TERM 2 2025

CHEMISTRY PAPER 1 MARKING SCHEME

1 a. a drug is any substance natural or manufactured which when used alters the way the body functions. (1mk)

b. tobacco, alcohol, bhang, khat (miraa) (any two ½ each)

2. Any two correct laboratory rules.

3.

4.i. Fractional distillation

ii) - Since the two liquids are immiscible pour the mixture into the separating funnel and allow settling.√ 1mk

- The denser liquid will settle down and the less dense one will form the second layer on top. √ 1mk

- Open the tap and run out the liquid in the bottom layer leavingthe second layer in the funnel.√ 1mk

5. a) i. Zinc carbonate

ii. Zinc chloride

iii. carbon iv oxide

b) $ZnCO_{3\,(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2\,(aq)} + CO_{2\,(g)} + H_2O_{\,(l)}$ (penalize ½mk for missing or wrong state symbol)

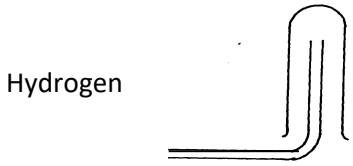
6. a) $3Mg_{(s)} + N_{2(g)} \longrightarrow 3Mg_3N_{2(s)}$

b) Argon

c. i) absorbs carbon (iv) oxide

ii) remove oxygen

7. a)



√ 1mk labeling the gas

√ 1mk method of gas collection

b) To drive out air out of the apparatus and to generate steam.

8. a) $\frac{20}{1000}$ x 0.25 √ ½mk

= 0.005 √ ½mk

b) $Na_2CO_{3(aq)} + 2HNO_{3(aq)} \longrightarrow 2NaNO_{3(aq)} + CO_{2(g)} + H_2O_{(l)}$ √ 1mk (penalize ½mk for missing or wrong state symbol)

moles of $Na_2CO_3 \longrightarrow \frac{0.005}{2}$ x1 √ ½mk = 0.0025 moles √ ½mk

c) $\frac{250}{25}$ x 0.0025 √ ½mk = 0.025moles √ ½mk

9. a) i) 11 protons ii) 16 protons

b) Formula of compound = T_2Z √ 1mk

Mass number of T = 11+ 12 = 23
Mass number of Z = 16+16 = 32 } √ ½mk for both values

Formula Mass of T_2Z = (23x2) + 32 = 78 √ ½mk

c) – When molten √ ½mk

- When in aqueous solution √ ½mk

10. Ethanol contains molecules ✓½which are not ✓½ responsible for electrical conductivity. (words to that effect.)

11. R – has the smallest atomic √ ½ size hence its outermost electrons are more strongly held to the nucleus resulting in high √ ½ value of ionization energy

12. - Add to lead (II) carbonate dilute nitric acid until in excess √ ½mk

- filter to obtain lead (II) nitrate solution as filtrate. √ ½mk

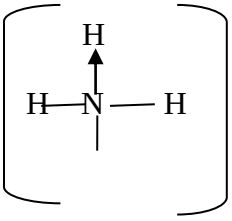
- React the filtrate with sodium sulphate solution √ ½mk to form insoluble √ ½mk lead (II) sulphate

- Filter to obtain lead (II) sulphate as residue. √ ½mk

- Wash the salt of lead (II) sulphate with distilled and dry in between the filter papers √ ½mk

13.a) A covalent bond is formed by equal contribution of the shared electrons by the atom ✓1 while Co-ordinate bond is where the shared electrons are contributed by one of the atoms. ✓1

b)



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14. Silicon (IV) oxide forms giant atomic structure√ 1mk of strong covalent bonds√ ½mk having high melting point. Carbon (IV) oxide has a simple molecular structure√ 1mk with weak Van der Waals forces√ ½mk between hence the low melting point.

15. i) hygroscopy ii) deliquescence iii) efflorescence √ 1mk each

16. a) An electrolyte is a substance which when melted or dissolved in water conducts an electric current and gets decomposed by the current.
b) Process of decomposing an electrolyte by passing an electric current through it.

c) i) delocalized electrons ii) mobile ions

17. a) black mixture turns into a brown powder.

b) $2CuO_{(s)} + C_{(s)} \longrightarrow 2Cu_{(s)} + CO_{2(g)}$

c) – solid carbon (IV) oxide is used as a refrigerating agent for perishable goods.

-to extinguish fires

-manufacture of sodium carbonate in solvay process

-add taste in aerated drinks

- manufacture baking powder

18. X: t_1= 28.3sec RMM = ?

Q_2: t_2= 20.0sec RMM=32

$$\frac{T_1}{T_2} = \sqrt{\frac{X}{32}} \quad \surd 1mk$$

$$\left(\frac{28.3}{20}\right)^2 = \frac{X}{32} \quad \surd ½mk$$

$$X = \frac{800.89 \times 32}{400} \quad \surd ½mk$$

$X = 64$ √ 1mk

19. RFM of $NaHCO_3$ = 23+1+ 12 + 16x3

= 84 √ ½mk

Moles of $NaHCO_3 = \frac{2100 \times 1000}{84}$ √ 1mk

= 25000moles

Mole ratio of $NaHCO_3:CO_2 = 2:1$

$\therefore$ Moles of $CO_{2(g)}$ ⟶ 25000 ÷2 = 12500 moles √ ½mk

Volume of $CO_{2(g)}$ = 22.4 x 12500 √ ½mk

= 280,000 dm^3 √ ½mk

20.	Fe	S	O	H_2O	
No. of moles	$^{20.2}/_{56}$	$^{11.5}/_{32}$	$^{23.0}/_{16}$	$^{45.3}/_{18}$	√ 1mk
	=0.36	=0.36	=1.44	=2.52	
Mole ratio	$^{0.36}/_{0.36}$	$^{0.36}/_{0.36}$	$^{1.44}/_{0.36}$	$^{2.52}/_{0.36}$	√ 1mk
	1	1	4	7	

Empirical formula: $FeSO_4.7H_2O$ √ 1mk

21. i) C_nH_{2n} √ 1mk

ii) C_sH_{10} √ 1mk

iii) 70 √ 1mk , **OPEN STRUCTURAL FORMULA TO BE DRAWN** √ 1mk

(PENALIZE FOR CONDENSED FORMULA)

22. a) calcium hydroxide, sodium hydroxide or potassium hydroxide (any one √ 1mk)

b) $Ca(OH)_{2(s)} + 2NH_4Cl_{(s)} \longrightarrow CaCl_{2(s)} + 2H_2O_{(s)} + 2NH_{3(g)}$

$NaOH_{(s)} + NH_4Cl_{(s)} \longrightarrow NaCl_{(s)} + H_2O_{(s)} + NH_{3(g)}$

$KOH_{(s)} + NH_4Cl_{(s)} \longrightarrow KCl_{(s)} + H_2O_{(s)} + NH_{3(g)}$

(Penalize ½ for missing or wrong state symbols)

23. a) vanadium (V) oxide

b) $2SO_{2(g)} + O_{2(g)} \longrightarrow 2SO_{3(g)}$ (penalize ½ for missing or wrong state symbols)

24. i) chlorine gas ii) Sodium chlorite (I)

25. (a) Temporary water hardness . √ 1mk This is because hardness is removed by boiling √ ½mk

(b) - Provide Calcium needed in formation of strong teeth and bones

- Hard water forms a layer of carbonate of lead which prevent water coming in contact with lead which cause poisoning

- It is used in beer brewing (award 1mk for any one)

26. a) I- $Cu(OH)_2$ or copper (II)hydroxide √1 mk

b) $[Cu(NH_3)_4]^{2+}$ √1mk

c) Hydrogen sulphide or H_2Sg √1mk

27. $\triangle H = \frac{120 \times 4.2 \times 4.5}{1000}$ (½mk)

$= +2.268KJ$ (½mk)

(b) RFM of $KNO_3 = 39 + 14 + 48 = 101$

$6g \longrightarrow 2.268KJ$

$101g \longrightarrow \frac{101 \times 2.268}{6}$ (½mk)

$= +38.178KJ\ mol^{-1}$ (½mk

28. a) Breaking of 'C = C' = +610 KJ Formation of 2C – Br = -560

Breaking of 'Br – Br' = +193 Formation of C-C = -346

+ 803 √ ½mk -906 √ ½mk

Sum +803 + -906 = - 103KJ√ 1mk

b) Addition reaction/ halogenation √ 1mk