

**BIFUNCTIONAL ADDITIVES FOR LIQUID HYDROCARBONS**  
**OBTAINED BY GRAFTING STARTING WITH COPOLYMERS OF**  
**ETHYLENE AND/OR PROPYLENE AND VINYL ESTER**

5

**Abstract**

The invention relates to the synthesis and the use of copolymers based on ethylene and/or of propylene and of vinyl ester(s) modified by grafting, effective for improving both the resistance to cold and the lubricity of liquid hydrocarbons in particular the middle distillates originating from the distillation of petroleum and crude oils, in particular those with a low sulphur content and relates to a copolymer comprising:

a) units derived from ethylene of formula A -  $(\text{CH}_2\text{-CH}_2)_{n1}$ - and/or propylene of formula A' -  $((\text{CH}_3)\text{CH}_2\text{-CH}_2)_{n2}$  with  $n1 + n2 = n$  ranging from 98 to 643, preferably ranging from 124 to 515;  $n1$  being advantageously equal to  $n$ ;

b) units of formula B: -  $(\text{CH}_2\text{-CHOOCR}_1)_{m-x}$ - in which  $R_1$  represents a  $C_1$ - $C_{15}$  linear or branched alkyl group, preferably methyl, propyl, and/or a  $C_5$  to  $C_{15}$  branched alkyl group, in which the branching is situated at any point of the alkyl radical, preferably in position 2 or 3 of the alkyl chain; preferably chosen from the preferred  $C_5$ - $C_{15}$  vinyl comonomers, preferably chosen from the pivalate, isopentanoate, isohexanoate, isononanoate, isodecanoate and/or isotridecanoate, and advantageously 2-ethyl hexanoate, neoalkanoates, in particular neononanoate, neodecanoate and/or neoundecanoate; with  $m$  ranging from 2 to 105, preferably ranging from 16 to 71 and  $x$  ranging from 0.2 to 105, preferably ranging from 1.6 to 71;

c) units of formula C: -  $(\text{CH}_2\text{-CHOH})_{x1}$ - in which  $x1$  ranges from 0 to  $0.30x$ , preferably  $x1 = 0$ ;

d) units of formula D: -  $(\text{CH}_2\text{-CHOOCR}_2)_{x2}$ - in which  $x2$  ranges from  $0.70x$  to  $x$ , preferably  $x2 = x$ , and  $R_2$  represents a  $C_8$ - $C_{24}$  saturated or unsaturated, linear or branched, alkyl group, preferably  $C_{14}$ - $C_{20}$  or also  $C_{14}$  to  $C_{18}$

$$\text{with } x = x_1 + x_2$$