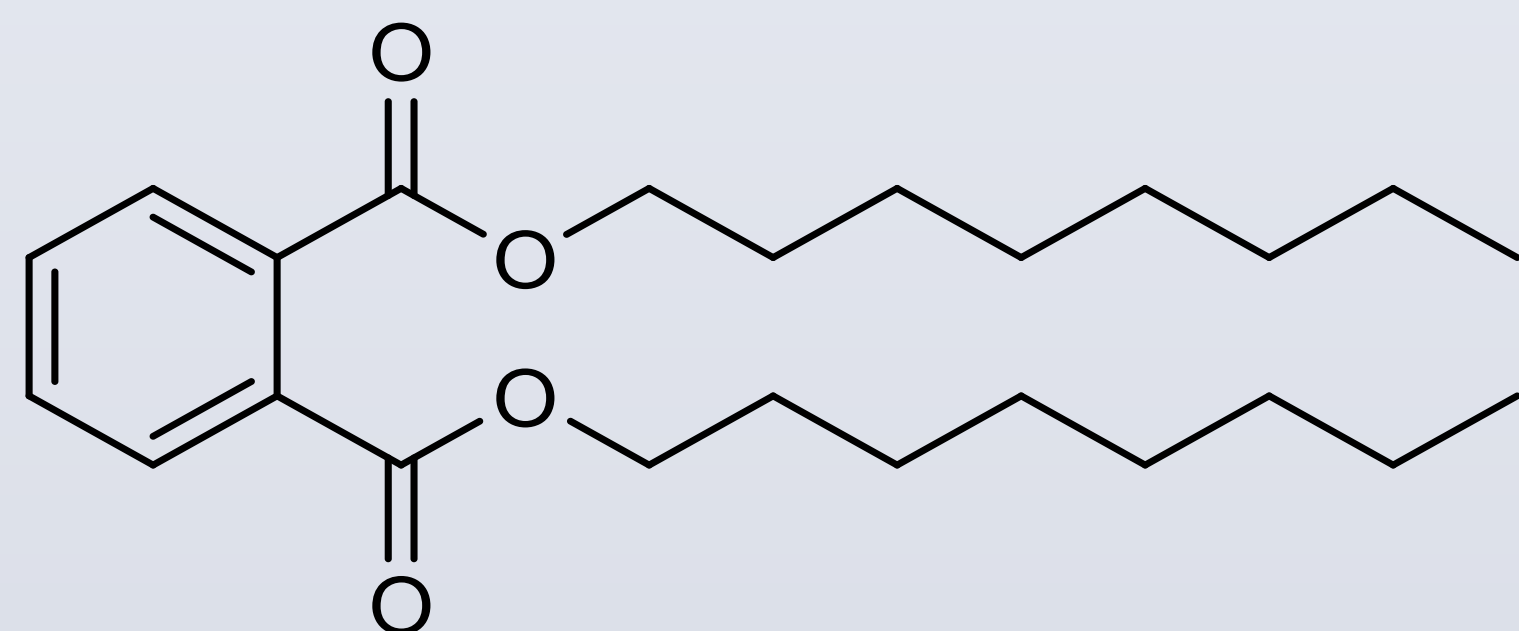


## ABSTRACT

This research tested samples from 10 suppliers of soft plastic lures for the presence of phthalates using FTIR-ATR Spectroscopy. Six of the supplier's samples were purchased from a well known retail supplier of sporting goods. Of these samples, 5 out of 6 were found to contain detectable levels of phthalates. The other 4 samples were purchased online by suppliers who marketed their products as using non-phthalate plasticizers or "phthalate free". None of these samples were found to contain phthalates above our detection limits of 10%; however they apparently contained high levels of non-phthalate plasticizers.



The United States Environmental Protection Agency (EPA) has reported on the hazards of 8 commonly used phthalates in its Phthalate Action Plan of 2009(1). Some of the health hazards include fetal mortality, problems in the fetal development of the male reproductive system, and problems in both male and female reproductive systems later in life. Accordingly the EPA, FDA, and Consumer Protection Commission (CPSC) have addressed the issue and suggested maximum concentrations are on the order of 0.1% by weight in consumer products such as medical devices and children's toys.

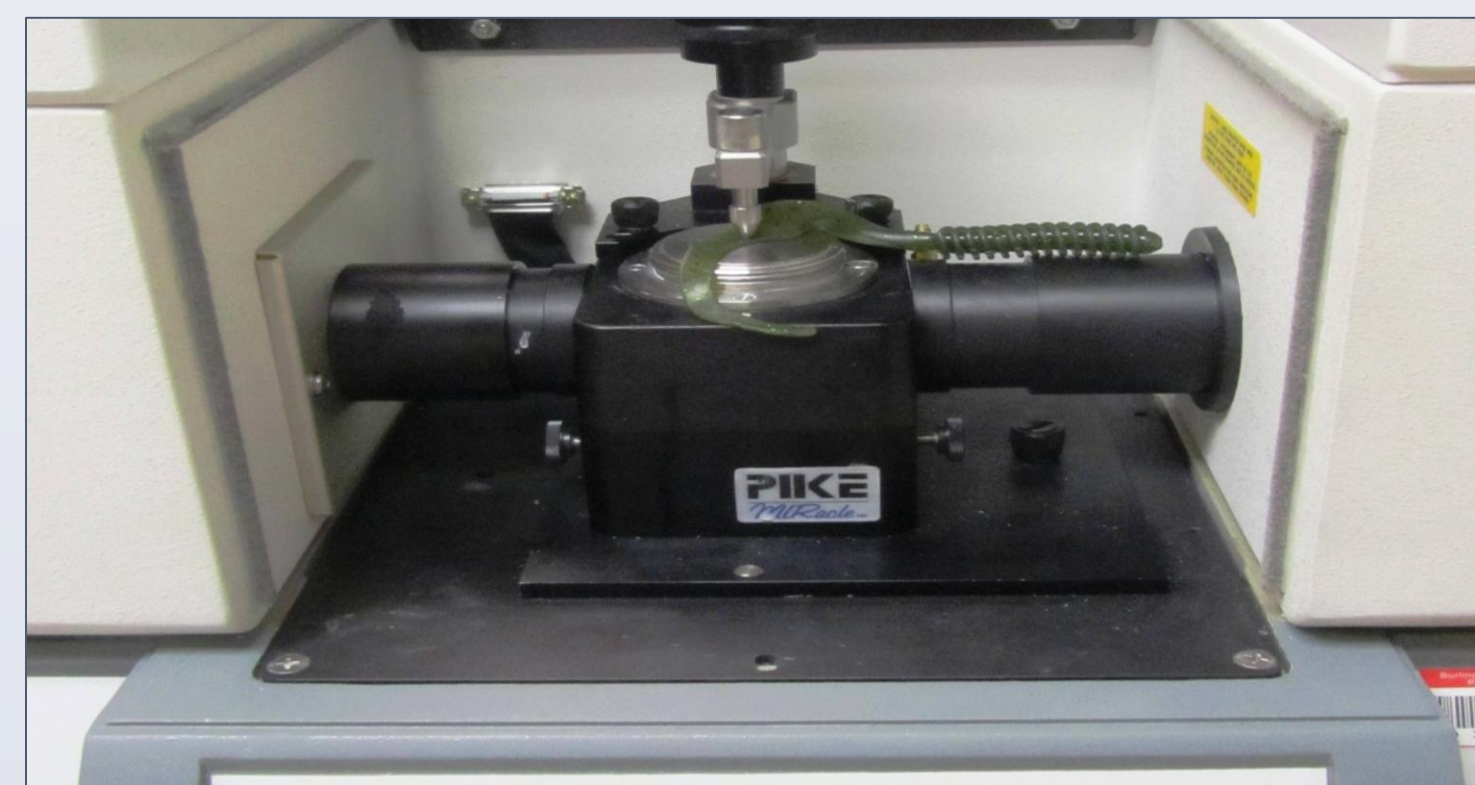
## EXPERIMENTAL METHODS

### FT-IR Instrument:

Agilent Technologies Scimitar Model 2000 with Resolutions Pro™ 4.1 software ; DTGS detector ATR Module: Pike MIRacle™ KSR-5/diamond Number of Scans 16 Resolution 4 cm<sup>-1</sup>

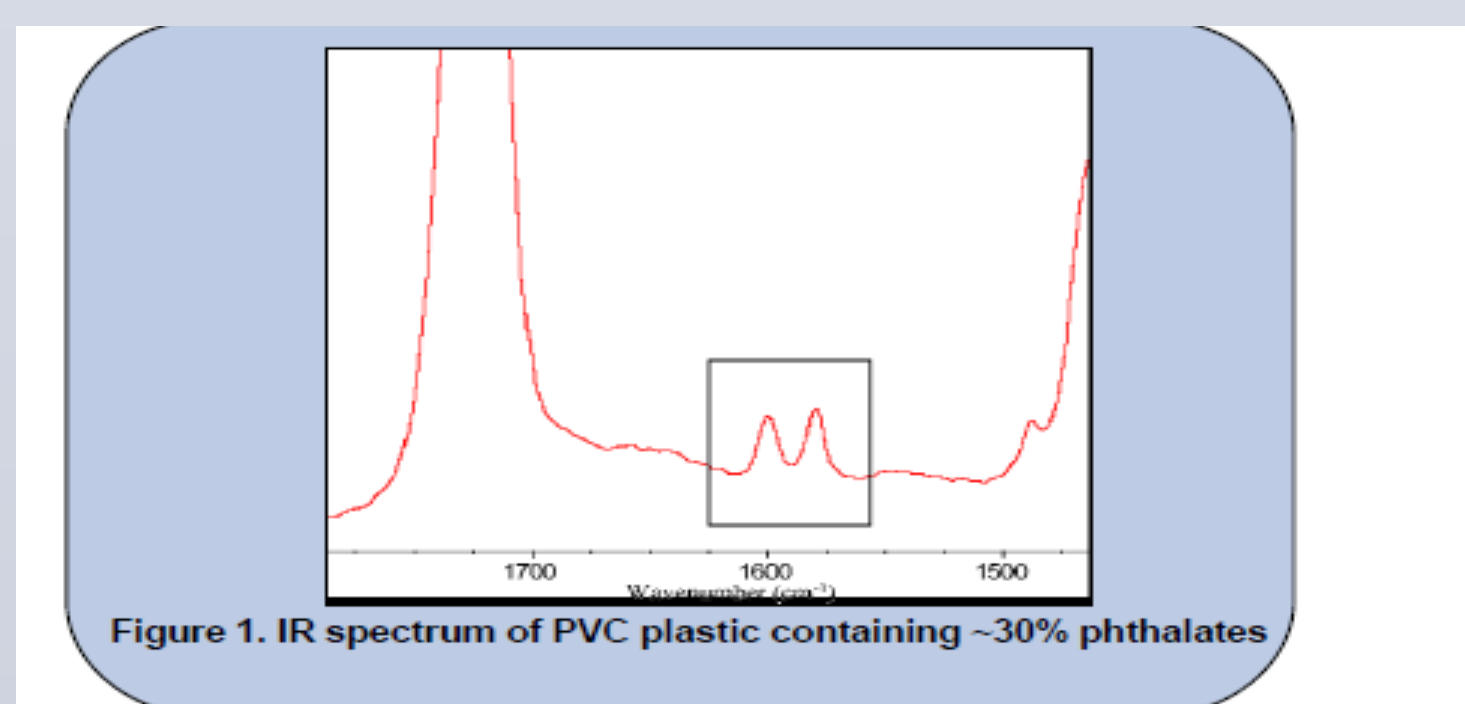
### IR Technique:

Phthalate standards and lures were placed directly on ATR crystal. See photo below.

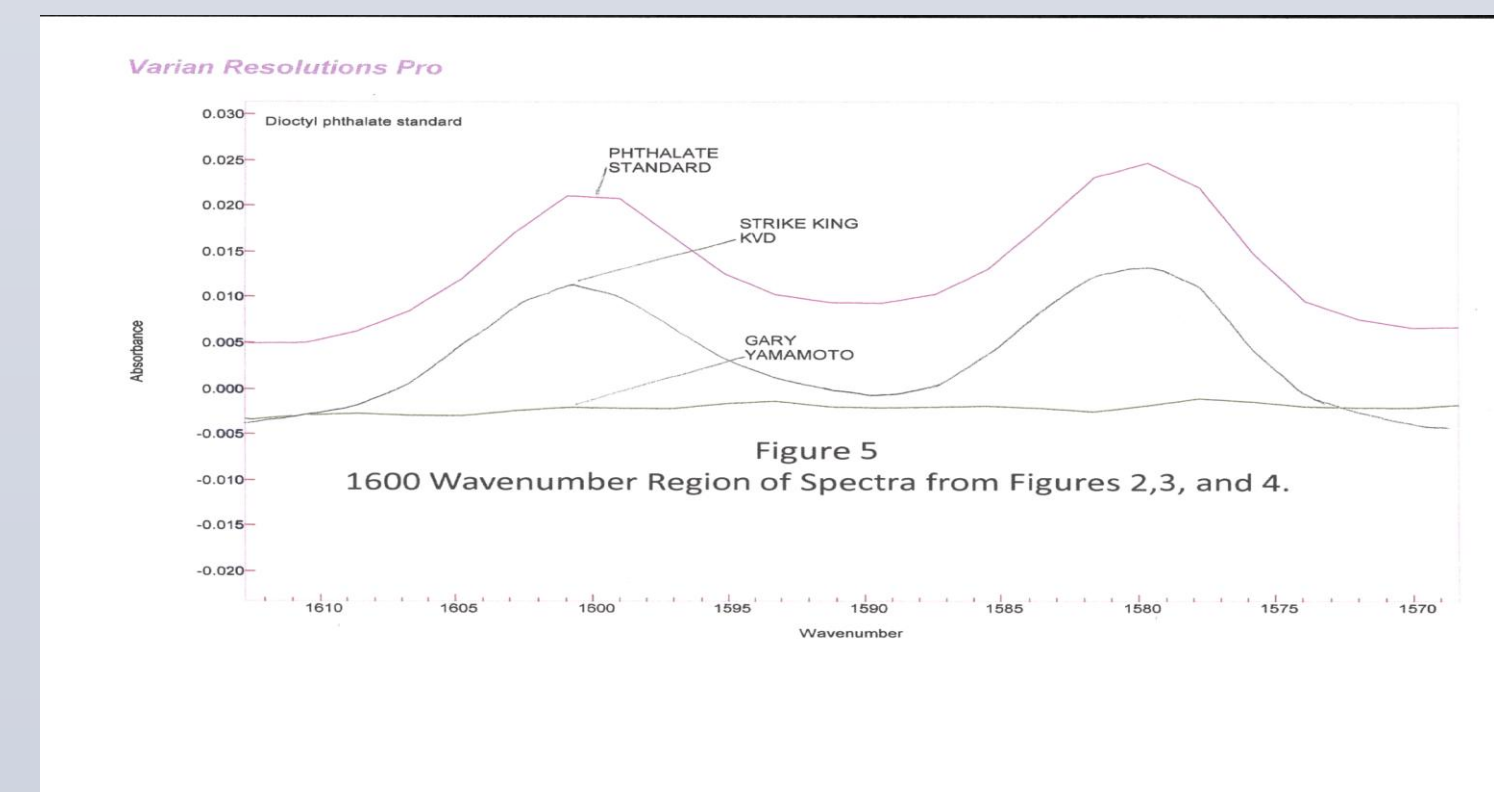
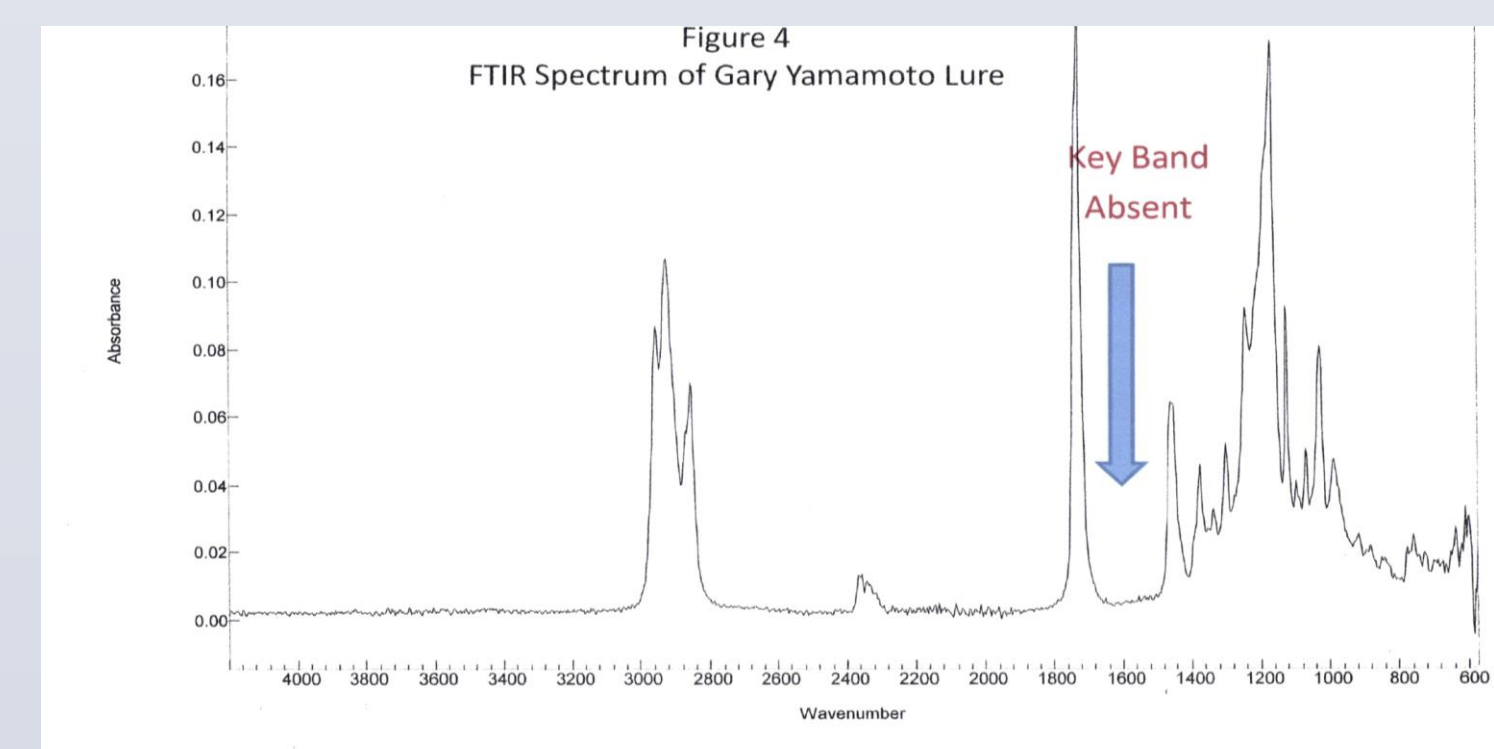
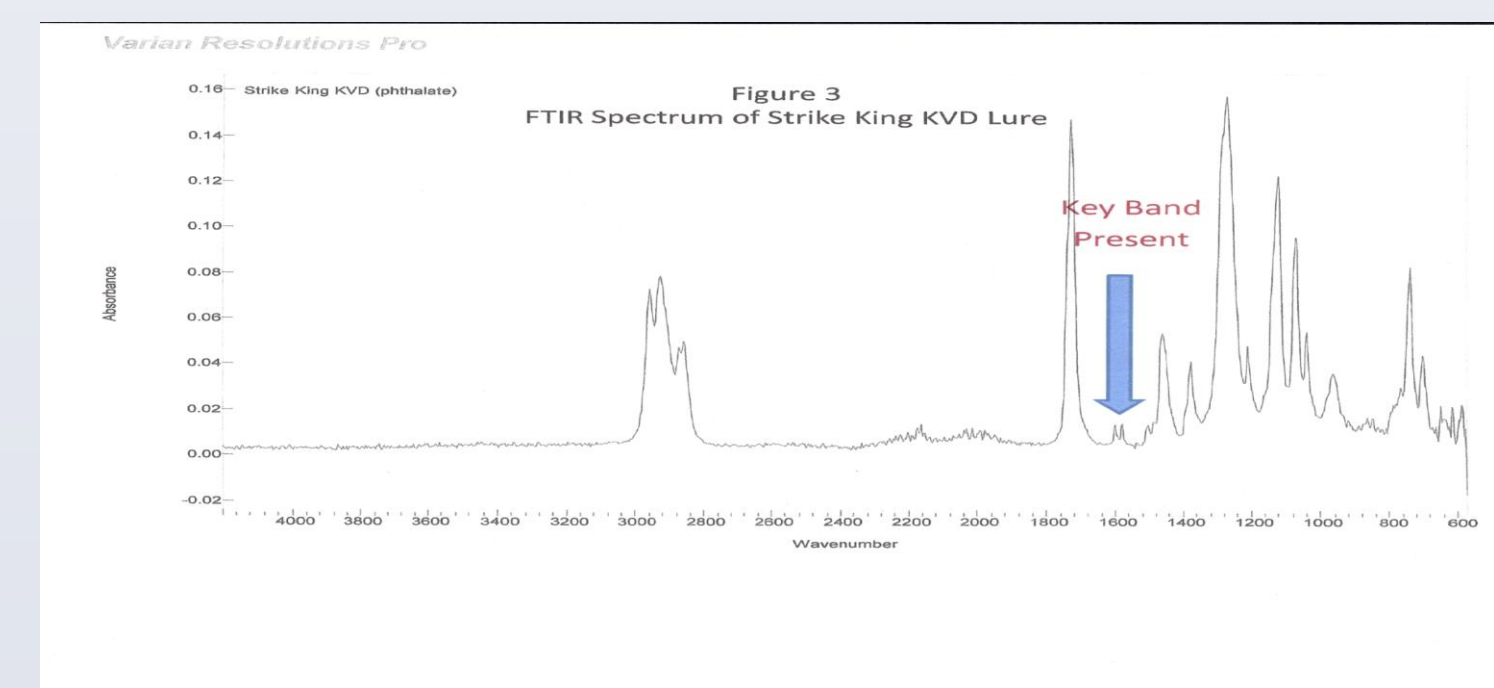
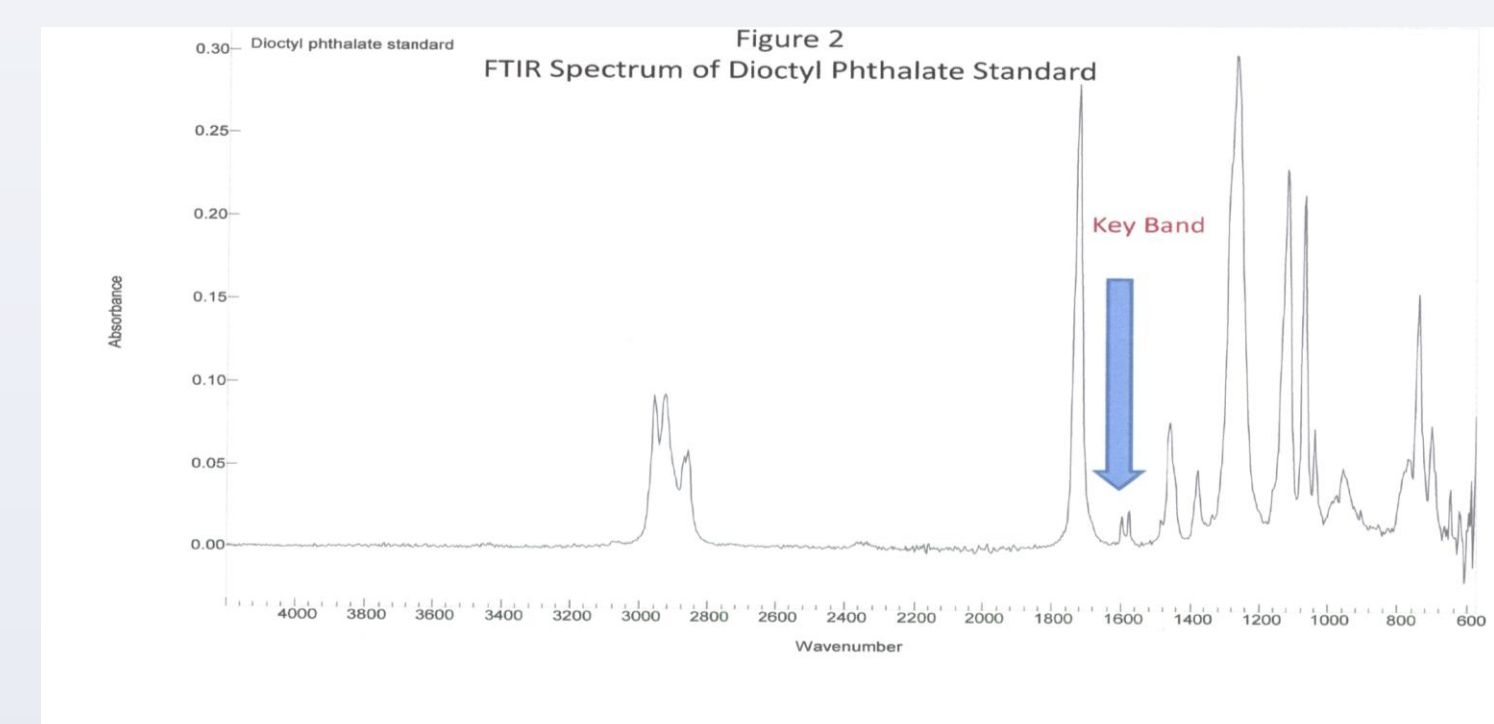


### Standard Spectra:

Figure 1 below shows a typical phthalate plasticized PVC compound with the key bands around 1600 wave numbers detailed. These bands are used to discriminate between phthalate and non-phthalate plasticizers (2). Spectra were collected on DOP and DiDP standards which also displayed the key bands.



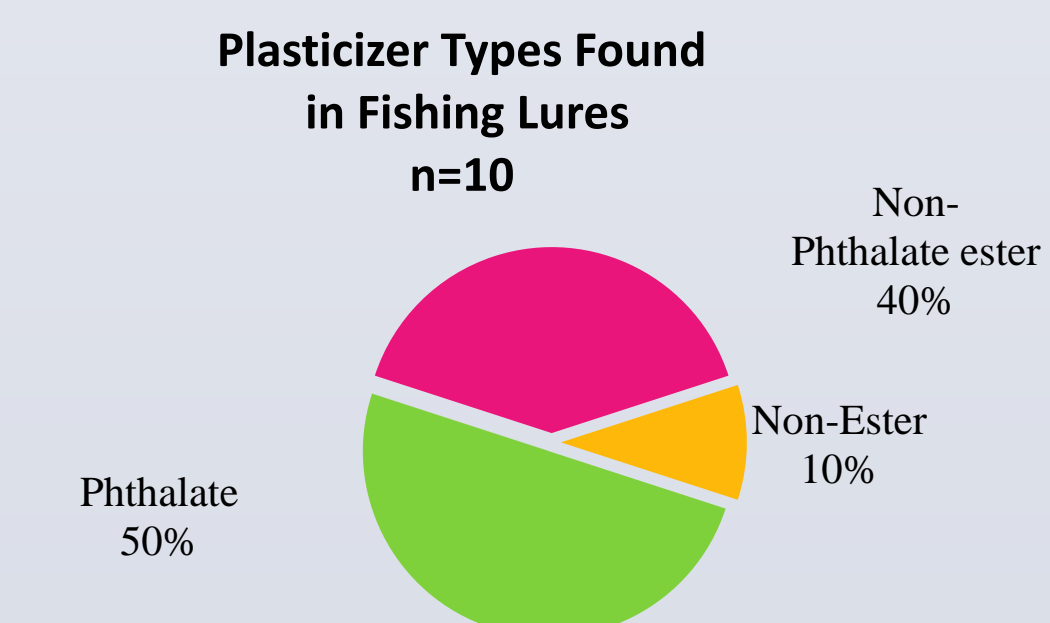
## EXPERIMENTAL FTIR SPECTRA



## RESULTS

A conclusion of phthalate presence was based on three factors, comparison to published spectra (Fig 1) and to standards run in our lab (Fig 2), and a positive search result of the Agilent Resolutions Pro™ database. All products tested had levels of plasticizer high enough that the liquid transferred to the inside of the packaging or other surfaces that the lures came in contact with. The only popular brand tested that did not appear to be using a phthalate type plasticizer was Gary Yamamoto.

None of the popular products tested that contained phthalates had any reference or warning on the packaging. All products tested that were marketed as "phthalate free" were confirmed as using non-phthalate plasticizers.



## CONCLUSIONS

The majority of popular brand soft plastic fishing lures contain hazardous phthalates despite the fact that most of the lures will ultimately end up in our aquatic life or lakes and streams. There are several non-phthalate options available online for the conscientious fisherman.

## REFERENCES

- 1) Environmental Protection Agency (EPA) Action Plan on Phthalates. [http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/phthalates\\_ap\\_2009\\_1230\\_final.pdf](http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/phthalates_ap_2009_1230_final.pdf) accessed August 2012
- 2) Consumer Product Safety Commission Standard Operating Procedure for Determination of Phthalates. <http://www.cpsc.gov/about/cpsia/cpsc-ch-c1001-09.3.pdf> accessed August 2012
- 3) Enhanced Sensitivity to Detect Phthalates by FT-IR Analysis. <http://www.spectroscopyonline.com/spectroscopy/Articles/Enhanced-Sensitivity-to-Detect-Phthalates-by-FT-IR/ArticleStandard/Article/detail/739849> accessed August 2012

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