

## DISCIPLINE INFORMATION NOTE

### Chemical Reaction Hazards

DIN No	CD5/054	Issue Date	March 2004
Open Government Status	Fully Open	Review Date	March 2005

To: All Process Safety Specialist Inspectors

## DOMESTIC PRODUCTION OF BIODIESEL

### CONTENTS

Introduction, Summary, Domestic Production of Biodiesel, Guidance, Further Information

#### INTRODUCTION

The attached note explains that domestic production of biodiesel raises serious fire safety and health concerns, although I am not aware of any reported incidents to date.

The note is shortly to be published on the HSE website. It is also being publicised via the Fire Protection Association, Chief and Assistant Chief Fire Officers Association, Home Office Fire Information Bureau, Fire Safety Inspectorate and National Community Fire Safety Centre.

HSE has enforcement powers where biodiesel is being sold on, but not in cases of home manufacture of biodiesel for sole use.

I would be grateful to hear of any incidents or other issues arising from the domestic production of biodiesel.

#### SUMMARY

This DIN summarises the process safety and health hazards associated with the domestic production of biodiesel. It contains the text of a document on the subject, to be placed on the HSE website and sent to various bodies with an interest in fire safety.

The distribution of the DIN is to all process safety specialist inspectors.

Biodiesel is a relatively new synthetic fuel that is made by chemical treatment of vegetable oils. It is produced commercially and can be bought from some petrol stations. However there are "recipes" available on the Internet for domestic production of biodiesel. These usually involve mixing methanol with sodium hydroxide (also known as caustic soda or lye), then pouring the resulting mixture into vegetable oil.

#### DOMESTIC PRODUCTION OF BIODIESEL – HEALTH AND SAFETY WARNING

Home production raises serious health and safety concerns. **Making biodiesel is a potentially hazardous process that should only be carried out in controlled conditions by people with the proper training and experience.** At the very least a poorly made product could seriously damage your vehicle engine.

The individual chemicals needed for the process are themselves hazardous.

**Sodium hydroxide** is extremely corrosive. It can cause burning to unprotected skin and is particularly damaging to the eyes. A fine mist of liquid droplets can easily be formed when the liquid is stirred. If this mist is inhaled, severe irritation of the respiratory tract and breathlessness can occur. Accidental swallowing can cause major damage to the throat lining and digestive system.

**Methanol** is a toxic chemical. It can enter the body via vapour inhalation, direct skin contact or by accidental ingestion. It can cause nausea, dizziness and visual disturbances that can result in blindness. Swallowing of small quantities could pose a significant health threat to the central nervous system and could also affect other vital organs. It is a cumulative poison and repeated exposures to relatively low concentrations could cause harm in the longer term.

**There is a serious risk of fire and explosion** because methanol is highly flammable and there are many potential sources of ignition in most homes. These include normal electrical equipment (for example kitchen appliances, plugs, switches), open flames (for example gas burners) and smoking materials.

It is also possible that a violent chemical reaction could occur by making a mistake with the recipe (for example getting the quantities wrong or adding the chemicals in the wrong order), poor mixing or making too much at once. Any of these could result in the mixture splashing or boiling over, causing serious burns.

Because of these serious health and safety risks, HSE advises against the home manufacture of biodiesel using domestic or other unsuitable facilities and by people who are not trained in handling dangerous substances.

## **GUIDANCE**

Basic safety principles when working with flammable liquids are available in a free HSE publication entitled "Safe Working With Flammable Substances".

More detailed guidance on flammable liquids can be found in "The Safe Use and Handling of Flammable Liquids", HSG 140, HSE Books, 1996, price £8.50 and "Fire and Explosion – How Safe Is Your Workplace? A Short Guide to the Dangerous Substances and Explosive Atmospheres Regulations", INDG 370, HSE Books, 2002, price £5.00.

Guidance on chemical reactions is given in "Designing and Operating Safe Chemical Reaction Processes", HSG 143, HSE Books, 2000, price £12.50. HSE publications are obtainable from HSE Books, telephone 01787 881 165.

## **FURTHER INFORMATION**

Further information on general health and safety issues is available on the HSE website, or from the HSE Infoline telephone 08701 545 500.

Although HSE's prime concern is with health and safety, we are also obliged to point out that duty must be paid on all vehicle fuel for use by the general public, whatever the origins of the fuel.

For further information please contact the HID CD5 General Office.