LANY JOINT EVALUATION TEST

Kenya Certificate of Secondary Education
233/1
CHEMISTRY
PAPER 1(THEORY)
JULY/AUGUST 2018
MARKING SCHEME

1. A- Chimney (1mk)
   B-air hole (1mk)
2. (a) Q- period two because it has two energy level (1mk)
   (b)Q has 5protons while P has 3 protons .These protons in each are pulling the same number of energy level s .Therefore the pull in Q is more than in P making Q to have a small radius . (3mks)
3. (a) It is lighter than air
   (½mk)
   (b) Dipping a burning splint that produces a pop sound
   (1/2mk)
   (c) Copper is less reactive and therefore does not react with steam (1mk)
4. (i) K and M (1mk)
   (ii) M because it is a strong alkali that react with aluminium hydroxide which is amphoteric

5. Mass of MgCl = $\frac{1.9}{95}$ = 0.02mol (1mk)
   $MgCl_2 + 2AgNO_3$ $Mg(NO_3)_2 + 2AgCl$
   Moles of $AgNO_3$ = 0.02 x 2 = 0.04mol (1mk)
   Mass of $AgNO_3$ = 0.04 x 170 = 6.8g (1mk)

6. $Zn_{(s)} + HNO_{3(aq)}$ $Zn(NO_3)_{2(aq)}$
   (1mk)
   $Na_2CO_3 + H_2O_{(l)}$ $Na_2CO_{3(aq)}$ (1mk)
   $Na_2CO_3 + Zn(NO_3)_{2(aq)}$ $ZnCO_{3(s)} + 2NaNO_{3(aq)}$ (1mk)
   Filter to remove sodium nitrate solution. Wash and dry solid zinc carbonate. (1mk)

7. (a) Strong acid is one that easily ionizes (ionizes fully). Concentrated acid is one that has
   more acid molecules in solution. (1mk)

(b) Acid H_3O^+ - donates a proton (H^+)

(1½mks)

Base NH_3 – accepts the proton.

(1½mks)

8. (a) NO_2 $N + (-2x2) = 0$

$N = +4$ (1mk)

(b) $NH4+$ $N +(+1 \times 4) = +1$

$N = -3$ (1mk)

9. (a) $4Fe_{(s)} + 3O_{2(g)} + XH_2O_{(l)} \rightarrow 2Fe_2O_2XH_2O_{(s)}$

(1mk)

(b) $\frac{Y - X}{Y} \times 100$ (1mk)

(c) Both use oxygen. (1mk)

Oxides are formed on both cases. (1mk)

10. Solubility in solvents. (1mk)

Stickiness or absorbility. (1mk)

11. (a) Under standard temperature and pressure, the rate of diffusion of a fixed mass of gas is

inversely proportional to square root of its density.

(b) $RO_2 = {}^{X}/_{20}$ molecules / sec.

$R_2 = {}^{X}/_{28.3}$ molecules / sec.

$$\frac{RO_2}{R_2} = \frac{MM_2}{MMO_2}$$

$$\frac{{}^{X}/_{20}}{{}^{X}/_{28.3}} = \frac{MM_2}{32}$$

$$\frac{28.3}{20} = \frac{MM_2}{32}$$

$$MM_2 = \frac{28.3^2 \times 32}{20^2}$$

$MM_2 = 64.07g$

12. $A - 2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$

(1mk)

$B - CO_{2(g)} + C_{(s)} \rightarrow 2CO_{(g)}$ (1mk)

$C - C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ (1mk)

13. (a) Hydrogen sulphide.

(1mk)

(b) $NaCl_{(s)} + H_2SO_{4(l)} \rightarrow NaHSO_{4(aq)} + HCl_{(g)}$ (1mk)

(c) Denser than air. (1mk)

14. a)M2+ EθV -2.37 strong reducing agent 1mk

b) +1.56 2mks

15. Some average bond energies are given below.

Bond	Energy in kJ mol^{-1}
C – C	348
C – H	414
Cl – Cl	243
C – Cl	432
H – Cl	340

Calculate the energy change for the reaction below. (3 mks)

$C_2H_{6\,(g)} + Cl_{2\,(g)} \rightarrow CH_3CH_2Cl_{(g)} + HCl_{(g)}$

Reactants ***Products***

C – C = 348 348 ***C – C = 348 348***

C – H = 6 x 414 = 2484 ***C – H = 5 x 414 2070***

Cl – Cl = 243 243 ***C – Cl = 432 432***

Total + 3075 kJ/ mol ✓1 ***Total -2850 kJ/mol ✓1***

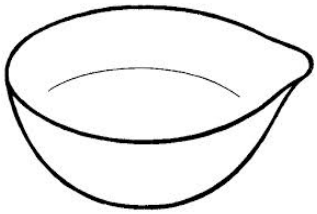
Δ H = 3075 - 2850

= +225 kJ/mol ✓1

16. (a) Give 2 reasons why most laboratory apparatus are made of glass. (1mk)

- ***Glass does not react with most chemicals ✓½***
- ***It is transparent one can see when reaction is taking place. ✓½***
- ***It is easy to clean. ✓ ½ any 2***

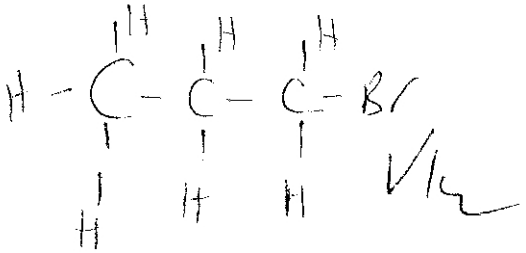
(b) The diagrams below are some common laboratory apparatus. Name each apparatus and state its use. (2mks)



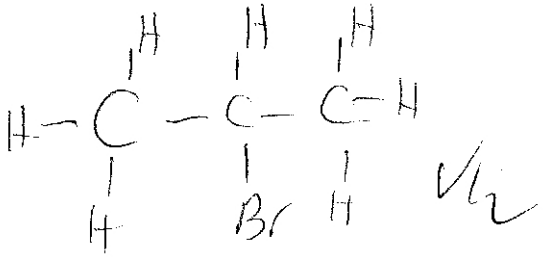
Name ***Desiccator*** Name Evaporating dish

Use ***Drying or keeping substances from moisture*** Use ***Evaporating liquids to obtain crystal***

17. Draw the structural formula and name possible isomers of organic compounds with the following molecular formula. C_3H_7Br (2mks)



1-bromopropane ½



2-bromopropane. ½

18. (a) Cation Zn^{2+}

Anion NO_3^-

(b) Solid K - ZnO
(½mk)

Solution B – $ZnSO_4$
(½mk)

White precipitate $Zn(OH)_{2(S)}$
(½mk)

(c) Solution T $Zn(NH_3)^{2+}_4$
(½mk)

19. (a) H+ ions are introduced which react with colourless bromide and hypobromite ions to form yellow-orange aqueous bromine. Equilibrium shifts to the left.
(1mk)

(b) No effect on the yield of hydrogen chloride. The number of molecules of reactants equals the number of molecules of the product.
(1mk)

20. (i) Hot compressed air.
(1mk)

(ii) To melt sulphur
(1mk)

(iii) - Low melting point

- Does not dissolve in water
(1mk)

21. (a) Heat change/or heat evolved when 1 mole ✓ of substance is completely burnt in oxygen.
(1mk)

(b)

$\Delta H + C_4 H_{10} + -2877 = 4 \times (-393) + 5 \times (-286)$

(½mk)

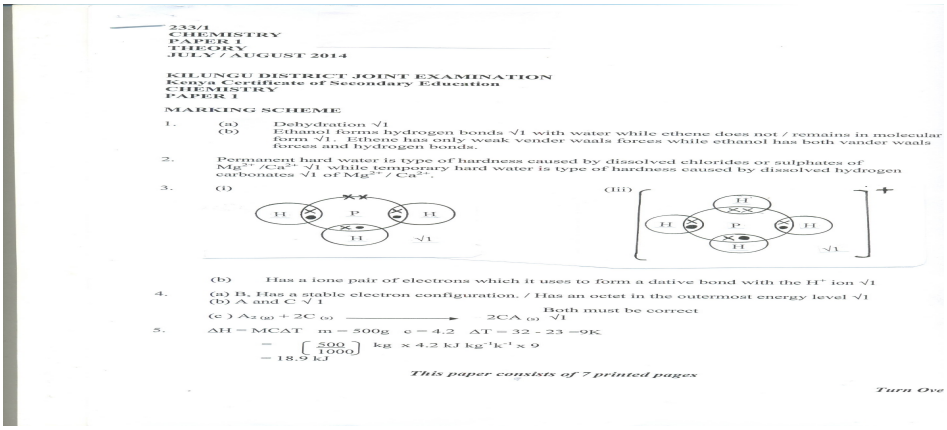
$\Delta H + (C_4 H_{10}) = 2877 - 1572 - 1430$

$= 2877 - 3002$

$= -125KJ/mol$

(½mk)

22.



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KILUNGU DISTRICT JOINT EXAMINATION
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MARKING SCHEME

1. (a) Dehydration √1
(b) Ethanol forms hydrogen bonds √1 with water while ethene does not / remains in molecular form √1. Ethene has only weak vender waals forces while ethanol has both vander waals forces and hydrogen bonds.

2. Permanent hard water is type of hardness caused by dissolved chlorides or sulphates of Mg^{2+} /Ca^{2+} √1 while temperary hard water is type of hardness caused by dissolved hydrogen carbonates √1 of Mg^{2+} / Ca^{2+}.

3. (i) (iii)

(b) Has a ione pair of electrons which it uses to form a dative bond with the H^+ ion √1

4. (a) B, Has a stable electron configuration. / Has an octet in the outermost energy level √1
(b) A and C √1
Both must be correct
(c) $A_{2(g)} + 2C_{(s)} \longrightarrow 2CA_{(s)}$ √1

5. $\Delta H = MCAT$ m = 500g c = 4.2 $\Delta T = 32 - 23 = 9K$
$= \left[\frac{500}{1000}\right]$ kg x 4.2 kJ $kg^{-1}k^{-1}$ x 9
= 18.9 kJ

This paper consists of 7 printed pages

Turn Ove

(b) Has a ione pair of electrons which it uses to form a dative bond with the H^+ ion √1

23. (a) F – Alpha, G- Beta, H - Gamma
(b) Lead block ✓ ½ to shield the operator ½ from radiations.
(c) $^{3}_{1}H$ ✓1

24. (a) To liberate ammonia gas rapidly ✓ 1
(b) Green – yellow ✓ 1
(c) $2NH_{3(g)} + 3O_{2(g)} \rightarrow 2N_{2(g)} + H_2O_{(l)}$ ✓ 1
UB eqn = zero mk

25. (a) (i) Increases ✓ ½ the surface area for condensation ✓ ½ process.
(ii) It allows water vapour to condense ✓ ½ into liquid and flow ✓ ½ back into the flask before the boiling point of water is reached.
(b) During oil refinery, crude oil is separated into a number of fractions ✓1

26. (a) Zn^{2+} ✓½

Cl^- ✓½

(b) $Pb^{2+}_{(aq)} + 2Cl^-_{(aq)} \rightarrow PbCl_{2(g)}$ ✓1

(c) $[Zn(NH_3)_4]^{2+}$ ✓1

27.(i) Liquid M – Water ✓1

(ii) CO_2 ✓½ formed by burning candle slightly soluble ✓½ forming an acidic solution ✓1

(iii) $2Na_2O_{2(S)} + H_2O_{(l)} \rightarrow 4NaOH_{(aq)} + O_{2(g)}$ ✓1