

### EXAMINATION

1. The following information is given for the reaction of ethyl acetate with sodium hydroxide:

CH<sub>3</sub>COOCH<sub>2</sub>CH<sub>3</sub> + OH<sup>-</sup> → CH<sub>3</sub>COO<sup>-</sup> + CH<sub>3</sub>CH<sub>2</sub>OH

Rate of reaction = k [CH<sub>3</sub>COOCH<sub>2</sub>CH<sub>3</sub>]<sup>1</sup> [OH<sup>-</sup>]<sup>1</sup>

At 25°C, the rate constant k is 0.105 L mol<sup>-1</sup> s<sup>-1</sup>.

At 35°C, the rate constant k is 0.225 L mol<sup>-1</sup> s<sup>-1</sup>.

At 45°C, the rate constant k is 0.450 L mol<sup>-1</sup> s<sup>-1</sup>.

At 55°C, the rate constant k is 0.900 L mol<sup>-1</sup> s<sup>-1</sup>.

At 65°C, the rate constant k is 1.800 L mol<sup>-1</sup> s<sup>-1</sup>.

At 75°C, the rate constant k is 3.600 L mol<sup>-1</sup> s<sup>-1</sup>.

Temperature (°C)	Rate constant k (L mol <sup>-1</sup> s <sup>-1</sup> )
25	0.105
35	0.225
45	0.450
55	0.900
65	1.800
75	3.600

Calculate the activation energy for the reaction.

### KINGSTON



Time	Temperature (°C)	Rate constant k (L mol <sup>-1</sup> s <sup>-1</sup> )
10:00	25	0.105
11:00	28	0.180
12:00	30	0.225
13:00	32	0.270
14:00	35	0.330
15:00	38	0.405
16:00	40	0.450
17:00	42	0.540
18:00	45	0.675
19:00	48	0.810
20:00	50	0.900

Calculate the activation energy for the reaction.