LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM

Kenya Certificate of Secondary Education – K.C.S.E

233/2
CHEMISTRY
PAPER 2
THEORY

MARKING SCHEME

Question one

(a) A (*√1mk)* elements in group (vi) have 6 electrons in the outermost energy level, they react by gaining 2 electrons.*√1mk*

(b) Amphoteric Oxide *√1mk*

(c) Element E is more reactive than H (*√1mk)* Elements E and H are non - metals in group (VII) and reactivity decreases down the group *√1mk* / E is smaller than H and hence has a higher electron affinity therefore more reactive.

(d) $B_{(s)} + Cl_{2(g)} \longrightarrow BCl_{2(s)}$ *1mk*

(e) (i) The atomic radius of element F is greater than that of G *√1mk* / Across period number of protons (nuclear charge increases increasing effective nuclear charge.

(ii) The atomic radius of element G is greater than that of B. *√1mk*

(f) Solution of oxide of B changes red litmus paper blue and has no effect on blue litmus paper *1mk* while solution of oxide of D changes blue litmus paper red and has no effect on red litmus paper. *1mk*

(g) $2IOH(aq) + H_2SO_4(aq) \longrightarrow I_2SO_4(aq) + 2H_2O(l)$ *√1mk*

2 : 1

Moles of $H_2SO_4 \longrightarrow \frac{17.5 \times 0.5}{1000} = 0.00875$moles *√½ mk*

Moles of IOH $\longrightarrow 0.00875 \div 2 = 0.004375$ moles *√½ mk*

Molarity of IOH $= \frac{1{,}000 \times 0.004375}{20}$

$= 0.21875$M *√1mk*

Concentration = 0.21875 moles/litre *√½ mk*

Question Two

(I) (i)A –iron nail has brown coat. Water and air were present for rusting t take place. ✓1
B- Iron nail remained grey- $CaCl_2$ hade absorbed moisture✓1
C-Iron nail remained grey- boiled water had no oxygen✓1
(ii)The decoration✓
To present corrosion✓1

(II) (a)To remove any oxide that could have coated magnesium ribbon. ✓1
(b)Hydrogen gas✓1
(c)copper metal remained brown. It does not react with steam✓1
Magnesium ribbon changed to white solid . due to formation of MgO✓1

Question three

a) (i) Crystalline forms of sulphur √*1mk*
Or
Existence of sulphur in more than one form in the same physical state.√*1mk*
(ii) Transition temperature √*1mk*

b) (i) X - dilution chamber √*1 ½ mk*
Y- Heat exchanger √*1 ½ mk*
Z - Burner √*1 ½ mk*
(ii) Vandalism (v) catalyst √*1 ½ mk*
Temperature – 500^0C √*1 ½ mk*
Pressure – 200atm √*1 ½ mk*
(iii)I – To remove dust particles and water vapour that could otherwise poison the catalyst √*1mk*
II- Lose heat and pre-heat incoming gases √*1mk*
(iv) Step 2; $2SO_{2(g)} + O_{2(g)} \longrightarrow 2SO_{3(g)}$ √*1mk*

Step 3: $SO_{3(g)} + H_2SO_{4(l)} \longrightarrow H_2S_2O_{7\,(l)}$ √*1mk*

Step 4: $H_2S_2O_{7(l)} + H_2O_{(l)} \longrightarrow 2\ H_2SO_{4(l)}$ √*1mk*

(v) $H_2SO_{4(l)} + SO_{3(g)} \longrightarrow H_2S_2O_{7(l)}$ √½ *mk*

1 : 1 : 1

1 mole of oleum = $\frac{178,000}{178}$ = 1,000moles
1 mole at s.t.p = 22.4L
1,000moles = ? √½ *mk*
= 1000 x 22.4 = 22,400 litres √*1mk*

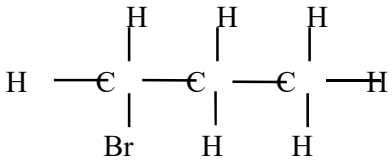
Question four

(a) Reagent : Hydrogen gas √*1mk*

Conditions: - Nickel catalyst √*1mk*

- I50-250^{0}C (temperature) √*1mk*

(b)



I – Bromopropane √*1mk*

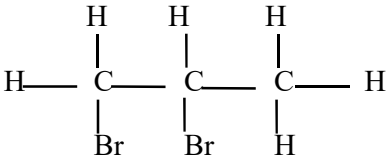
(c) Polypropene √*1mk*

(d) Ydecolourises bromine water √*1mk* while the product formed after step, I have taken place does not √*1mk*

(e) Step II – dehydration √*1mk*
Step III – substitution √*1mk*

(f) (i) A hydrocarbon is a compound that contains carbon and hydrogen only √*1mk*

(ii)



√*1mk*

Question five

5. (a) -Cost of fuel✓1
-Heat value✓1
-environmental effect

(b) -Heat loss by radiation, conduction and convection✓1
-Wrong reading on the thesmotres✓1
-Heat absorbed by apparatus

(c) (i)The graph
Plot – 1mk
Scale- 1mk
Lines – 1mk

(ii) maximum $29^{\circ}c \pm 1.0^{\circ}c$

(iii) $29\text{-}15 = 1^{\circ}c$

(iv) mass of NaOH= 116.35 – 110.15 = 6.2g ✓ ½

(v) Heat change = mcDT =
100.15 x 4.2✓ ½ x 14 = 5888 . 82J✓ ½
$\frac{5888.82}{0.155}$ ✓ ½ = - 37,992.387 KJ mole ✓½

(vi) Heat change that occurs when one mole of the substance is dissolved to make one mole of solution. ✓1

Question six

6. (a) (i)To lower the M.p of NaCl from $800^{\circ}c$ to $60^{\circ}c$✓1
(ii)graphite is inert so it does not next with chlorine gas✓1
(iii)It is less dense✓1
(iv)To present sodium and chlorine from recombining✓1
cathode
$2Na_{(l)}^{+}, \rightarrow 2NaCl(s)$✓
Anode
$2Cl_{(l)} \rightarrow Cl_{2_{(g)}}^{+} + 2e^{-}$ ✓
(vi)Used in manufacture of sodium cynide which is used in the extraction of gold✓

(b) (i) it's a radio active element// nucleus of protons

(ii) P beta✓1
Q gamma✓1

R alpha✓1

Question seven

7. (a) Zn✓1

(b) Ca^{4+} ✓/Fe^{3+} ✓1

(c) (i) $Zn_{(s)} \rightarrow Zn_{(aq)}^{2+} + 2^{-}e$ ✓1

(ii)emf = RHS-LIts

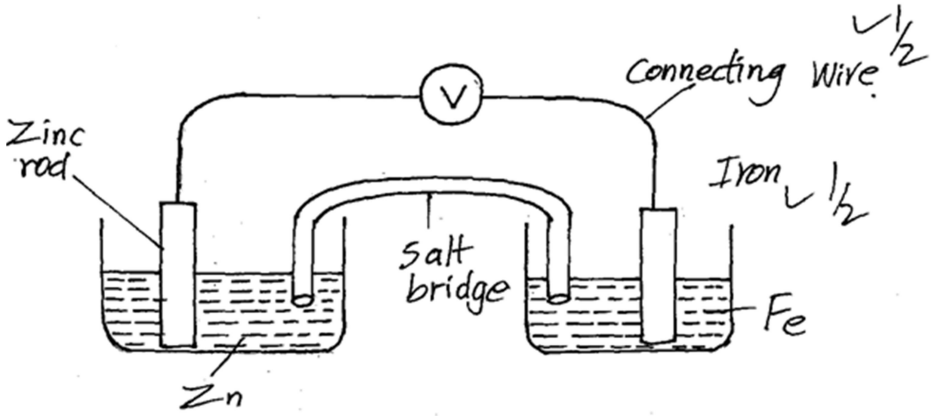
= -0.44 - - 0.76✓1

= 0.32v✓1

(iii)To complete the circle✓1

To maintain the balance of charges✓1

(iv)



(d) Pb^{2+} react with Cl^{-} to form insoluble $PbCl_2$ the circuits✓1