PROCESS FOR RECOVERING AND REUSING DEPOLYMERIZATION CATALYST

CROSS-REFERENCE

[0001] This application claims the benefit of U.S. Provisional Application Serial No. 62/821,264 filed March 20, 2019 which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present disclosure relates to a recovery of an alkoxide from an alkoxide containing mother liquor. The present disclosure also relates to a process for purifying a diol mother liquor. The present disclosure also relates to a process for depolymerizing a polyester wherein the process uses an alkoxide recovered from an alkoxide containing mother liquor.

BACKGROUND OF THE INVENTION

[0003] The polyethylene terephthalate (PET) bottle resin market has been growing strongly as PET resins have replaced glass in carbonated soft drink, bottled water and food containers.

[0004] Dimethyl terephthalate (DMT) is primarily used in the manufacture of polyethylene terephthalate (PET) for fiber, film, container plastics, and specialty plastics applications.

[0005] The largest polyester sector is the fibers market where it is used to make clothes, home textiles such as sheets and curtains, carpets and rugs, and industrial products such as tire cord, seat belts, hoses and ropes. PET film is utilized in electrical applications such as dielectric metal foil capacitors and for food packaging.

SUMMARY OF THE INVENTION

[0005a] In one aspect, described herein is a process for the recovery of an alkoxide from an alkoxide containing mother liquor; the process comprising: (i) an adsorption cycle comprising contacting the alkoxide containing mother liquor with an adsorbent, thereby adsorbing the alkoxide; (ii) a wash cycle comprising washing the adsorbent with a wash solvent, thereby eliminating ester salts, pigments, and dyes adsorbed during the adsorption cycle; and (iii) a desorption cycle comprising washing the adsorbent with a desorption solvent, thereby obtaining a mixture comprising the alkoxide and the desorption solvent.

[0005b] In another aspect, described herein is a process for depolymerizing a polyester; the process comprising admixing the polyester with a mixture comprising an alkoxide; wherein the alkoxide is recovered from an alkoxide containing mother liquor using the process as described herein.

[0006] Described herein is a process for the recovery of an alkoxide from an alkoxide containing mother liquor; the process comprising: (i) an adsorption cycle; (ii) a wash cycle; and (iii) a desorption cycle. In some embodiments, the adsorption cycle, wash cycle, and desorption cycle are performed sequentially. In some embodiments, the adsorption cycle, and/or wash cycle and/or desorption cycle are performed continuously. In some embodiments, the alkoxide containing mother liquor is obtained from a process of depolymerizing a polyester to form an organic diacid and a diol. In some embodiments, the alkoxide containing mother liquor is obtained from a process of depolymerizing a polyester to form a

diester and a diol. In some embodiments, the alkoxide containing mother liquor is obtained from a process of depolymerizing polyethylene terephthalate (PET) to form a terephthalate and/or an isophthalate, and mono ethylene glycol (MEG). In some embodiments, the alkoxide containing mother liquor further comprises a diol. In some embodiments, the diol is mono ethylene glycol (MEG). In some embodiments, the adsorption cycle comprises contacting the alkoxide containing mother liquor with an adsorbent, thereby adsorbing the alkoxide. In some embodiments, the adsorption cycle comprises eluting the alkoxide containing mother liquor through an adsorbent, thereby adsorbing the alkoxide. In some embodiments, the eluting through the adsorbent is performed 1 to 20 times. In some embodiments, the eluting through the adsorbent is performed 1 to 10 times. In some embodiments, the eluting through the

CLAIMS

What is claimed is:

1. A process for the recovery of an alkoxide from an alkoxide containing mother liquor; the process comprising:

   (i) an adsorption cycle comprising contacting the alkoxide containing mother liquor with an adsorbent, thereby adsorbing the alkoxide;

   (ii) a wash cycle comprising washing the adsorbent with a wash solvent, thereby eliminating ester salts, pigments, and dyes adsorbed during the adsorption cycle; and

   (iii) a desorption cycle comprising washing the adsorbent with a desorption solvent, thereby obtaining a mixture comprising the alkoxide and the desorption solvent.

2. The process of claim 1, wherein the adsorption cycle, wash cycle, and desorption cycle are performed sequentially.

~~3. The process of claim 1, wherein the adsorption cycle comprises contacting the alkoxide containing mother liquor with an adsorbent, thereby adsorbing the alkoxide.~~

~~4.~~3. The process of claim 1, wherein the contacting comprising ~~adsorption cycle comprises~~ eluting the alkoxide containing mother liquor through ~~an~~ the adsorbent, thereby adsorbing the alkoxide.

~~5.~~4. The process of any one of claim~~s 3~~ ~~4~~1-3, wherein the adsorbent is basic alumina, neutral alumina, or acidic alumina.

~~6. The process of any one of claims 1-5, wherein the wash cycle comprises washing the adsorbent with a wash solvent, thereby eliminating ester salts, pigments, and dyes adsorbed during the adsorption cycle.~~

~~7.~~5. The process of claim ~~6~~1, wherein the wash solvent is an alcoholic solvent.

~~8.~~6. The process of claim ~~7~~5, wherein the wash solvent is methanol.

~~9. The process of any one of claims 1-8, wherein the desorption cycle comprises washing the adsorbent with a desorption solvent, thereby obtaining a mixture comprising the alkoxide and the desorption solvent.~~

~~10.~~7. The process of claim ~~9~~1, wherein the desorption solvent is an alcoholic solvent.

~~11.~~8. The process of claim ~~10~~7, wherein the desorption solvent is methanol.

~~12.~~9. The process of any one of claims ~~9~~1-~~11~~8, wherein a portion of the desorption solvent in the mixture comprising the alkoxide and the desorption solvent is subsequently removed.

~~13.~~10. The process of claim ~~12~~9, wherein the alkoxide in the desorption solvent is re-used in a process of depolymerizing a polyester to form a diester and a diol.

~~14.~~11. The process of any one of claims 1-~~13~~10, wherein the alkoxide is an alkali metal alkoxide, an alkaline earth metal alkoxide, a metal alkoxide, an ammonium alkoxide, or any combinations thereof.

~~15.~~12. The process of any one of claims 1-~~13~~10, wherein the alkoxide is sodium methoxide.

~~16.~~13. The process of any one of claims 1-~~15~~12, wherein the process further comprises (iv) a regeneration cycle.

~~17.~~14. The process of claim ~~16~~13, wherein the regeneration cycle comprises washing the adsorbent with an acid, thereby regenerating the adsorbent.

~~18.~~15. The process of ~~any one of claims 16-17~~claim 13 or 14, wherein the acid is acetic acid.

~~19.~~16. The process of ~~any one of claims 16-17~~claim 13 or 14, wherein the acid is formic acid.

~~20.~~17. A process for depolymerizing a polyester; the process comprising admixing the polyester with a mixture comprising an alkoxide; wherein the alkoxide is recovered from an alkoxide containing mother liquor using the process of claim 1.