Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Chemical Equilibria, Le Chatelier's Principle And Kc

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Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Mark Schemes

Q1.

(a) (i) $\mathbf{4}FeS_2 + \mathbf{11}O_2 \longrightarrow \mathbf{2}Fe_2O_3 + \mathbf{8}SO_2$

2 **5½** **(1)** **4**

Or multiples of this equation

1

(ii) **M1** **(+) 4**

M2 **– 1**

Ignore working
M1, credit (+) IV
M2, credit – I

2

(b) **M1** Lower/smaller/decreases/reduced yield
OR equilibrium shifts (right) to left

M2 (Forward) reaction is exothermic OR reverse reaction is endothermic

M3 (By Le Chatelier's principle) equilibrium responds/shifts/moves (R to L)
to lower the temperature
OR to absorb the heat
OR to cool the reaction

If M1 is blank, mark on and credit M1 in the text.
If M1 is incorrect, only credit correct M2
Mark M2 independently – it may be above the arrow in the equation
For M3, not simply "to oppose the change/temperature"

3

(c) **M1** $Fe_2O_3 + 3CO \longrightarrow \mathbf{2}Fe + \mathbf{3}CO_2$

Or multiples
Ignore state symbols

M2 Reducing agent
OR Reduce(s) (Fe_2O_3/iron(III) oxide)
OR Electron donor
OR to remove the oxygen (from iron(III) oxide to form CO_2)
OR reductant

For M2, credit "reduction"

2

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Q2.

(a) **M1** The yield of zinc oxide <u>increases/greater</u>

If M1 is given as "decrease" OR "no effect" then CE= 0

M2 Removal of the carbon dioxide results in the **<u>equilibrium</u>**

Either

Shifting/moving/goes to the right
shifting/moving/goes L to R
favours the forward reaction/towards the products

M3 (By Le Chatelier's principle) the reaction/equilibrium will respond so as <u>to replace the CO_2/lost product</u>
OR <u>to make more CO_2</u>
OR <u>to increase concentration of CO_2</u>

For M3, not simply "to oppose the change/to oppose the loss of CO_2/to oppose the removal of carbon dioxide."

3

(b) **M1** Process 2 produces/releases SO_2
OR Process 2 produces/releases CO

M2 It/Process 3 avoids the release of SO_2 OR CO
OR It/Process 3 (captures and) converts SO_2 to H_2SO_4

M3 SO_2 causes acid rain OR is toxic/poisonous
OR CO is toxic/poisonous

3

Ignore "global warming" and "greenhouse gases" and "the ozone layer"
If both CO and SO_2 claimed to form acid rain, treat as contradiction

(c) **M1** Process 3 (is expensive because it) uses <u>electrolysis</u>
OR due to high <u>electricity/electrical</u> consumption

M2 this is justified because the product/zinc is pure

Ignore "energy"
Penalise "pur<u>er</u>"

2

(d) **M1** $Zn^{2+} + 2e^- \longrightarrow Zn$

Ignore state symbols

M2 the negative electrode OR the cathode

Ignore absence of negative charge on electron
Accept electrons subtracted from RHS

2

(e) **M1** The reaction of ZnO with sulfuric acid
OR the second reaction in Extraction process 3

M2 neutralisation or acid-base

OR alternatively

M1 The reaction of zinc carbonate in Extraction process 1

M1 could be the equation written out in both cases

M2 (thermal) decomposition

M2 depends on correct M1

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M3 It/carbon is <u>oxidised/gains oxygen/changes oxidation state/number from 0 to +2/increase in oxidation state/number</u> in Process 2

Do not forget to award this mark

Ignore reference to electron loss but penalise electron gain

Ignore "carbon is a reducing agent"

3

(f) **M1** $Zn + H_2O \longrightarrow ZnO + H_2$

M2 <u>Zinc oxide and hydrogen</u>

OR as an alternative

M1 $Zn + 2H_2O \longrightarrow Zn(OH)_2 + H_2$

M2 <u>Zinc hydroxide and hydrogen</u>

Mark independently

If ZnO_2 is given for zinc oxide in the equation, penalise M1 and mark on

If ZnOH is given for zinc hydroxide in the equation, penalise M1 and mark on

Ignore state symbols

Credit multiples of the equation

If M1 is blank, either of the M2 answers could score

To gain <u>both</u> marks, the names must match the correct equation given.

2

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