

END 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 leaving the second layer in the funnel. ✓ 1mk

5. a) i. Zinc carbonate

ii. Zinc chloride

iii. carbon iv oxide

b) $\text{ZnCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ (penalize ½mk for missing or wrong state symbol)

6. a) $3\text{Mg}(\text{s}) + \text{N}_2(\text{g}) \longrightarrow 3\text{Mg}_3\text{N}_2(\text{s})$

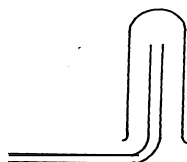
b) Argon

c. i) absorbs carbon (iv) oxide

ii) remove oxygen

7. a)

Hydrogen

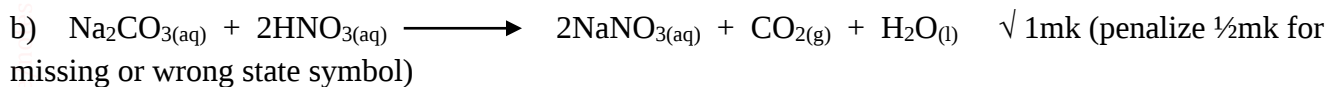


✓ 1mk labeling the gas

✓ 1mk method of gas collection

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

8. a) $\frac{20}{1000} \times 0.25 \quad \checkmark \quad \frac{1}{2}\text{mk}$
 $= 0.005 \quad \checkmark \quad \frac{1}{2}\text{mk}$



moles of $\text{Na}_2\text{CO}_3 \longrightarrow \frac{0.005}{2} \times 1 \quad \checkmark \quad \frac{1}{2}\text{mk} = 0.0025 \text{ moles} \quad \checkmark \quad \frac{1}{2}\text{mk}$

c) $\frac{250}{25} \times 0.0025 \quad \checkmark \quad \frac{1}{2}\text{mk} = 0.025 \text{ moles} \quad \checkmark \quad \frac{1}{2}\text{mk}$

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

b) Formula of compound = $\text{T}_2\text{Z} \quad \checkmark \quad 1\text{mk}$
 $\left. \begin{array}{l} \text{Mass number of T} = 11 + 12 = 23 \\ \text{Mass number of Z} = 16 + 16 = 32 \end{array} \right\} \quad \checkmark \quad \frac{1}{2}\text{mk} \quad \text{for both values}$
 Formula Mass of $\text{T}_2\text{Z} = (23 \times 2) + 32 = 78 \quad \checkmark \quad \frac{1}{2}\text{mk}$

c) – When molten $\checkmark \quad \frac{1}{2}\text{mk}$
 – When in aqueous solution $\checkmark \quad \frac{1}{2}\text{mk}$

10. Ethanol contains molecules $\checkmark \frac{1}{2}$ which are not $\checkmark \frac{1}{2}$ responsible for electrical conductivity. (words to that effect.)

11. R – has the smallest atomic $\checkmark \frac{1}{2}$ size hence its outermost electrons are more strongly held to the nucleus resulting in high $\checkmark \frac{1}{2}$ value of ionization energy

12. - Add to lead (II) carbonate dilute nitric acid until in excess $\checkmark \frac{1}{2}\text{mk}$

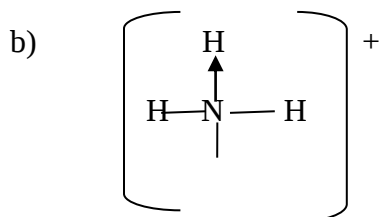
- filter to obtain lead (II) nitrate solution as filtrate. $\checkmark \frac{1}{2}\text{mk}$

- React the filtrate with sodium sulphate solution $\checkmark \frac{1}{2}\text{mk}$ to form insoluble $\checkmark \frac{1}{2}\text{mk}$ lead (II) sulphate

- Filter to obtain lead (II) sulphate as residue. $\checkmark \frac{1}{2}\text{mk}$

- Wash the salt of lead (II) sulphate with distilled and dry in between the filter papers $\checkmark \frac{1}{2}\text{mk}$

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



H

14. Silicon (IV) oxide forms giant atomic structure $\sqrt{1\text{mk}}$ of strong covalent bonds $\sqrt{\frac{1}{2}\text{mk}}$ having high melting point. Carbon (IV) oxide has a simple molecular structure $\sqrt{1\text{mk}}$ with weak Van der Waals forces $\sqrt{\frac{1}{2}\text{mk}}$ between hence the low melting point.

15. i) hygroscopy ii) deliquescence iii) efflorescence $\sqrt{1\text{mk}}$ 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) $2\text{CuO}_{(s)} + \text{C}_{(s)} \longrightarrow 2\text{Cu}_{(s)} + \text{CO}_{2(g)}$

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: $t_1 = 28.3\text{sec}$ RMM = ?

Q2: $t_2 = 20.0\text{sec}$ RMM=32

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

$$\left(\frac{28.3}{20}\right)^2 = \frac{X}{32} \quad \sqrt{\frac{1}{2}\text{mk}}$$

$$X = \frac{800.89 \times 32}{400} \quad \sqrt{\frac{1}{2}\text{mk}}$$

$$400$$

$$X = 64 \quad \sqrt{1\text{mk}}$$

19. RFM of $\text{NaHCO}_3 = 23+1+ 12 + 16 \times 3$

$$= 84 \quad \sqrt{\frac{1}{2}\text{mk}}$$

$$\text{Moles of NaHCO}_3 = \frac{2100 \times 1000}{84} \quad \sqrt{1\text{mk}}$$

$$= 25000 \text{ moles}$$

Mole ratio of $\text{NaHCO}_3:\text{CO}_2 = 2:1$

$$\therefore \text{Moles of } \text{CO}_2(\text{g}) \longrightarrow 25000 \div 2 = 12500 \text{ moles} \quad \sqrt{1/2 \text{mk}}$$

$$\text{Volume of } \text{CO}_2(\text{g}) = 22.4 \times 12500 \quad \sqrt{1/2 \text{mk}}$$

$$= 280,000 \text{ dm}^3 \quad \sqrt{1/2 \text{mk}}$$

20.	Fe	S	O	H ₂ O	
No. of moles	$\frac{20.2}{56}$	$\frac{11.5}{32}$	$\frac{23.0}{16}$	$\frac{45.3}{18}$	$\sqrt{1 \text{mk}}$
	=0.36	=0.36	=1.44	=2.52	
Mole ratio	$\frac{0.36}{0.36}$	$\frac{0.36}{0.36}$	$\frac{1.44}{0.36}$	$\frac{2.52}{0.36}$	$\sqrt{1 \text{mk}}$
	1	1	4	7	
	Empirical formula: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$				$\sqrt{1 \text{mk}}$

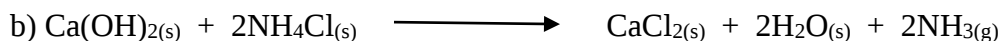
$$21. \text{ i) } \text{C}_n\text{H}_{2n} \quad \sqrt{1 \text{mk}}$$

$$\text{ii) } \text{C}_5\text{H}_{10} \quad \sqrt{1 \text{mk}}$$

$$\text{iii) } 70 \quad \sqrt{1 \text{mk}}, \text{ OPEN STRUCTURAL FORMULA TO BE DRAWN } \sqrt{1 \text{mk}}$$

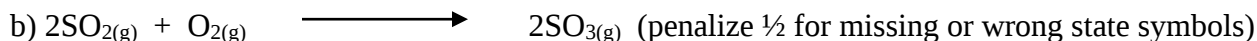
(PENALIZE FOR CONDENSED FORMULA)

22. a) calcium hydroxide, sodium hydroxide or potassium hydroxide (any one $\sqrt{1 \text{mk}}$)



(Penalize $\frac{1}{2}$ for missing or wrong state symbols)

23. a) vanadium (V) oxide



24. i) chlorine gas

ii) Sodium chlorite (I)

25. (a) Temporary water hardness . $\sqrt{1 \text{mk}}$ This is because hardness is removed by boiling $\sqrt{1/2 \text{mk}}$

(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- $\text{Cu}(\text{OH})_2$ or copper (II)hydroxide $\sqrt{1}$ mk

b) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ $\sqrt{1}$ mk

c) Hydrogen sulphide or H_2Sg $\sqrt{1}$ mk

$$27. \Delta H = \frac{120 \times 4.2 \times 4.5}{1000} \quad (\frac{1}{2}\text{mk})$$

$$= + 2.268\text{KJ} \quad (\frac{1}{2}\text{mk})$$

(b) RFM of $\text{KNO}_3 = 39 + 14 + 48 = 101$

$$6\text{g} \longrightarrow 2.268\text{KJ}$$

$$101\text{g} \longrightarrow \frac{101 \times 2.268}{6} \quad (\frac{1}{2}\text{mk})$$

$$= +38.178\text{KJ mol}^{-1} \quad (\frac{1}{2}\text{mk})$$

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

$$\begin{array}{ll} \text{Breaking of 'Br – Br'} = +193 & \text{Formation of C-C} = -346 \\ + 803 \quad \sqrt{\frac{1}{2}\text{mk}} & -906 \quad \sqrt{\frac{1}{2}\text{mk}} \end{array}$$

$$\text{Sum } +803 + -906 = - 103\text{KJ} \sqrt{1}\text{mk}$$

b) Addition reaction/ halogenation $\sqrt{1}$ mk