Final Assessment Schedule

Chemistry: Describe thermochemical and equilibrium principles (90310)

Evidence Statement:

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	NH_3, HPO_4^{2-}, HCl, H_2SO_4	Three correct		
(b)	It can donate **and** accept H^+ HCO_3^- , can donate H^+, can accept H^+	It can donate and accept H^+ **OR** HCO_3^- and can donate H^+, **OR** HCO_3^- and can accept H^+	HCO_3^- and both justifications given.	
2(a)	• Exothermic • The enthalpy change is negative.	Correct word circled and reason given.		
(b)	$n(\text{glucose}) = \frac{100}{180} = 0.556$ (mol) $\Delta_r H = 0.556 \times -2820 = 1567$ kJ mol^{-1}	Numerical value of $\Delta_r H$ correct. **OR** One step of the calculation correct.	Answer correct. Answer must include sign and unit(s).	
(c)	$n(\text{sucrose}) = \frac{150}{342} = 0.439$ (mol) $\Delta_r H = \frac{1}{0.439} \times -2478 = -5650$ kJ mol^{-1}	Numerical value of $\Delta_r H$ correct. **OR** One step of the calculation correct.	Answer correct. Answer must include sign and unit(s).	
3(a) (b) (c)	• Surface area: • Greater surface area: greater rate • Greater surface area hence an increase in the frequency of collisions.	Factor correctly identified.	Factor and relationship correctly identified.	Factor and relationship correctly identified and clearly explained.

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4	• HA has higher $[H_3O^+]$ / $[H^+]$ • HA's: rate of reaction with Mg will be higher or converse statement for HB. • same amount acid is present and if same amount Mg then same volume of gas.	One factor explained.	Two factors explained.	Three factors explained.
5(a)	$K_c = \frac{[NH_3]^2}{[H_2]^3[N_2]}$	Expression correct.		
(b)	Line A • Equilibrium shifts to reduce pressure increase. • Product side has fewer moles. • Equilibrium shifts in forward dir./least amt dir. • Therefore increase in % NH_3.	Correct line identified and one bullet point.	Correct line identified and three points covered.	Correct line identified and all points covered.
6(a)	Observation**:** Colour of the solution turns purple or blue. Explanation: • The (concentration) of Cl^- is increased. • Equilibrium shifts to decrease concentration of Cl^-. • Eqb shifts in favour of reactant. • More blue $[CoCl_4]^{2-}$ formed.	Observation correct.	Observation correct and: • recognises that $[Cl^-]$ is increased • linked to direction of equilibrium shift.	Observation correct and fully explained.
(b)	$[CoCl_4]^{2-}$ • equilibrium shifts to reduce temperature increase • ΔH –ve/reaction exothermic • reverse direction endothermic • equilibrium shifts in endothermic/reverse direction.	Correct ion circled and one point covered.	Correct ion circled and three points covered.	Correct ion circled and all points covered.

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7(a)	<table><tr><th>Soln</th><th>$[H_3O^+]$ / mol L^{-1}</th><th>$[OH^-]$ / mol L^{-1}</th><th>pH</th></tr><tr><td>HCl</td><td></td><td>1.39×10^{-13}</td><td>1.143</td></tr><tr><td>NaOCl</td><td>3.98×10^{-12}</td><td>2.51×10^{-3}</td><td></td></tr><tr><td>HOCl</td><td>4.46×10^{-4}</td><td></td><td>3.35</td></tr></table>	Two correct.	Four correct.	Six correct.
(b)	OCl^-, H_3O^+	Either product correct.	Equation correct.	
(c)	• OCl^- is basic or reacts with water or reacts to accept H^+ from water • $OCl^- + \underline{H_2O} \rightleftharpoons HOCl + OH^-$ • $[OH^-] > [H_3O^+]$ or $[OH^-]$ now increased.	OCl^- identified as: basic or species that reacts with H_2O or statement regarding increased OH^-.	Equation or description shows that OCl^- accept H^+ from water and statement regarding increased OH^-.	Explanation correct including: • balanced equation, • equilibrium arrows • statement regarding increased $[OH^-]$.

Judgement Statement

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Achievement	Achievement with Merit	Achievement with Excellence
EIGHT questions answered correctly. Minimum of 8 × A	NINE questions answered correctly, including at least SEVEN at Merit level. Minimum of 7 × M + 2 × A	TEN questions answered correctly, including at least FOUR at Merit level and at least FOUR at Excellence level. Minimum of 4 × E + 4 × M + 2 × A