CEKENAS END OF TERM I EXAM-2022
FORM FOUR EXAM
Kenya Certificate of Secondary Education.(K.C.S.E)
MARKING SCHEME
CHEMISTRY 233/1
PAPER 1

1. a) Under constant temperature and pressure, the rate of diffusion of a gas is inversely proportional to the square root of its density.✓

$$\frac{T_{NO}}{T_{CO}} = \sqrt{\frac{M_{NO}}{M_{CO}}}$$

b) $\frac{20}{T_{CO}} = \sqrt{\frac{30}{28}}$ ✓$^{1/2}$

$$T_{CO} = \frac{20}{1.0351}$$

$$= 19.322 \sec onds$$

2. – A place where experiment producing poisonous gases are carried out. ✓1

- Storage of substances that produce foul or poisonous fumes.✓1

3. i) Hydrogen bond ✓1mk

ii) Covalent bond ✓1mk

4. i) a) $Ca(HCO_3)_2$, $Mg(HCO_3)_2$ ⎫
b) $CaSO_4$, $MgSO_4$ ⎬ any present ✓1mk

ii) – Ion exchange ⎫

- Addition of sodium carbonate ⎬ any present ✓1mk

- Distillation ⎭

5. – <u>Add excess Lead metal</u> to a certain volume of nitric(v) acid. ✓$^{1/2}$

- <u>Filter</u> to obtain excess lead metal as a residue and lead (ii) nitrate as a filtrate. ✓$^{1/2}$

- Add distilled water to sodium sulphate to form sodium sulphate solution. ✓$^{1/2}$

- Add lead (ii) nitrate solution to sodium sulphate solution to precipitate lead (ii) sulphate and form sodium nitrate solution. ✓$^{1/2}$

-Filter to obtain lead (ii) sulphate as a residue and sodium nitrate as a filtrate. ✓$^{1/2}$

- Wash the residue and dry it between the filter paper. ✓$^{1/2}$

6. a) Yield of sulphur(vi) oxide decreases. Increase in temperature favours backward reaction which is <u>endothermic.</u> ✓1

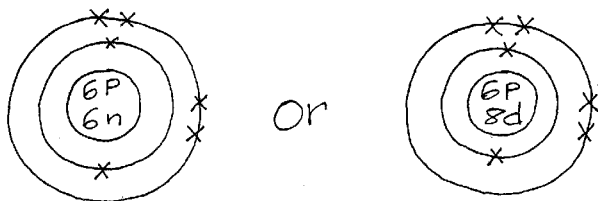b) No effect on the yield.✓1 Absence of a catalyst makes the equilibrium not to be achieved faster. ✓1

7. a)

Element	Fe	O
Mass	3.36	1.28✓1
Molar mass	56	16
Mole	0.06	0.08✓1
Mole ratio	1x3	1.333x3
	3	4

 Empirical formula = Fe_3O_4✓1

b) Reducing property✓1

8. a) Isotopes

b)

Or

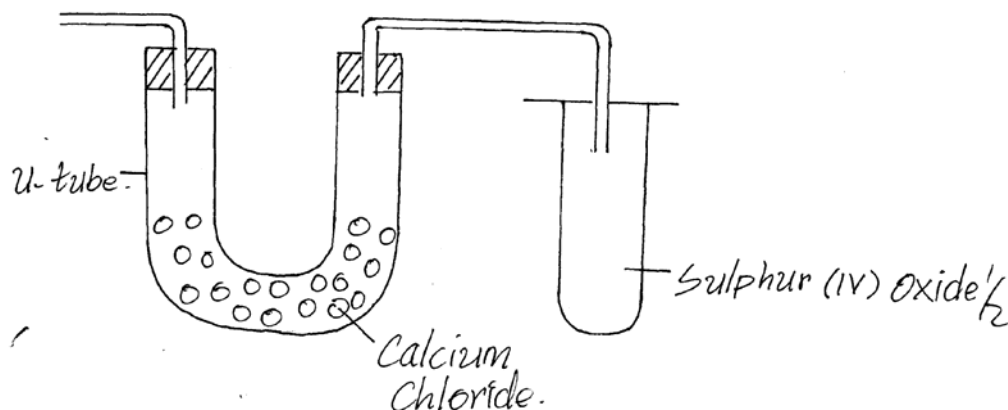9. a) i) –Yellow solution changes to pale green solution.✓1

- Yellow deposit.✓1

ii) $2FeCl_{3(s)} + H_2S_{(g)} \longrightarrow 2FeCl_{2(aq)} + S_{(s)} + 2HCl_{(g)}$
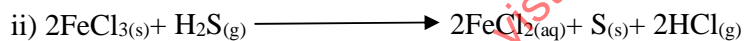
10. – A brown coating/ rust is observed on nail y. ✓$^{1/2}$Rust occurs on Y because silver is less reactive than iron✓$^{1/2}$

- No brown coating/ no rust on nail X. ✓$^{1/2}$This is because magnesium is more reactive than iron✓$^{1/2}$

11. a) Sodium sulphite/ $NaSO_3$✓1

b)

12.

Reactants	Products
C-C = 348x1=348	C-C = 348x1=348
C-H = 6x414= 2484	C-H = 5x414= 2070
Cl-Cl = 243x1=<u>243</u>	C-Cl = 432x1=432
+ 3075KJ/mol✓1	H- Cl = 340x1= <u>340</u>
	-3190KJ/mol✓1

ΔH = 3075-3190✓$^{1/2}$

= - 115kJ/mol✓$^{1/2}$

13. a) Hydrogen chloride gas ✓1

b) Polymerisation ✓1

c) Polyvinylchloride✓1

14. a)

$$H_2C_2O_{4(s)} \xrightarrow{H_2SO_{4(l)}} CO_{(g)} + CO_{2(g)} + H_2O_{(l)}$$
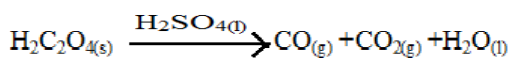
b) Bubble/ pass the mixture of two gases through sodium hydroxide solution.✓1

- Carbon (iv) oxide is absorbed leaving carbon (ii) oxide.✓1

15. a) Grey solids are deposited Pb^{2+} ions migrate to the cathode and gain electrons to form lead metal.✓1
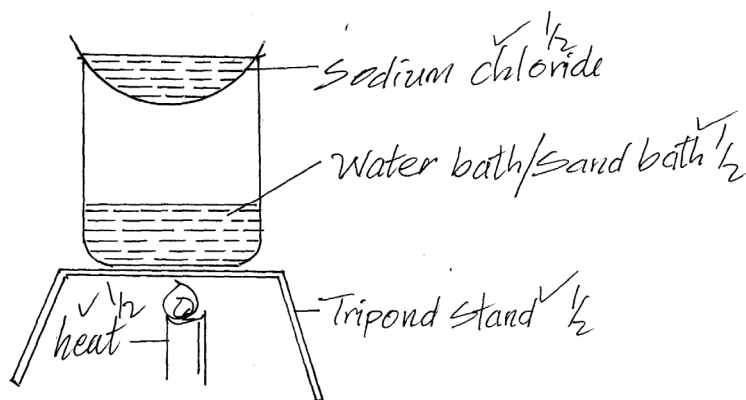
b) Electroplating

- Purification of water   any one correct ✓1

16. a) Solubility✓1

b) When tap is opened and closed a <u>small drop of water dissolves a large volume</u> ✓$^{1/2}$ of ammonia gas creating a <u>partial vacuum</u>✓$^{1/2}$ decreasing pressure inside the flask. When the tap is opened for the second time, water gets in <u>forming a fountain</u>.✓1

c) HCl gas / NO_2 gas

17.

18.a) The maximum mass in grams of a solute that saturates 100g of water at a specific temperature.

b) Mass of water = 40 – 15 ✓$^{1/2}$

$\qquad$ = 25g of H_2O ✓$^{1/2}$

$\quad$ 15g of salt = 25g of H_2O

$\qquad$? $\quad$ = 100g of H_2O

$\dfrac{100 x 15}{25}$ ✓$^{1/2}$ = 60g/100g of H_2O ✓$^{1/2}$

19.- Deforestation

- More cars

- More industries

- Sea unable to absorb extra CO_2 produces. $\qquad$ Any two ✓✓2mks

20. <u>Blue litmus paper remains blue;</u>✓^{1}HCl gas dissolves in methylbenzene but does not <u>dissociate to produce H^+ ions.</u> ✓1

21- - The activation energy should be from the reactants to the peak.✓1

-The product should be below the reactants/ products should have less energy than reactants.✓1

22. <u>Water has hydrogen bond</u>✓$^{1/2}$ as intermolecular forces of attraction while H_2S gas has <u>weaker vanderwaal forces</u>✓$^{1/2}$ of attraction between its molecules. Hydrogen bonds are stronger than weak vanderwaal forces.✓1
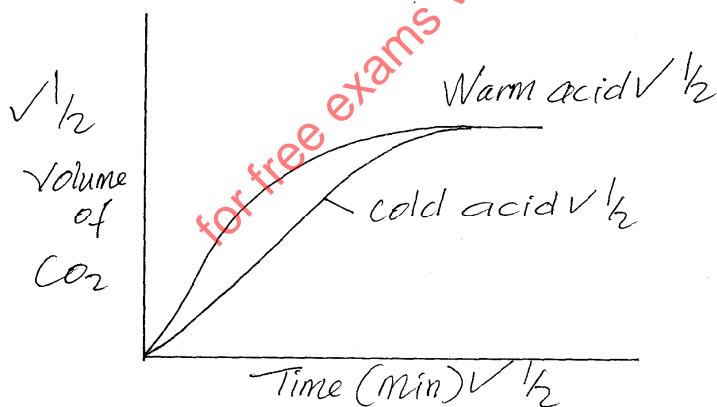
23. a) Atomic radius of R is bigger than that of G.✓1

b) Oxide of A is acidic while oxide of E I basic.✓1

c) Indicated in the periodic table before letter C.✓1
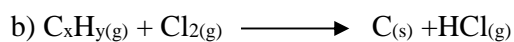
24. a) Curve II

b)

25. i) – Melts into a silvery ball✓1

- Darts on the surface of water.✓1

- Ignites spontaneously to produce a lilac flame✓1 $\qquad$ Any two

ii) Alkali metal

26. a) Alkynes

b) $C_xH_{y(g)} + Cl_{2(g)} \longrightarrow C_{(s)} + HCl_{(g)}$

27. i) Hydrogen gas

ii) To increase surface area for absorption.

iii) – Pricking of metal.

- Treatment of sewerage

- Standardizing of pH in beers and wine.   Any one ✓1mk

28. a) $\Delta H = 50g \times 4.2Jg^{-1}k^{-1} \times 3K$

     $= 630J$

b) Moles of NaOH $= \dfrac{25 \times 0.5}{1000}$ ✓½ $= 0.0125$ moles ✓½

    $\dfrac{1 \times 630}{0.0125}$ ✓½ $= -50400J$ ✓½

         OR

Moles $= -50.4kJ/mol$