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**CEKENAS END OF TERM TWO EXAM-2021**

**FORM FOUR**

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

**233/1**

**CHEMISTRY**

**PAPER 1**

**(THEORY)**

**Nov-Dec-2021**

**MARKING SCHEME**

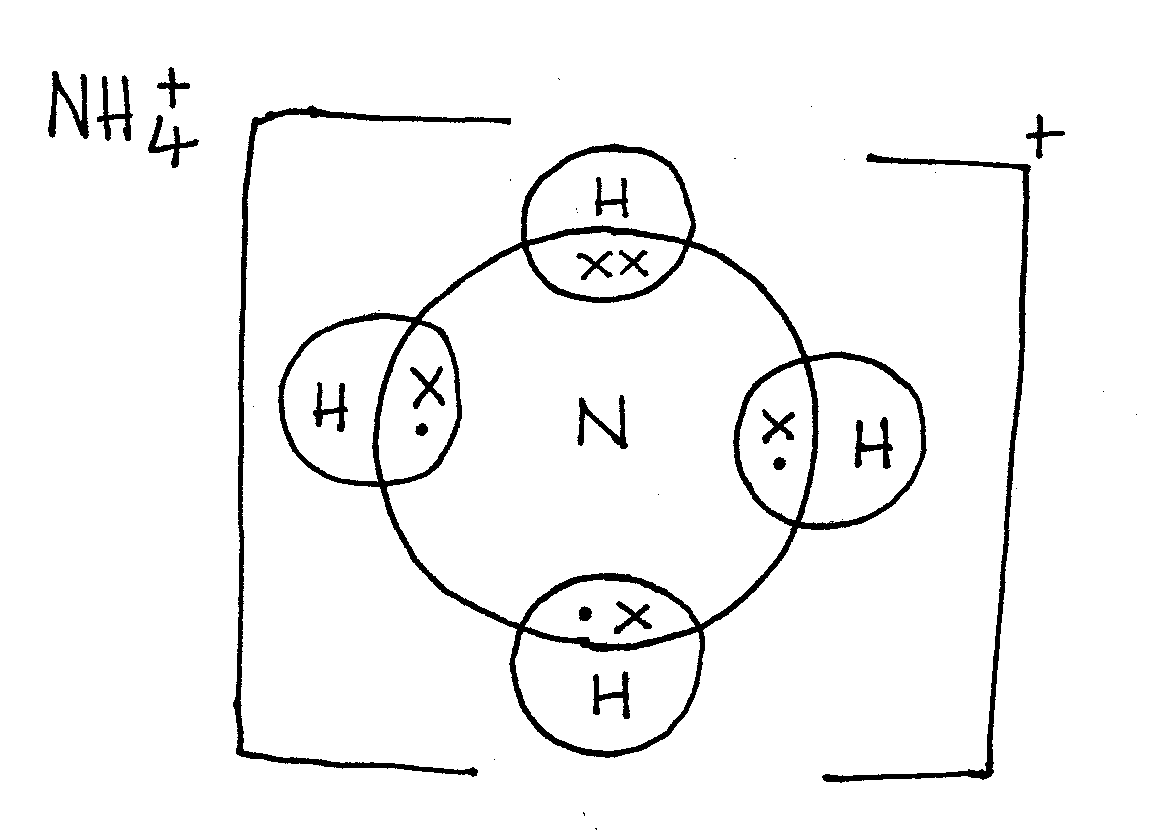
1. Add water ½ to the mixture. Water mixes with ethanol and forms a lower layer while the upper layer is pentane ½. Use separating funnel½ to separate pentane and use fractional distillation to obtain ethanol from water.

2. (a) K and M 1 (for both)

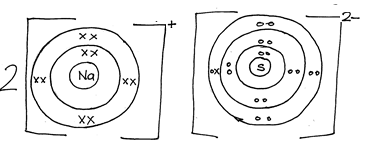
(b) K½ and M½

This is because K is an acid and M is a base and aluminum hydroxide being amphoteric would react with both 1

3. (a) NH4



(b)



4. Add 100cm3  of 0.5M1 NaOH/50cm3 of 1M NaOH t 50cm3 of 0.5 H2SO4 in a beaker and shake, evaporate to saturation ½ and allow it to cool ½ for crystals to form, filter ½ and dry the crystals between filter papers ½

5. (a) When gases react, they do so in volumes that bear a simple ratio to one another and to the volumes of products if a gaseous, temperature and pressure remains constant.

(b) CxHy(g) + O2(g) 🡺 CO2(g) + H2O(g) ½

100 300 200 200

1mol 3mol 2mol 2mol½

CxHy(g) +3O2(g) 🡺 2CO2(g) + 2H2O(g) ½

C4Hy(g) +3O2(g) 🡺 2CO2(g) + 2H2O(g) 

C2H4

6. (a) i) Cu(s) 🡺 Cu2+(aq) +2e- 1

ii) CU2+(aq) +2e- 🡺 Cu(s) 1

(b) Blue colour of CuSO4 remains the same ½ the Cu2+ discharged at cathode were replaced when copper dissolves ½

7. Gas P – Hydrogen ½

Solid R – Magnesium Oxide ½

Solid T – Copper metals ½

Liquids S – Water ½

8. (a) Chlorine is diatomic molecule while argon is monoatomic, therefore chlorine has a larger ½ molecular mass hence stronger/ more van der waal forces than argon.

(b) S, ½ has smallest ½ radius and highest number of delocalized electrons/3 delocalized electrons ½ hence strongest ½ metallic bonding.

9. (a) Electolysis 1

(b) To lower the m.p of aluminium oxide 1

(c) Aluminium has thin oxide layer  which prevent it from reacting with oxygen.

10. (i) Dinitrogen tertaoxide/ N2­O4 1

(ii) Insert a glowing splint inside the gas ½ jar the splint relight½

(iii) 2Pb (NO3)2(s) 🡺 2PbO(s) + 4NO2(g) + O2(g) 1 (penalize ½ missing/wrong state symbols unbalanced penalize fully)

11. (a) 

(b) -Treatment of cancerous tumor through radioactivity.

-Sterilizing hospital/surgical instrument/equipment by exposing them to gamma radiation

-For providing power in heart pace setters.

-Radioactive iodine is used in patient with defective thyroid to enable doctors to follow the path of iodine through the body. (Any two correct answer)

12. (a) A state of balance where the rate of forward reaction equals the rate of backward reaction1

(b) More of HI forms ½ i.e favour the forward endothermic½ reaction

(c) Has no effect ½ , molecules are equal on both sides of the system.

13. Q= 1t

t= 32× 60+10=1930 seconds

Q = 0.5× 1930 ½ = 956C½

If 0.44g = 965C

88 g = ?

½ ½

96500C - 1 mole of electron

193000C =  + 2½½ sign must be there to score

14. (a) Bubbles of a colourless gas with pungent smell 1.

-White crystals are blackened /charred to a mass of black spongy/frothy solid substance1

(b) It is insoluble in water hence cannot be washed ½easily ½

15. 1

1=10.13

16. (i) Sulphur/ S

(ii) Sodium chloride/ NaCl

(iii) Potassium chloride (KCl)/Potassium chlorate (I) / KClO

17. (a) Yellow deposit  and white solid ½

Magnesium continues ½ to burn with a bright flame/Burning masgesium produce intense heat energy which decomposes ½ SO2 to yellow sulphur with oxygen. Magnesium combine with oxygen to form magnesium oxide.

(Mark any two correct observations and 2 correct explanation)

(b) Mg(s) + SO2(g) 🡺 MgO(s) + S(s)

18. (a)

|  |  |
| --- | --- |
| Physical | Chemical |
| * No new substance formed * No change in mass * Reversible * Not accompanied by great heat change | * New substance formed * Change in mass * Irreversible * Accompanied by great heat change |

(b) Process I – Physical

Process II – Chemical

19. NaoH(aq) HCl(aq) 🡺 NaCl(aq) +H2O(l)

Ratio 1:1

Moles of acid  ½½

Moles of NaoH in 1000cm3 = ½½

Conc = 0.6 × 40 = 24g/l ½ = 24g/l½

20. (a) Atoms of the same element with the same atomic number but different mass number.

(b)

 1 ½

=24.263½

21. (a) Test-tube I : Effervescence occurred 1

Test-tube II : No efferevescence 1

(b) Ethanoic acid dissolves in water and dissociate partially ½hence producing hydrogen ½ ion which are responsible for acidic properties of the solution.

In methylbenzene it only dissolves but does not dissociate ½ therefore no hydrogen ½ ions in the solution.

22. ΔH = MCΔ

½½

Moles of ethanol = 16/46 = 0.3478 moles ½

0.3478 moles – 163.8kJ ½

1 mole - ½

23. (a)

(b) Propylethanoate 1

(c) 3-bromo-2-methylpent-1-ene1

24. (a) Maximum mass of solute required to saturate 100g of solvent/water at a g iven temperature 1

(b) mass of solid × 30.4-26.2 = 4.2g½

mass of water = 42.4 – 30.4 =12g½

12g of water dissolves 4.2g

100g

of water.½½

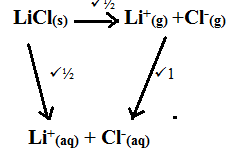
25. i) 4NH3(g) + 5O(2)(g) 🡺 4NO(g) + 6H2O(l)

NB: unbalanced – zero no or wrong state symbols symbols penalize ½

ii) To provide activation energy for the reaction

iii) 

26. (a)



(b) Hsolution= ΔHlattice + ΔHhydration

=891 + -884½ = +7kJ/mol ½

27. (a) Cooling1

(b) Latent heat of fusion 1