Q: 20mL of the sample solution is pipetted into a 250mL conical flask and diluted to 150mL with distilled water. It’s titrated with 0.004mol L-1 KIO3 solution. The average titre is 7.65mL. Calculate the number of moles of ascorbic acid reacted. Calculate the concentration of ascorbic acid in mol L-1, mg/100mL and mg/100g.

2IO3– + 10I– +12H+ → 6I2 + 6H2O

Ascorbic acid + I2 → 2I– + dehydroascorbic acid

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| --- | --- |
| Independent variable | Whether an open or unopened orange juice package is titrated. |
| Dependent variable | Concentration of vitamin C in the orange juice package. |
| Controlled variables | * Surrounding temperature. * Surrounding pressure. * Volume of indicator added. * Indicator used. |

Systematic errors:

1. Inherent error in the burette.
2. Inherent error in the measuring cylinder.
3. Inherent error in the pipette.

(I)

Random errors:

1. Parallax error – viewing burette and measuring cylinders from different angles.
2. Endpoint determination – a visual endpoint is always slightly beyond the equivalence point due to needing to see the colour change.
3. Estimating values between graduations.

(PEE)

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| --- | --- |
|  | Improvement: |
| Reliability | Perform more repeat trials. |
| Accuracy | Ensure the burette and measuring cylinders are viewed horizontally to minimise parallax error. |
| Validity | Use separate measuring cylinders to measure the volume of each substance to avoid contamination with other substances. |

