Clean it up!

Background
Motor oil is used around the world to stop the damaging effects of friction and heat on the metal engine parts in vehicles. After a few thousand miles of abuse, these oils become contaminated with metal filings, dirt and other burnt particles that cause them to be less effective. That’s when you change the oil in your car. You then have to deal with the waste oil. It is typically burned to heat shops and homes or re-purified/cleaned to be used once again in a motor vehicle. Surprisingly, once you take the contaminants out, the oil is still good to use in your car. Since burning contaminated oil can have a negative effect on the atmosphere, the methods used for re-claiming and reusing oil are becoming more popular. In this lab, you will get an opportunity to consider and use some of the techniques you have learned about separating materials and try to clean up some used motor oil. Be careful, it is really dirty.

Prelab Questions
1. What are three problems associated with used oil?

2. Have you ever participated in or watched an oil change?

3. Have you ever seen a negative environmental effect of used oil?

4. What are some ways oil can be cleaned?

Problem/Objective
In this lab we will tackle the problem of how to get the contaminants out of used motor oil using some of the separation techniques we have covered in lecture.

Materials
- One screw top test tube with 10 mL used motor oil
- Small bottle of distilled white vinegar (3-5% acetic acid)
- 10ml graduated cylinder
- Test tube rack
- Trays to catch the mess

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Students should wash their hands thoroughly before leaving the lab.
- Clean up and dispose of materials as directed.
• Wear a lab apron and nitrile gloves during the lab.

**Procedure**
One of the techniques used to clean oil is to mix it with acetic acid. We will be using distilled white vinegar (like in pickles) as our source of acetic acid.

1. Record your initial observations for the oil in the test tube in the data table below.
2. Measure 10ml of vinegar in the graduated cylinder.
3. Remove the cap from the oil test tube and add the 10mL of vinegar. Be sure to do this over the tray!
4. Firmly replace the cap and record your observations of the mixture in the data table.
5. Now take turns shaking the tube for a total of 10 minutes. Be careful, the oil will stain your clothing and shoes if it leaks from the test tube!
6. Set the tube back in the rack and observe what happens. Be ready to note your observations in the data table.

**Data**

<table>
<thead>
<tr>
<th>Oil</th>
<th>Oil + Vinegar (before shaking)</th>
<th>Oil + Vinegar (after shaking)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

**Analysis**

1. Describe what happens to the mixture both before and after you shake it. Be sure to explain it as if the person reading it has never seen the lab in action. Please use the following questions as a writing guide.
   - What is happening?
   - Why?
   - Can you recall any scientific terms used to describe this?
   - Is the oil clean? Is it pure? Why or why not?
   - What’s next? Consider what you could do next to further purify the oil. Remember the techniques we talked about in class.
Conclusion
Please describe what you learned and how successful your attempt to purify your oil sample went. Please include any ideas you have to further clean up your sample. Remember to describe it in a way that someone who wasn’t involved in the lab can understand.