**MARKING SCHEME**

**CHEMISTRY PAPER 2**

**ARISE AND SHINE TRIAL 1 EXAM**

**AUGUST - 2022**

1. (a). Q$√$ 1- has highest number of occupied energy levels $√$

(b). U$√1$- most electro negative/highest to attract tendency the highest elector affinity$√$

(c.(i). S – 2.8 $√$1/2

 (ii). Q – 2,8,8,1 $√$1/2

(d). P is larger than R $√$1 nuclear charge increase across the period //R has more protons than P. $√$1

e). Atomic mass = P + n

18 + n = 40

N = 40 – 18

N = 22

Composition P = 18$√$1/2 , n = 22$√$1/2

f). i) P2S$√$1/2 //Na2O

 ii) RT/MgS$√$1

g.i) U- or S2- // F- or O2-

 ii). P+ or R2+$√$1 // Na+ or Mg 2+

2.a i) W – propanoic acid /CH3CH2COOH$√$1

ii). Gas V – carbon (iv). Oxide $√$1 / CO2

b.i). Hydrogenation $√$1

ii). Polymerisation $√$12

c.i). Oxidation $√$1

ii). H H H 1,2 dibromopropane$√$1

 Q H C C C H $√1$

 H Br Br

CH3 H $√1$

P C C polypropene $√1$

H H n

d). CH3CHCH2(g) + Br2(g)$\rightarrow $CH3CHBrCH2Br(g) $√1$

Q3.

1.a) E$√1$Itt has the more positive$√1$ standardelectrode potential

b.i) A and E half cells$√$1

ii). A(s)/A+(aq) // ½ E2(s)/E-(aq) Pt EƟ=+4.28V$√$1/2

c). emf = Ered – Eoxid

=2.92 - -(-0.44)$ √$1

= -2.48V

Overall emf is negative, the reaction$√$1 does not take place Orz$√1$

2A+ + 2e- $\rightarrow $A(s) EƟ – 2.92

D(s) $\rightarrow $D2+ + 2e- EƟ + 0.44\_\_\_\_\_\_\_\_\_\_

2A+(aq) + D(s) $\rightarrow $A(s) + D2+(aq) E – 2.48

11. a) H -Anode $√$1/2

 J – Cathode $√$1/2

b) a burning splint is introduced at the mouth a test tube containing gas F$√$1

A dep sound is produced $√$1

 Accept: It goes off/extinguishes with a loop ‘sound

Reject – It burn with a ‘pop’ sound

c) Q = it Q = 5x [(3x60) + 21]

= 5 x 201

= 1005c$√$1

4OH(aq) $\rightarrow $2H2O(l) + O2(g) + 4e- $√$1

If = 96500c

4 x 96500c $⟶$24000cm3

1005 c$\rightarrow $ ?

1005c x 24000 $√$1/2

4 x 96500c = 62.4870466

= 62.48cm3$√$1/2

4(i) Mass of magnesium oxide = 20.92 – 19.52

=1.40g

(a)(i). Mass of magnesium = 20.36 = 19.52

 = 0.84g$√$1/2

Mass of oxygen = 20.92 – 20.36

= 0.56g$√$1/2

Percentage mass of oxygen in magnesium oxide = $\frac{0.56 }{1.40}$ x 100%

 = 40%$√$1/2

(II)

|  |  |  |
| --- | --- | --- |
| Element  | Mg | O |
| % composition by massR.A.MNo. of molesMole ration | 6024=$\frac{60 }{24}$ = 2.5$√1/$2=$\frac{2.5}{2.5}$1$√$1/2 | 4016=$\frac{40}{16}$ 2.5$√$1/2=$\frac{2.5}{2.5}$1 $√$1/2  |

The empirical formula is MgO$√$1

(b). (i). 2HaOH(aq) + H2SO4(aq) $\rightarrow $Na2SO4(aq) + 2H2O(l)$ √$1/2

I. Moles of sulphuric acid that reacted with the solution = $\frac{20 x 0.25}{1000}$ $√$1/2

= 0.005 moles $√$1/2

NaOH : H2SO4

 2:1 $√$1/2

$∴$Moles of sodium hydroxide $\rightarrow $ 0.005 x2

 0.01 moles $√$1/2

II. If 50cm3 contains 0.01 moles

$∴$1000cm3 contains = $\frac{1000 x 0,01 }{50}√$1/2

0.2 moles$√$1

III. RMM of NaOH = 23 + 16 + 1

= 40

Mass of NaOH in 1 litre $⇒$0.2 x 40

= 8g$√$1/2

Mass of sodium chloride in the mixture = (8.8 – 8)g

= 0.8g$√$1/2

Percentage mass of sodium chloride = $\frac{0.8}{8.8} $x 100%$√$1/2

 = 9.09%$√$1/2

5.(a)(i). Change in temperature $∆$T = 46.5 – 25

= 21.5k$√$1/2

Heat evolved $∆$H =MC$∆$T

= 0.45 x 4.2 x 21.5$√$1/2

= 40.635KJ$√$1

(ii). Mass of ethanol burned = 125.5 – 124.0

 = 1.5g

Molar mass of C2H5OH = (2 x 12) + (6 x 1) + 16

 = 46$√$1/2

No.of moles = $\frac{1.5}{46}$ $√$1/2

 = 0.032608695652173 moles

Molar heart of combustion of ethanol =$\frac{40.635 }{ 0.032608695652173}√$1/2

 = -1,246.14Kjmol-1 $√1/2$

(b). CH3H2OH(l)$ $+ 3O2(g) $\rightarrow $2CO2(g)$ $+ 3H2O(l)$ √$1

c). Heat last to the surrounding $√$1 and that absorbed by apparatus$√$1 is not accounted for.

d)(i). H2 (g) + ½O2(g) $\rightarrow $H2O(g) $∆H$= -286kJmol-1$√$1/2

Enegy (kJ)

 H2(g) + ½ O2(g) $√$1/2

 =$∆H$= -286kJmol-1

 H2O(g)$ √$1/2

 Reaction path $√$1/2

e). (i). A fuel is a substance that produces useful energy when it undergoes a chemical or nuclear reaction $√$1

(ii). Cost

Heating value

Availability

Environmental effects

Ease of storage

Ease of transportation

Ease and rate of combustion

(Any two for mk)

6. (a) surface area $√$1 / size of particles

(b) (i).



(ii).



(iii). PbCO3(s) + 2HNO3(aq) $\rightarrow $Pb(NO3)2(aq) + CO2(g) + H2O(l)$√1$

(Penalize ½ mk for missing/wrong state symbols)

c). Insoluble lead (II) chloride formed coat the surface of lead (II) carbonate.$ √$1 This prevents further reaction $√$1

(d). Colourless solution changes to yellow/orange$√$1. Addition of hydrochloric acidincreases the concentration of H+ ions and the equilibrium shifts from right to left $√$1

(7)(a)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Solubility of potassium chlorate (g/100gH2O | 50.0$√$1 | 25.0$√$1 | 16.7$√$1 | 12.5$√$1 | 10.0$√$1 |

NB$√$1mk  for expressing solubility values to the same number of decimal places.

(b). S-1/2

L- ½

P – 1

C – 1

 3

(c) (i). 11g/100gH2O$√$1

 (ii). 72oc ($\pm $0.5)$ √$1

(d). solubility of potassium, chlorate increases with increase in temperature $√$1/more potassium chlorates dissolves as temperature rises$√$1

e). Extraction of sodium carbonate from Trona

 Extraction of sodium chloride

(Any one)