N12 ANALYSIS OF SALT CONTENT OF FOODS

PREWORK
1. List the steps involved in the standardisation of 0.1M potassium thiocyanate
2. List the problems associated with nitrobenzene
3. Outline the appropriate method of disposal of silver salts

PROCEDURE

I. Soluble Salt Content of Potato Chips by Mohr’s Method
1. Weigh accurately about 3g of chips (in triplicate) into a 250 mL conical flask
2. Add about 50 mL of purified water and a small amount of CaCO₃ powder and swirl for about 3 minutes
3. Add 1 mL of chromate indicator
4. Titrate with standardised 0.1M silver nitrate until endpoint
5. Weigh accurately about 3g of potato chips (in duplicate) into an evaporating basin

II. Total Salt Content of Potato Chips by Fajans’ Method
6. Pour 10 mL of 1:1 ethanol/glycerol over the chips and set fire to the sample as shown by your teacher. (do this in the fumehood)
7. Once your sample is essentially burnt, place in a 600°C muffle furnace for at least 2 hours or until the ash is light grey
8. Remove from the muffle furnace and allow to cool
9. Add 5 mL of 5M nitric acid to dissolve the ash
10. Neutralise with CaCO₃ powder
11. Transfer to a conical flask, rinsing the basin with about 50 mL of purified water
12. Add a few drops of fluorescein indicator
13. Titrate with standardised 0.1M silver nitrate until endpoint

III Salt Content of Soy Sauce by Volhard’s Method
14. Pipette a 10 mL aliquot of soy sauce into a 250 mL volumetric flask. Make up to the mark with purified water.
15. Pipette (in triplicate) 5 mL aliquots of the diluted sample into 250 mL conical flasks
16. Add 10 mL 5M nitric acid to each flask
17. Pipette 25 mL of standardised 0.1M AgNO₃ into each flask
18. Add 2 mL nitrobenzene and 1 mL iron (III) indicator to each flask. Shake well
19. Titrate to endpoint with standardised 0.1M thiocyanate.
20. Pour all solutions containing nitrobenzene into the special residue bottle provided

CALCULATIONS
I & II Soluble & Total Salt Content of Potato chips by Mohr’s Method
1. Calculate the average volume of titrant used
2. Calculate the moles of silver in the average volume
3. Calculate the mass of sodium chloride in each sample
4. Calculate the %w/w of sodium chloride in the sample
III Salt Content of Soy Sauce by Volhard’s Method
1. Calculate the moles of silver in the 5 mL aliquot
2. Calculate the average moles of thiocyanate used in the titration
3. Determine the moles of silver remaining
4. Calculate the moles of silver that reacted
5. Determine the moles of sodium chloride in the diluted sample aliquot
6. Calculate the total moles of NaCl in the diluted sample and thus in the 10 mL aliquot of
   the original sample
7. Calculate the mass of NaCl in the 10 mL aliquot and therefore the g/100mL in the sample

DISCUSSION
- Compare the soluble and total salt contents of the chips
- Compare the difference between total and soluble salt content to that of potatoes
- Explain the purpose of the CaCO$_3$ in step 2
- Explain the purpose of the nitrobenzene
- Explain how each indicator works

QUESTIONS
1. Explain why solution pH is important in each indicator method
2. A blank titration is often carried out to counteract overuse of the chromate indicator, can it
   can add slightly to the endpoint volume. The blank consists of purified water, 1 mL
   indictor and about 0.5g calcium carbonate. What purpose would the carbonate serve?
3. Outline the health effects of large amounts of salt in the diet.