KENYA NATIONAL EXAMINATION COUNCIL
REVISION MOCK EXAMS 2016
TOP NATIONAL SCHOOLS

BAHATI GIRLS HIGH SCHOOL

CHEMISTRY

PAPER 2

MARKING SCHEME

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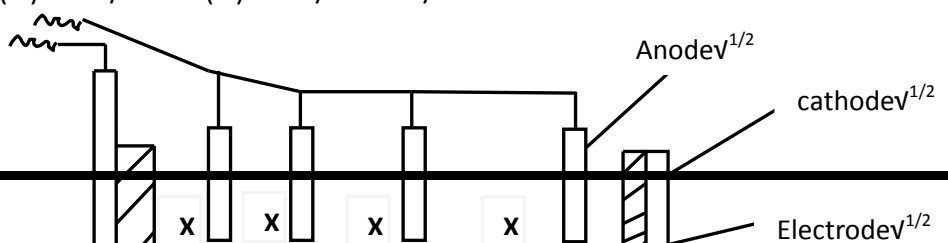
BAHATI GIRLS HIGH SCHOOL KCSE TRIAL AND PRACTICE EXAM 2016
QUESTION PAPER 2
MARKING SCHEME

1.
(a) A✓[1], D have the same number of valence electrons✓[1] (belong to the same group 2)
(b) B_2O✓[1/2]
(c) B✓[1/2], has more✓[1/2] than 3 valence electrons
(d) (i) Strongest reducing agent is C✓[1/2]. It's the most electropositive or has the least electrostate/electromagnetic forces hence has the highest ability✓[1/2] to lose its valence electrons
(ii) Oxidising agent is B✓[1/2]. Has the highest ability to form negatively charged ion. Highest ability✓[1/2] to gain electrons up the valence energy level
(e) Ionic radius of D is less than of C due D has highest electrostatic force or ✓[1]greater nuclear charge, hence the valence energy level is greatly attracted in D than in C after forming its ion inwardly contracting the D valence energy level.
(f) Form ion by gaining electrons the , the gained electrons are being repelled by the others in the inner energy levels and even in the same energy level. Hence making the ionic radius to expand outwardly✓[1] due to repulsive forces. Hence the atomic radius being less than its ionic radius.
(g) (i) A and D alkali earth metals✓[1/2] *reject groups II or 2*
(ii) B halogens *reject group 7*
(iii) C alkali metals✓[1/2] *reject group IIor 2*
(h) B (chlorine)
- Manufacture of HCl acid
- Disinfectant✓[1/2]
- Water treatment
- Plastic manufacture✓[1/2]
- Manufacture of pesticides
- Manufacture of drugs
Any two correct uses, any additional wrong use cancels the correct

2.
(a) Y = hydrogen✓[1/2] gas/H_2
X = oxygen ✓[1/2]gas/O_2
(b) Y = $2H^+_{(aq)} + 2e \longrightarrow H_{2(g)}$ ✓[1] *correct state symbols wrong state symbols penalise ✓[1/2]not balanced zero*
X = $4OH^-_{(aq)} \longrightarrow 2H_2O_{(l)} + O_{2(g)} + 4e$✓[1] accept convectional way. Reject
$4OH^-_{(aq)} - 2e \longrightarrow 2H_2O_{(l)} + O_{2(g)}$ *(non convectional way)*
(c) Oxygen X used in
- Welding✓[1/2]
- Rocket fuel✓[1/2]
- Respiration aid in hospitals/deep sea diving.
Any correct 2 uses, any additional wrong use cancels the correct one
(d) No free ions for the HCl is a molecular compound does not conduct electricity
(e) Y $4H^+_{(aq)} + 4e \longrightarrow 2H_{2(g)}$ ✓[1/2]
X $4OH^-_{(aq)} \longrightarrow 2H_2O_{(l)} + O_{2(g)} + 4e$✓[1/2]
Mole ratio of product formation= 2vol of H_2:1vol of O_2✓[1]

3. a) Bauxite✓[1/2] or correct formular
b) Iron(iii)oxide/silicon(iv)oxide/dioxide/silica✓[1/2]
c)



NB: x = Place where electrolyte is put

d) (i) it is uneconomical/expensive because a lot of energy is required to produce this high temperature✓^{1}
(ii) Addition of cryolite
(iii) The melting point✓^{1} is below 800^{0}C

e) Quantity of electricity:
=40000 x 60 x 60 coulombs✓$^{1/2}$
3 x 96500✓$^{1/2}$ coulombs produce 27g of aluminium
∴ 40,000 x 60 x 60 coloumbs produce
=40000 x 60 x 60 x 27✓$^{1/2}$
3 x 96500 ✓$^{1/2}$ x 1000
=13.43kg✓$^{1/2}$

4.

(a) $Mg(s) + 2HCl \longrightarrow MgCl_2(aq) + H_{2(g)}$
(*1mk if correct in balanced correct symbols, ½ mk if wrong symbols or missing symbols. 0mk if not balanced)*

(b) (i) 298 ±0.5
(ii) 30cm^3✓$^{1/2}$ 0f 2M HCl was used to completely react with 0.6g of magnesium from that volume of HCl , ✓$^{1/2}$ any extra volume of acid no change in volume of gas

(c) 0.6mg ⟶ 600cm^3 of hydrogen gas

$$\longleftarrow \frac{24000cm^3}{600cm^3}$$

24000cm^3

= 24g of magnesium. Hence R.A.M of Mg is 24

(d) (i) 0.6g magnesium ribbon is used less rate of reaction for ribbon magnesium offers smaller surface area✓^{1} hence less rate of reaction, hence small rate of bubbling due to lesser production of hydrogen gas per minute
(ii) 3M HCl will produce higher bubbling rate due to high concentration of acid particles or molecules✓^{1} hence higher rate of reaction
(iii) when 0.6g of magnesium powder is used with 2M HCl, at a lower temperature there is decreased✓^{1} rate of bubbling due to decreased kinetic energy reducing rate of collision

5. a) (i) cracking✓$^{1/2}$
(ii) High pressure, ✓$^{1/2}$ high temperature✓$^{1/2}$
Any additional wrong conditions cancels the correct i.e. penalise ½ mk for every wrong point

b) (i)Reduces pollution or environmental effect of lead compounds✓^{1}. reduces cancer effect on pregnant mothers when they inhale lead(ii)oxide gas
(ii) catalytic converters ensures combustion in the petrol engine✓$^{1/2}$ is complete, produces non poisonous compounds like NO_2, CO_2 instead of ✓$^{1/2}$NO, CO which are deadly poisonous
(iii) to avoid or prevent production of lead (ii) oxide dusts which are deadly poisonous✓^{1} when inhaled
(iv)- Carbon (ii) oxide or CO✓$^{1/2}$
- Nitrogen(ii)oxide or NO✓$^{1/2}$
- Nitrogen (iv) oxide or NO_2✓$^{1/2}$
- Lead (ii) oxide or PBO✓$^{1/2}$

6.

(a) 65 – 29=36$\sqrt{}^{1/2}$

(b) Isotope$\sqrt{}^{1/2}$

(c) $_{29}{}^{65}$Y has the least % of abundance of 30.9$\sqrt{}^{1/2}$

(d) R.A.M = $\frac{(63 \times 69.1)\sqrt{}^{1/2} + (65 \times 30.9)}{100\sqrt{}^{1/2}}$

$= \frac{4353.3+2008.5}{100}$

$= \frac{6361.8}{100}\sqrt{}^{1/2}$

$= 63.618\sqrt{}^{1/2}$

(e) Nucleon particles

Particles present in the i.e. protons neutrons$\sqrt{}^{1/2}$ e.t.c

$\frac{63}{29}$Y ⟶ 63 – 29 =34 neutrons$\sqrt{}^{½}$

$\sqrt{}^{1/2}$=29 protons

7.

(a) Under the same conditions of temperature and pressure the rate of diffusion of a gas is inversely proportional $\sqrt{}^{1/2}$to the square root of its density

(b) $\frac{TSO_2}{T_2} = \frac{\overline{R.MM\ SO_2}}{R.MM\ O_2}$ R.MM SO_2 = 64$\sqrt{}^{1/2}$

R.MM O_2 = 32

$\frac{TSO_2}{50sec} = \frac{\overline{64}}{32}\sqrt{}^{1}$

= TSO_2

TSO_2 = 70.7 sec$\sqrt{}^{1/2}$

8.

(a) Z$\sqrt{}^{1/2}$ is copper metal, is the reference electrode$\sqrt{}^{1/2}$ whose standard electrode is 0volts

(b) X$\sqrt{}^{1/2}$ and Y metals$\sqrt{}^{1/2}$

E.m.f = $E^{\emptyset}$ reduced – $E^{\emptyset}$oxidised

= $E^{\emptyset}{}_{L} - E^{\emptyset}x$

= 1.16 – (- 1.10) $\sqrt{}^{1/2}$

=2.26v$\sqrt{}^{1/2}$

(c) Xl(s)/X^{2+}(aq)//L^{2+}(aq)/L(s) $\sqrt{}^{1}$

(d) L(s)/ L^{2+}(aq)// X^{2+}(aq)/ X(s) $\sqrt{}^{1/2}$

E.m.f = $E^{\emptyset}$ reduced – $E^{\emptyset}$oxidised

= $E^{\emptyset}$ x – $E^{\emptyset}{}_{L}$

= -1.10 – 1.16 $\sqrt{}^{1}$= -2.26V$\sqrt{}^{1}$

9.

(a) 56g ⟶ $\sqrt{}^{1/2}$14g of solid

Water

100g ⟶ ?

$\frac{100g}{56g}$ x 14g $\sqrt{}^{1}$

⟶ =25g $\sqrt{}^{1/2}$of solid in 100g of solution

(b) (i) ΔH = -128KJ 2moles

⟵ 1mole

½ x -128KJ$\sqrt{}^{1/2}$ ⟶ ΔH= - 64KJ/mol$\sqrt{}^{1/2}$

(ii) If $H_{2(g)}$ + ½ $Br_{2(g)}$ ⟶ $2HBr_{(g)}$ ΔH = -128KJ

Required answer ½ $H_{2(g)}$ + ½ $Br_{2(g)}$ $\sqrt{}^{1/2}$ ⟶ $HBr_{(g)}$ ΔH= -108KJ

(c) $H_{2(g)} + Cl_{2(g)}$ ⇌ $2HCl_{(g)}$ ΔH=-108kj/mol

(i) Increase in pressure **no effect**$\sqrt{}^{1/2}$ since there is **no side** favoured by decrease in volume thus equilibrium position not affected

(ii) Increase in temperature favours the formation of more H_2, $Cl_2\sqrt{}^{1/2}$ gas since formation of HCl is exothermic. Hence the position of the equilibrium goes towards formation$\sqrt{}^{1/2}$ of Cl_2, Cl_2.

(iii) Removal of chlorine gas causes decrease in concentration of Chlorine gas hence more HCl$\surd^{1/2}$ decomposes to replace the concentration of chlorine gas hence the equilibrium position shifts towards the formation of more hydrogen and chlorine gas$\surd^{1/2}$

10. Let the initial sample be X

(a)

$X \xrightarrow{t_1} \frac{x}{2} \xrightarrow{t_1} \frac{x}{4} \xrightarrow{t_1} \frac{x}{8} \xrightarrow{t_1} \frac{x}{16}$

.t1=half-life= 25days

$\frac{1}{16} \longrightarrow$ 50g$\surd^{1/2}$

$\frac{16}{1} \longrightarrow$?

$=\frac{16}{1}$ x 50$\surd^{1/2}$

=800g$\surd^{1/2}$

(b) (i) reagent used in step 1, **excess**$\surd^{1/2}$ hydrogen gas or $H_{2(g)}$)

(ii) Step II : **Little**$\surd^{1/2}$ hydrogen gas

(iii) Step III: Hydrogen$\surd^{1/2}$ chloride gas (HCl)

(iv) Step IV: sodium hydroxide/soda lime

(v) Step V: $CH_2 = CH_2\surd^{1/2}$ Ethene monomers

(c) L – Carbon (iv) oxide or $CO_2\surd^{1/2}$

P – water or $H_2O\surd^{1/2}$

Q – carbon (ii) oxide or CO$\surd^{1/2}$

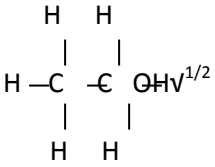
R – ethanol $\surd^{1/2}$

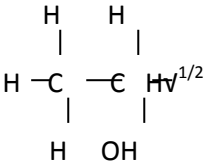
K – polythene or polyethene polymer ($-CH_2 - CH_2-)_n\surd^{1/2}$

N – chloroethane or 1-chloroethane$\surd^{1/2}$

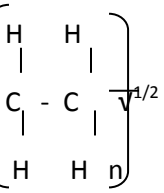
(d) Structures for

i) R





ii) K



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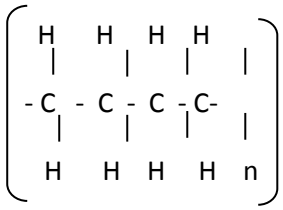
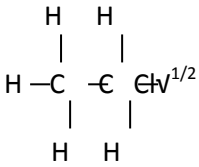


$(CH_2 - CH_2)n$

Any of the above structures

iii) N



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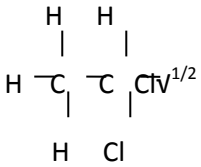

Accept any of the above structures

(e) Continued use of polythene/polyethene it keeps on accumulating in the environment since its non-biodegradable$\surd^{1/2}$ i.e. not decomposed by decaying bacteria. It disfigures the environment, when disposed by burning produces a very poisonous gas.

Any of these effects or any other that is correct

11.

(a) Concentration = $\frac{\text{moles of solute}}{\text{Vol. In litres}}$

$= \frac{0.1M}{0.1}$ = 1M

0.1 moles ⟶ $100cm^3 v^{1/2}$

$1000cm^3$

$\frac{1000cm^3}{100cm^3}$ x 0.1 $v^{1/2}$ = 1 ~~mole~~ ⟶ 23 + 1 + 16 = $40g v^{1/2}$

= $40g/dm^3 v^{1/2}$

(b)