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(54) Titre : COMPOSITIONS D'ENCRE SECHE ET PROCEDES
(54) Title: TONER COMPOSITIONS AND PROCESSES

(57) Abrégé/Abstract:

Disclosed are toner compositions that contain an amorphous polyester resin, a crystalline polyester resin, a colorant and a wax, and where the crystalline polyester resin is subjected to nucleation with a rosin acid or the salt of a rosin acid.

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ABSTRACT

Disclosed are toner compositions that contain an amorphous polyester resin, a crystalline polyester resin, a colorant and a wax, and where the crystalline
5 polyester resin is subjected to nucleation with a rosin acid or the salt of a rosin acid.

TONER COMPOSITIONS AND PROCESSES

[0001] The present disclosure is generally directed to toner compositions and processes thereof, and more specifically, to toners comprised of crystalline polyesters nucleated with a rosin acid or the salts thereof.

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BACKGROUND

[0002] Certain polyester containing toner compositions are known, including where the polyesters selected are amorphous, crystalline or mixtures thereof. Thus, for example, in U.S. Patent 7,858,285, there are disclosed emulsion/aggregation toners that include specific crystalline polyesters.

10 **[0003]** Toner compositions prepared by a number of emulsion/aggregation processes, and which toners may include certain polyesters are known as disclosed in U.S. Patents 8,466,254; 7,736,832; 7,029,817; 6,830,860, and 5,593,807.

[0004] While these known toners may be suitable for their intended purposes, there remains a need for toners with acceptable and improved characteristics relating, for example, to fixing temperature latitudes and blocking temperatures of, for example, a blocking temperature of from about 50°C to about 60°C. There is also a need for toners with excellent gloss and cohesion properties, acceptable minimum fixing temperatures, excellent hot and cold offset temperatures, and which toners possess desirable size diameters. Further, there is a need for toner compositions that do not substantially transfer or offset onto a xerographic fuser roller, referred to as hot or cold offset depending on whether the temperature is below the fixing temperature of the paper (cold offset), or whether the toner offsets onto a fuser roller at a temperature above the fixing temperature of the toner (hot offset).

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[0005] Also, there is a need for toners that can be economically prepared and where low cost crystalline polyester resins are selected.

[0006] Moreover, there is a need for processes that enable the generation of enhanced crystallinity in polyesters.

5 **[0007]** Yet additionally, there is a need for polyester based toners with low fixing temperatures, such as from about 100°C to about 130°C, and with a broad fusing latitude, such as from about 50°C to about 90°C.

[0008] Another need resides in providing toners with improved blocking temperatures of, for example, from about 50°C to about 55°C, from about 51°C to
10 about 54°C, and from about 53°C to about 55°C.

[0009] Moreover, there is a need for toners with consistent small particle sizes of, for example, from about 1 to about 15 microns in average diameter, are of a suitable energy saving shape, have a narrow particle size GSD, and which toners include various core and shell structures.

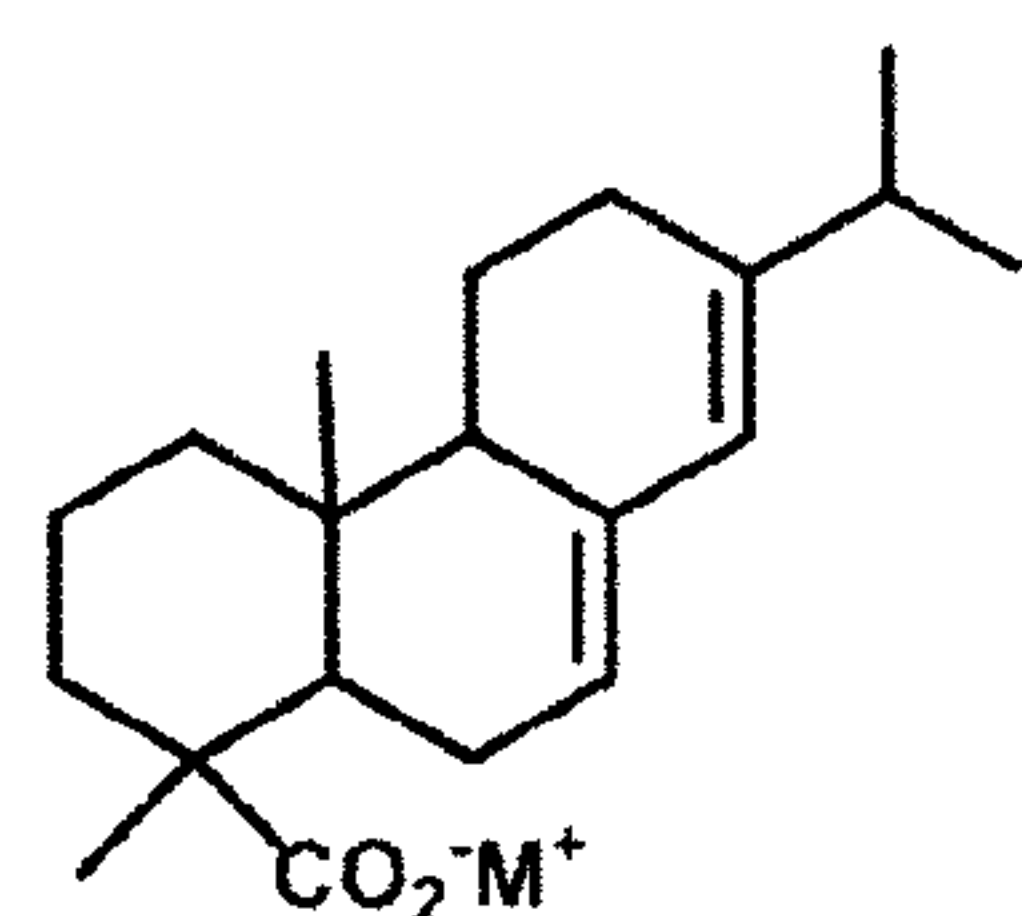
15 **[0010]** These and other needs and advantages are achievable in embodiments with the processes and compositions disclosed herein.

SUMMARY

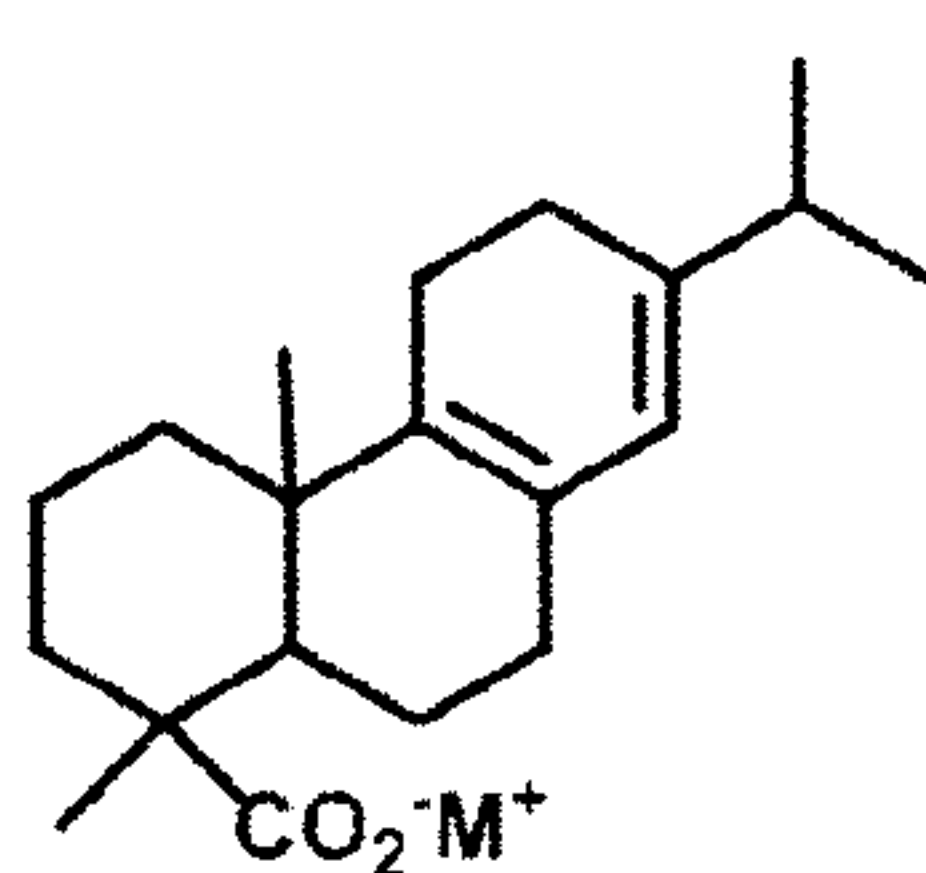
[0011] Disclosed is a toner composition comprised of an amorphous polyester resin, a crystalline polyester resin, a colorant and a wax, and wherein the crystalline
20 polyester resin is subjected to nucleation with a rosin acid or a salt of a rosin acid.

[0012] Further disclosed herein is a toner composition comprised of a core of an amorphous polyester resin, a crystalline polyester, a wax and a colorant, and at least one shell encasing said core, and which shell is comprised of an amorphous polyester resin, and optionally a wax, wherein the crystalline polyester includes a
25 nucleating salt of a rosin acid as represented by at least one of the following formulas/structures

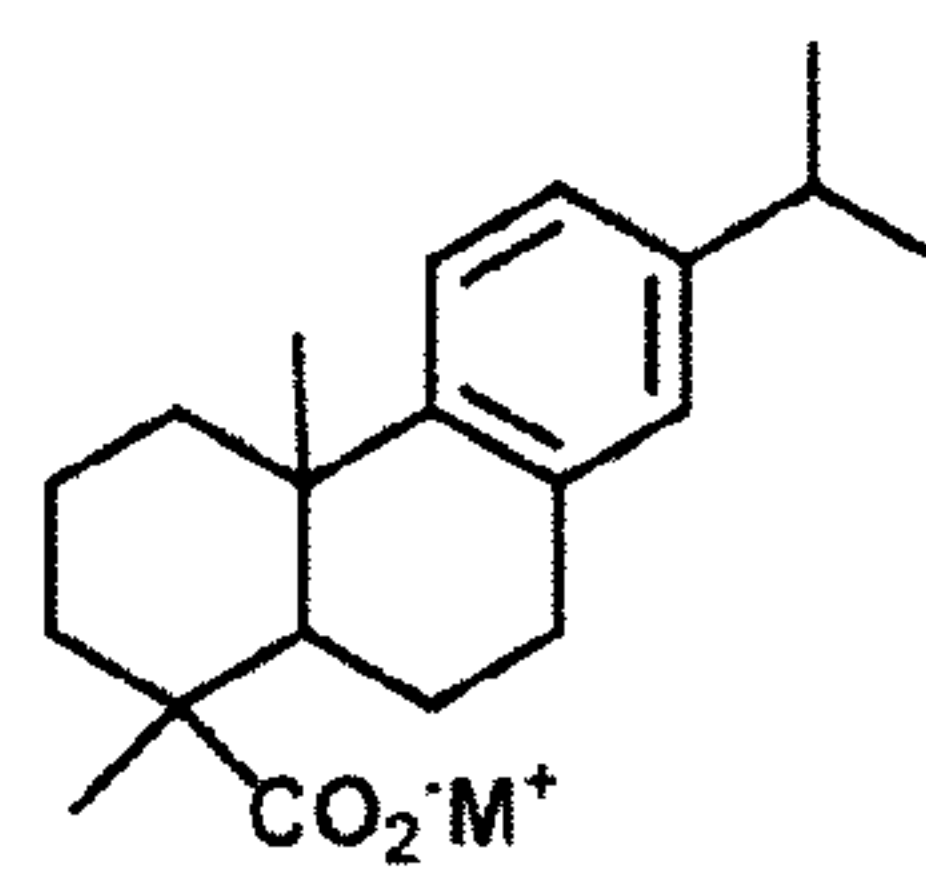
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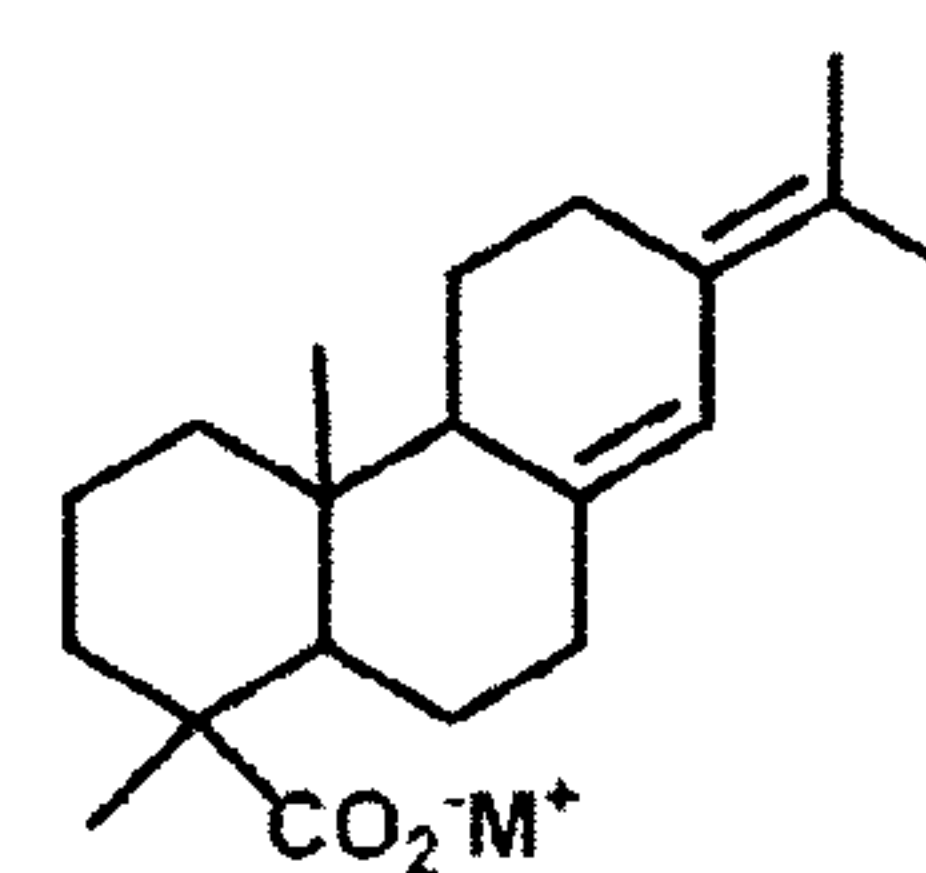
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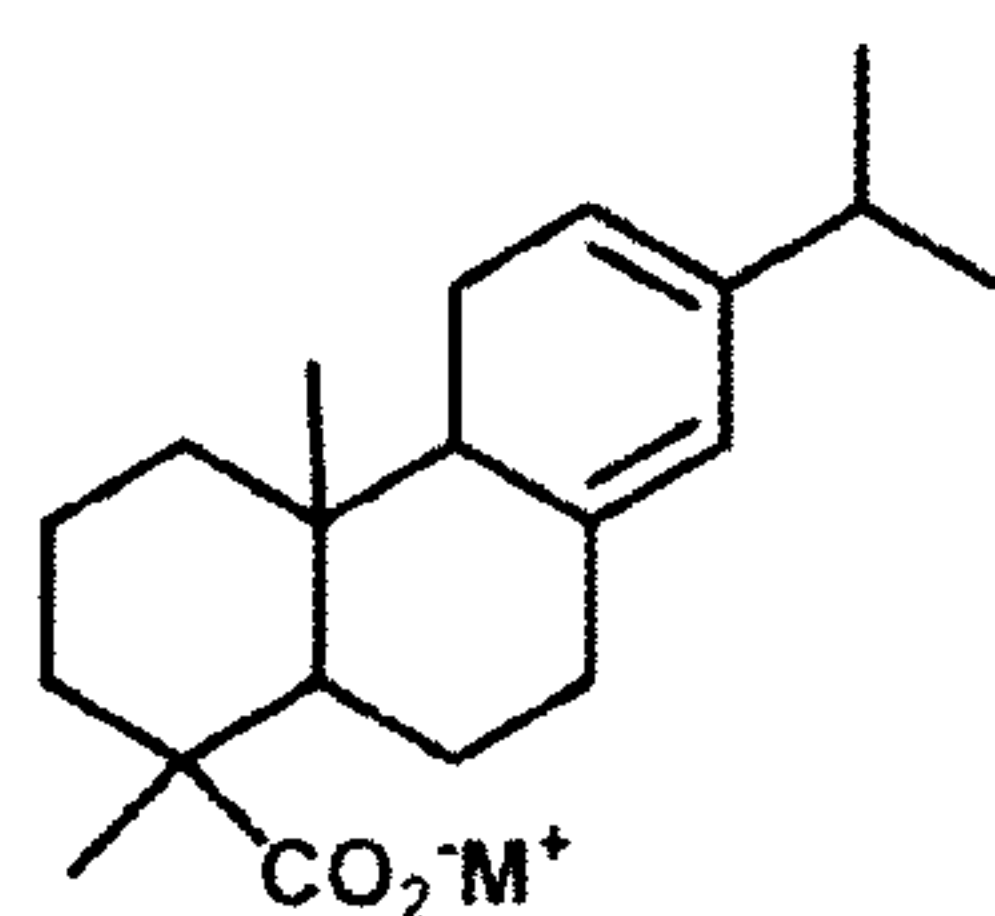
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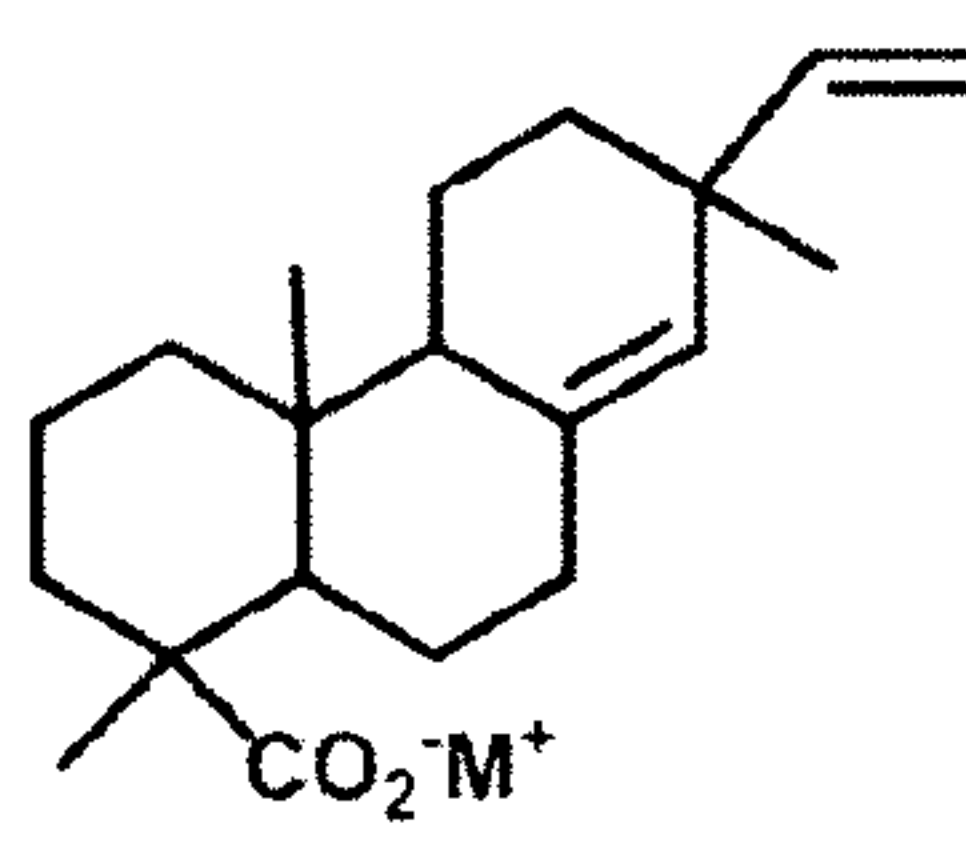
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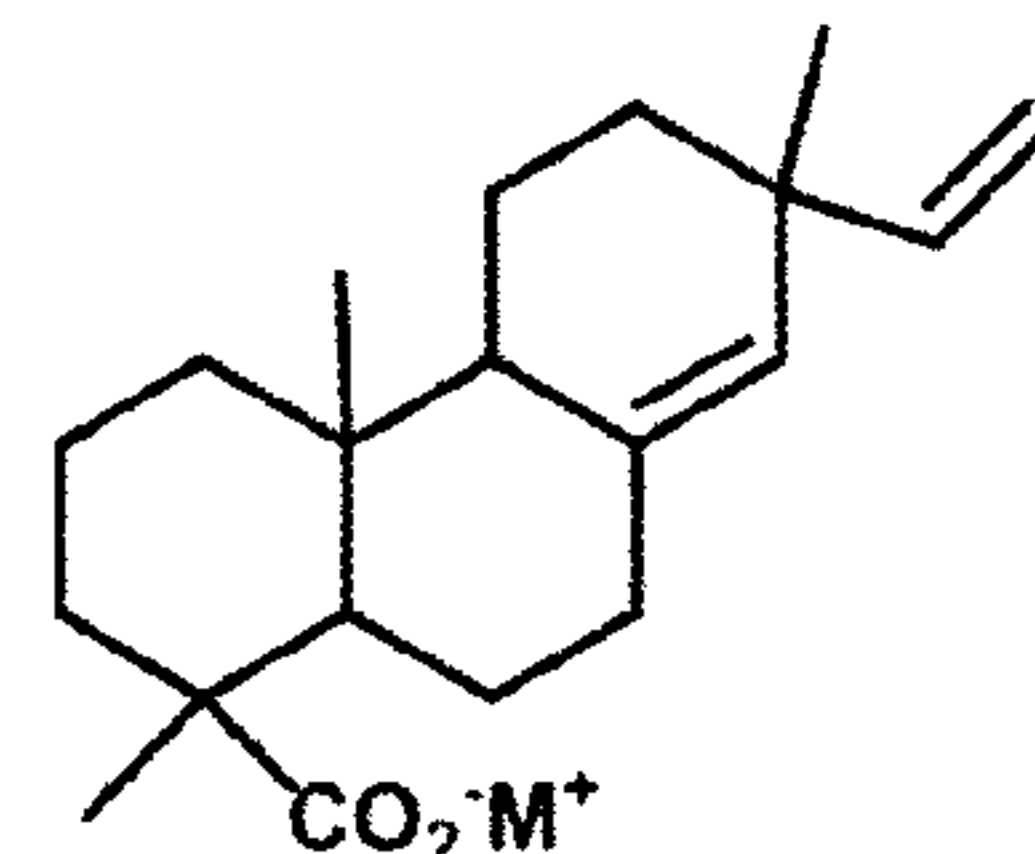
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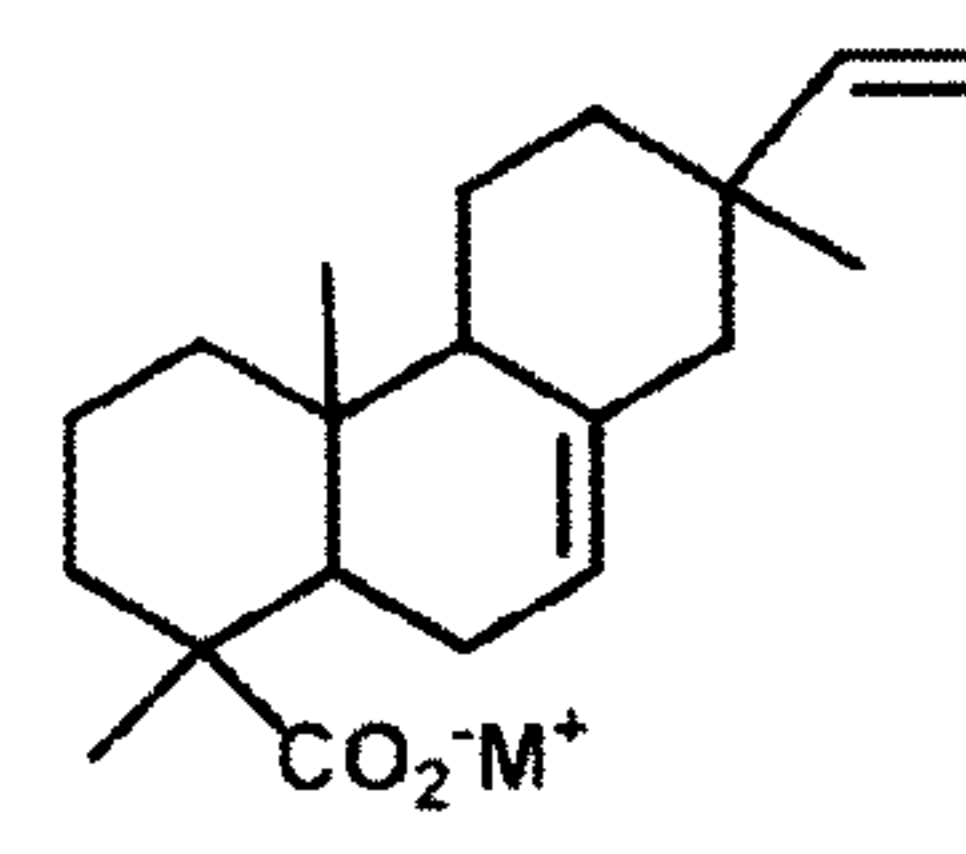
Levo-Pimaric Acid



Pimaric Acid



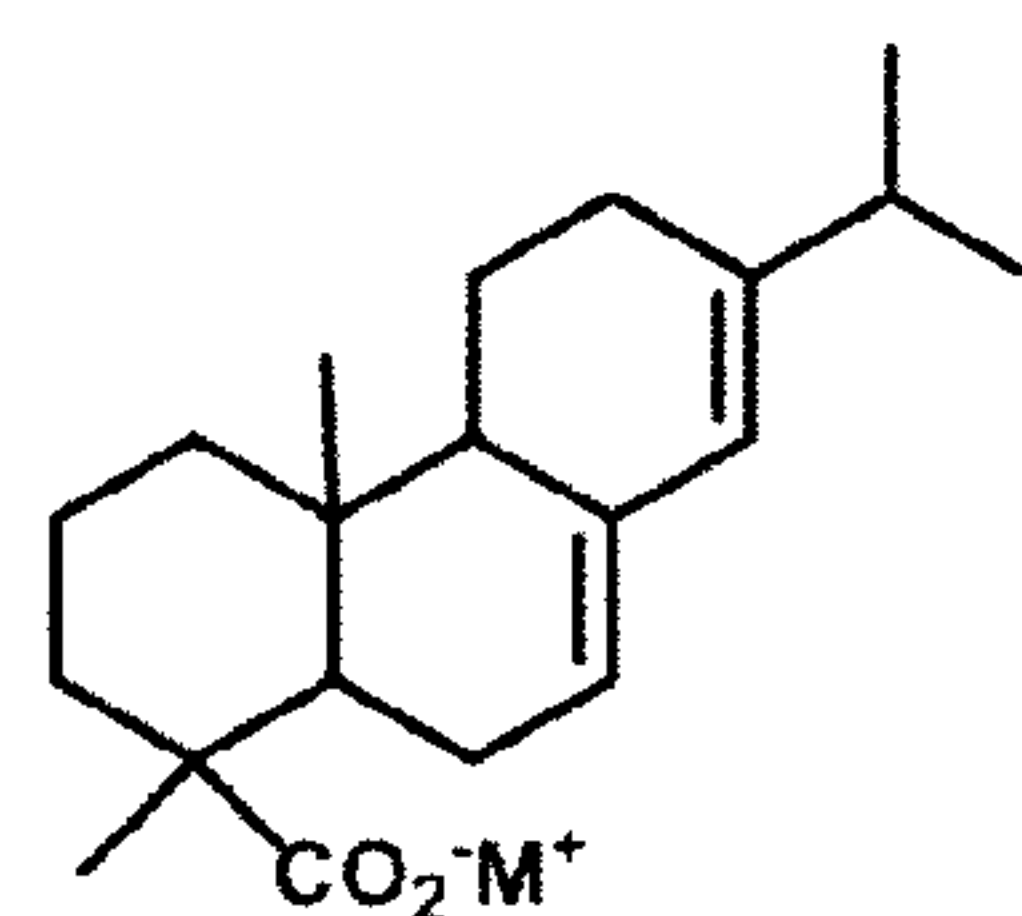
Sandaracopimaric Acid



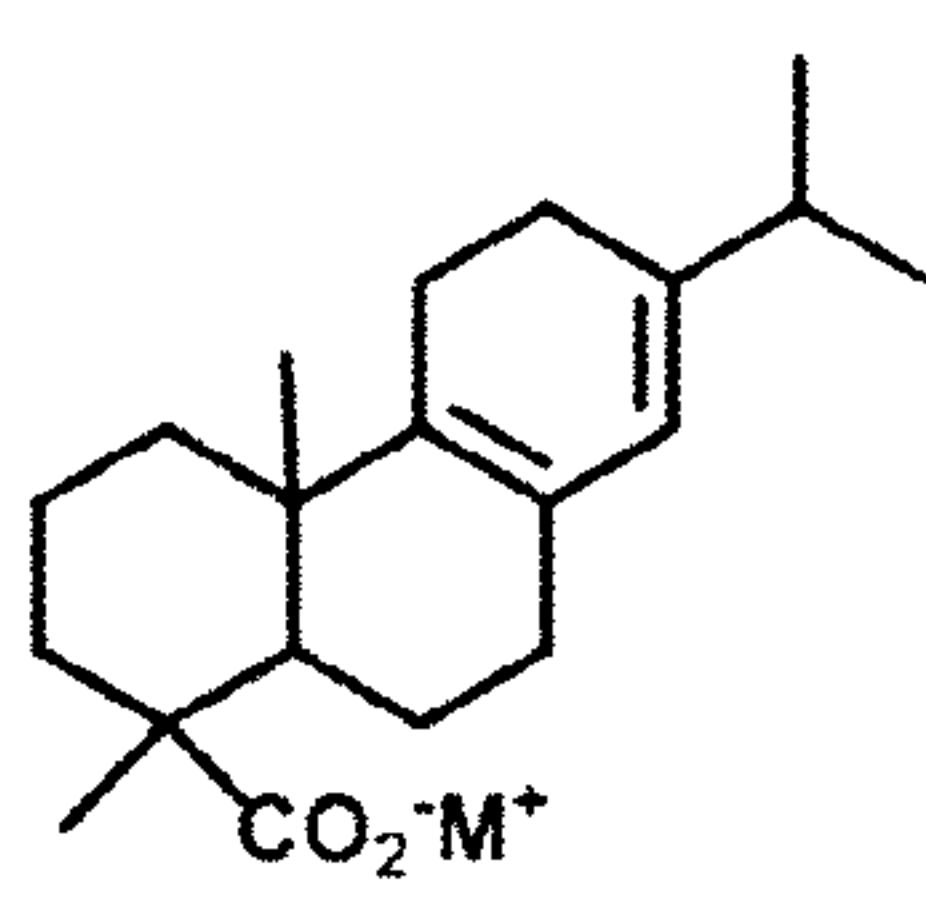
Iso-Pimaric Acid

where M is a metal, NH₄ or hydrogen.

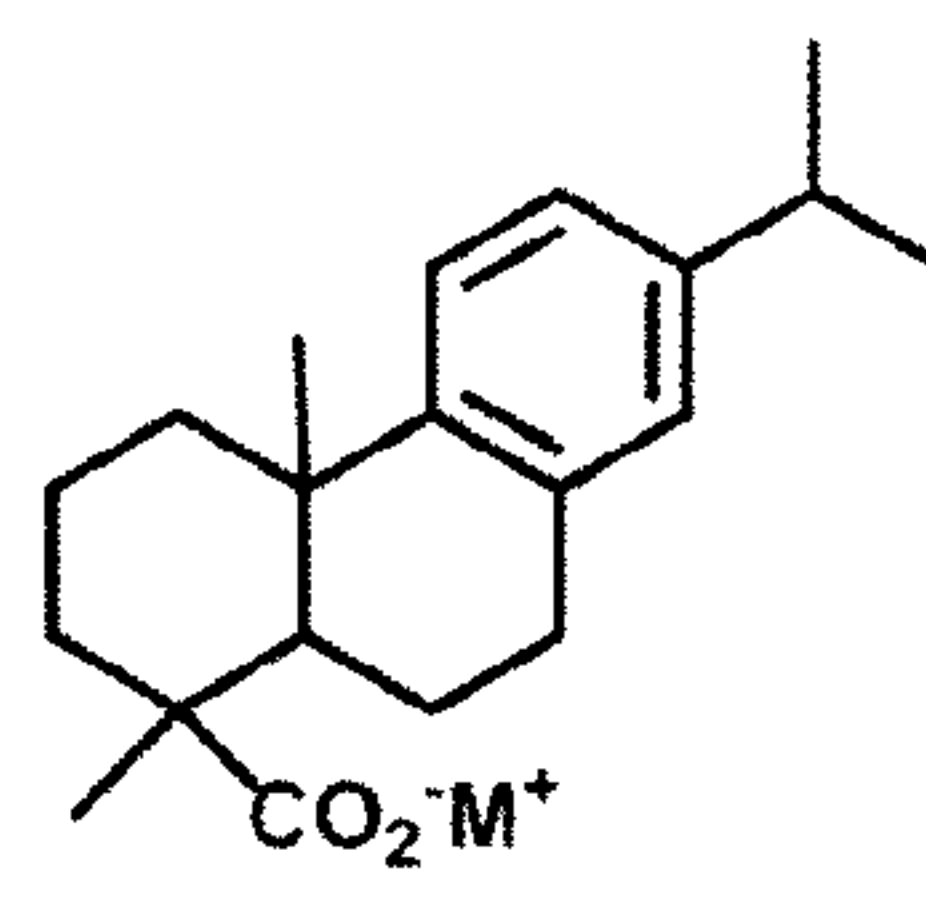
[0013] Moreover, there is illustrated herein a process comprising mixing an amorphous polyester resin, a crystalline polyester resin containing a salt of a rosin acid represented by at least one of the following formulas/structures



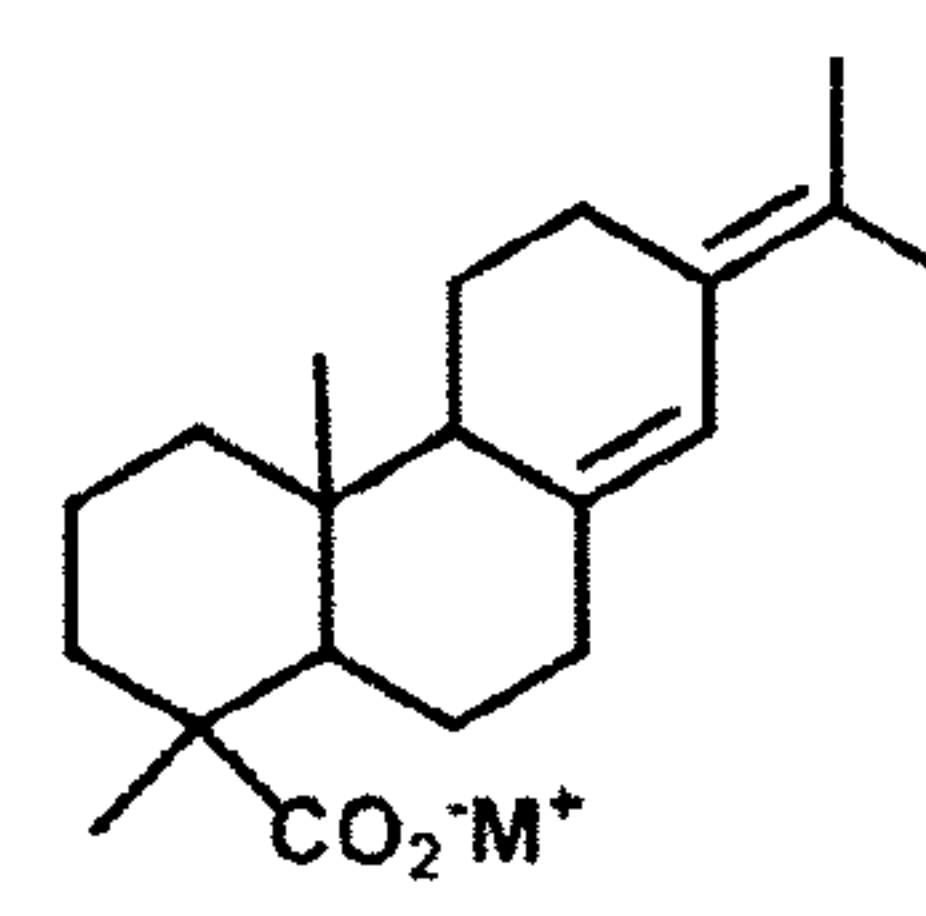
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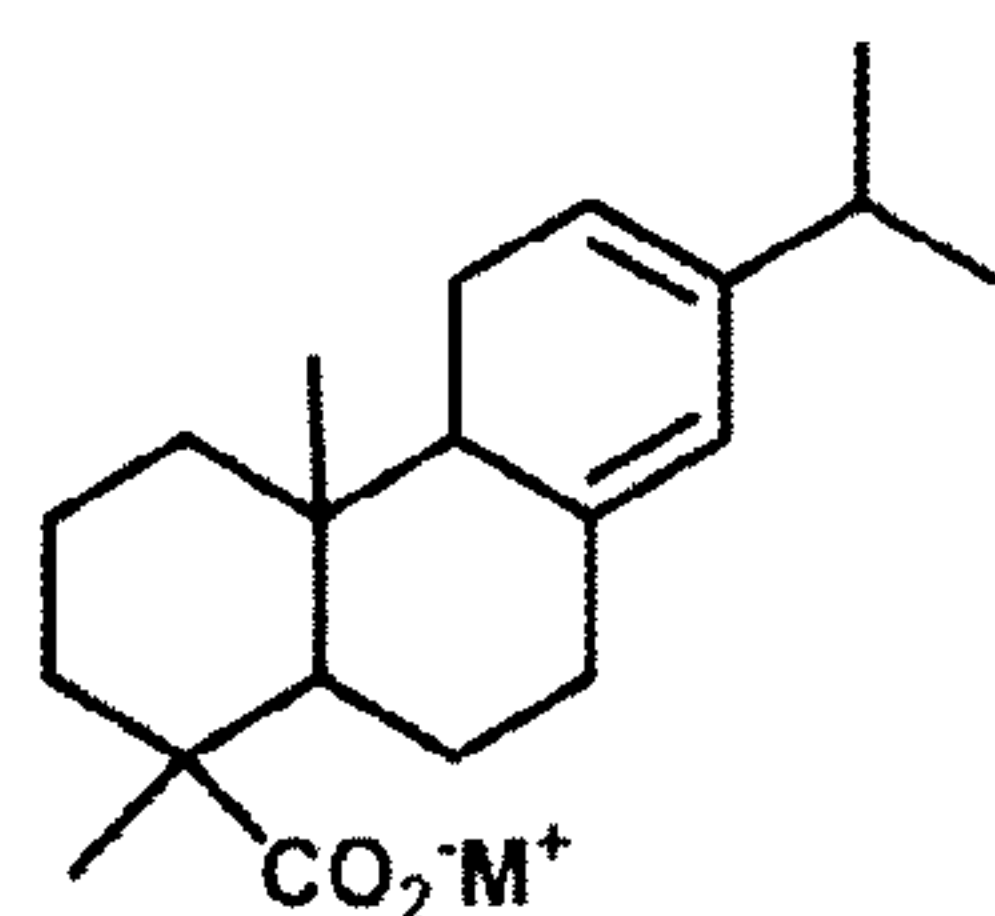
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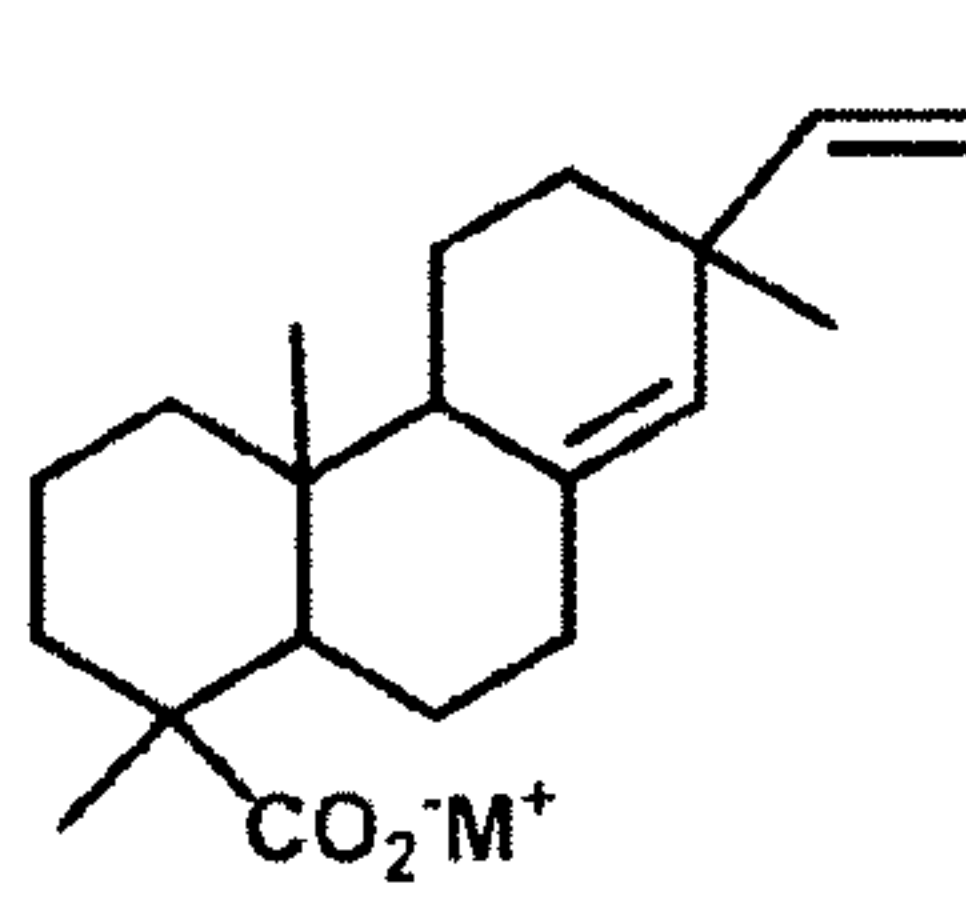
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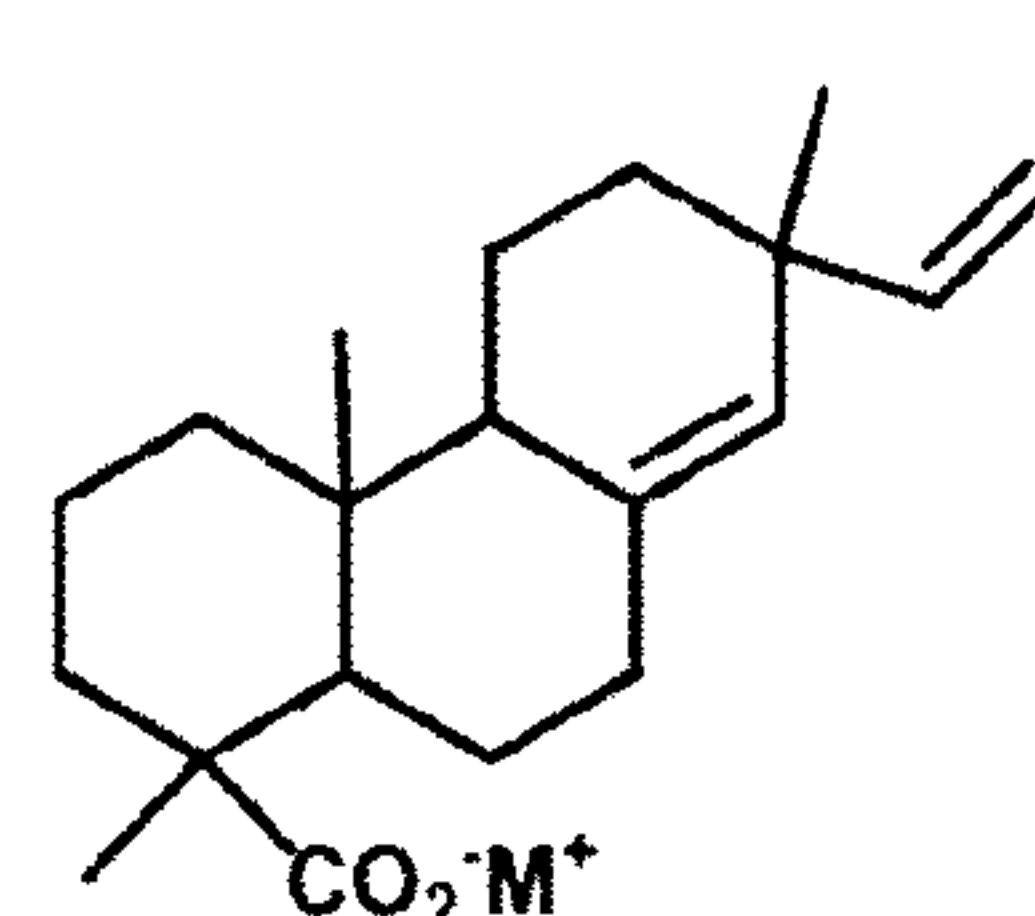
Neo -Abietic Acid



Levo-Pimaric Acid



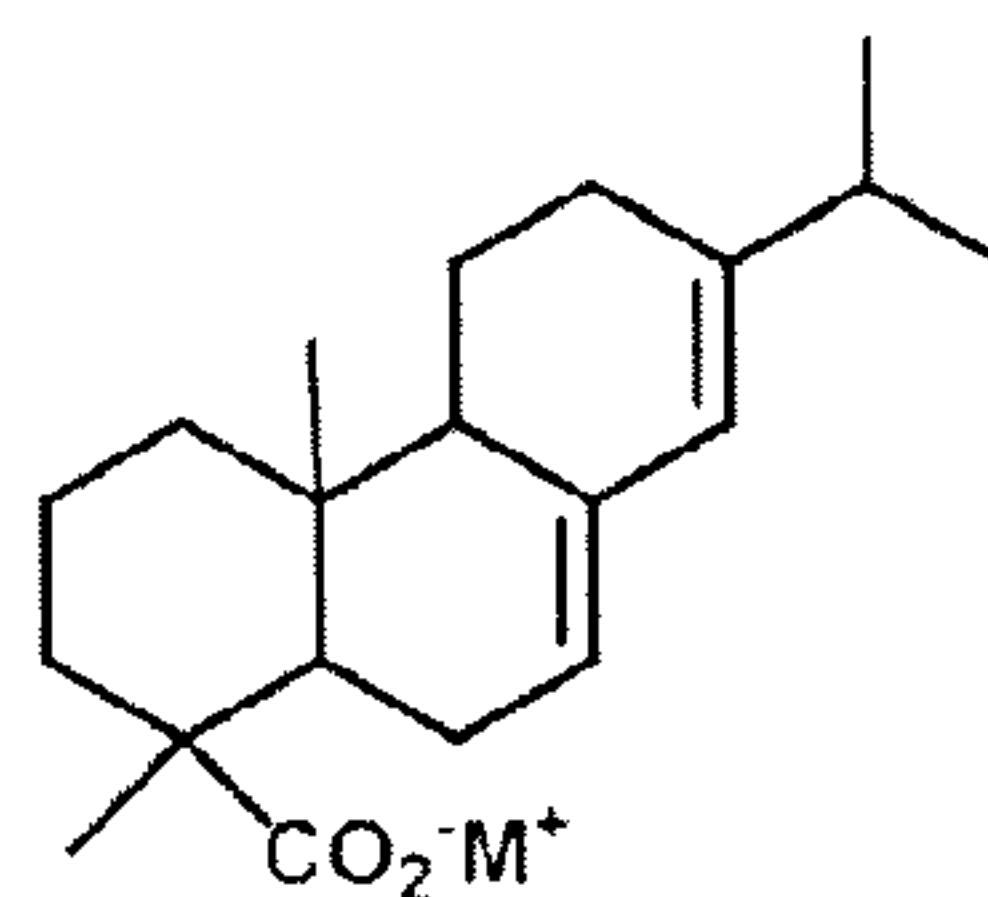
Pimaric Acid



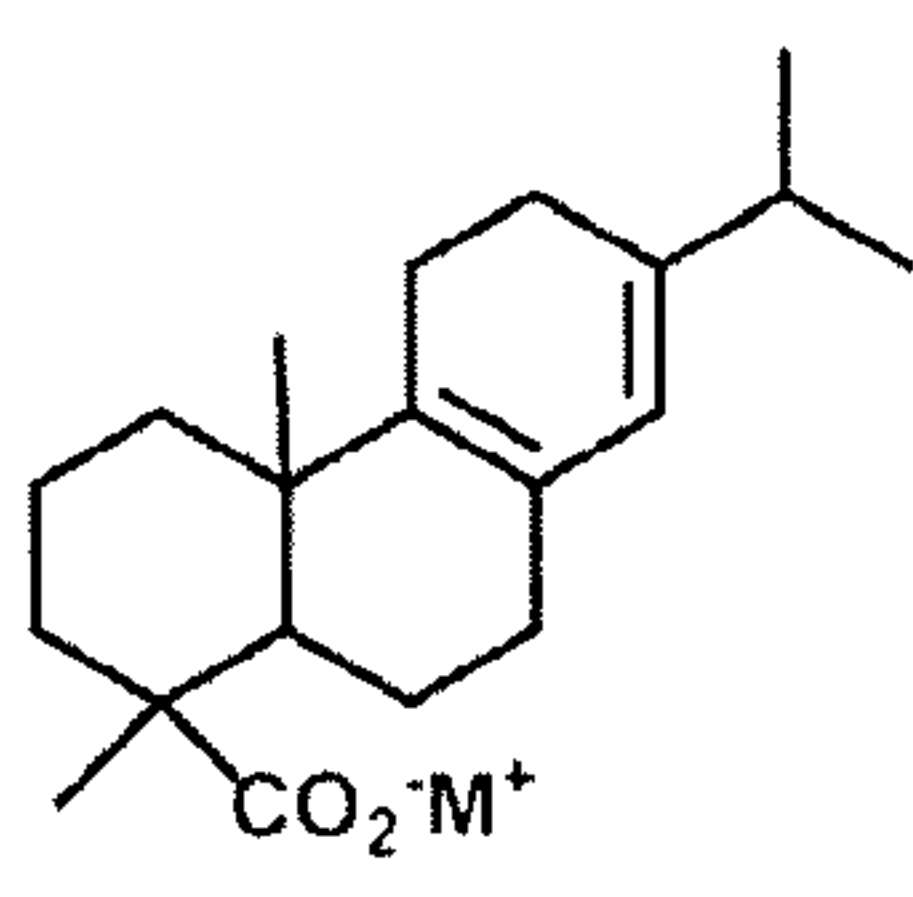
Sandaracopimaric Acid

a colorant, and wax, and aggregating and coalescing to form toner particles, and wherein M is a hydrogen atom, NH₄ or a metal.

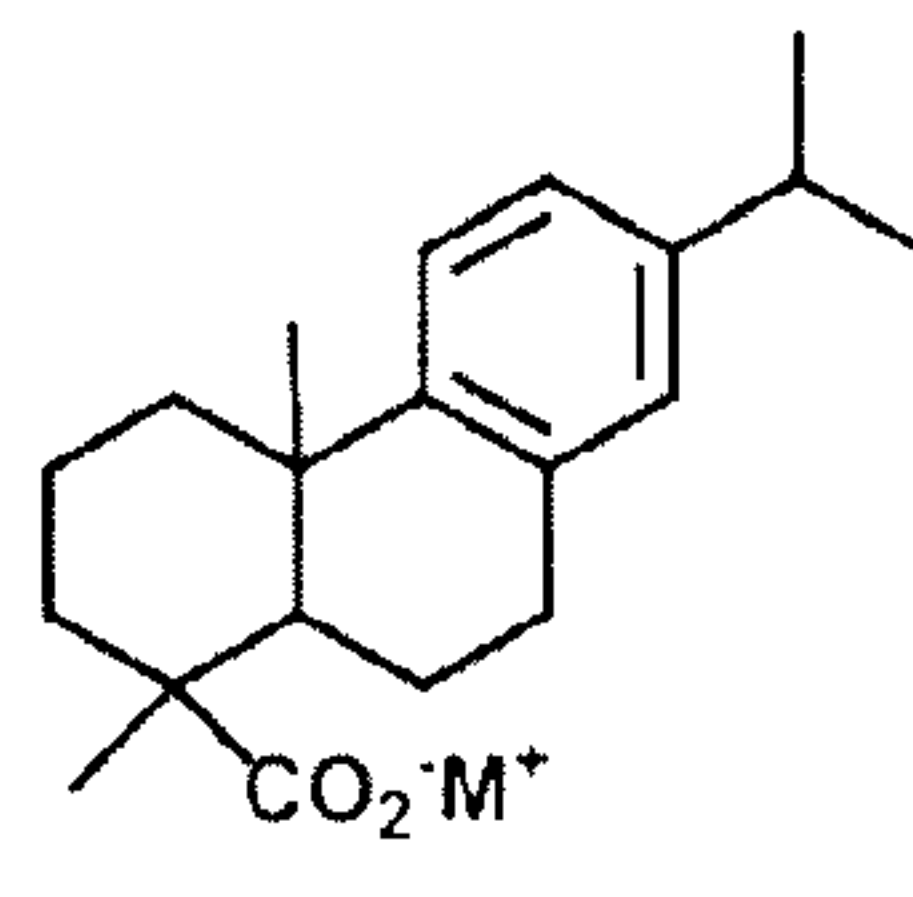
[0013a] In accordance with an aspect, there is provided a toner composition comprised of an amorphous polyester resin, a crystalline polyester resin, a colorant and a wax, and wherein said crystalline polyester resin includes a rosin acid or a salt of a rosin acid and wherein said crystalline polyester is poly(1,2-propylene-diethylene) terephthalate, polyethylene-terephthalate, polypropylene-terephthalate, polybutylene-terephthalate, polypentylene-terephthalate, polyhexalene-terephthalate, polyheptadene-terephthalate, polyoctalene-terephthalate, polyethylene-sebacate, polypropylene-sebacate, polybutylene-sebacate, poly(nonylene-sebacate), polyethylene-adipate, polypropylene-adipate, polybutylene-adipate, polypentylene-adipate, polyhexalene-adipate, polyheptadene-adipate, polyoctalene-adipate, polyethylene-glutarate, polypropylene-glutarate, polybutylene-glutarate, polypentylene-glutarate, polyhexalene-glutarate, polyheptadene-glutarate, polyoctalene-glutarate, polyethylene-pimelate, polypropylene-pimelate, polybutylene-pimelate, polypentylene-pimelate, polyhexalene-pimelate, polyheptadene-pimelate, poly(1,2-propylene itaconate); poly(ethylene-succinate), poly(propylene-succinate), poly(butylene-succinate), poly(pentylene-succinate), poly(hexylene-succinate), poly(octylene-succinate), poly(decylene-decanoate), poly(ethylene-decanoate), poly(ethylene dodecanoate), poly(nonylene-decanoate), copoly(ethylene-fumarate)-copoly(ethylene-sebacate), copoly(ethylene-fumarate)-copoly(ethylene-decanoate), copoly(ethylene-fumarate)-copoly(ethylene-dodecanoate), poly(1,6-hexylene-1,12-dodecanoate) or optionally mixtures thereof, and wherein said salt of a rosin acid is represented by one of the following formulas/structures wherein M is a hydrogen atom, NH₄ or a metal



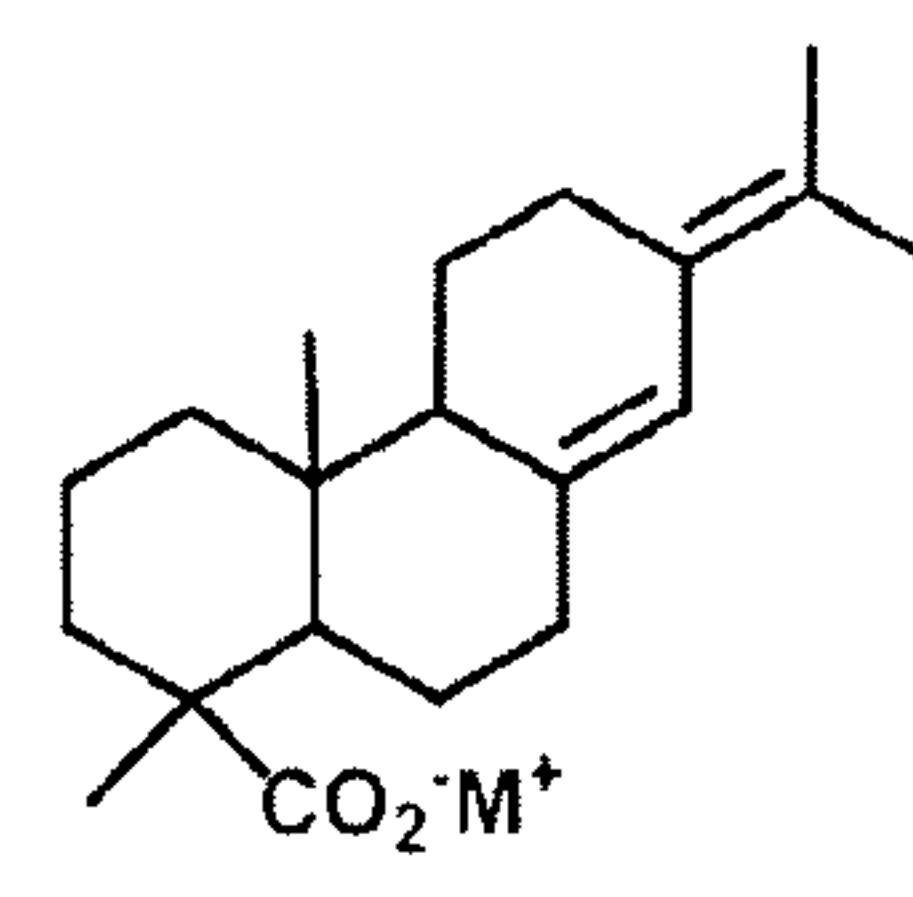
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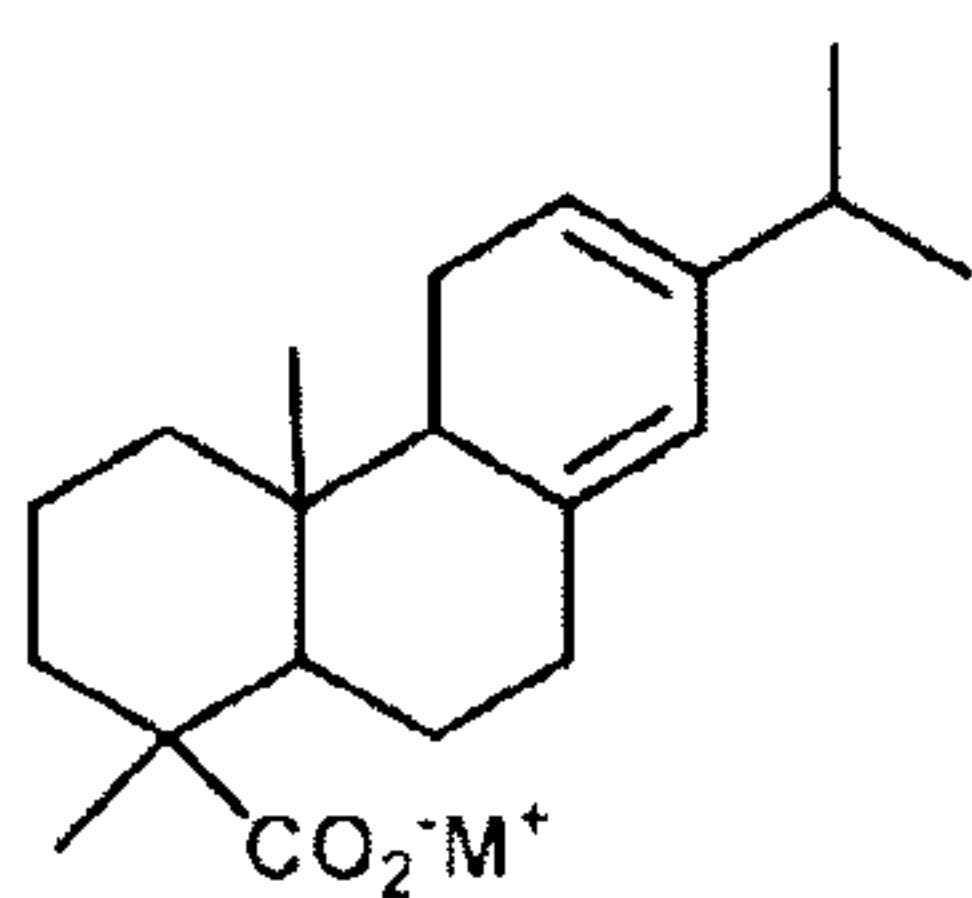
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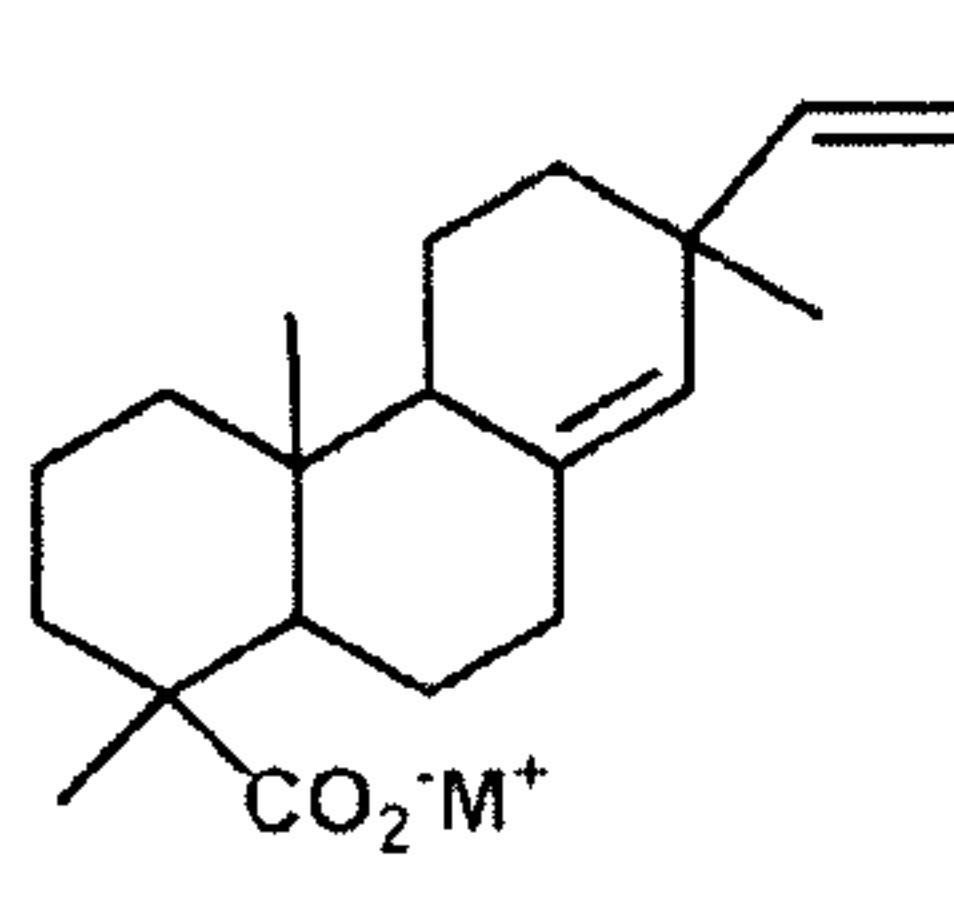
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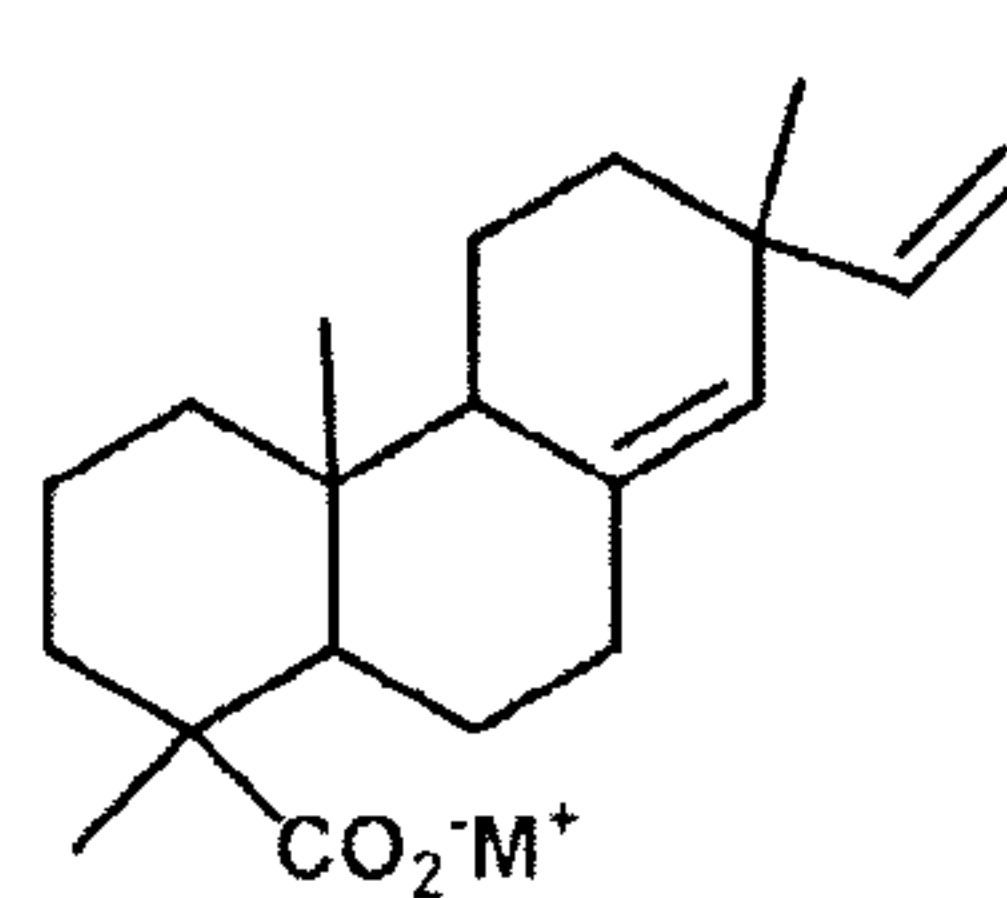
Neo -Abietic Acid



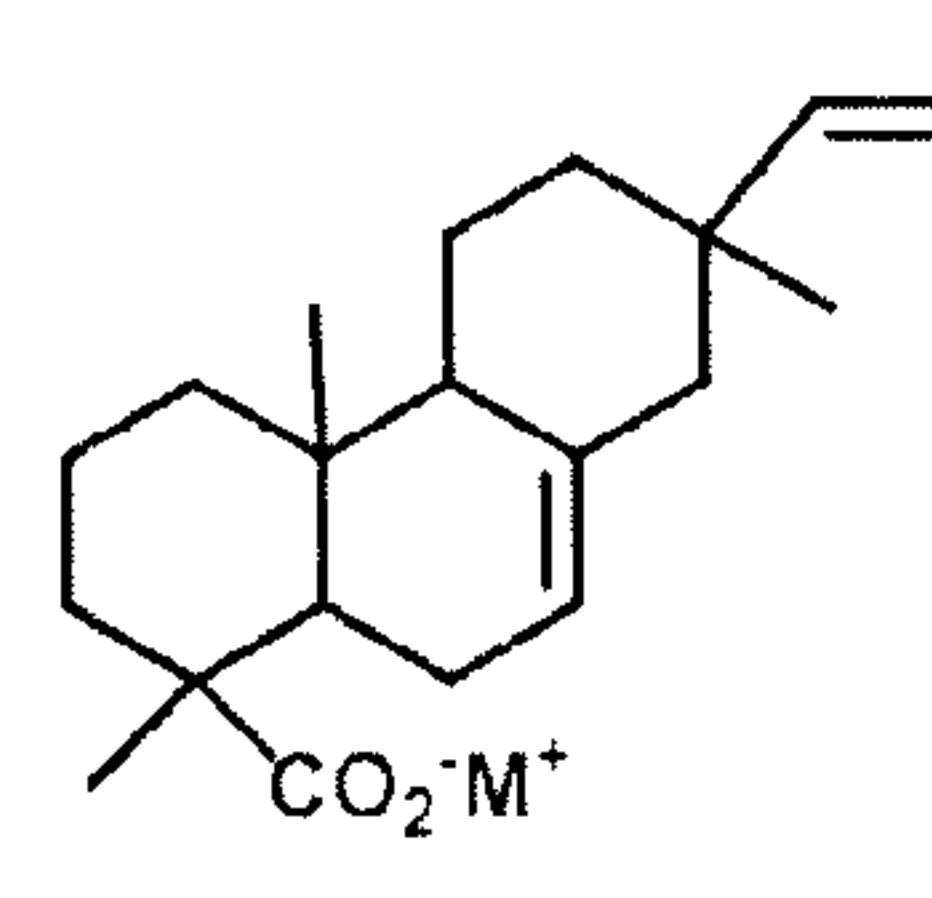
Levo-Pimaric Acid



Pimaric Acid



Sandaracopimaric Acid



Iso-Pimaric Acid

EMBODIMENTS

[0014] There are disclosed herein toner compositions that comprise nucleated crystalline polyester resins, amorphous polyester resins, colorants, waxes, and optional additives. The toner compositions illustrated herein, which can be prepared by emulsion/aggregation/coalescence processes, comprise crystalline polyesters that contain a rosin acid or the salts thereof as a nucleating agent.

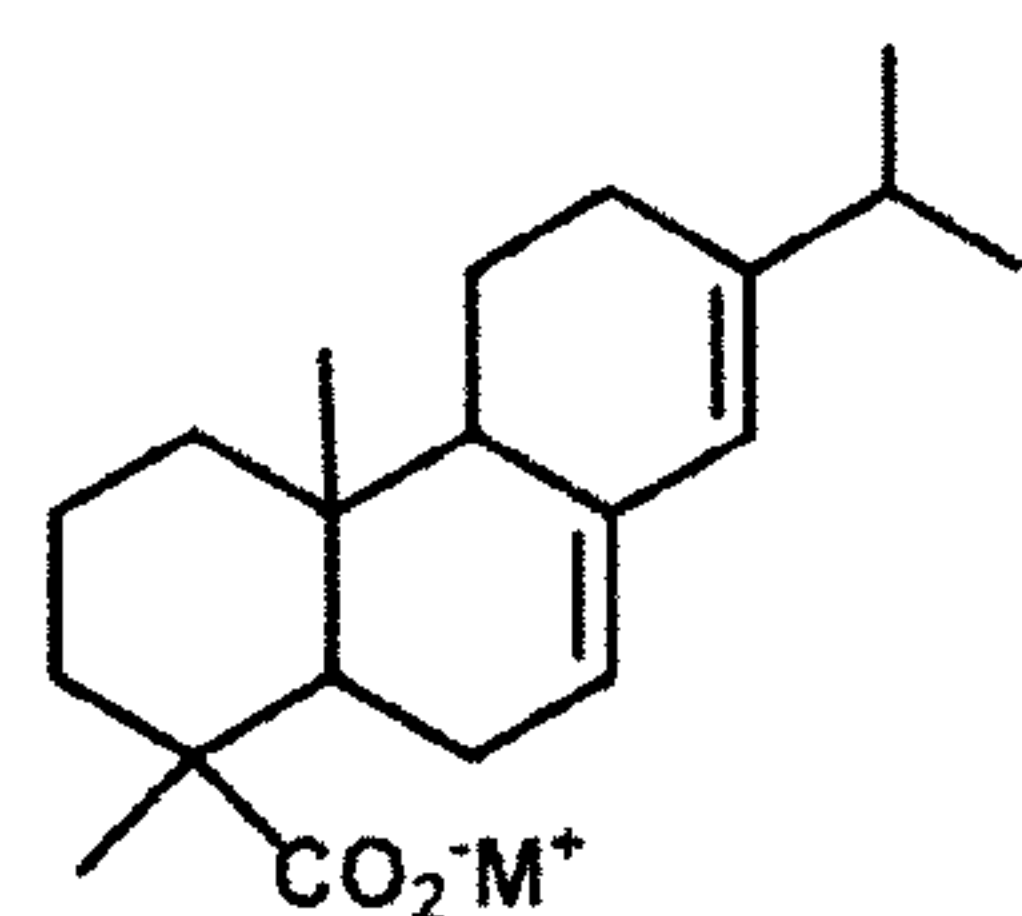
[0015] In embodiments, the disclosed toners can be comprised of a core of, for example, an amorphous polyester, a crystalline polyester containing nucleating agent, wax, colorant, and additives and at least one shell thereover, such as from about 1 shell to about 5 shells, and more specifically, from about 1 shell to about 3 shells, and yet more specifically, from about 1 shell to about 2 shells.

[0016] Crystalline Polyesters

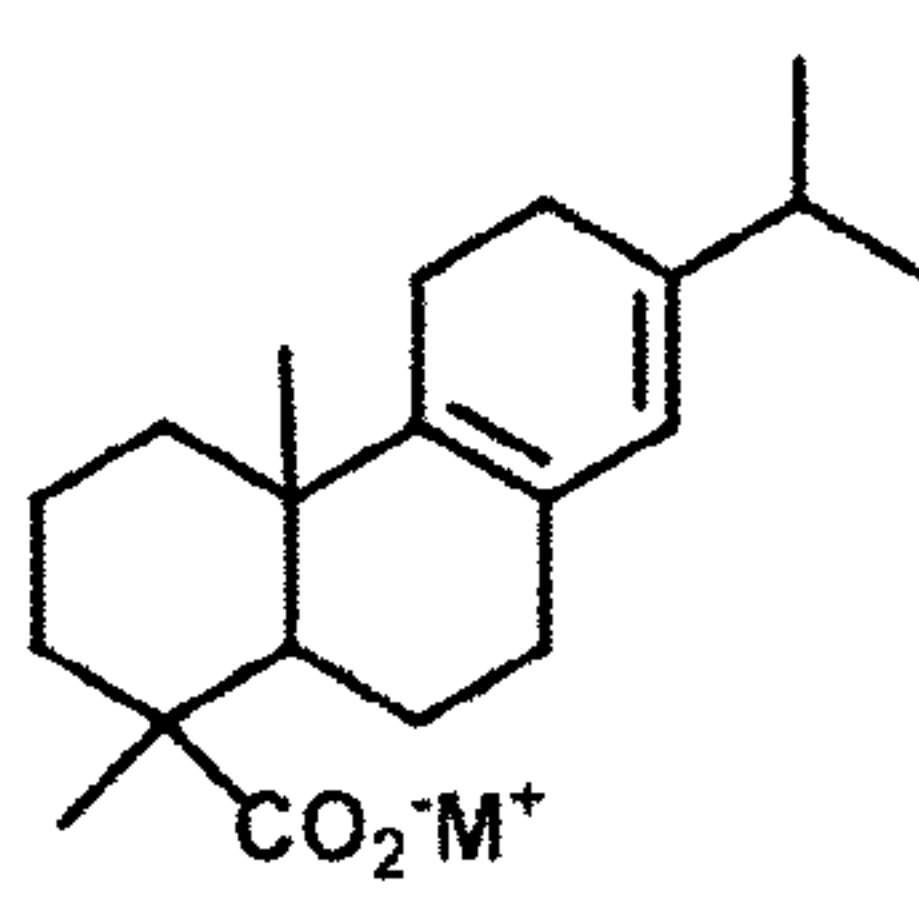
[0017] A number of crystalline polyesters can be selected for nucleation, inclusive of suitable known crystalline polyesters. Examples of crystalline polyesters that may be selected are poly(1,6-hexylene-1,12-dodecanoate), poly(1,2-propylene-

diethylene-terephthalate), poly(ethylene-terephthalate), poly(propylene-
terephthalate), poly(butylene-terephthalate), poly(pentylene-terephthalate),
poly(hexalene-terephthalate), poly(heptylene-terephthalate), poly(octylene-
terephthalate), poly(ethylene-sebacate), poly(propylene-sebacate), poly(butylene-
5 sebacate), poly(nonylene-sebacate), poly(ethylene-adipate), poly(propylene-adipate),
poly(butylene-adipate), poly(pentylene-adipate), poly(hexylene-adipate)
poly(heptylene-adipate), poly(octylene-adipate), poly(ethylene-glutarate),
poly(propylene-glutarate), poly(butylene-glutarate), poly(pentylene-glutarate),
poly(hexalene-glutarate), poly(heptylene-glutarate), poly(octylene-glutarate),
10 poly(ethylene-pimelate), poly(propylene-pimelate), poly(butylene-pimelate),

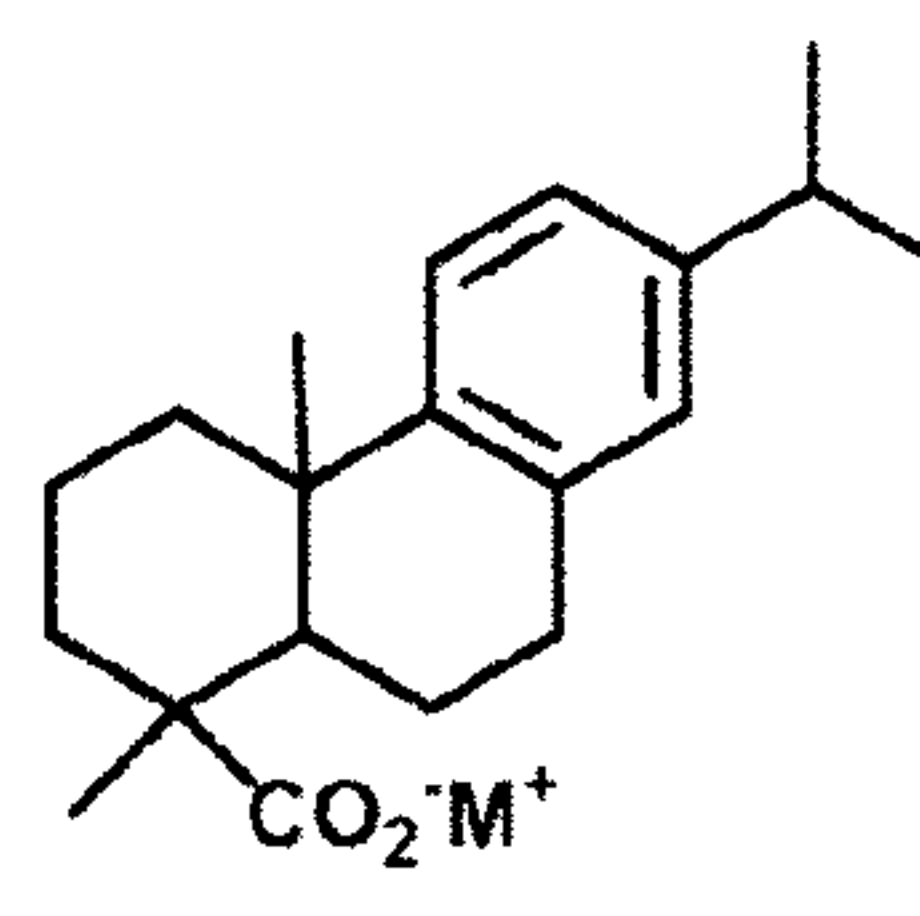
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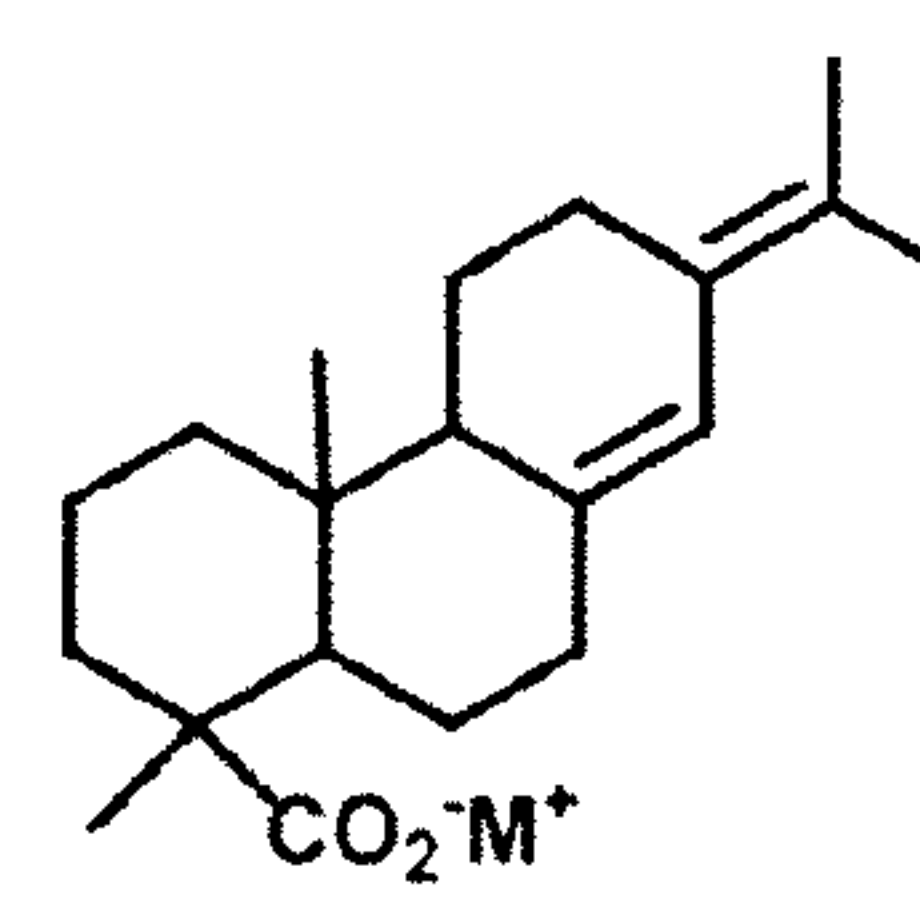
Abietic Acid



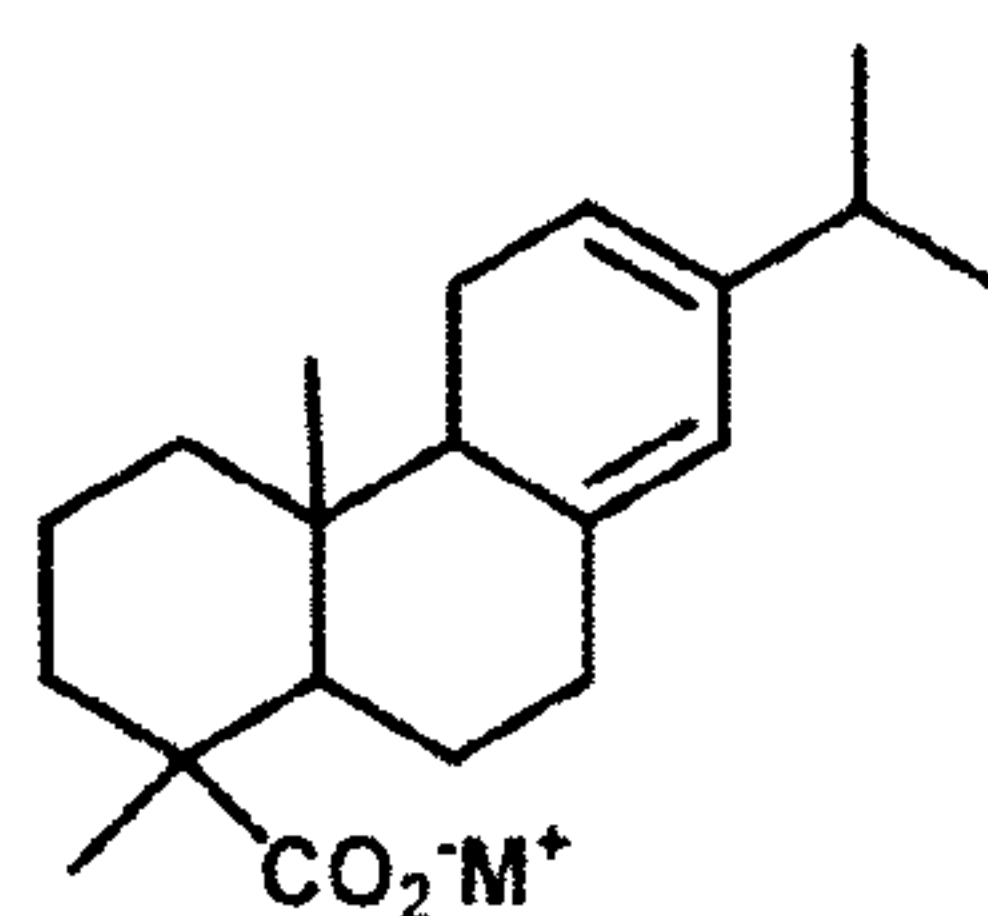
Palustric Acid



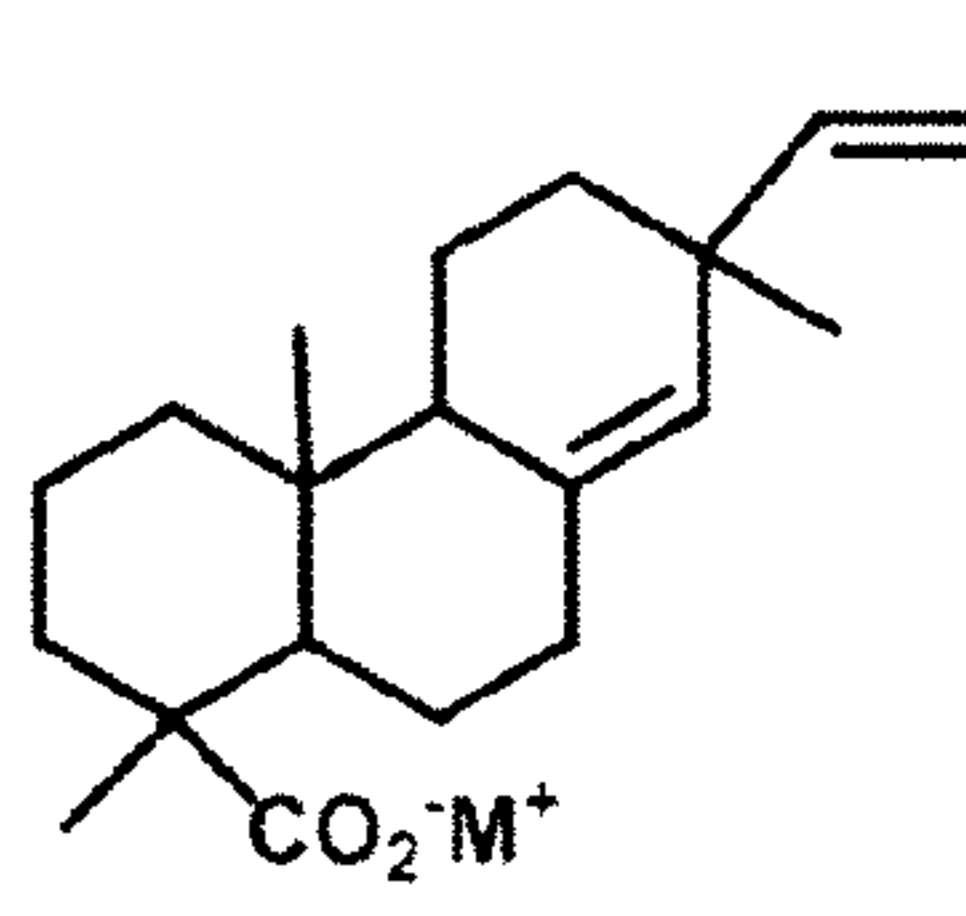
Dehydroabietic Acid



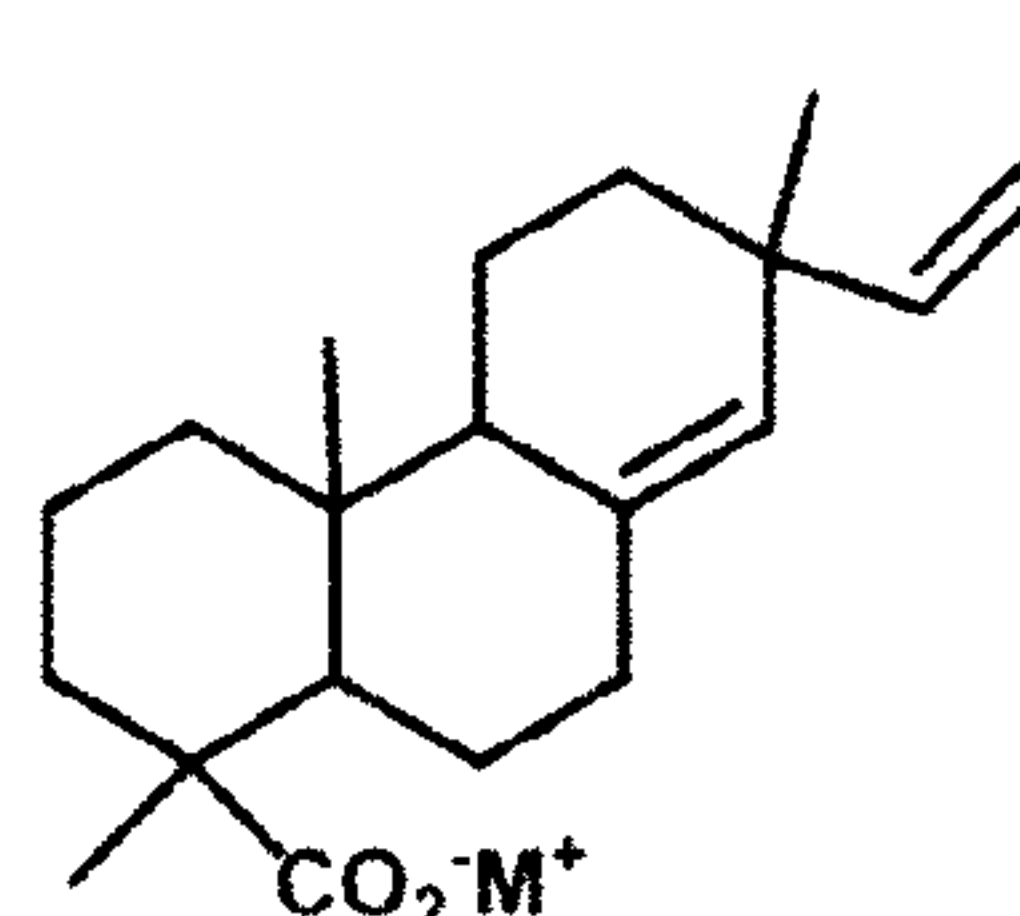
Neo -Abietic Acid



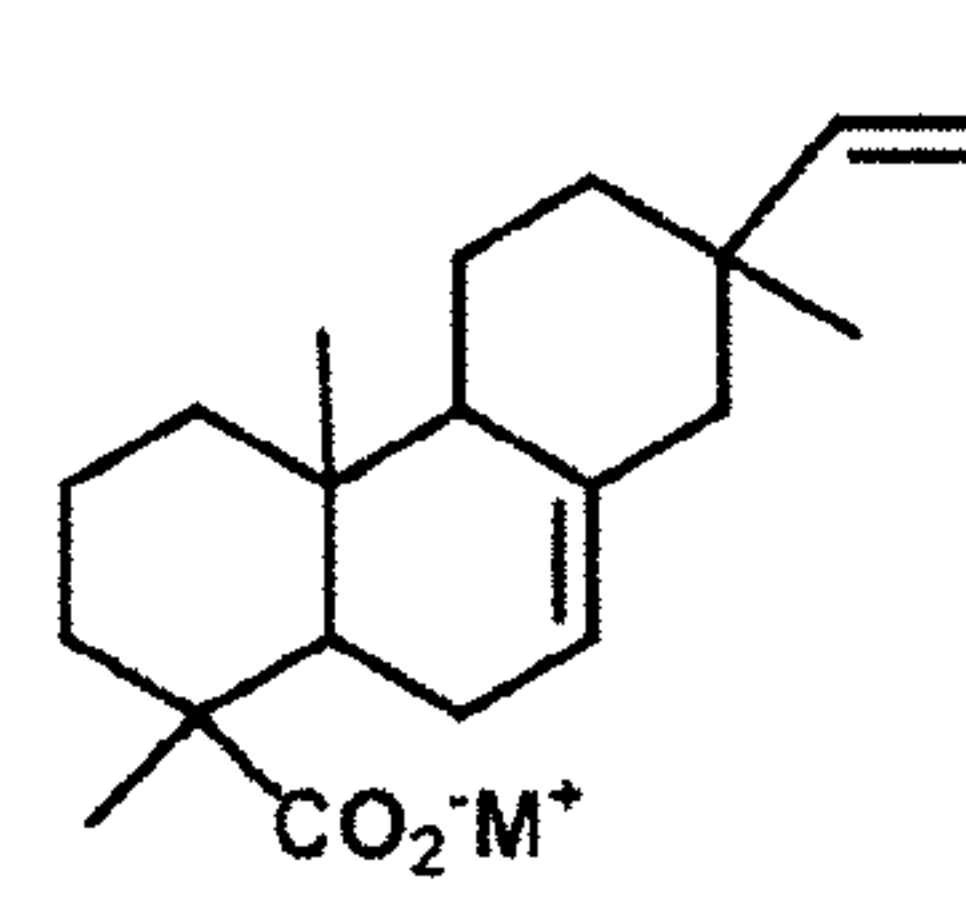
Levo-Pimaric Acid



Pimaric Acid



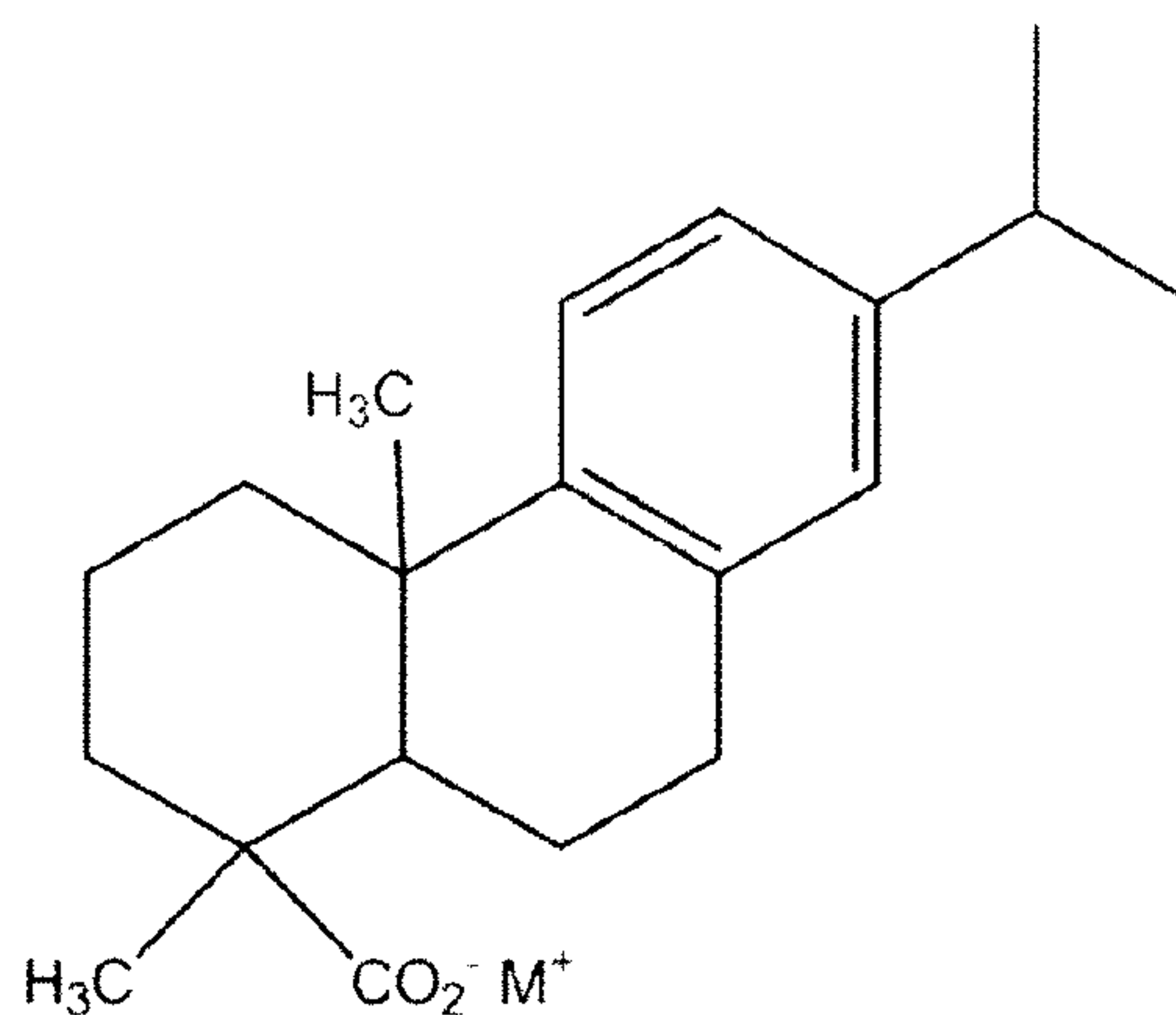
Sandaracopimaric Acid



Iso-Pimaric Acid

wherein M is a hydrogen atom, NH_4 or a metal, and which nucleating agents are available from Arakawa Chemicals, Pinova Incorporated Arizona Chemicals, and Eastman Chemicals.

- 5 **[0033]** Also, in embodiments the nucleating component, additive, or agent is comprised of the salts of a rosin acid, such as dehydroabietic acid, and which agent is, for example, represented by the following formula/structure



wherein M is as illustrated herein, and is, for example, a metal, a hydrogen atom,
10 NH_4 , and the like.

