**CHEMISTRY 233/2**

 **MARKING SCHEME**

1. (a) (i) K **√1mk**

 (ii) J or C **√1mk**

 (iii) Group 4 , period i.e. below S in the grid

 (iv) J and U are in the same period and across the period the nuclear charge increases hence nuclear

 charge of U is greater than that of J hence it pulls the outermost electron more strongly reducing the radius.

 (v) **Y** – is better conductor because it has more delocalized electrons. ***OR*** Y- has 3 delocalized

 electrons while A how one delocalized electron.

 (vi) The B.p of the elements increases **√1mk** down the group. This is because the intermolecular forces of attraction increase **√1mk** down the group with increase in the size of the molecules.

 (b) (i) **V** and **G√1mk** because they are in the same group or loses 2 electrons / some number of electrons in the outer energy levels.

 (ii) **X**, **√½mk** because its ionic radius is bigger tendency to donate its electron is high. **√½mk**

 (iii) E, **√½mk** because its ionic radius is bigger than atomic radius so its tendency to donate its electron is high. **√½mk**

2. (a) Fractional distillation **√1mk**

 (b) (i) Cracking – is the braking of long-chain alkane molecules into shorter alkanes and an alkene by

 heating or use of catalyst. **√1mk**

 (ii) - Heat or temperature 400oC – 700oC **Any two correct for√1mk each**

 - Silica /SiO2 or Catalyst – silica /SiO2

 - Aluminium oxide Al2O3

 (iii) C10H22(l) → C5H12 + C5H10(g) **√1mk**

 (iv)

H H H H √½mk

 | | |

 C = C – C – C – C – H

 | | | |

H H H H H Pent-1-ene √½mk

H H H H √½mk

 | | |

 C = C – C – C – H  ***OR***

 | |

H H H √½mk

 H C H

 |

 H 2-methyl but- 1-ene

 H H H H √½mk

 | | |

 H C = C – C – C – C – H

 | | | |

 H H H H H Pent-2-ene √½mk

H H H √½mk

 | |

 C = C – C – C – H

 | |

H H H H √½mk

 H C H

 |

 H 3-methylbut-1-ene

H H H √½mk

 | |

H - C = C – C – C – H

 | |

 H H √½mk

 H - C - H

 |

 H 2-methylbut-2-ene

*Any two; drawing ½mk naming ½mk*

 (v) Shake a sample with;

 Bromine C5H12 does not decolourise, C5H10 decolourise ***OR***. – Acidified Potassium

 chromate (VI) with C5H12 the orange colour does not change but with C5H10 the orange

 colour changes to green ***OR*** Burn a sample of C5H12 burns with a non-luminous flame;

 while C5H10 burns with luminous

 (c) (i) Soapy √1mk Detergent √1mk

 (ii) Soapless detergent √1mk because it is non-biodegradable √1mk hence pollutes the

 Environment.

3. (a) (i) Name – Aluminium hydroxide √½

 Formula: Al(OH)3(s) √½ (1mk)

(ii) Name: Sodium aluminate / tetrahydroxo aluminate √1

 Formular: NaAl(OH)4(aq) /[Al(OH)4]-(aq) √1 (2mks)

 (b) Amphoterism

 (c) Al(OH)3(s) + OH-(aq)→[Al(OH)4]-(aq) (1mk)

d) i)



 (ii) I . 33/100g of H2O (must be on the graph)

 II. 25oC √1

III. Solubility of X at 30oC = 19g/100g of water mass of crystals deposited 50-19 = 31g √½ (1mk)

4. (a) (i) Water

 (ii) 6.5; √1 presence of Carbonic acid

 i.e CO2 + H2O → H2CO3

 (iii) 2 Na2O2(s) + 2H2O(l) →4NaOH(aq) + 2O2(s) √1

(b) (i) to lower the melting point of sodium chloride √1

 (ii) sodium react with air and water vigorously/sodium would react with moist air √1

(c) (i) If CO2 is bubbled in lime water for a few minutes white ppt. is formed. No white ppt. forms

 when CO is bubbled into lime water.

 (ii) – Extraction of metals √1

(d) CO2 is highly soluble√½ in sodium hydroxide to form Na2CO3 √½soluble in water to form

 Carbonic acid. √ (2mks)

5. (a) (i) A – Concentrated hydrochloric acid√1

 B – water √ 1mk

 (ii) Calcium oxide / CaO√ (1mk)

(iii) To absorb unreacted /excess chlorine √

(iv) 2KMnO4(s) + 16HCl(aq) →2KCl(aq) + 2MnCl(aq) + 8H2O(l) + 5Cl2(g) √1

(v) Solid C sublimes √ hence collects on a cooler place away fromheating.

(vi) Elements present Al Cl

 Mass/volume 0.675 1800cm3

R.A.M/M.G.V 27 24000

No. of moles 0.675 √½ = 0.0025 √½ 1800 = 0.075

 27 24100

Mole ratio 0.025 = 1 √½ 0.075 = 3

 0.025 0.025

 EF = AlCl3 √½

(AlCl3)n = 267 √½

(27 + 35.5 x 3 )n = 267

n = 267 =2 √½

 133.5

 M.F = (AlCl3)2 = Al2Cl6 √½

(b) (i) 6NaOH(aq) + 3Cl2(g) → NaClO3(aq) + 5NaCl(aq) + 3H2O(l)

 (ii) Bleaching agent in paper pulp√1 // Used as herbicides √1

(c) Sulphur (IV) oxide bleaches by reduction√½ and removal of oxygen from the dye hence

 temporary √½ while chlorine bleaches by oxidation√½/adding oxygen to the dye hence permanent. √½

6. A. (i) (a) Carbon (IV) oxide or CO2 or

 Carbon (IV) oxide (CO2) √1 (Any)

 (b) KOH(aq) + CO2(g) KHCO3(aq) √1

 Wrong balanced = 0

 State symbols wrong or missing ½ mark

 (ii) Oxygen gas or O2(g) or oxygen (O2) gas √1

 (iii) Nitrogen gas or N2(g) or nitrogen (N2) gas. √1

 B. (i) Moles of nitrogen = 1.54 √ ½ = 0.11 √ ½

 14

 Moles of oxygen = 3.53 √ ½ = 0.22 √ ½

 16

 (ii) N O

 Mole ratio 0.11 = 1 √ ½ 0.22 = 2 √ ½

 0.11 0.11

 Simplest formula NO2 √1

 (iii) Compound has low melting and boiling points √1 because it has a

 weak Van der wall forces √1

7. (a) copper oxide / CuO √1mk

 (b) CuSO4(aq) + Na2CO3(aq) CuCO3(s) + Na2SO4(aq) √1mk

(c) (i) Sodium sulphate / Na2SO4  √1mk

 (ii) Copper carbonate √1mk

 (d) CuO(s) + H2SO4(aq) CuSO4(aq) + H2O(l) √1

(e) Cu2+ (aq) + CO32-(aq) CuCO3(s) √1mk5

***heat***

(f) CuCO3(s) CuO(s) + CO2(g) √1mk

(g) Filtrate √ ½

 Beaker √ ½

 Water bath√ ½

 Tripond stand √ ½

 Workability √1mk

 