

Exp no. 1

11/9/07

PREPARATION AND STANDARDIZATION OF 0.1N IODINE SOLUTION

Aim

To prepare and standardise 0.1N Iodine solution

Chemical Requirements

Iodine, potassium iodide, dil. HCl, Arsenic trioxide,
Methyl orange, starch solution, sodium hydroxide

Apparatus required

Burette, pipette, conical flask, beaker, glass rod,
mortar & pestle, measuring cylinder

Procedure

Dissolve about 14 gm of iodine in a solution
of 36 gms of potassium iodide in 100 ml of
water. Add 3 drops of dil. HCl. Finally
dilute with water upto 1000 ml

STANDARDISATION OF 0.1N IODINE SOLUTION

About 0.15g of Arsenic trioxide was accurately
weighed. which was previously dried at 105°C for
1 hr. Dissolved in 20 ml of 1N sodium hydroxide
by warming if required.

Dilute with 40 ml of water and 2 drops of
methyl orange solution were added. Dil. HCl was
added drop by drop until the yellow colour is changed
to pink; then add 2g of sodium carbonate,
dilute with 50ml of water and add 3ml of
starch solution.

Titrate with 0.1 N Iodine solution taken in a burette with the permanent blue colour of starch is produced.

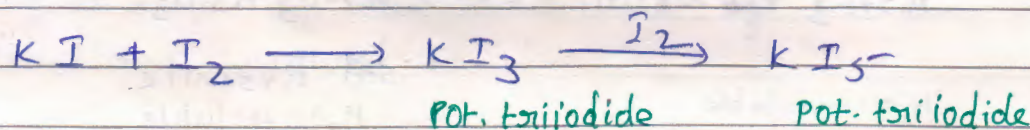
Each ml of 0.1 N Iodine solution \cong 0.00496 gm of Arsenic trioxide.

Note:

Iodine is supplied in the form of lumps or flakes or balls. Flakes dissolve very slowly, so the lumps or flakes or balls are powdered in a clean mortar with a pestle. The fine powder dissolves much faster.

Iodine is insoluble in water; it dissolves in a solution of potassium iodide. Iodine reacts with KI to form polyiodides of potassium which are water soluble.

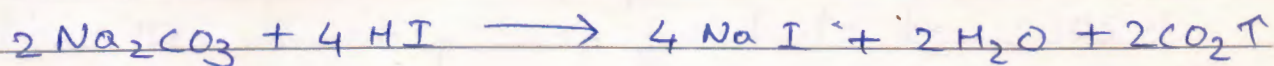
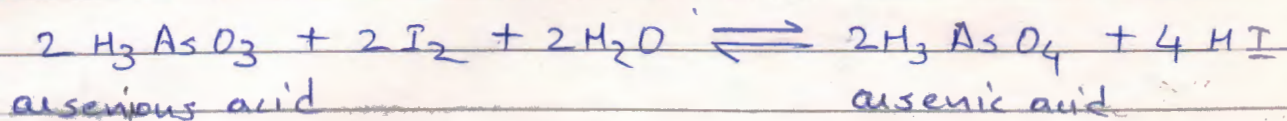
This is written as



The poly iodides decomposed easily liberating free iodine. HCl is added to aid this decomposition. Thus, in effect, titration with solution amounts to titration with iodine.

NOTE:

Iodine is not used as a primary standard



PREPARATION OF STARCH SOLUTION

Add 0.5g of starch to 100 ml of boiled water. Stir well, allow it to cool.

Starch solution is used as an indicator in the titration. After iodine oxidises all the arsenious acid, the extra drop of iodine reacts with the starch to give a blue colour which is the end point. Starch forms a complex with iodine. The starch-iodine complex is blue in colour. Solutions of indicators are usually used in drops (1-2 drops). Very few indicators like starch are used in milliliter quantity (2-3 ml).

Standardisation

0.1 N iodine solution is standardised by using arsenic trioxide as primary standard. Arsenic trioxide is converted into arsenious acid. This is oxidised by iodine to arsenic acid. In the process iodine is reduced to HI. Thus it is a redox titration.

Report:

Iodine solution was prepared and upon standardisation the normality was found to be 0.105 N

Am
7/3/08

Q.1) what is a Primary standard? Give some examples

Primary standard is a compound of sufficient purity from which standard solution of known normalities can be prepared by direct weighing of it and dilution to a defined volume of solution.

Examples: Na_2CO_3 , $\text{Na}_2\text{B}_4\text{O}_7$, potassium hydrogen iodate $\text{KH}(\text{IO}_3)_2$

Pure metals & their salts like Zn, Mg, Cu, Mn, Ag, AgNO_3 , NaCl, KCl, KBr — acid base titration.

$\text{K}_2\text{Cr}_2\text{O}_7$, KBrO_3 , KIO_3 , $\text{KI}(\text{IO}_3)_2$, $\text{Na}_2\text{C}_2\text{O}_4$, As_2O_3 , pure iron — in Redox titrations.

Q.2) what are the conditions that are to be fulfilled by a primary standard?

i) should be very pure

ii) should neither be deliquescent nor efflorescent

iii) should have high molecular weight, so that weighing errors are minimized

iv) It must be chemically stable.

v) It shall be readily soluble under given conditions

vi) It should react stoichiometrically.

Q.3) what is secondary standard? Give some examples.

A substance which may be used in titration and which may be ~~used~~ compared against a primary standard to find the content of active substance.

A substance whose solution is standardized against a primary standard to standardize another

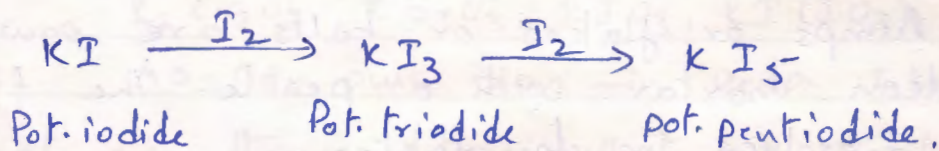
Examples: $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Q.4) why iodine cannot be used as a primary standard?

Iodine is not used as a primary standard mainly because of its ~~less~~ solubility ^{problems}. It does not get dissolved even in potassium iodide solution.

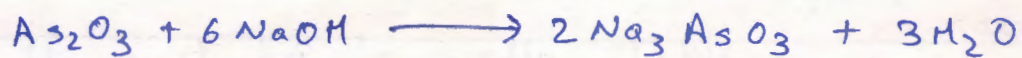
Q.5) what is the role of KI in preparation of Iodine solution?

KI reacts with Iodine to form polyiodides of potassium which ^{are H₂O-soluble} (makes iodine soluble in water.)



Q.6) what is the reaction between As_2O_3 & NaOH ?

Arsenic trioxide reacts with NaOH to form sodium arsenite, which is soluble in water.



H_2O -insoluble

sod. arsenite
 H_2O -soluble

Q.7) what is the use of sod.

CALCULATIONS

Weight of compound + paper = 351.2 mg

Weight of paper after transferring = 190 mg

Weight of substance transferred = 161.2 mg

s.No	Burette reading		Volume of iodine consumed
	Initial	Final	
1	0	30.8	30.8 ml

0.00496 gm of As_2O_3 = 1 ml of 0.1 N I_2 solution

0.1612 gm of As_2O_3 = ?

$$\frac{0.1612 \times 1}{0.00496} = 32.591 \text{ ml of } 0.1 \text{ N } I_2 \text{ solution}$$

$$V_1 = 32.591 \text{ ml} \quad N_1 = 0.1 \text{ N}$$

$$V_2 = 30.8 \text{ ml} \quad N_2 = ?$$

$$N_1 V_1 = N_2 V_2$$

$$\Rightarrow N_2 = \frac{0.1 \times 32.591}{30.8} = \underline{\underline{0.105 \text{ N}}}$$