**CHEMISTRY**

**OPENER EXAMINATION TERM 3, 2022**

**FORM FOUR PAPER 2**

**MARKING SCHEME**

**1 a)** i)2,8 ii) 2,8,8

b) i) U ii) S

C) Q has a larger atomic radius than R/ R has a shorter atomic radius Q 1mk

 R has a greater nucleic charge /protonic charge which attracts the energy levels reducing its size

d)

e) S has a giant atomic structure with strong covalent bonds while T HAS SIMPLE MOLECULAR STRUCTURE WITH WEAK VAN DER WAAL FORCES.

F i) 2Na + 2H20 -------------- 2 NaOH + H2

 2Q + 2H2O ---------------2 QOH + H2

ii) 4Al + 3 O2 --------------- 2 Al2O3 1mk

MOLES OF OXYGEN GAS 960/24000= 0.04 ½mk

MOLES OF AL2O3 O2;AL2O3

 3 ; 2

 0.04; ?

 0.04 X2 /3 = 0. 0267 ½ mk

Mass of AL2O3 = 0.0267 X 102= ½mk

 2.7234g ½ mk

2.a)i) CaO………………..Ca+ ½ O2 +635

 CO2………………….C + O2  +394

 Ca + 1 ½ O2 …………CaCO3  -720

 =+309

b) i)DH Hydration

ii) DH3=DH1 +DH2

+2237-2378=-141

c) i) MCDT M= 250, C= 4.2 ,DT= 29-22= 7

250 X 4.2 X 7/1000=7.35kJ

If 1.2g= 7.35

 ?= 560

1.2 x 560 /7.35=

 91

ii) Incomplete combustion of the compound.

 Heat loss to the surrounding

iii) The enthalpy change when one mole of a substance is dissolved in water to form the most dilution solution possible/an infinitely dilute solution.

d) i) H-H + Cl –Cl ---------2H-Cl

 +435 + 243 --------------2( -431) 1MK

 678 – 862= -184 Kj 1mk

ii) exothermic , reactants above, products below, arrow facing down.

 

3 a) React zinc metal with dilute nitric v acid, stir until effervescence stops.

Filter. React the zinc nitrate solution formed with sodium carbonate to form insoluble zinc carbonate. Filter, rinse the residue with distilled water and dry between filter papers.

b)Nb/ separating funnel - 1MK

 correct order of liquids- X

 Z

 Y

 

Beaker---------------- ½

 Stand ---------------- ½

c) I) Lead oxide

Ii) 2AgNO3(aq)………………2Ag(aq)+2NO2(g) +O2 (g )

d I) A blue precipitate is formed. 1mk

ii)Blue ppt dissolves forming a deep blue solution. 1mk

Cu (OH)2(s) +4NH3(aq) …………..[Cu(NH3)4]+2 (aq) +2OH- (aq)

4.I a) x-axis with correct units½

 Y-axis with correct units ½

 Plotting- 13 points- 1mk

 12 points – ½ mk

 11points and below- 0mk

 b) tangent- 1mk dy/dx= ½ correct answer with units ½

 c) i) the reactants are at a higher concentration in the beginning thus more particles hence higher chances of collision 1mk

 ii) all the zinc has been used up and therefore reaction has come to an end.1mk

d) curve should start and level off at the same time with the other one but is ABOVE IT.

II a) Reversible reaction

b)i)The yield would increase.1MK Removing co2 would favor the forward reaction forming more hydrogen.

ii) Equilibrium shifts to the right. 1mk The forward reaction is endothermic and therefore would be favored by an increase in temperature.

5.a) an electrolyte that contains only one cation and one anion.

b)i) Hydrogen. ½ It has an electrode potential of 0.0v ½ mk



ii) EREDUCED - EOXIDIZED

 + .9- -2.4 = ½

 0.9 +2.4= 3.3V

IV) Y/Y+2 (aq) // M+2  (aq)/M(S)

c) The electrons lost at anode must be the ones gained at cathode 1 mk , 4 electrons are lost at anode to form 1 mole of oxygen, when the four electrons are gained at cathode, 2 moles of hydrogen are formed1mk

 **also accept correct equations;**

 4OH- (aq) ------------ 2H20 + O2 + 4e-

 4H+ (aq) + 4e- ---------------- 2H2 (g)

 *Both equations must be correct to score two mks*

d) i) Q=IT 1.3X 2.5 X60 X 60= 11,700C 1mk

 63.5g of Cu= 2Faradays

 If 63.5g ---------- 2 x96500

 ? ------------ 11700

 63.5 x 11700/ 2x 96500 ½ mk= 3.8494g ½ mk

ii) - blue color of solution fades.

 -bubbles of a colorless gas

6. a i) Electrolysis

ii) Haber

iii) Frasch

b) 2NH3 aq + H2SO4 aq ----------- ( NH4)2SO4 aq

 c i) finely divided iron ½ mk

 Temp --4500c ½ mk

 Pressure 200- 250 atm ½ mk

d )i) 4NH3 + 5O2----------- 4NO + 6H20

 ii) The NO produced is readily oxidized to NO2

e) Bubble a sample of each gas into acidified potassium manganite (vii), 1mk

 - In both purple acidified KMnO4 will turn colorless but with H2S there will be a yellow deposit. 1mk

7. a ) i) Propanoic acid

 ii) 3-Bromo-2-Chloro-pentane

b)i I Hydrogen

 II Magnesium propanoate

 III Propane

 ii) I -hydrogenation

 II- dehydration

 III – esterification

IV. polypropene.

V . CH3CHCH2 + HBr--------- CH3CH2CHBr

C.i) nylon 6,6

 ii) NH2 (CH2)6NH2 1MK and HOOC (CH2)4COOH 1MK

 iii) I- Soap detergents

 II- C 1mk, it is non-biodegradable 1mk