Determination of Free, Bound and Total SO_2 by Aeration Oxidation(AO)

PERFORM THE ENTIRE EXPERIMENT FOR BOTH WHITE & RED WINES TO COLLECT DATA FOR 4 TRIALS: TWO for red and TWO for white

PROCEDURES - Free SO_2

Run cold tap water through the condenser. Connect the "water-in" to the bottom of the condenser.

Using a 10mL graduated cylinder, prepare the following solution in the pear-shaped flask:

- 10ml 3% H_2O_2
- 3 drops of the AO-indicator.
- ***The solution needs to appear metallic-green in color***.
    - If the solution is too green, add 0.01M HCl drop-wise
    - If the solution is purple, add 0.01M NaOH drop-wise
- Attach the flask to the AO apparatus.

Aeration of the wine for free SO_2:

- Place the round-bottomed flask in a 1-Liter beaker 3/4 –filled with ice.
- Pipet 20.00mL of wine into the round-bottomed flask.
- Adjust the flow meter to 1L/min & turn ON the air pump. Set the timer for 15 minutes.
- Immediately add 10mL of 25% phosphoric acid solution to the wine using a 10mL graduated cylinder.
- The solution in the pear-shaped flask will eventually become ***dark purple***.
- Leave the round-bottom flask attached to the AO apparatus.

  ******DO NOT DISCARD THE WINE IF BOUND SO_2 WILL BE DETERMINED*****
- After aeration, remove the pear-shape flask from the AO apparatus and rinse the end-tube with a small amount of DI water into the pear-shape flask.
- Using your hand, swirl the solution in the ***pear-shaped flask*** and titrate the solution in the flask with 0.01M NaOH until the color changes ***from purple back to gray.*** Record the initial and final volumes of 0.01M NaOH used in the titration.
- Rinse the pear-shaped flask with DI water.

CALCULATION

- Use the following formula to calculate the free SO_2 in the wine:
  SO_2 (ppm) = 0.01 x mL NaOH x 1600

ICED Trials	Initial V	Final V	Total mL	FREE SO_2 (ppm)
1_{red}				
2_{red}				

ICED Trials	Initial V	Final V	Total mL	FREE SO_2 (ppm)
1_{white}				
2_{white}				

PROCEDURES - Bound SO_2

USE THE SAME WINE SAMPLE

Adjust the dial on a hot plate to half-max and set the hot plate aside.

Using a 10mL graduated cylinder, prepare the following solution in the pear-shaped flask:

- 10ml 3% H_2O_2
- 3 drops of the AO-indicator.
- ***The solution needs to appear metallic-green in color***.
    - If the solution is too green, add 0.01M HCl drop-wise
    - If the solution is purple, add 0.01M NaOH drop-wise
- Attach the flask to the AO apparatus.

Aeration of the wine:

- Adjust the flow meter to ***1L/min*** & turn ON the air pump for appx. 20 minutes- this will prevent the wine, when heated, from escaping through the aeration tube.

  DO NOT ADD ADDITONAL ACID
- Place the round-bottomed flask containing ***the same 20.00mL of wine*** on the hotplate and allow the wine to aerate for the remaining time. The solution in the pear-shaped flask will eventually become ***dark purple***.
- After 15 minutes of aeration leave the aerator "ON", turn off the hotplate and remove the glass stopper (the "plug") from the round-bottomed flask
- Raise the AO apparatus so the round-bottom flask is no longer in contact with the hotplate and now switch off the aerator.
- Remove the pear-shape flask from the AO apparatus and rinse the end-tube with a small amount of DI water into the pear-shape flask.
- Using your hand, swirl the solution in the pear-shaped flask and titrate the solution with 0.01M NaOH until the color changes ***from purple back to green.*** Record the initial and final volumes of 0.01M NaOH used in the titration.
- Rinse the pear-shaped flask with DI water.

- Clean the round-bottom flask and the end of the aeration tube with appx. 25mL **1-2M NaOH** solution then rinse thoroughly with DI water.

CALCULATION

- Use the following formula (same as before) to calculate the bound SO_2 in the wine.

SO_2 (ppm) = 0.01 x mL NaOH x 1600

HEATED Trials	Initial V	Final V	Total mL	BOUND SO_2 (ppm)
1_{red}				
2_{red}				

HEATED Trials	Initial V	Final V	Total mL	BOUND SO_2 (ppm)
1_{white}				
2_{white}				

- Add the free SO_2 to the bound SO_2 to determine the total SO_2.

Trial	Total SO_2
1_{red}	
2_{red}	
1_{white}	
2_{white}	

Each student – Using Google Docs, create and share with me a spreadsheet file titled, CHM130VV-SO2 in Wine by AO – Your FULL NAME. Label one sheet for RED and another for White. Use the spreadsheet to carry out all calculations. Do not simply type the numbers into the cells.