CHEM 3120 - Project Outline template

Project title including name of real sample and analyte(s):

Determination of TiO₂ in commercially available pool care products via Raman spectroscopy

Project group members:

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Overall project goal statement:

To determine the concentration of TiO₂ in the commercial brand Solei Sun Powered Water Care product.

Project Summary paragraph:

This project will set out to determine the concentration of TiO₂ in a commercially available pool product. The actual concentration is unknown as the product is still in the process of patenting. Therefore, the results will not be able to be compared to a known value but will rather be used to state a concentration. This project will involve the creation of external standards created from food grade TiO₂ diluted in water. The food grade stock ordered is used in soap creation and is listed as being soluble in water, along with the real sample being used in pools so it is as well. Due to unknown matrix effects of the real sample, the method of standard addition may have to be used. As there is not a listed concentration of TiO₂, the real sample will be run early along with a couple prepared standards to find an estimate of the dynamic range for the calibration curve. Using the Raman instrument, the standards and real samples will be run, and the peak heights will be measured to be used on the calibration curve. Using the Raman's software, the appropriate wavenumber range will be selected for analysis. From online references the wavenumber range is expected in the 400-600 cm⁻¹ range, but this number will be confirmed once the standards are run.

Instrument, Details and Settings:

Anton Paar Cora 5001 Raman Spectrometer, set at 532nm.

Using the liquid detection probe.

List of Chemicals:

Food grade TiO_2

18megohm water

Solei Sun Powered Water Care product

List of Supplies:

- 50mL volumetric flasks
- 4mL sample vials
- Analytical balance
- Weigh boat
- Scoopula
- 100 1000uL micropipettes
 - For additional dilution or spiking
- Marker
- Wash bottle
- 25mL beaker
- Glass stir rod
- Kimwipes

Any Additional equipment needed:

No

Information on preparation plans for solutions and samples:

The standards will be diluted with water so that the TiO_2 dissolves. The sample will not be adjusted on the first day, but it may be spiked with the food-grade TiO_2 on the second day. To confirm that the real sample is within the span of the calibration curve, only two standards, one high and one low, in order to not waste time remaking all the standards.

Advance work needed?

No

Day 1 Objective:

- Testing the dissolving of the TiO₂
- Preparing the standards
- Observing the spectrum to determine if the real sample needs to be spiked.
- Comparing the sample to the water blank along with identifying the peaks for TiO₂

Day 2 Objective:

- Running the spiked sample if needed
- Use this time to run any replicates if applicable.
- Compare the sample to the calibration curve to finally decide the TiO₂ concentration.