

# **ORGANIC FUEL ADDITIVE COMPOSITIONS AND METHODS FOR MAKING THE SAME AND EMULSION FUEL COMPRISING THE ORGANIC FUEL ADDITIVE COMPOSITIONS**

## **Field of the Invention**

**[0001]** The present invention generally relates to the emulsion fuel technologies, and more particularly to the process of manufacturing biodiesel and glycerin, organic fuel additive compositions and emulsion fuels, and the organic fuel additive compositions and emulsion fuels manufactured by said process.

## **Background of the Invention**

**[0002]** The facts that fossil fuels including petroleum are running out and the demands for energy supplies are skyrocketing are well known. The pollution of the environment due to the burns of fossil fuel has resulted in the increased health problems and more alarmingly the global warming. Amidst the oil crisis in 2008, many countries implemented a variety of strategies to increase fuel efficiency and develop alternative fuel supplies such as biodiesel, hoping to obtain sustainable fuels that are enable the humans to be less dependent upon fossil fuels and at the same time reduce the pollution so as to at least slow down the process of global warming.

**[0003]** For the increase of fuel efficiency especially in internal combustion engines, many fuel additives have been developed; some of them have been available in the market for many years. However, most of the available fuel additives contain harmful chemicals such as benze and its derivatives; while giving the benefit of doubt to the claims of enhanced fuel efficiency, the detrimental effects from these added benze and its derivatives on public health and ozone deficiency cannot be overstated.

**[0004]** For the reduction of environmental pollution, water-based emulsion diesel has been used in the Europe for many years. While the water-based emulsion diesel reduces environmental pollution especially black smokes, it suffers from the decreased fuel power and the higher cost incurred in the manufacture process.

**[0005]** Biodiesel is usually derived from vegetable oil; it pushes the prices of vegetable oils higher, burdening the citizens of poor countries. Furthermore, current technologies in manufacturing biodiesel from vegetable oils focus on the recovery of fatty esters, leaving the glycerin entity out of the biodiesel process.

**[0006]** It is evident that current approaches to fuel shortage, fuel efficiency and pollution are fragmented. Therefore, there is a need to develop an integrated strategy for addressing the aforementioned problems together.

### **Summary of the Invention**

**[0007]** One embodiment of the present invention provides an organic fuel additive composition. In one embodiment, the organic fuel additive composition comprises surfactant in an amount of 10-25% of the composition; glycerin in an amount of 10-30% of the composition; polyethoxy-ester in an amount of 15-45% of the composition; water in an amount of 1-15% of the composition; and diesel in an amount of 10-40% of the composition; whereby all components are admixed together to form the organic fuel additive composition.

**[0008]** In another embodiment of the organic fuel additive composition, the surfactant is preferably 15-20% of the composition.

**[0009]** In another embodiment of the organic fuel additive composition, the surfactant is NP-9, NP15, or in combination.

**[0010]** In another embodiment of the organic fuel additive composition, the glycerin has over 85% purity, and is preferably 10-20% of the composition, and further preferably 12-18% of the composition.

**[0011]** In another embodiment of the organic fuel additive composition, the polyethoxy-ester is preferably 20-30% of the composition.

**[0012]** In another embodiment of the organic fuel additive composition, the water has a pH value between 6.8 to 7.2 and is preferably 5-10% of the composition.

**[0013]** In another embodiment of the organic fuel additive composition, the diesel is fossil diesel, biodiesel or in combination, and preferably 15-25% of the composition. the water has a pH value between 6.8 to 7.2.

**[0014]** In another embodiment of the organic fuel additive composition, the glycerin is manufactured by the process comprising providing a suitable vegetable oil for processing; adding alcohol and catalyst into the vegetable oil to form a mixture; heating the mixture to a predetermined temperature for a predetermined time period; separating the heated mixture into two fractions: fraction A and fraction B; and neutralizing the fraction B with an inorganic or organic acid substance to have a neutral pH value, and then heating the fraction B to a predetermined temperature, and then distilling to get the glycerin.

**[0015]** Another embodiment of the present invention provides an emulsion fuel. In one embodiment, the emulsion fuel comprises fossil diesel in an amount of 60-80% of the fuel; water in an amount of 10-25% of the fuel; and organic fuel additive composition in an amount of 10-25% of the fuel; wherein the organic fuel additive composition comprises surfactant in an amount of 10-25% of the composition; glycerin in an amount of 10-30% of the composition; polyethoxy-ester in an amount of 15-45% of the composition; water in an amount of 1-15% of the composition; and diesel in an amount of 10-40% of the composition; whereby all components are admixed to form the emulsion fuel.

**[0016]** In another embodiment of the emulsion fuel, the fossil diesel is preferably 65-75% of the fuel.

**[0017]** In another embodiment of the emulsion fuel, the water not including the water used in the organic fuel additive composition is preferably about 12-18% of the fuel.

**[0018]** In another embodiment of the emulsion fuel, the organic fuel additive composition is preferably 12-18% of the fuel.

**[0019]** In another embodiment of the emulsion fuel, the surfactant in the organic fuel additive composition is preferably 15-20% of the composition.

**[0020]** In another embodiment of the emulsion fuel, the surfactant in the organic fuel additive composition is NP-9, NP15, or in combination.

**[0021]** In another embodiment of the emulsion fuel, the glycerin in the organic fuel additive composition has over 85% purity, and is preferably 10-20% of the composition, and further preferably 12-18% of the composition.

**[0022]** In another embodiment of the emulsion fuel, the polyethoxy-ester in the organic fuel additive composition is preferably 20-30% of the composition.

[0023] In another embodiment of the emulsion fuel, the water in the organic fuel additive composition has a pH value between 6.8 to 7.2 and is preferably 5-10% of the composition.

[0024] In another embodiment of the emulsion fuel, the diesel in the organic fuel additive composition is fossil diesel, biodiesel or in combination, and preferably 15-25% of the composition. the water has a pH value between 6.8 to 7.2.

[0025] In another embodiment of the emulsion fuel, the glycerin is manufactured by the process comprising providing a suitable vegetable oil for processing; adding alcohol and catalyst into the vegetable oil to form a mixture; heating the mixture to a predetermined temperature for a predetermined time period; separating the heated mixture into two fractions: fraction A and fraction B; and neutralizing the fraction B with an inorganic or organic acid substance to have a neutral pH value, and then heating the fraction B to a predetermined temperature, and then distilling to get the glycerin.

[0026] The objectives and advantages of the invention will become apparent from the following detailed description of preferred embodiments thereof in connection with the accompanying drawings.

### **Brief Description of the Drawings**

[0027] Preferred embodiments according to the present invention will now be described with reference to the Figures, in which like reference numerals denote like elements.

[0028] FIG 1 is a block diagram showing the process and products produced by the process in accordance with one embodiment of present invention.

### **Detailed Description of the Invention**

[0029] The present invention may be understood more readily by reference to the following detailed description of certain embodiments of the invention.

[0030] Throughout this application, where publications are referenced, the disclosures of these publications are hereby incorporated by reference, in their entireties,

into this application in order to more fully describe the state of art to which this invention pertains.

**[0031]** The present invention provides a process for processing vegetable oils to obtain biodiesel, fatty alcohol and glycerin, organic fuel additive compositions, and emulsion biodiesel containing the organic fuel additive compositions, and further provides the organic fuel additive compositions and emulsion fuels manufactured by the process provided by the present invention..

**[0032]** Now referring to FIG 1, there is provided a block diagram showing the process and products produced by the process in accordance with one embodiment of the present invention. The clean refined vegetable oil **10** is any vegetable oil available for example palm oil; the vegetable oil does not require to be 100% pure; as long as the impurities existing in the vegetable oil do not interfere with the process of the present invention, the vegetable oil is suitable for use in the present invention. For example, the content of free fatty acid in the vegetable oil is critical for the process. Our inventors discovered that the content of the free fatty acid shall be less than 2.5% in the vegetable oil; preferably less 1.0%; more preferably less 0.5%.

**[0033]** The vegetable oil is first processed **20** by adding alcohol and catalyst; all materials are mixed and heated to a predetermined temperature for a predetermined time period. The temperature and heating duration are dependent upon the used vegetable oil, alcohol and catalyst, and can be easily determined by one skilled in the art. When palm oil is used as the exemplary vegetable oil for the process of the present invention, the alcohol is methanol, ethanol or long chain alcohols with 10, 12 or 14 carbons; the catalyst is potassium hydroxide or sodium hydroxide; the temperature is about 70-80 °C; and the heating duration is about 20-30 minutes. It is preferred to have air injection during the process. The alcohol and hydroxides are preferably in equal molar ratio; the ratio of the vegetable oil and the alcohol/hydroxides is preferably 4-6 to 1, more preferably 5 to 1.

**[0034]** The processed mixture is then separated **30** into two fractions: fraction A and fraction B. As for fraction B **100**, it is about 10% of the total mixture with glycerin as its main component. The fraction B is first neutralized **110** with an inorganic or organic acid substance for example phosphoric acid or citrus acid to have a neutral pH value, and then refined with heating the fraction B to about 90-110 °C and distilling to get purified glycerin for further uses as discussed below.

**[0035]** With regard to fraction A **40**, it is about 90% of the total mixture with ester (biodiesel) as its main component. The fraction A is first neutralized **50** with an inorganic or organic acid substance for example phosphoric acid or citrus acid to have a neutral pH value, and initially distilled **60** at a low temperature for example 60-70 °C to produce fatty alcohol (product A2) **70**, and further distilled **80** at a high temperature for example 100-110 °C to produce refined biodiesel (product A1). The refined biodiesel can be used directly as fuel for internal combustion engines.

**[0036]** The organic fuel additive compositions in accordance with one aspect of the present invention comprise surfactant, glycerin, polyethoxy-ester, water and diesel. In some embodiments, surfactant is about 10-25% of the final composition, preferably 15-20%; glycerin has over 85% purity, and is about 10-30% of the final composition, preferably about 10-20%, and further preferably 12-18%; polyethoxy-ester is about 15-45% of the final composition, preferably about 20-30%; water is about 1-15% of the final composition, preferably 5-10%; diesel is about 10-40% of the final composition, preferably 15-25%. In some embodiments, the suitable surfactant is characterized by that the surfactant wraps water when the surfactant and water are mixed; the exemplary surfactants include NP-9, NP-15 or in combination thereof; the water has a pH value between 6.8 to 7.2. In some embodiments, the organic fuel additive compositions disclosed herein are manufactured by admixing the surfactant and diesel first and then with glycerin, polyethoxy-ester and water.

**[0037]** The emulsion biodiesel in accordance with one aspect of the present invention comprises fossil diesel, water and organic fuel additive composition as aforescribed. In some embodiments, fossil diesel is about 60-80% of the final emulsion fuel, preferably about 65-75%; water is about 10-25% of the final emulsion fuel, preferably about 12-18%; and organic fuel additive composition is about 10-25%, preferably 12-18%. In some embodiments, the emulsion fuel is manufactured by admixing the fossil diesel, water and organic fuel additive compositions together.

**[0038]** The following examples are provided for the sole purpose of illustrating the principles of the present invention and better understanding of the scope of the present invention; they are by no means intended to limit the scope of the present invention.

**[0039]** Examples

**[0040]** Production and purification of glycerin from palm olein—protocol 1

**[0041]** 100kg of palm oil and 25 kg of methoxide were admixed and heated to 70 °C for 30 minutes, and the heated mixture were let to stand still for 8 hours; then the vapor 15 kg was recovered as methanol; the second fraction was 90kg of ester (biodiesel); the third fraction was 1g of dirt, soap and oil; the fourth fraction was 10 kg of glycerin with a minimal purity of 85%; and the last fraction was 1g of dirt, salt and water. The third and last fractions were discharged. The purified biodiesel and glycerin were used for further applications. The glycerin purified from the fourth fraction had a purity over 85%.

**[0042]** Production and purification of glycerin from palm olein—protocol 2

**[0043]** 100kg of palm oil, 1.5kg of sodium hydroxide, and 25kg of methanol were admixed and heated to 70 °C for 30 minutes, and the heated mixture were let to stand still for 8 hours; then the vapor 15 kg was recovered as methanol; the second fraction was 90kg of ester (biodiesel); the third fraction was 1g of dirt, soap and oil; the fourth fraction was 10kg of glycerin with a minimal purity of 85%; and the last fraction was 1g of dirt, salt and water. The third and last fractions were discharged. The purified biodiesel and glycerin were used for further applications. The purified biodiesel and glycerin were used for further applications. The glycerin purified from the fourth fraction had a purity over 85%.

**[0044]** Composition A

**[0045]** 10g NP-9, 10g glycerin, 45g polyethoxy-ester, 5g water and 20g diesel were admixed to produce composition A.

**[0046]** Composition B

**[0047]** 10g NP-15, 10g glycerin, 45g polyethoxy-ester, 5g water and 20g diesel were admixed to produce composition A.

**[0048]** Composition C

**[0049]** 10g NP-9, 10g NP-15, 10g glycerin, 45g polyethoxy-ester, 5g water and 20g diesel were admixed to produce composition A.

**[0050]** Emulsion biodiesel

**[0051]** 100g of biodiesel, 10g of pure water, and 10g of composition A were admixed to produce emulsion biodiesel, where the composition A can be substituted by composition B, and composition C.

**[0052]** The emulsion biodiesel of the present invention has many advantages including: no modification to existing engines, no modification to existing infrastructures, reduction of harmful gas emission, reduction of smoke, improvement of engine

performance and power, improvement of fuel consumption, and reduction of productivity down time.

**[0053]** While the present invention has been described with reference to particular embodiments, it will be understood that the embodiments are illustrative and that the invention scope is not so limited. Alternative embodiments of the present invention will become apparent to those having ordinary skill in the art to which the present invention pertains. Such alternate embodiments are considered to be encompassed within the spirit and scope of the present invention. Accordingly, the scope of the present invention is described by the appended claims and is supported by the foregoing description.

**CLAIMS**

What is claimed is:

1. An organic fuel additive composition, comprising:  
surfactant in an amount of 10-25% of the composition;  
glycerin in an amount of 10-30% of the composition;  
polyethoxy-ester in an amount of 15-45% of the composition;  
water in an amount of 1-15% of the composition; and  
diesel in an amount of 10-40% of the composition;  
whereby all components are admixed together to form the organic fuel additive composition.
2. The organic fuel additive composition of claim 1, wherein the surfactant is preferably 15-20% of the composition.
3. The organic fuel additive composition of claim 1, wherein the surfactant is NP-9, NP15, or in combination.
4. The organic fuel additive composition of claim 1, wherein the glycerin has over 85% purity, and is preferably 10-20% of the composition, and further preferably 12-18% of the composition.
5. The organic fuel additive composition of claim 1, wherein the polyethoxy-ester is preferably 20-30% of the composition.
6. The organic fuel additive composition of claim 1, wherein the water has a pH value between 6.8 to 7.2 and is preferably 5-10% of the composition.
7. The organic fuel additive composition of claim 1, wherein the diesel is fossil diesel, biodiesel or in combination, and preferably 15-25% of the composition. the water has a pH value between 6.8 to 7.2.

8. The organic fuel additive composition of claim 1, wherein the glycerin is manufactured by the process comprising:
- providing a suitable vegetable oil for processing;
  - adding alcohol and catalyst into the vegetable oil to form a mixture;
  - heating the mixture to a predetermined temperature for a predetermined time period;
  - separating the heated mixture into two fractions: fraction A and fraction B; and
  - neutralizing the fraction B with an inorganic or organic acid substance to have a neutral pH value, and then heating the fraction B to a predetermined temperature, and then distilling to get the glycerin.
9. An emulsion fuel, comprising:
- fossil diesel in an amount of 60-80% of the fuel;
  - water in an amount of 10-25% of the fuel; and
  - organic fuel additive composition in an amount of 10-25% of the fuel;
- wherein the organic fuel additive composition comprises:
- surfactant in an amount of 10-25% of the composition;
  - glycerin in an amount of 10-30% of the composition;
  - polyethoxy-ester in an amount of 15-45% of the composition;
  - water in an amount of 1-15% of the composition; and
  - diesel in an amount of 10-40% of the composition;
- whereby all components are admixed to form the emulsion fuel.
10. The emulsion fuel of claim 9, wherein the fossil diesel is preferably 65-75% of the fuel.
11. The emulsion fuel of claim 9, wherein the water not including the water used in the organic fuel additive composition is preferably about 12-18% of the fuel.
12. The emulsion fuel of claim 9, wherein the organic fuel additive composition is preferably 12-18% of the fuel.

13. The emulsion fuel of claim 9, wherein the surfactant in the organic fuel additive composition is preferably 15-20% of the composition.
14. The emulsion fuel of claim 9, wherein the surfactant in the organic fuel additive composition is NP-9, NP15, or in combination.
15. The emulsion fuel of claim 9, wherein the glycerin in the organic fuel additive composition has over 85% purity, and is preferably 10-20% of the composition, and further preferably 12-18% of the composition.
16. The emulsion fuel of claim 9, wherein the polyethoxy-ester in the organic fuel additive composition is preferably 20-30% of the composition.
17. The emulsion fuel of claim 9, wherein the water in the organic fuel additive composition has a pH value between 6.8 to 7.2 and is preferably 5-10% of the composition.
18. The emulsion fuel of claim 9, wherein the diesel in the organic fuel additive composition is fossil diesel, biodiesel or in combination, and preferably 15-25% of the composition. the water has a pH value between 6.8 to 7.2.
19. The emulsion fuel of claim 9, wherein the glycerin is manufactured by the process comprising:
  - providing a suitable vegetable oil for processing;
  - adding alcohol and catalyst into the vegetable oil to form a mixture;
  - heating the mixture to a predetermined temperature for a predetermined time period;
  - separating the heated mixture into two fractions: fraction A and fraction B; and
  - neutralizing the fraction B with an inorganic or organic acid substance to have a neutral pH value, and then heating the fraction B to a predetermined temperature, and then distilling to get the glycerin.