****

**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