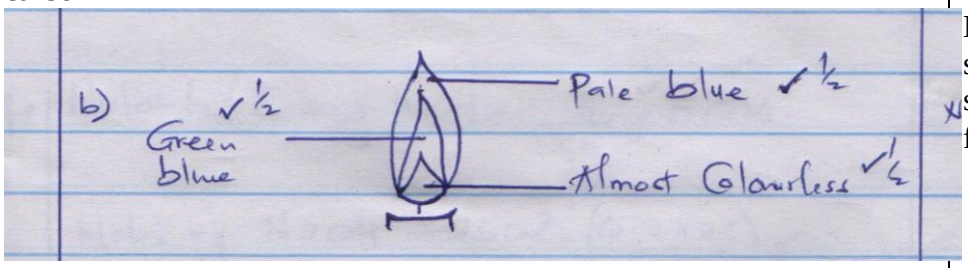
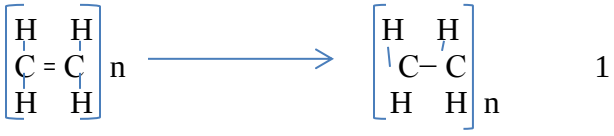
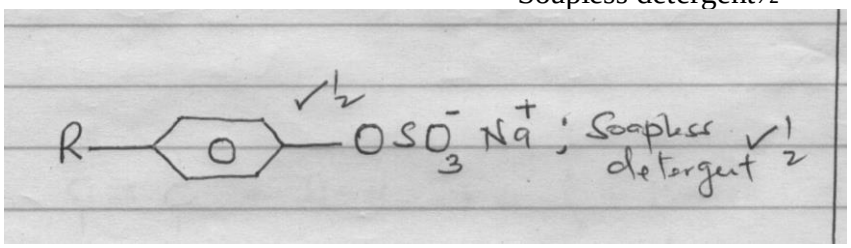
√CHEMISTRY 233/1 MARKING SCHEME

NO	ANSWER	REMARKS
1	a) The laboratory gas burns in excess oxygen 1 OR There is no unburnt carbon 1  	NB: ½ for straight shape of flame
		3
2	Crush the nuts using mortar and pestle 1 Add appropriate solvent e.g Acetone and continue crushing 1 Filter/decant the mixture to obtain a solution of oil in filtrate½ Allow the filtrate/Acetone to evaporate in the sun½	
		3
3	a) $2I^-_{(aq)} \longrightarrow I_{2\,(g)} + 2e^-$ 1 $Pb^{2+}_{(aq)} + 2e^- \longrightarrow Pb_{(s)}$ 1 b) Extraction of reactive metals Purification of metals Electroplating Manufacture of pure chemicals e.g Cl_2, NaOH etc	Any: one
		3
4	Molarity/ conce. Of NaOH = 8/40 = 0.2 Moles of NaOH in $25cm^3$ = $\frac{0.2 \times 25}{1000}$ = 0.005mol $H^+ + 2OH^- \longrightarrow H_2O$; M.R = 1:2 Moles of acid = ½ x 0.005 = 0.0025 mol R.M.M = $\frac{0.245}{0.0025}$ = 98	
		3
5	a) Zinc blende 1 b) $2ZnO_{(s)} + C_{(s)} \longrightarrow 2Zn_{(s)} + CO_{2\,(g)}$ 1	

	c) Manufacture of dry cell ½ Galvanizing of iron ½	
		3
6	a) (i) S 1 (ii) Q 1 b) Sodium hydroxide/ potassium hydroxide 1	
		3
7	i) Stable 1 ii) R 1 As the number of electrons the same energy level, nuclear attraction increases leading to decrease in atomic radius 1	
		3
8	a) Frasch process 1 b) Hot compressed air 1 c) Monoclinic/prismic ½ Rhombic/alpha ½	
		3
9	a) A 2.8.1 ½ B 2.1 ½ b) B 1: Strong attraction of outermost energy level electrons towards the nuclear 1	
		3
10	a) Time taken for a given mass of a radioactive isotope to reduce to half its original mass 1 b) No. of half-life = $\frac{100}{25}$ = 4 $5/W = (½)^4$ = W = 80 g OR X → ½x → ¼x → 1/8x → 1/16x 1/16x = 5 g x = 80 g	
		3
11	a) Equilibrium shifts to the right ½ to replace ammonia gas absorbed by water molecule ½ b) Equilibrium shifts to the right ½ to use up nitrogen gas added ½	

	c) Forward reaction is exothermic ½ hence forward by low temperature: Equilibrium shifts to the right ½	
		3
12	a) (i) X- Bromoethene ½ N- Ethylhydrogen sulphate ½ b) M- Bromine gas ½  1	NB;carbon atom MUST have 4 covalent bonds
		3
13	a) Rate of diffusion of fixed mass of a gas is inversely proportional to the square root of its density 1 b) R_{HCl} = 30/20 = 1.5cm^3/s $1.5/R_B = \sqrt{64/36.5}$ R_B = 1.1333cm$^{3/s}$ If 1sec = 1.1333cm^3 ? = 42cm^3 = 37 sec	
		3
14	a) $CuO_{(s)} + H_{2\,(g)} \rightarrow Cu_{\,(s)} + H_2O_{\,(l)}$ b) Add anhydrous copper II sulphate 1 to D, if changes to form white to blue 1 OR dip cobalt (II) chloride paper into substance D; if changes from blue to pink 1	
		3
15	a) Soapless detergent½  b) Non-biodegrable 1	Accept **K**$^+$ in the reagent X
		2
16	a) Different forms of pure substance/Element existing in the same physical state 1	

	b) Has layers bonded with weak vander waal forces which slide on slight heating 1 c) Sulphur 1	
		3
17	Place the sodium carbonate in a test tube containing water and stir to make a solution 1 Place the lead (II) nitrate in another test tube containing water to make a solution 1 React an equal portions of the two solution in a boiling tube to precipitate lead (II) carbonate ½ Filter off the precipitate as a residue and wash with distilled water. ½	
		3
18	Bond breaking = (C=C) + (H-H) + 4(C-H) = 612 + 435.9 + 4(413) ½ = +2699.9kJ½ Bond formation = (C-C) + 6(C-H) = 347 + 6(413) ½ = -2825kJ½ Enthalpy change = (+2699.9- 2825) ½ = -125.1kJ½	
		3
19	a) Reacts with both oxygen ½ and nitrogen ½ in air b) $3Mg_{(s)} + N_2 \rightarrow Mg_3N_2(s)$ 1 $2Mg_{(s)} + O_{2(g)} \rightarrow 2MgO_{(s)}$ 1	
		3
20	i) Mass of iron = (12.66 – 10.98) = 1.68 g½ ii) Mass of oxygen = (13.30 – 12.66) = 0.64 g½ iii) Empirical formula Element Fe O Mass 1.68 0.64 R.A.M 56 16 Mole 0.03 0.04 ½ M .R 1x3 1.33x3 ½ 3 4 ½ Formula Fe_3O_4 ½	

		3
21	a) Chlorine → melts and boils below room temperature (25^0C) b) Bromine has large molecular/atomic mass√ 1 hence experience stronger √1 intermolecular force of attraction than chlorine c) Chlorine has smallest atomic radius hence easily attract electrons /low shielding effect	3
22	a) Q = It = 0.5 x (32 x 60 + 10) = 9650√½ No. of faradays = $\frac{9650}{96500}$ √½ = 0.01 F√½ No. of Faraday liberating 1 mole = $\frac{(0.01 \times 88)}{0.44}$√½ = 2 F ½ b) XCl_2 ½	
		3
23	a) Light blue precipitate√ formed that dissolves√ in excess ammonia forming a deep blue√ solution b) $Cu^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Cu(OH)_{2\,(s)}$√ Light blue $Cu(OH)_{2\,(s)} + 4NH_{3\,(aq)} \rightarrow [Cu(NH_3)_4]^{2+}_{(aq)}$√ Deep blue	
		3
24	i) a→Dative bond OR coordinate bond 1 b→Covalent bond 1 ii) $7 \times 2 = 14e^-$ 1	
		3
25	i) ACl_3 1 ii) $2Al_{(s)} + 3Cl_{2\,(g)} \rightarrow 2\,AlCl_{3\,(s)}$ 1 iii) Prevents moisture from entering the apparatus 1	
		3
26	a) When gases react, they do so in volumes that bear simple ratio to one another and to the products formed 1 b) $C_2H_x + 3O_2 \rightarrow CO_2 + H_2O$ 10 30 20 20	

	1 3 2 2 1 X = 4 1	
		3
27	a) Expel air from the combustion tube to avoid pre-oxidation of copper metal (hot) 1 b) Brown copper metal turns black 1 c) Nitrogen gas 1	
		3
	TOTAL MARKS	**80**