**UNIT 5 PRACTICAL 10**

**Identification of an iodate salt**

**Introduction**

In this Practical Task you are given full instructions for the practical procedure, which must be followed carefully.

You have two exercises to carry out.

* You will prepare a solution of a salt, **X**, which contains iodate ions, IO3-
* You will add excess aqueous potassium iodide, KI(aq), and aqueous acid to a measured portion of your solution to form aqueous iodine, I2 (aq).

You will then carry out a titration of this mixture with 0.120 mol dm-3 sodium thiosulfate,

Na2S2O3.

You will use your results to determine the formula of the iodate salt, **X**.

**Part 1 – Titration**

You are provided with the following.

* Solid iodate salt, **X**
* Aqueous sodium thiosulfate, Na2S2O3 (aq), of concentration 0.120 moldm-3
* Aqueous potassium iodide, KI(aq), of concentration 0.5 moldm-3
* Dilute sulfuric acid, H2SO4(aq), of concentration 1.0 mol dm-3
* Starch indicator solution

1. Weigh the bottle provided, containing **X**.
2. Tip the solid into a 250 cm3 beaker and re-weigh the empty bottle.
3. Dissolve the solid in the beaker in about 150 cm3 of distilled (or de-ionised) water.
4. Transfer this solution into a 250 cm3 volumetric flask. Make the solution up to 250 cm3 using distilled water. Invert the volumetric flask several times before use to mix the solution thoroughly.
5. Fill the burette with 0.120 mol dm–3 Na2S2O3 (aq).
6. Using a pipette and filler, transfer 25.0 cm3 of your solution of **X** into a conical flask. Using a measuring cylinder, add 10 cm3 of KI(aq) and 10 cm3 of H2SO4(aq). The colour of the solution will change from colourless to brown.
7. Carry out a trial titration. Record all burette readings to the nearest 0.05 cm3. Add Na2S2O3(aq) from the burette until the colour changes from brown to pale yellow. Add about 1 cm3 of starch indicator solution to the conical flask. The colour of the solution will turn dark-blue. Continue adding Na2S2O3(aq) from the burette. At the end-point the solution becomes **colourless**.
8. Now carry out the titration accurately and obtain two consistent values for the titre.

**Part 2 – Analysis**

In the titration, iodine is titrated with aqueous thiosulfate ions:

2S2O32- + I2 🡪 S4O62- + 2I-

The iodine has been formed by the reaction of iodate ions, IO3- with iodide ions under

acidicconditions. The half-equations that take place are shown below:

2IO3- + 12H+ + 10e 🡪 I2 + 6H2O

2I- 🡪 I2 + 2e

1. Construct an overall equation for the reaction of iodate ions with iodide ions under acidic conditions.
2. Hence show that 1 mol of iodate ions, IO3-, reacts with I- and H+ to form 3 mol of iodine, I2(aq).
3. Calculate the amount, in moles, of S2O32- in your mean titre.
4. Calculate the amount, in moles, of iodate ions, IO3-, in the 250 cm3 solution that you prepared.
5. The iodate salt **X** is an anhydrous salt of a metal ion **M**+. Calculate the molar mass of **X**.
6. Determine the relative atomic mass of **M** and hence predict the formula of the iodate salt **X**.