

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Mark Schemes

Q1.

- (a) **M1** The activation energy is the minimum / least / lowest energy

Mark independently

Ignore "heat" and ignore "enthalpy"

M2 (energy) for a reaction to occur / to go / to start

OR (energy) for a successful / effective collision

Ignore "breaking the bonds"

2

- (b) **M1** Catalysts provide an alternative route OR an alternative mechanism OR alternative / different path(way)

M2 Lowers the activation energy

Mark independently

Ignore reference to "surface"

2

- (c) (i) Stay(s) the same

1

- (ii) Increases

Credit "increase" or "increased"

1

- (iii) Increases

Credit "increase" or "increased"

1

- (iv) Stay(s) the same

1

- (d) (i) **M1** yeast or zymase

M2 ethanol

Ignore "enzyme"

In M2, ignore "alcohol" and ignore any formula

2

- (ii) **M1** (Concentrated) H_3PO_4 OR (Concentrated) H_2SO_4

M2 butan-2-ol

Credit correct names

Ignore “hydrogenphosphate or hydrogensulfate”

Ignore “dilute” or “aq”

Do not penalise absence of hyphens in name.

In M2, ignore any formula

Q2.

(a) (i) **M1** The peak of the new curve is displaced to the right.

M2 All of the following are required

- The new curve starts at the origin
 - The peak of the new curve is lower than the original
 - and the new curve only crosses the original curve once
 - and an attempt has been made to draw the new curve correctly towards the energy axis but not to touch the original curve
 - the new curve must not start to diverge from the original curve
- M1 is low demand*
M2 is higher demand.

2

(ii) **M1** Increase in the number/proportion of molecules with $E \geq E_a$

OR more molecules have $E \geq E_a$

OR more molecules have sufficient energy to react

M2 More effective/productive/successful collisions

Ignore "molecules have more energy"

Ignore "more energetic collisions"

Ignore "molecules gain activation energy"

Ignore "more collisions"

Accept "particles" for "molecules" but NOT "atoms"

Ignore "chance of collision"; this alone does not gain M2

2

(b) (i) Iron **OR** Fe

1

(ii) **M1** Catalysts provide an alternative route/pathway/mechanism

OR

(in this case) surface adsorption/surface reaction occurs.

For M1, not simply "provides a surface" alone

M2 that has a lower activation energy

OR

lowers the activation energy

For M2, the candidate may use a definition of activation energy without referring to the term

2

[7]