HALF YEARLY EXAM 2008
HSC CHEMISTRY

Marking & Answers

Part A – multiple choice (1 mark each correct answer; maximum = 20)

1	C	2	B	3	D	4	A	5	C	6	B	7	A	8	D	9	B	10	C
11	A	12	A	13	A	14	D	15	B	16	D	17	B	18	C	19	A	20	A

Part B – written responses

21	**1 mark**	**2 marks**	**3 marks**
	Outlines the procedure for bromine water experiment but it is missing steps; correctly uses some terminology	Outlines the procedure and results for bromine water experiment; uses the results to distinguish between saturated and unsaturated; correctly uses most terminology	Name the alkane and alkene; outlines the procedure and results for bromine water experiment; uses the results to explain the difference between saturated and unsaturated compounds; correctly uses all terminology
22a.	**1 mark**	**2 mark**	
	Renewable resources and advantages / reasons	Renewable resources and advantages / reasons **and** comparison with advantage over fossil fuel usage	
22b.	**1 mark**	**2 mark**	
	Example of disadvantage but no real link to the use by society	High cost of production etc. would be a suitable disadvantage → limitation related to supply and insufficient quantities to gain widespread usage	
23a.	**1 mark**	**2 marks**	**3 marks**
	Judgment made using incorrect calculations. Comparison made using incorrect figures	Correctly identify greatest value – no units some calculations; no comparison of values made	Correctly identify greatest value – ensure units are correct. In justification must mention other fuels and their values. All values correct and comparison for full marks Ethanol = 29.6 kJg^{-1} Petrol = 47.89 kJg^{-1} Butane = 49.66 kJg^{-1} Propane = 50.45 kJg^{-1}
23b.	**1 mark**	**2 mark**	
	No working out but correct answer or units missing.	Full working out shown; correct value (0.32g)	
24a.	$Zn_{(s)} \leftrightarrow Zn^{2+}_{(aq)} + 2e$; must show states and use double arrows for mark		
24b.	$Zn_{(s)} + 2Ag^{+}_{(aq)} \leftrightarrow Zn^{2+}_{(aq)} + 2Ag_{(s)}$; must show states and use double arrows for mark		
24c.	**1 mark**	**2 mark**	
	Incomplete answer compare with 2 mark answer or simple statement that it balances the charge	The salt bridge allows the migration of ions to balance the charge build-up that occurs inside the half cells. The anions in the salt bridge migrate towards the anode half cell to balance the build-up of positive charge due to the oxidation reaction; the cations will migrate towards the cathode cells.	
24d.	The carbonate ions would form insoluble precipitates when it cam into contact with either the silver ions or the zinc ions and stop the reaction.		
25a.	The nucleus is too large or the p : n ratio is unbalanced; both responses for the mark.		
25b.	$^{90}_{38}Sr \longrightarrow {}^{90}_{39}Y + \beta^-$		
25c.	**1 mark**	**2 mark**	
	Mentions cyclotrons, particle accelerators and reactors. Gives very brief outline of how, but does not link to named isotope and use.	Must mention and briefly outline the use of cyclotrons and particle accelerators. Nuclear reactors can also be used. Should link to a named isotope used in medicine or industry.	

26a.	**1 mark**	**2 marks**	**3 marks**
	Brief description; no mention specific chemical; misuse of terminology	Missing steps from complete method	• Calculate moles of $NaHCO_3$ needed • Accurately weigh out sample • Add deionised water to volumetric flask • Add solid and dissolve • Top up with deionised water to the mark • Label • Complete method
26b.	**1 mark**	**2 mark**	
	Correct comparison; reason wrong or incomplete	Comparison of solutions NaOH and $NaHCO_3$; NaOH less reliable because it is hygroscopic and we can never be sure as to the amount of water it has absorbed.	
27a.	$CH_3COOH_{(aq)} + NaHCO_{3(aq)} \rightarrow NaCH_3COO_{(aq)} + CO_{2(g)} + H_2O_{(l)}$ must show states for mark		
27b.	$H^+_{(aq)} + HCO_3^-{}_{(aq)} \rightarrow CO_{2(g)} + H_2O_{(l)}$ must show states for mark		
27c.	**1 mark**	**2 marks**	**3 marks**
	Calculations using all values; no units	Calculation using mL instead of L; values are omitted without reasons	Correct answer; converts all volumes to L; includes units; titre value using only precise values – tell why values are omitted
28a.	$HCN_{(g)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + CN^-_{(aq)}$		
28b.	**1 mark**	**2 marks**	
	A weak acid doesn't fully dissociate OR doesn't form many ions OR similar	A weak acid has a low dissociation and few hydronium ions form as the acid stays as a molecule. Must use HCN as examples in answer to gain two marks.	
28c.	**1 mark**	**2 marks**	
	Dilute refers to concentration and strong does not. Strong refers to dissociation.	Weak and strong refers to degree of dissociation into ions; while dilute is a concentration term referring to the moles of acid present. So any acid may be present in low concentration, but that will not mean that it can fully dissociate and form ions. An example of a dilute, strong acid would be 0.01M HCl which has a low concentration, but will fully dissociate into ions.	
29a.	**1 mark**	**2 marks**	**3 marks**
	Acids contain H^+ when they dissolve.	His theory was based upon reactions of acids and bases in solution; an acid will form H^+ ions in solution OR a base will form OH- ions in solution; no equation to illustrate each rxn	His theory was based upon reactions of acids and bases in solution; an acid will form H^+ ions in solution; a base will form OH- ions in solution; an equation to illustrate each rxn
29b.	**1 mark**	**2 marks**	
	Definition of amphiprotic + example + reactions showing amphiprotic nature – 2 of	Definition of amphiprotic + example + reactions showing amphiprotic nature - all of	
29c.	**1 mark**	**2 marks**	**3 marks**
	Hydrogen carbonate is a base but missing or incorrect equation; hydrogen sulfate is an acid but missing or incorrect equation;	Hydrogen carbonate is a base + equation; hydrogen sulfate is an acid + equation;	Hydrogen carbonate is a base + correct equation; hydrogen sulfate is an acid + correct equation; amphiprotic substances but during hydrolysis of the ion the reaction shown is favoured

30a.	**1 mark**	**2 marks**	**3 marks**
	Partially complete sequence of things to do for ester production using reflux - NO expected result +/OR name of chemicals used and product (including water)	Complete (or partially complete) sequence of things to do for ester production using reflux +/OR expected result +/OR name of chemicals used and product (including water) – 2 out of three correct	Complete sequence of things to do for ester production using reflux + expected result + name of chemicals used and product (including water)
30b.	**1 mark**	**2 marks**	
	Risks identified & described + describe how risks were minimized	Variety of risks (not from single area) identified & described + explanation of how risks were minimized	
31a.	$[H_3O^+] = 10^{-pH}$; 5.01×10^{-6}M – must have units for mark		
31b.	**1 mark**	**2 marks**	
	Weak because it's a food (or similar); no mark for a classification only	Classified as weak – very low dissociation constant (K_a) value indicating a low degree of ionization and hydronium ion production	
31c.	**1 mark**	**2 marks**	**3 marks**
	Reasons given but no assessment made. No real linkage between reason and question.	Contains an assessment OR offers supporting reason(s) for the assessment. Minimal linkage between reasons and assessment.	Contains an assessment – offers supporting reasons for the assessment. Must be fully explained for 3 marks