Determination of Peroxide Concentrations in Dental Bleaching Products

Materials:

scale (accurate to 0.0000g)
stir plate
magnetic stirrer
stir bar
250mL beaker
metal spatula
titration stand
10mL burette
50mL burette
transfer pipette
weighing paper
watch glass, medium
timer
exam gloves
25mL graduated cylinder
0.025N Sodium Thiosulfate
Potassium Iodide
Acetic Acid, glacial
Ammonium Molybdate
1.0% Starch Indicator
Milli-Q (Deionized) Water

Procedure:

Preparation

1. Complete the top portion of the data sheet, noting the type of peroxide contained in the specimen.
2. Weigh 250mL beaker on scale. Record the empty weight on the data sheet.
3. Add specimen to beaker and weigh. Record the beaker and specimen weight on the data sheet.
4. Calculate the specimen weight and record it on space (A) of the data sheet.
5. Add milli-Q (deionized) water to the 100mL level.
6. Add stir bar and place on stir plate. Solution should be mixing smoothly.
7. Using 25mL graduated cylinder, measure 20mL Acetic Acid and add to solution.
8. Immediately cover beaker with watch glass.
9. Weigh approximately 2g Potassium Iodide and add to solution. Record the actual weight on the data sheet on space (B). Solution should change color to a shade of yellow.
10. Transfer 3 drops of Ammonium Molybdate to solution using transfer pipette.
11. Allow solution to mix completely.
12. Place solution in dark chamber for at least 10 minutes.

Titration

1. Place the 10mL and 50mL burette in a titration stand over magnetic stirrers.
2. Fill both burettes with 0.025N Sodium Thiosulfate, recording the initial volumes on the data sheet, the 50mL burette for the first titration and the 10mL burette for the second titration.
3. Begin the first titration using the 50mL burette, with stir bar in the beaker. Add sodium thiosulfate until solution becomes pale yellow in color.
4. Once the desired color is achieved, stop the titration and record the final volume of the first titration on the data sheet.
5. Add 3mL 1.0% Starch Indicator to the solution. The solution will turn purple.
6. Begin the second titration using the 10mL burette, with stir bar still in beaker.
7. Slowly add sodium thiosulfate to solution until color disappears.
   WARNING – this is a very sensitive process and will occur rapidly over the span of a few drops.
8. Once the solution is back to its original color, stop the titration and record the final volume on the data sheet.
9. Discard solution in sink with running water.
10. Clean all materials used and store properly.

Calculations

1. Determine volume of the first titration, using the final and initial volumes of the 50mL burette.
2. Record the first titrant volume on space (C) of the data sheet.
3. Determine the volume of the second titration, using the final and initial volumes of the 10mL burette.
4. Record the second titrant volume on space (D) of the data sheet.
5. Determine the total volume of titrant added to the solution by adding the first and second titrant volumes and record on space (E) of the data sheet.
6. Perform the appropriate calculation on the data sheet, as determined by the type of peroxide in the specimen (Attachment 1).

Data Recording Sheet

Evaluator: _____ Manufacturer: _____

Date: _ _ / _ _ / _ _ _ _ Product: _____
DD/MM/YYYY

Lot# _____ Concentration from label: _____

Expiration Date _____

Peroxide: Hydrogen Carbamide Trial #: 1 2 3

A. Preparation:

1. Weigh amount of product

   _____g - _____g.....____ g (A)
   beaker and specimen; empty beaker

2. Add milliQ (or deionized) water to 100mL
3. Add 20mL acetic acid
4. Add potassium iodide .....____ g (B)
   should be approximately 2g
5. Add 3 drops ammonium molybdate

B. Titration:

1. Add sodium thiosulfate until liquid is pale yellow

   _____mL - _____mL .....____mL (C)
   final volume; beginning volume

2. Add starch indicator
3. Carefully add sodium thiosulfate until normal color

   _____mL - _____mL .....____mL (D)
   final volume; beginning volume

4. Calculate total titration amount

   _____mL + _____mL .....____mL (E)
   (C); (D)

C. Calculations:

CP% = 4.704 * _____mL * (0.025/ _____g) = _____ %
(E); (A)

HP% = 1.704 * _____mL * (0.025/ _____g) = _____ %
(E); (A)

Attachment 1