LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM

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

CHEMISTRY MARKING SCHEME

233/1 PP1 TERM II 2022

1. a) number of protons in the atom 1mk
   b) J 2.8.8 √
   K 2.8 √
   c) 2J(s) + K_2(g) --------- 2JK (s) √ 1mk penalize ½ mk for wrong symbols

2. a). i. Magnesium in air reacted both with Oxygen and Nitrogen gas hence higher mass √ 1mk
   ii. 4Mg(s) + O2(g) + N2(g) ------- MgO (s) + Mg3N2 (s) √ 1mk

   b). i. Non – luminous flame √ 1mk
   ii. There is complete combustion of gases √ 1mk
3. a) add 3-4 drops of bromine water to gas jar containing each sample. √1mk
   in the sample containing C4H6, bromine changes from yellow to colourless √ ½ mk
   while in C4H10, the yellow colour persists √ ½ mk
   OR
   Bubble each gas sample through bromine water in separate test tubes. √ 1mk
   C4H6 decolorizes bromine water √ ½ mk while C4H10 does not √ ½ mk

   b). $2C_4H_{10}$ + 13 O_2 (g) ========== 8CO_2 (g) + 10H_2O (l) √ 1mk

4. a) moles of acid $\frac{50\ x\ 2}{1000}$= 0.1 moles √ ½ mk

   mole ratio 1: 2 √ ½ mk

   moles of Na2CO3 = ½ x 0.1 = 0.05 moles √ ½ mk

   mass that reacted. 0.05 x 106 = 5.3 g √ ½ mk

   % mass of unreacted = $\frac{10-5.3}{10}$ x 100 = 47% √ 1mk

   b) Nitric (V) acid oxidizes Hydrogen to water // Nitric (V) acid is an oxidizing agent

5. i. Aluminium Chloride
   ii. Dry Calcium oxide // Silica gel

   iii. 2Al (s) + 3Cl2 (g) ---------- AlCl3 (s) √ 1mk

6. a) An acid is a substance that dissociates in water to yield/give Hydrogen ions as the only positively charged ions/cations // an acid is a proton donor. √ 1mk
   b). RNH3+ √ 1mk

7. a). A half-life is the period a radioactive nuclide takes to disintegrate to half its original mass √ 1

b). 1------1/2 -------1/4 ------1/8 ----------1/16----------1/32

4 half lifes = 100 days, √ 1mk thus each takes 100/4 = 20 days √ 1mk

8. a). Highly oxidizing √ 1mk
   b). switched off to save on the gas√ ½ mk
   Adjusted to luminous because it is visible√ ½ mk and does not go off easily by itself

   c). Carelessness // Negligence

9. a). Cation ---Lead ions / Pb^{2+} √1mk
   Anion----- Nitrate ions / NO_3^-

   b). Tetrahydroxoplumbate // $(Pb(OH)4)2^-$

10. a). To control the amount of oxygen gas entering the chamber.
    b). Nitrogen (II) oxide

    c). Nitrogen is generally unreactive hence to overcome activation energy, high temperature is required √ 1mk

11. Time taken for 400cm3 of Nitrogen = $\frac{400\ x\ 70}{280} = \ 100sec$ √1mk

$$\frac{100}{TCO2} = \frac{\sqrt{28}}{\sqrt{44}} \quad \sqrt{1\text{mk}}$$

TCO2 = 100/0.7977 = 125.36 sec √1mk
(Accept Alternative of Rates)

12. a).

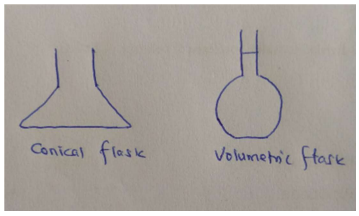
Bond breaking		Bond formation	
C=C	612	C-H	5 x 413
C-H	4x413	C-C	436
H-Br	366	C-Br	276
----------2630kJ		----------2777	√1mk

Overall +2630 – 2777 = -147kJ/Mol √1mk

b). Exothermic. Bond breaking is endothermic while bond formation is exothermic. Bond formation has a higher value than bond breaking. √ 1mk

13. a). Clamp and Stand √ ½ mk
    b). Spatula √ ½ mk

c). √2mks



14. a). Fractional distillation
    b). Miscibility and Close boiling points √ 1mk
    c). Propene

15. a). F, Be, Cu √ 1 ½ mks
    b). $NH4^+$, $NO3^-$ and $HCO3^-$ √ 1 ½ mks

16. a). Reduction in mass √ ½ mk Black solid changes to brown √ ½ mk
    b). CuO (s) + C (s) ---------- Cu (s) + CO (g) Any for √ 1mk
    CuO (s) + CO (g) -------Cu (s) + CO2 (g)
    CuO (s) + C (s) ---------- Cu (s) + CO2 (g)

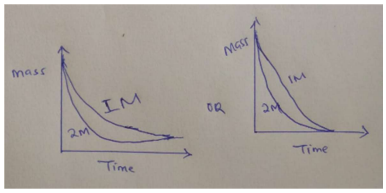
17. a). L – Concentrated Sulphuric (VI) acid, Q – Potassium Nitrate/Sodium Nitrate
    b). Has dissolved Nitrogen (IV) oxide// Contains Nitric (III) acid
    c). Retort flask

18. a). i. T = 11 √ ½ mk
    ii. Z = 16 √ ½ mk

    b). T_2Z = (2x 23) + 32 = 78 √1mk penalize ½ mk for units of RFM

19. a). A substance made up of both a cation and an anion √ 1mk
    b). Pale Green fumes // Yellow-green fumes √1mk
    c). Na^+ (l) + e = Na (l) √1mk penalize ½ mk for wrong state symbols

20. a). and b). √√2mks



c). <u>Decrease in mass</u> of metal carbonate √ 1mk

21. a). It is the amount/mass of a substance that dissolves in 100g of water at a given temperature. √1mk

    b). solution – solute = 28 – 7 = 21cm^3, √1mk thus,

7g are in 21g water, 100g water will contain:- $\frac{7\ x\ 100}{21} = 33.33g$ / 100g √ 1mk

22. a). I – Non-polar / organic solvent/ Methyl benzene/ propanone / acetone √1mk
II – Polar / water solvent √1mk

b). In B red litmus remain red. √ ½ mk. Ammonia remain in molecular form √ ½ mk

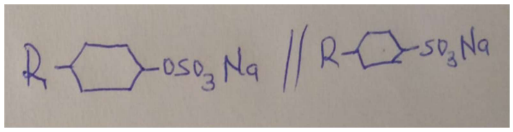
In C re litmus turns blue. √ ½ mk. Ammonia ionizes to form basic hydroxyl ions √ ½ mk.

23. Molarity of NaOH = g/dm3/ molar mass = $\frac{4.5}{40} = 0.1125M$ √ ½ mk
Thus, M:R = 2: 1, Moles of NaOH = 0.1125 x 20/1000 = 0.00225moles √ ½ mk
Moles of acid = ½ of 0.00225moles = 0.001125moles √ ½ mk
Molarity of acid = $\frac{0.001125}{24}\ x\ 1000\ \sqrt{} = 0.046875M$ √ 1mk

24. a). II √1mk. This is because Iron is more reactive than Copper hence rusts instead. √ 1mk
b). Sacrificial protection // Galvanization √1mk

25. a). It is a reaction in which forward and backward reaction takes place simultaneously. √1mk
b). Brown color intensifies. √1mk. This is because an acid neutralizes Hydroxyl ions and hence equilibrium shifts to the left to replace OH- ions. √1mk
c). A – $Cr_2O_7^{2-}$ √ ½ mk
B - CrO_4^{2-} √ ½ mk

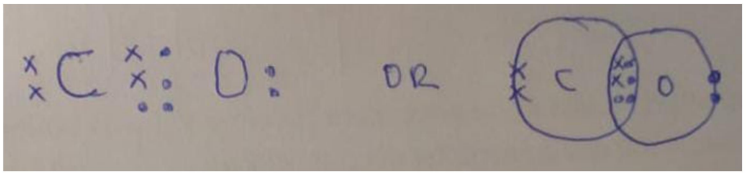
26. a). Formula -



Type – soap less detergent √ 1mk

b). F is Non bio-degradable

27. 2mks



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