**CHEMISTRY 233/2**

**FORM 4**

**MARKING SCHEME**

1. a) Q (½)

b) U (½)

c) i. 2,6 (½)

 ii. 2,8,6 (½)

d) W has a higher atomic mass than V.

e) i. S2- or U-

ii. P+ or R2+

f) Protons 18 neutrons 22

g) H+e- H-

H H++e-

 h) 2P+U2 2PU

 R+U2 RU2

1.



ii) NaCl(s) + H2SO4(l) NaHSO4(aq) + HCl(g) (1mk)

 iii) Anhydrous calcium chloride / Silica jel / Conc. Sulphuric (VI) acid. (1mk)

 iv) White ppt / suspension formed (1mk)

 Chlorine Cl- ions precipitate with Pb2+(aq) as PbCl2(s) (1mk)

 v) Hydrochloric acid is not an oxidizing agent hence reacts to remove the oxide. (1mk)

 Conc. Nitric (V) acid is an oxidizing agent. It oxidizes the cleaned surface.

b) i. Oxygen (½)

 ii. a glowing splint lowered into gas X is required (1mk)

 iii. 2HOCl 2HCl(aq) + O2(g)

c) i. P-conc. Hydrochloric acid ( ½ mk) M – water ( ½ mk)

 ii. Anhydrous calcium chloride ( ½ mk)

 iii. Aluminium chloride / AlCl3

1. a) i. International union of pure and applied chemistry. (1mk)

ii. Compound made up carbon and hydrogen only. (1mk)

iii. alkynes (1mk)

b) i. 3-ethyl-2 methyl pentane (1mk)

ii. 2-chloron-3-methyl but-2-ene (1mk)

 H H

 I I

c) i. H – C ≡ C – C – C – H (1mk

 I I

 CH3 H

 H H Br H

 I I I I

ii. H – C – C – C ≡ C – C – H (1mk)

 I I I I

 H H Br H

 d) i. Calcium dicarbide /CaC2 ( ½ )

ethyne ( ½)

chloroethene ( ½ )

 ii. CaC2(l) + 2H2O C2H2 + Ca(OH)2(aq) (1mk)

 iii. C2H2 + H2 C2H4 (1mk)

e) i. C3H6 ( ½ )

ii. Use bromine water – C3H6 – neutralizes but not C3H8

* Use acidified K2Cr2O7 – C3H6 turn it from orange to green but C3H8 does not.
1. a) i. Conc. potassium hydroxide /conc. Sodium hydroxide (A) (1mk)
* B (Conc. Sulphuric (VI) acid (1mk)

ii. Combustion tube

2CU(s) + O2(g) 2CuO(s)

In Q

KOH(aq) + CO(g) KHCO3 (1mk)

NaOH + CO2(g) NaHCO3(aq)

iii. Brown colour of copper turns to black. (1mk)

iv. Neon ( ½)

v. Magnesium reacts also with Nitrogen to form magnesium nitride.

b) i. X – Oxygen Y – Ammonia (1mk)

c) i. A – Water B – Nitrogen (1mk)

ii. Black copper (V) oxide changes to brown copper as its reduced by ammonia

iii. 3CuO(s) + 2NH3(g) 3Cu(s) + N2(g) + 3H2O(l) (1mk)

iv. – Any one correct (1mk)

* As fertilizer
* Manufacture of nitrogenous fertilizer
* As refrigerant
* Softening water
* Removal of greasy stains
* Manufacture of hydrazine (rocket fuel)

1. a) i. Different forms of an element existing in the same physical state (1mk)

ii. The structure of graphic uses 3 of the 4 valence electrons for covalent bonding, the extra electrons conduct electricity (free mobile electrons). Diamond does not conduct electricity because it uses all its valence electrons for bonding. (2mks)

iii. Sodium carbonate and potassium carbonate. (2mks)

iv. C(s) + O2(g) CO2(g) (1mk)

v. HCOOH(aq) CO(g) + H2O(l) (1mk)

b) i. Black specks – carbon (1mk)

White ash – magnesium oxide (1mk)

ii. 2Mg(s) + CO2(g) 2MgO(s) + C(s) (1mk)

c) i. Calcium carbonate (1mk)

ii. CaCO3(s) + H2O(l) + CO2(g) Ca(HCO3)2(aq) (1mk)

1. a) i. Sodium sulphate ( ½ )

ii. Na2SO3 ( ½ )

iii. Sulphur (IV) oxide ( ½ )

iv. Na2SO3(s) + 2HCl(aq) 2NaCl(aq) + H2O(l) + SO2(g) (1mk)

b) i. Gas E – Oxygen / O2 ( ½ )

ii. Sulphur/ S ( ½ )

iii. Sulphuric (VI) acid / H2SO4. ( ½ )

Water / H2O(l) ( ½ )

c) i. Vanadium (V) oxide platinum ( ½ )

(catalyst chamber)

ii. 2SO2(g) + O2(g) 2SO3(g) (1mk)

 (dilution chamber)

H2S2O7 + H2O(l) 2H2SO4(aq) (1mk)

1. i. White colour changes to black mass as the sugar is dehydrated to carbon. ( 1 ½ mk)

ii. Blue colour of copper (II) sulphate turns white. The acid dehydrates copper (II) sulphate crystals to anhydrous copper (II) sulphate. (1 ½ mk)

1. i. X – Dil. hydrochloric acid /HCl (1mk)

 Y – anhydrous calcium chloride / CaCl2

ii. FeS(s) + 2HCl FeCl2(aq) + H2S(g) (1mk)

iii. (1mk)



iv. Pb2+(aq) + H2S PbS + 2H+(aq) (1mk)

1. Mass of acid in a litre (1000cm3) (3mks)

Vol. x Den. = 1.84 x 1000 = 1840g (1)

% of acid is;

$$\left(\frac{1840×98}{100}\right)=1$$

∴Moles of acid per litre

$$\frac{1840}{100} × \frac{98}{98}=18.4M \left(1\right)$$

1. Reducing agent – H2S (1mk)

Oxidising agent – Cl2

1. i. T – hydrogen chloride gas / HCl

S – Ammonium chloride solid (NH4Cl)

ii. White ppt. of lead (II) chloride formed. (1mk)

iii. HCl(g) + NH(g) NHCl(g) (1mk)