

Chemical Equilibria

Question Paper

Level	International A Level
Subject	Chemistry
Exam Board	Edexcel
Topic	Chemistry Lab Skills 2
Sub Topic	Chemical Equilibria
Booklet	Question Paper

Time Allowed: 26 minutes
Score: /21
Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 A salt, **P**, contains carbon, hydrogen, oxygen and one metallic element.

(a) When a flame test is carried out on **P**, a yellow flame results.

Give the **formula** of the metal ion in the salt.

(1)

(b) **P** dissolves in water to form a weakly alkaline solution, **Q**, with pH 8.1.

The pH of **Q** can be measured by using a calibrated pH meter or an indicator.

(i) Describe how to calibrate a pH meter.

(2)

(ii) Name a suitable indicator you could use and state the colour you would expect to observe.

(2)

(iii) Which of the two methods will give the more accurate value for the pH of **Q**?
Justify your answer.

(1)

(c) Some of the solution **Q** is acidified with concentrated hydrochloric acid.

An organic compound, **R**, forms in the solution.

Methanol is added and the mixture warmed, forming a new organic compound **S**.

This mixture is added to sodium carbonate solution in an evaporating basin.
A fruity smell is detected.

(i) Describe and explain what you would **see** as the mixture is added to the sodium carbonate solution.

(2)

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(ii) What type of compound is **S**?

(1)

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- (d) The high resolution proton nuclear magnetic resonance (nmr) spectrum of **S** has only two peaks which are both singlets and have the same area.

Deduce the structural formulae of **S**, **R**, and **P**.

(3)

S

R

P

(Total for Question 1 = 12 marks)

2 A white solid, **A**, has one metal cation, and an anion containing two non-metallic elements.

(a) A flame test is carried out on **A**.

(i) Describe how you would carry out this flame test in the laboratory.

(3)

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(ii) A yellow flame is seen. Give the **formula** of the metal ion present.

(1)

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(b) Solid **A** dissolves in water to form a colourless solution.

This solution decolorises a dilute aqueous solution of iodine.

Dilute hydrochloric acid is added to a fresh solution of **A**.

A very pale yellow precipitate, **B**, forms slowly and an acidic gas, **C**, is given off.

Gas **C** turns acidified sodium dichromate(VI) from orange to green.

(i) Identify, by name or formula, the precipitate **B** and the gas **C**.

(2)

Precipitate, **B**

Gas, **C**

(ii) What is the colour of a **dilute** aqueous solution of iodine?

(1)

(iii) Give the **name** of the anion in compound **A**.

(1)

(iv) Give the **formula** of compound **A**.

(1)

(Total for Question 2 = 9 marks)
