***EXPERIMENT NO. 2***

***To determine the specific rate constant for the oxidation of ethanol by potassium dichromate***

**Apparatus** Beakers; volumetric flask; pipette; sucker; test tubes and spectrophotometer **Chemicals required** *H2O;* C2H5OH; H2SO4 *and K2Cr2O7* **Theory**. The reaction between ethanol and potassium dichromate is first order with respect to each reactant.

3 C2H5OH + *Cr2O7* -2 +8 H+ ------🡪 3CH3CHO + 2Cr+3 + 7 H2O

The reactant dichromate is colored.it disappears in the course of reaction. Its concentration may be followed with time using spectrophotometer at 420nm wavelength. Dichromate obeys Beer-Lambert law at this wavelength. According to Beer-Lambert law

**Absorbance**= ἐ b c

Where c= concentration, b= path length in cm, ἐ = molar absorptivity of any substance **Procedure**

1. Apparatus was taken, washed and dried.

***2.*** 2M H2SO4, 0.5 M C2H5OH and 0.1 M *K2Cr2O7* was prepared in distilled water.

3. Pipette out 0.5cm3 of C2H5OH; 1cm3 of H2SO4; 0.2cm3 of K2Cr2O7 and 0.3cm3 distill waterin a test tube containing ethanol solution. The contents were shaken quickly.

4. Instrument was calibrated by using distilled water.

5. Absorbance was measured at 420nm by using spectrophotometer in time intervals of 1min.

**Preparation of solutions**

1. 2M H2SO4  C1V1 =C2V2

17.8 × V1 = 2×10

V1 =1.2 ml

1. 0.5 M C2H5OH C1V1 =C2V2

17.1 × V1 = 0.5 ×10

V1 =0.3 ml

1. 0.1 M K2Cr2O7 mass in g = molarity ×molar mass × volume in dm-3

m= 0.1×294.185×0.025

m= 0.73 g

**Observations and calculations**

|  |  |  |  |
| --- | --- | --- | --- |
| Time (min) | absorbance | AO/At | Log(AO/At) |
| 0 | Ao 1.503876 | 1 | 0 |
| 1 | 1.422262 | 1.05738 | 0.024 |
| 2 | 1.346164 | 1.1172 | 0.048 |
| 3 | 1.276561 | 1.175 | 0.07 |
| 4 | 1.214846 | 1.238 | 0.09 |
| 5 | 1.154327 | 1.303 | 0.11 |
| 6 | 1.098701 | 1.368 | 0.14 |
| 7 | 1.047665 | 1.435 | 0.16 |

Slope= 0.0227

k= 2.303× slope

k= 2.303 × 0.0227

k=0.0523