KITUI COUNTY MOCK

233/2

CHEMISTRY

PAPER 2

(THEORY)

JULY, 2017

TIME: 2 HOURS

END OF TERM II FORM FOUR EXAMINATION, 2017

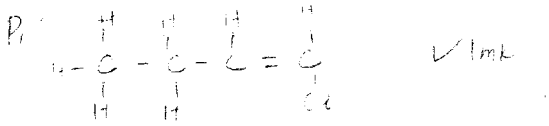
Kenya Certificate of Secondary Education (K.C.S.E)

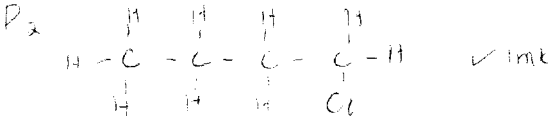
MARKING SCHEME

1. a) Carbon = 6 ✓½ mk, Hydrogen = 1 ✓½ mk, Sodium = 11 ✓½ mk, Neon = 10 ✓½ mk
   b) Ca^{2+} 2.8.8 ✓1 mk P^{3-} 2.8.8 ✓1 mk
   c) –259 + 273 = 14K ✓1 mk
   d) Red phosphorous ✓1 mk it has a higher melting point ✓1 mk
   e) The one with atomic number 24 ✓1 mk because the mass number is closer to the relative atomic mass(R.A.M) showing that it contributes to R.A.M more than the other two isotopes ✓1 mk
   f) Al_4C_3 ✓1 mk
   g) Melting point of magnesium is higher than that of sodium ✓1 mk because magnesium has more (2) delocalized electrons compared to sodium (1) hence it has strong metallic bonds ✓1 mk
2. a) i) Hot compressed <u>air</u> ✓1 mk
      ii) In order to melt suplhur in the deposits ✓1 mk
      iii) - It is insoluble in water ✓1 mk
      - Its melting point ids lower than that of super-heated water ✓1 mk
   b) i) $S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$ ✓1 mk
      ii) To dry sulphur (IV) oxide and air
      iii) Platinum ✓1 mk, Vanadium (V) oxide ✓1 mk
      iv) - It cools the products from the catalytic chamber ✓1 mk
      - It prevents the reactants getting into the catalytic chamber ✓1 mk
   c) It dissolves in water vapour in the air leading to formation of acid rain ✓1 mk
   d) A black mas is formed, concentrated H2SO4 is a dehydrating agent. It removes elements of water (hydrogen and oxygen) leaving behind carbon ✓1 mk
3. a) - Type of flame produced by the fuel
      - Amount of heat produced during combustion
      - Effects of products formed on the environment
      (Any two)
   b) i) Heat produced = MCΔT
      $\Delta T = 46.5 - 25 = 21.5^oC$ ✓1 mk
      $\Delta H = 450 \times 4.2 \times 21.5$ ✓1 mk
      $= -40635J$ ✓1 mk
      ii) Moles of ethanol = $\frac{1.5}{46} ½\,mk$
      $¿ 0.0326\,moles\ ½\,mk$
      Molar heat = $\frac{40653}{0.0326} ½\,mk$
      $¿ -1246472.392\,J/mole\ ½\,mk$
      NB: - **penalize ½ mk for wrong units**
      - **Penalize ½ mk for missing or wrong sign**
   c) $C_2H_5OH_{(aq)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_2OH_{(l)}$ ✓1 mk
      NB: Penalize ½ for wrong / missing state symbol
   d) Heat loss by radiation / conduction / convectional current ✓1 mk
4. a) i) Fractional distillation ✓1 mk
      ii) - Boiling point ✓1 mk
      - Molecular mass / density ✓1 mk
   b) i) C_4H_8 ✓1 mk
      ii) Use acidified potassium manganate (VII), C_3H_8 does not decolourise it while C_4H_8 decolourises it from purple OR
      Use acidified potassium dichromate (VI), C_3H_8 does not change it from orange to green will C_4H_8 does

(*Any one* 2 mks)

c)





d) i) Ethanol ✓1 mk

ii) It is slightly soluble in water ✓1 mk

e) **Name:** polythene✓1 mk

Disadvantage: it is non-biodegradable hence causes pollution ✓1 mk

5. a) i) Cl_2 ✓1 mk It has a positive standard electrode potential hence a higher tendency to gain electrons ✓1 mk

ii) $Cl_{2(aq)} + 2e^- \rightarrow 2Cl^-_{(aq)}$ $E^\theta = +1.36V$

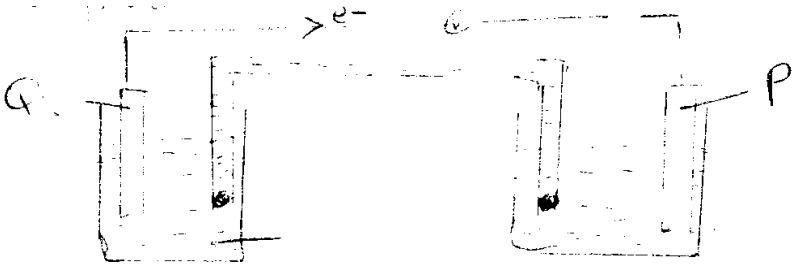
$Mg_{(s)} \rightarrow Mg^{2+}_{(aq)} + 2e^-$ $E^\theta = +2.36V$

$E^\theta = +3.72$

$E^\theta = +3.72V$

b) i) Metal S: it has the highest negative e.m.f hence a high oxidizing power therefore low tendency to gain electrons and be displaced✓1 mk

ii) I.



II. P: $P^{2+}_{(aq)} + 2e^- \rightarrow P_{(s)}$

Q: $Q_{(s)} \rightarrow Q^{2+}_{(aq)} + 2e^-$

III. - It completes the circuit ✓1 mk

- It ensures electrical neutrality and balance of ions between the two cells ✓1 mk

IV. The salt in the bridge should not react with ions in the solution

iii) I. E^θ cell = E^θ reduction + E^θ oxidation

+1.71 = Z – – 079

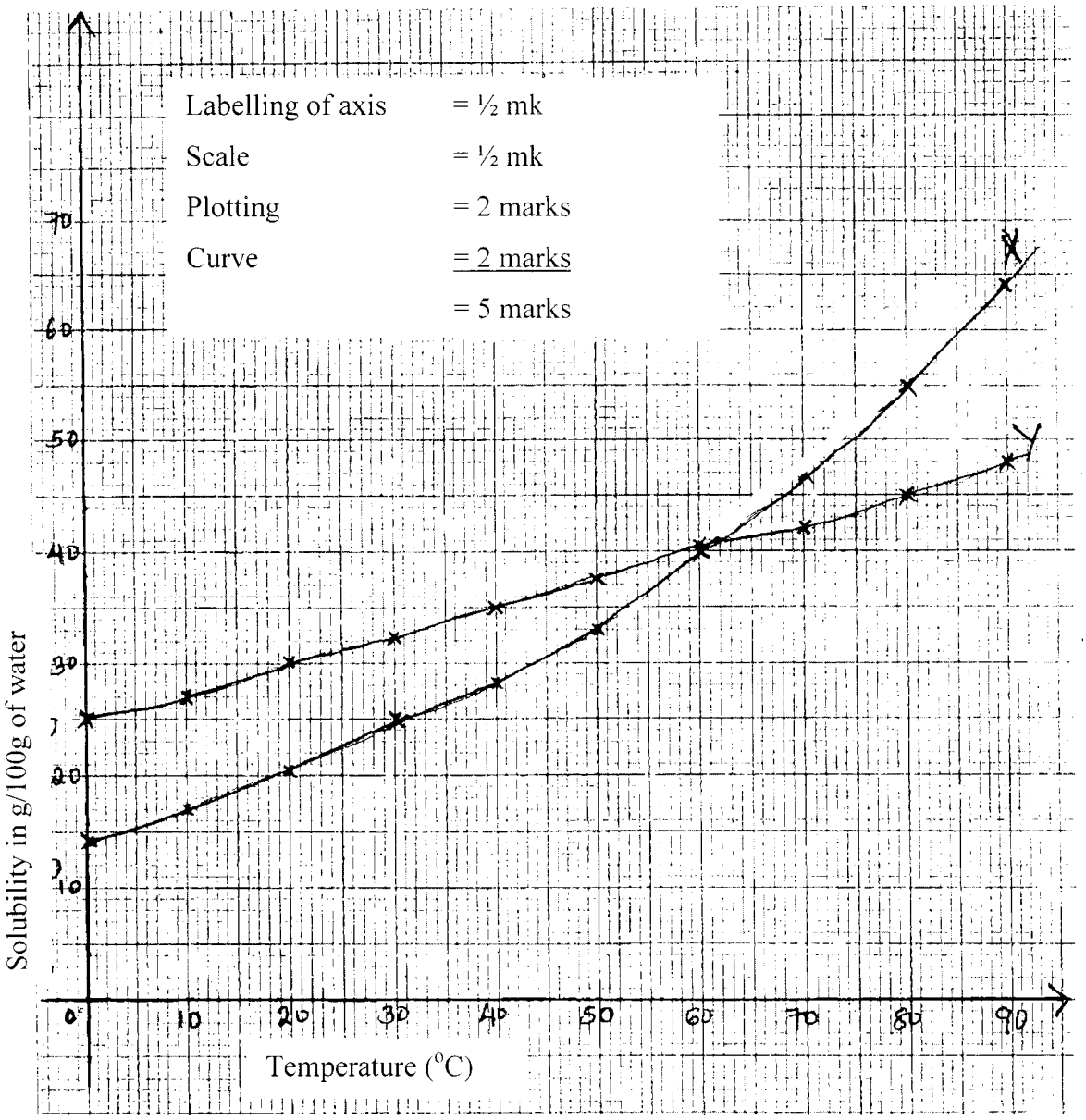
Z = +1.71 – 0.76

= + 0.95V

II. Q, R, Z, P (2 marks)

6. a) Solubility is the maximum mass for solute that dissolves in 100g of a solvent (water) at a particular temperature to make a saturated solution.

b)



c) i) X: 31.5 (± 0.2)g / 100g of water ✓½ mk
Y: 31.5 (± 0.2)g / 100g of water ✓½ mk

ii) 60.5±1°C

d) 60 – 20.7 = 39.3g ✓1 mk

e) 13 g ✓½ mk of X will crystallize, salt Y will be in solution ✓½ mk the solubility of X is lower than the mass dissolved while that of Y is higher than the mass dissolved ✓1 mk

f) Fractional crystallization ✓1 mk

7. a) To remove any oxide film on it 1 mk

b) A white solid is formed 1 mk

c) Due to the oxygen which combines with magnesium

d) $2Mg_{(s)} + O_{2(g)} \rightarrow 2MgO_{(s)}$ ✓1 mk

e) The filtrate is magnesium hydroxide ✓1 mk which is an alkaline, there was no change in the blue litmus paper✓½ mk but the red litmus paper turned blue ✓½ mk

f) $2(24g) \rightarrow 2400cm^3$

$2.4g \rightarrow ?$ ✓1 mk

$\frac{2.4\,g \times 2400\,cm^3}{48\,g}$ ✓1 mk

$= 120cm^3$ ✓1 mk