FORM FOUR JOINT EVALUATION 2017 MARKING SCHEME

233/1

CHEMISTRY PAPER I

1 (a) Oxygen✓1/2

Argon✓1/2

Nitrogen✓1/2

(b) Fractional distillation✓1/2

(c) not enough oxygen in air ✓1*//small percentage of oxygen in air//Not a sufficient amount of oxygen only 20% oxygen in air*

2 (i) a base that is partially dissociates in water ✓1*//Not completely ionized*

(ii) MM of NH_3 *= 17g*

Moles of $NH_3 = \frac{510}{17}$ *=30 moles, moles of* $(NH_4)_3PO_4 = \frac{30}{3}$ *= 10 moles*✓1

Mass of $(NH_4)_3PO_4$ *=10 × 149 = 1490g*✓1

OR

$NH_3 \longrightarrow (NH_4)_3PO_4$

51g $\longrightarrow$ *149g*✓1

510g = $\frac{510}{51} \times 149 =$ *1490g*✓1

3 mm of CH_3COOH *=60*✓1/2

Moles of $CH_3COOH = \frac{6}{60}$ *= 0.1 moles*✓1

Concentration = 0.1/0.1 = 1 mol l^{-1} ✓1

4 (a) slower ✓1 *reject slow*

Lower✓1 *reject low*

(b) hydrochloric acid is fully dissociated giving a more H^+ *ions than ethanoic acid*✓1

5 energy absorbed = 0.1 x 4.2x 8

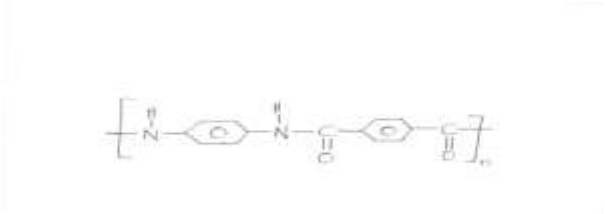
=3.36Kj✓1

(b) molar heat combustion = $\frac{3.36}{5} \times 270 = 181.44$ ✓1

$\Delta H_{comb} = -181.44 kJmol^{-1}$ ✓1

6 (a) lighter// cheaper// stronger// can be moulded to desired shapes easily//less affected by acids, alkalis, water and air✓1 (any one correct)

(b)



✓1

7 add excess magnesium to dil sulphuric acid, filter, ✓1*heat to saturate filtrate, cool to allow crystallization,* ✓1 *filter and dry magnesium sulphate residue between filter papers.* ✓1

8 (a) process by which an electric current is passed through a compound and is decomposed by it. ✓1

(b) electrode A –anode✓1 *electrode B – cathode*✓1

9a) Grater surface area✓1 *increases the frequency of fruitful collisions*✓1*// more collisions//greater chance of collisions .*

b) Redox reaction

10 Electrons 79✓1

Protons 79✓1

Neutrons 118✓1

11 (a) Reduction✓1

(b) $Fe_2O_{3(s)} + 3CO_{(g)} \longrightarrow 2Fe_{(s)} + 3CO_{2(g)}$ ✓1

c) making nuts//bolts// nails//handrails// iron sheets// horse shoes//agricultural implements✓1

12 A - $Cu(OH)_2$ ✓1

B - $[Cu(NH3)4]2+$ ✓1

C - $CuCl_2$ ✓1

13 (a) Yield of SO_3 *reduces,* ✓1 *increase in temperature favors the process that absorbs heat*✓1

(b

✓1

14 (a) Energy change when one mole of electrons is removed from one mole of gaseous atoms✓1*//amount of energy required when one electron is removed from a gaseous atom*

(b) Group V✓1*, big difference between fifth and sixth ionization energies* ✓1

(i) 2,5✓1

15 (i) $NaCl_{(s)} + H_2O_{(l)} \longrightarrow NaCl_{(aq)}$ ✓1

$SiCl_{4(s)} + 2\ H_2O_{(l)} \longrightarrow SiO_{2(s)} + 4HCl_{(aq)}$ ✓1

(ii) $SiCl_4$ *is covalent and simple molecular it reacts with water/hydrolysed while NaCl is ionic and giant ionic structure it dissolves/does not react with water.* ✓1

16 (a) oxidation is loss of electrons ✓1

(b) MnO_4^- : Fe^{2+}

Mole ratio 1 : 5 moles of Fe^{2+} *= 5 x 0.02x0.02= 0.002moles* ✓1

25cm^3 *contains 0.002 moles* Fe^{2+}

250cm^3 *contains 0.02 moles, 3.4g = 0.02 moles*

1mole= 3.4/0.02 =170g

152 + 18x =170, 18x = 18 X=1✓1

17 (i) strontium has four isotopes✓1

(ii) R.A.M = $\underline{0.56x84+9.86x86+87x7.0+88 \times 82.58}$ ✓1 $= \underline{8771.04} = 87.71$ ✓1

100 *100*

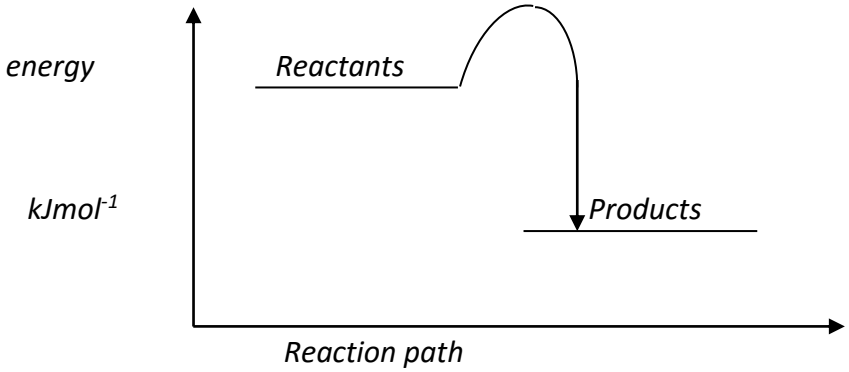
18 (a) X $Mg(OH)_2$ ✓1

Y MgO ✓1

(b) $2Mg(NO_3)_{2(s)} \longrightarrow 2MgO_{(s)} + 4NO_{2(g)} + O_{2(g)}$ ✓1

19 manufacture of glass, soap ,softening hard water ✓1

20



21 Chlorine is more reactive than iodine, ✓1 it displaces iodide ions from solution to form brown iodine ✓1// chlorine is higher in the reactivity series than iodine

22 (i) number of nucleons = 24✓1

number of charged particles =22 ✓1

(ii) to kill bacteria in canned food✓1// to monitor the uptake of phosphate fertilizer by plants

23 add dilute HCl/ H_2SO_4 ✓1 copper does not react ✓1/ dissolve, zinc dissolves/reacts, filter, ✓1 wash and dry the copper residue. ✓1

24 (i) adds upto a 100%

(ii) element C H O

Mass 55.85 6.97 37.18

No of moles 55.85/12=4.65 6.97/1=6.87 37.18/16= 2.325✓1

Relative atoms 4.65/2.325= 2 6.97/2.325= 2.9978 2.325/2.325 =1✓1

EF C_2H_3O✓1

25 the density of a component✓1

The stickness of a component✓1

26 (i) The flask, ✓1 *to produce steam that reacts with iron powder// to prevent iron from reacting* ✓ *with air in the combustion tube.*

(ii) $4Fe_{(s)} + 4H_2O_{(g)} \longrightarrow Fe_3O_{4(s)} + 4H_{2(g)}$ ✓1

27 (a) existence of an element in different forms in the same physical state✓1

(b) graphite✓1

diamond✓1