Xinmin Secondary School
2023 Sec 3 Weighted Assessment 3 – Answer Scheme

Section A

Question	1	2	3	4	5
Answer	B	A	D	D	C

Section B

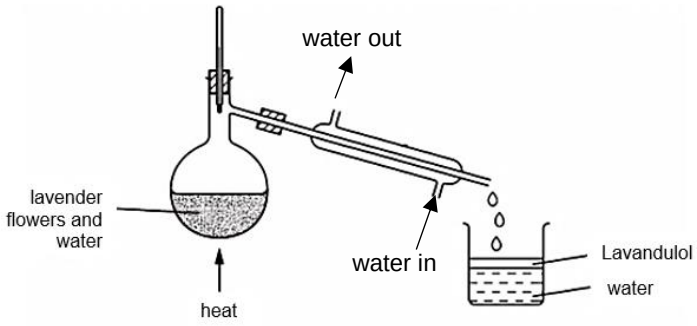
Qn		Suggested answers	Mark
6	a	Al_2O_3	1
	b	SO_2	1
	c	$Pb(NO_3)_2$	1
	d	NaCl	1
			[Total: 4]
7	a	**P**: Magnesium **Q**: Aqueous ammonia [A: ammonium hydroxide] **R**: Ammonium chloride A: formulae	1 1 1
	b	$N_2 + 3H_2 \rightleftharpoons 2NH_3$ 1m for balanced chemical equation 1m for reversible arrow	2
	c	Nitrogen: fractional distillation of liquid air OR Hydrogen: cracking of crude oil A: Nitrogen obtained from air, hydrogen obtained from crude oil – with mention of the gas R: If no mention of gas but just the method.	1
			[Total: 6]
8	ai	'Barium meal' contains <u>barium sulfate which is insoluble</u>. Hence will not produce barium ions.	1
	aii	Even though barium carbonate is insoluble<u>, it will react with the acids in gastric juice (hydrochloric acid)</u> in the stomach; [A: if lifted directly from the passage, but need to mention 'acids in gastric juice'] to form <u>soluble barium chloride that produces barium ions</u>, causing poisoning. [R: if no mention of how the barium ions come about]	1 1
	b	Bubble the gas through <u>limewater</u> and a <u>white precipitate</u> will be formed. A: chalky, cloudy, milky	1 1
	ci	In a strong acid like HCl, the **<u>molecules dissociate / ionise completely in water</u>**, releasing a **<u>higher concentration of H^+ ions.</u>** In a weak acid, the molecules **<u>partially dissociate / ionise in water</u>**, to give a **<u>lower concentration of H^+ ions.</u>**	1 1

<table>
<tr><th colspan="2">Qn</th><th>Suggested answers</th><th>Mark</th></tr>
<tr><td></td><td></td><td>A: if answers compare ionisation of strong vs weak acid [1m] before stating the concentration of H^+ ions [1m].</td><td></td></tr>
<tr><td></td><td>cii</td><td><table><tr><th></th><th>pH</th><th>pKa</th></tr><tr><td>strong acid</td><td>low</td><td>low</td></tr><tr><td>weak acid</td><td>high</td><td>high</td></tr></table></td><td>Every 2 correct, 1 mark</td></tr>
<tr><td></td><td>d</td><td><u>Carbonic acid</u> is the weakest.

It has the <u>highest pKa value of 6.3</u> which means that it dissociates to produce the least amount of H^+ ions.

As a result, there would <u>be less H^+ ions to react</u> with the carbonate hence producing <u>0.95cm^3 of CO_2 gas which is the least volume.</u></td><td>1

1

1</td></tr>
<tr><td></td><td>e</td><td>Carbon monoxide is a neutral oxide.</td><td>1</td></tr>
<tr><td colspan="4">[Total: 13]</td></tr>
<tr><td>9</td><td>a</td><td> 
</td><td>1</td></tr>
<tr><td></td><td>b</td><td>Separating funnel;
They are immiscible liquids.

A: Fractional distillation, reason: they have different boiling points. Note: method and reason must match for full credit.</td><td>1
1</td></tr>
<tr><td></td><td>ci</td><td>4</td><td>1</td></tr>
<tr><td></td><td>cii</td><td>Unlike the conventional chromatography which only uses one solvent, two-way chromatography allows for the <u>pigments which have very similar R_f values</u> to be

<u>further separated using a second solvent</u> because one solvent may not be sufficient to properly separate the pigments.

A: Any other possible answers which mention further separation using different solvents.</td><td>1

1</td></tr>
<tr><td></td><td>ciii</td><td>R_f = 0.8/4.2 = 0.19 (2dp)

A: calculations that are +/- 0.1</td><td>1</td></tr>
<tr><td colspan="4">[Total: 7]</td></tr>
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