**SCHOOL BASED EXAMINATION 2019**

**CHEMISTRY 233/1**

**MARKING SCHEME**

**JULY/AUGUST 2019**

1. a) Exothermic reaction - heat energy is given out (lost) to the surrounding.

 Endothermic reaction - heat energy is absorbed from the surrounding.

b) Heat change = Heat required + Heat given out

 to break bonds during bond formation

 CH 4(g) + 2O 2(g) CO 2(g) + 2H2O*(l)*

 Heat required to break bonds = 4 x 413 = 652

 = 2 x 497 = 994

 2646 ✓ 1/2

 Heat given out = -804 x 2 = -1608

 = -464 x 5 = -1856

 -3464 ✓ 1/2

 Heat change = 2646 + - 3464 ✓ 1/2

 = -818 kJ/mol ✓ 1/2

1. Test I✓ 1/2  and II✓ 1/2
* Dilute sulphuric (VI) acid is not an oxidizing agent ✓ 1 hence cannot oxidize carbon to carbon (IV) oxide. ✓ 1
* Iron is above hydrogen in the reactivity series hence it displaces hydrogen. ✓ 1
1. – Add excess lead (II) oxide to dilute Nitric (V) acid. Filter the mixture.
* Add sodium carbonate /potassium carbonate/ammonium carbonate to the filtrate.
* to precipitate lead (II) carbonate. Filter the residue and wash it with distilled water. Dry between filter paper.
1. a) Zinc sulphide / Iron (II) sulphide

b) FeS(s) + 2 HCl (aq)  FeCl 2(aq) + H2S (g)

c) Has a smell of rotten eggs. Colourless gas.

1. KOH = 39 + 1 + 16 = 56 ✓ 1/2

Concentration of KOH = 7 = 0.125 moles/dm3 ✓ 1/2

 56

2KOH(aq) + H2X (aq)  K2X (aq) + 2H2O*(l)*

 2 : 1

Moles of H2X = 0.125 = 0.0625 Moles /dm3 ✓ 1/2

 2

RFM of the acid = 0.18 ✓ 1/2

 0.0625

 = 288 ✓ 1/2  (3 marks)

1. a) G and K

b) HL2

c) F

1. Yellow colour intensifies ✓ 1

Addition of NaOH increases the concentration ion of hydroxide ✓ 1/2  in the system therefore equilibrium shifts to the right. ✓ 1/2

1. O = 16 x 2 = 32



1. a)

 H H H

 H C C C OH

 H H H

b) i) dehydration

 ii) Propane

c) 70

1. Mass of oxygen = 2.75 – 195

 = 0.8 ✓ 1/2

 K O

 1.95 0.8

 39 16 ✓ 1/2

 0.05 0.05

 0.05 0.05 ✓ 1/2

 1 1

 (KO)n = 110

 (39 + 16) n = 11

 55n = 110 2

 55 55

 n = 2 ✓ 1/2  M.F. = (KO)2

 = K2O2 ✓ 1/2

1. a) Period 3 – Has 3 occupied energy levels.

b) R has more number of protons/nuclear charge than Q. Hence electrons of R are more strongly attracted.

Hydrogen gas

from generator

 

✓ 1

✓ 1

Workability – 10mk

Dry hydrogen gas

Conc. H2SO4 acid

1. i) Heat evolved = 400 x 4.2 x 9✓ 1/2

 = 15120J or 15.12kJ ✓ 1/2

ii) Mass of methanol burnt = 125 – 124.5

 RFM of methanol = 32 ✓ ½ = 0.5g ✓ 1/2

 0.5g of methanol = 15.12kJ

 32g of methanol = 15.12 x 32 ✓ 1/2

 0.5

 = -967.68kJ/mole ✓ 1/2

 

1. The solid dissolved to form a solution. (1mk)

This is because calcium chloride formed is deliquescent. ✓ 1

1. i) Cation – Zinc /Zn 2+

 Anion – Chloride / Cl-

b) Ag + (aq) + Cl - (aq) AgCl(s)

t 1/2

5600yrs

t 1/2

5600yrs

t 1/2

5600yrs

1. 1 1/2  1/4  1/8

Age of the wood = 3 x 5600

 = 16800 yrs

1. a) Sodium nitrate or Potassium nitrate

b) H2SO4(aq) + NaNO 3 (s) NaHSO 4 (aq) + HNO 3(g)

c) To prevent it from decomposing

1. a) Temporary

b) Temporary

c) Permanent

**20**. a) U – NaHCO3 or KHCO3

 V – Na2CO3 or K2CO3

 b) Na2CO 3(s) + 2HCl (aq) 2 NaCl (aq) + H2O (l) + CO 2(g)

or

 K2CO 3(s) + 2HCl(aq) 2KCl(aq) + CO 2(g) + H2O (l)

**21.** a) Copper (II) Sulphate

 b) 36 – 27 = 9g

 c) Fractional Crystallization

**22.** i) L(s) L 2+ (aq) + 2e-

 ii) Q 2+ (aq) + 2e- Q(s)

 b) E = +0.34 - - 0.13

 = 0.47v

**23.** i) t

 ii) P

**24.** a) RFM of BaSO4 = 56 + 32 + 64

 = 152

 Moles of BaSO4 = 4.66 = 0.031 moles

 152

 BaSO4 Ba 2+ + SO4 -2

 Mole 1 : 1 : 1 ∴ Moles of SO4 2- = 0.31

 b) 152 → 4.66g N2SO4 = 174

 ? → 5.34g SO4 = 96

 RFM of N2SO4 = 152 x 5.34 = 174 2N + 96 = 174

 4.66 2N = 174 – 96

 2N = 78 39

 2 2

 N = 39

**25.** i) Propanoic acid

 - Methanol

 ii) Esters

 iii) 2CO3OH + 2K 2CH3OK + H2

**26.** a) Because concentration of ions is high ✓ 1 at the beginning and decreases as the ions are discharged

 during electrolysis ✓ 1 (2mks)

 b) CU 2+ (aq) + 2e Cu(s) ✓ 1

**27.** T = (18 x 60) + 5

 = 1085 seconds

 Q = 0.5 x 1085

 = 542.5 C

 0.22g of Z = 542.5 C

 44g of Z = 542.5 x 44

 0.22

 = 108500C

 Charge = 108500 = 1.12

 Or 96500

 No. of Faradays

 +1

 Or

 Charge = 0.5 x 1085 x 44

 0.22 x 96500

 = + 1

**28.** a) Sublimation

 b) Oxidation

 c) Dehydration