

Practice Question Set For A-Level

Subject : Chemistry

Paper-2 Topic: Rate Equations

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Mark Schemes

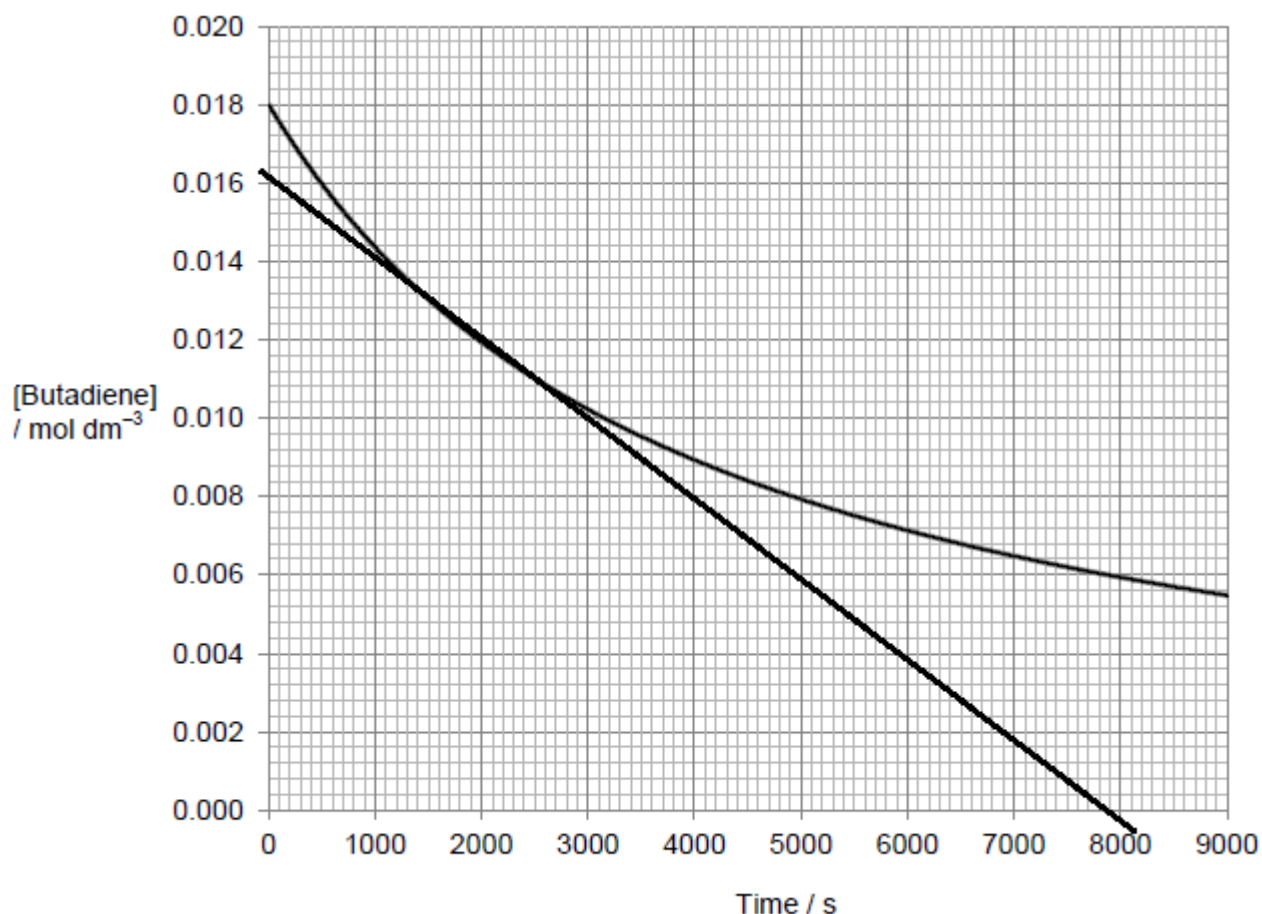
Q1.

D

[1]

Q2.

(a) Gradient drawn on graph



Line must touch the curve at 0.012 but must not cross the curve.

1

(b) Stage 1: Rate of reaction when concentration = $0.0120 \text{ mol dm}^{-3}$

From the tangent

Change in [butadiene] = $-0.0160 - 0$ and change in time = $7800 - 0$

Extended response

1

Gradient = $-(0.0160 - 0) / (7800 - 0) = -2.05 \times 10^{-6}$

Rate = $2.05 \times 10^{-6} \text{ (mol dm}^{-3} \text{ s}^{-1})$

1

Stage 2: Comparison of rates and concentrations

Initial rate / rate at $0.0120 = (4.57 \times 10^{-6}) / (2.05 \times 10^{-6}) = 2.23$

Marking points in stage 2 can be in either order

1

Initial concentration / concentration at point where tangent drawn = $0.018 / 0.012 = 1.5$

1

Stage 3: Deduction of order

If order is 2, rate should increase by factor of $(1.5)^2 = 2.25$ this is approximately equal to 2.23 therefore order is 2nd with respect to butadiene

1

[6]

Q3.B

[1]

Q4.

- (a) Order wrt **D** = 1 OR first OR [D] OR [D]¹

Ignore working

1

Order wrt **E** = 2 OR second OR [E]²

1

- (b) (At time zero/start) the concentrations are known

1

- (c) M1 (Calculate) gradient (of tangent/curve/graph)

Allow description of gradient calculation:

Change in conc / time

1

M2 at t=0 or at start of graph/curve

M2 scored only if M1 gained

Ignore the word initial

1

[5]

Q5.

(a) (i) 2

1

(ii) 0

1

(b) (i) $K = \frac{6.64 \times 10^{-5}}{(4.55 \times 10^{-2}) \times (1.70 \times 10^{-2})^2}$

Correct answer for k with or without working scores 2.

First mark is for insertion of numbers into a correctly rearranged rate equ, k = etc.

1

$= 5.05$ (range allowed 5.03–5.07)

AE (–1) for copying numbers wrongly or swapping two numbers.

1

$\text{mol}^{-2} \text{dm}^{+6} \text{s}^{-1}$

Mark units separately, ie only these units but can be in any order.

1

(ii) $8.3 \times 10^{-6} (\text{mol dm}^{-3} \text{s}^{-1})$

Allow 0.83×10^{-5} .

Ignore units.

OR if not 8.3×10^{-6} , look at their k in part(i) and if not 5.05

Allow ecf for their (incorrect) $k \times (1.64 \times 10^{-6})$

1

[6]