



வடமாகாணக் கல்வித் திணைக்களத்துடன் இணைந்து

தொண்டைமானாறு வெளிக்கள நிலையம் நடாத்தும்

தவணைப் பரீட்சை, நவம்பர் - 2019

Conducted by Field Work Centre, Thondaimanaru

In Collaboration with Provincial Department of Education Northern Province

Term Examination, November - 2019

Grade - 12 (2021)

Chemistry

Marking Scheme

Part - I MCQ

01) 4

02) 1

03) 5

04) 1

05) 3

06) 4

07) 1

08) 2

09) 5

10) 2

11) 1

12) 4

13) 5

14) 2

15) 3

16) 2

17) 4

18) 3

19) 5

20) 5

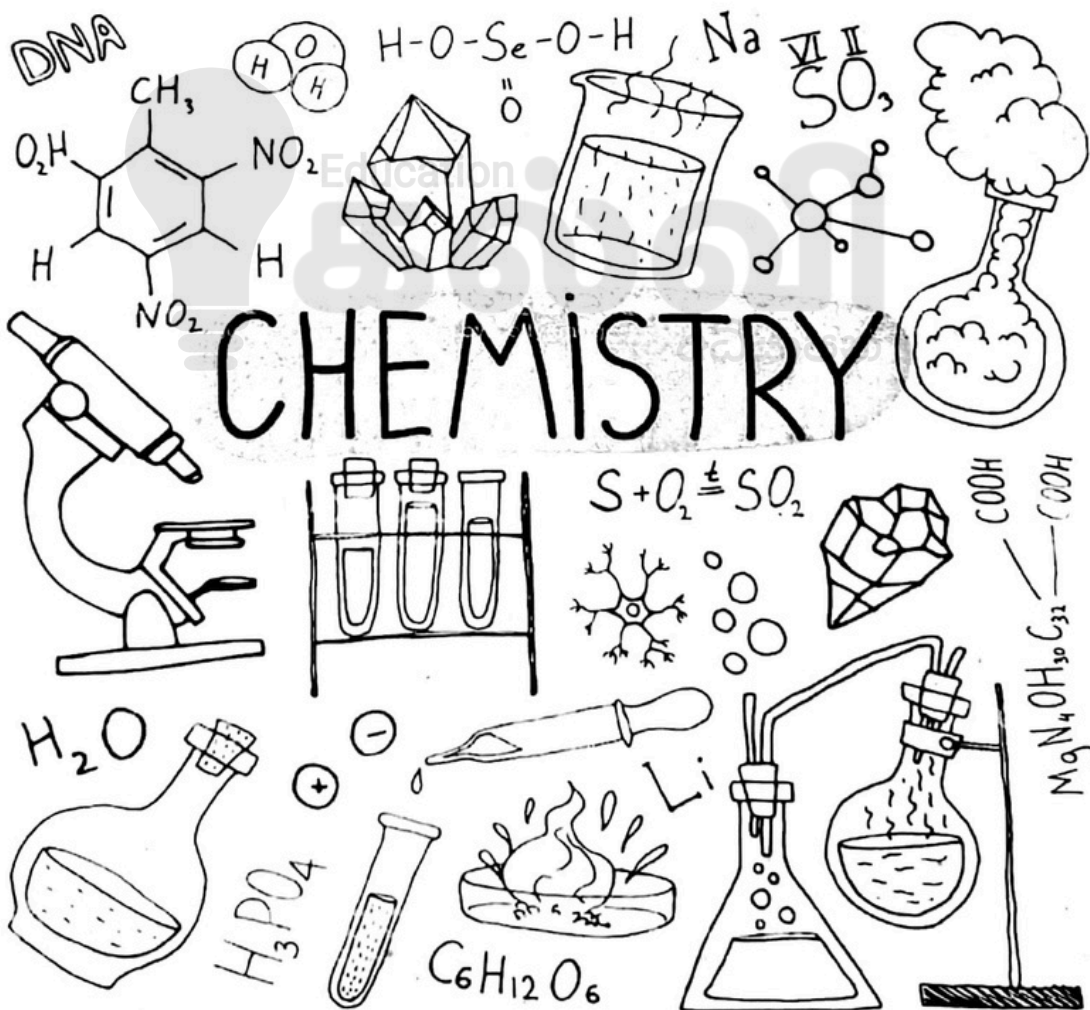
21) 1

22) 3

23) 1

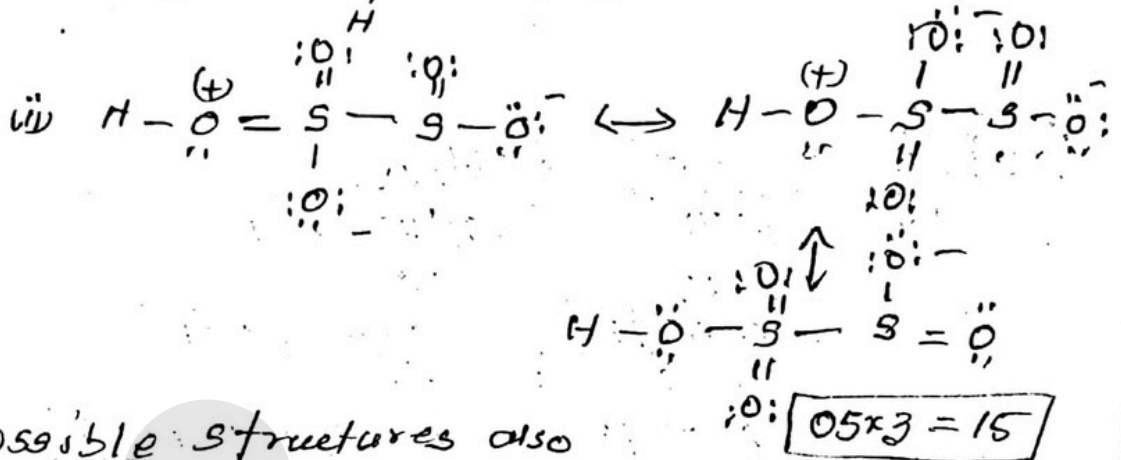
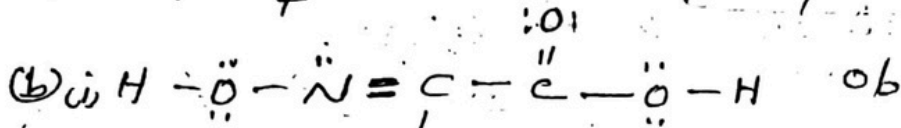
24) 4

25) 3



Gr 12 Structure Essay

Q1] (i) H_3O^+ (ii) SF_6 (iii) NH_4Cl (iv) SiO_2 (v) CO_3^{2-}
 (vi) $HClO_4$ 06x4 = 24



Possible structures also acceptable

	C ¹	N ³	C ⁴	O ⁵
(iii) I	3	4	3	4
II	Trigonal Planar	Tetra-hedral	Trigonal Planar	Tetrahedral
III	Trigonal Planar	Trigonal Pyramidal	Trigonal Planar	angular
IV	sp^2	sp^3	sp^2	sp^3

(iv)	C ¹	sp^2	C ²	sp^2	01x16 = 16
	C ²	sp^2	N ³	sp^3	
	N ³	sp^3	C ⁴	sp^2	
	C ⁴	sp^2	O ⁵	sp^3	
	C ⁴	sp^2	O ⁶	sp^2	
				01x10 = 10	

(v)	C ¹	2P (a.o)	C ²	2P (a.o)	01x4 = 04
	C ⁴	2P (a.o)	O ⁶	2P (a.o)	

(c) (i) SF_4 (ii) CO 02x2 = 4

- (ii) 1) Ion-dipole, Hydrogen bond, London force
 2) Induce dipole → Induce dipole, London force.
 3) Ion-Induce dipole,
 4) dipole-Induce dipole,

$$0.3 \times 7 = 2.1$$



Q2] (i)
 (ii)

CO_2	:	H_2O
$\frac{1.738}{44}$		$\frac{0.711}{18} \text{ mol}$
0.0395		0.0395 mol

C	:	H
0.0395		0.079 mol

$W_C = 0.4749 \text{ g}$ $W_H = 0.079 \text{ g}$ $\therefore W_O = 0.9479 \text{ g}$

$n_0 = 0.0395 \text{ mol}$

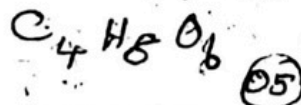
C	:	H	:	O
0.0395		0.079		0.059
2		4		3

Empirical formula $\text{C}_2\text{H}_4\text{O}_3$ (0.5)

(ii) molecular formula $(\text{C}_2\text{H}_4\text{O}_3)_n = 150$

$(24 + 4 + 48)n = 150$

$n = 2$ (0.5)



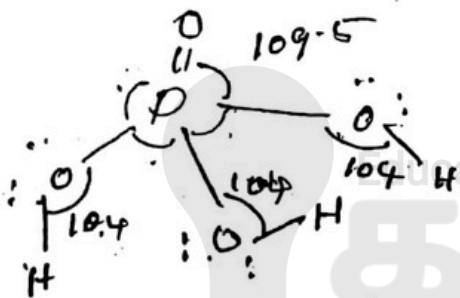
28

(I) Total number of valance electron pairs around P = 5
 VSEPR pairs = 4
 σ Pairs = 4
 Lone pairs = 0
 shape - Tetrahedral

$$0 \times 5 = 10$$

(II) Total number of valance electron pairs around O = 4
 VSEPR pairs = 4
 σ pairs = 2
 Lone pairs = 2
 shape Angular

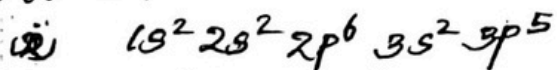
$$0 \times 5 = 10$$



$$0 \times 7 = 7$$

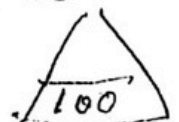
IV Charge of P = [number of valance electrons in the atom] - [number of bonds] - [number of electrons in lone pairs]
 $= 5 - 5 - 0 = 0$

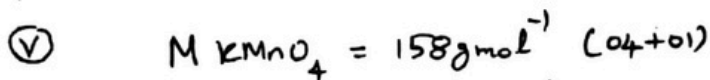
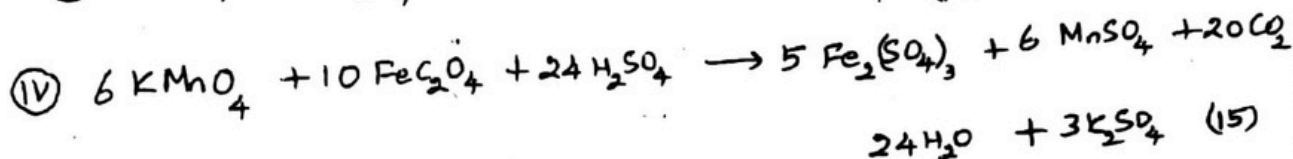
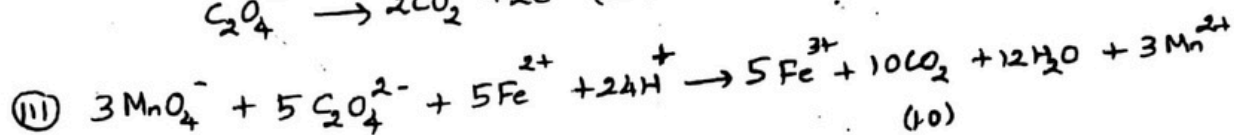
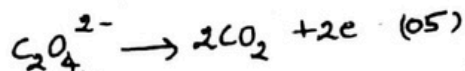
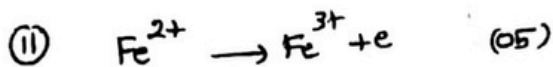
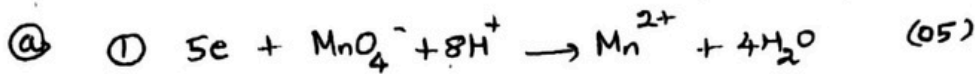
(C) a) e1



(3) -1, +1, +3, +5, +6, 17

(4) Possible answer NCl, $7.5 \times 4 = 30$



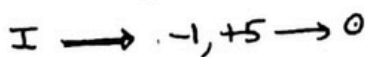
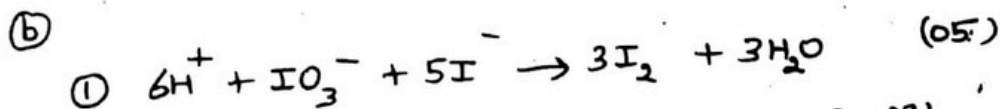


moles of $MnO_4^- = \frac{0.948g}{158 g mol^{-1}}$ (04+01)

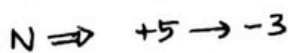
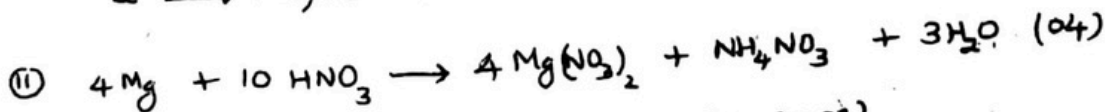
Volume of FeC_2O_4 $V cm^3$

$\frac{n MnO_4^-}{n FeC_2O_4} = \frac{3}{5} = \frac{\frac{0.948}{158} mol}{\frac{0.2 \times V}{1000} mol}$ (04+01) $\times 2 = (10)$

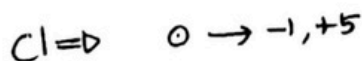
$= \frac{0.948 \times 1000 \times 5}{158 \times 0.2 \times 3} = 50 cm^3$ (05)



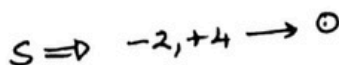
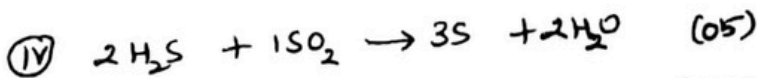
(01 \times 3 = 03)



(01 \times 2 = 02)



(01 \times 3 = 03)



(01 \times 3 = 03)

4

Q) It is the formula which represents the simplest whole number ratio among the atoms of different element of a molecule. (10)

	C	H	O	N	
Mass ratio	53.93	12.35	17.97	15.73	(05)
Mole ratio	$\frac{53.93}{12}$ 4.494	$\frac{12.35}{1}$ 12.35	$\frac{17.97}{16}$ 1.123	$\frac{15.73}{14}$ 1.123	(05)
Simplest ratio	$\frac{4.494}{1.123}$ 4	$\frac{12.35}{1.123}$ 11	$\frac{1.123}{1.123}$ 1	$\frac{1.123}{1.123}$ 1	(05)

Empirical formula $C_4H_{11}ON$ (05)

b) i Volumetric flask (03), funnel (03), Watchglass (05), four beam balance, Washbottle, (03) distilled water (03)

ii

$$M_{Na_2CO_3} = 106 \text{ g mol}^{-1} \quad (05)$$

$$n = \frac{W}{M} \quad (05)$$

$$0.025 \text{ mol} = \frac{W}{106 \text{ g mol}^{-1}} \quad (05)$$

$$W = 2.65 \text{ g} \quad (05)$$

$$c = \frac{n}{V} \quad (05) \quad n = 0.1 \text{ mol dm}^{-3} \times \frac{250 \text{ dm}^3}{1000} \quad (05)$$

$$= 0.025 \text{ mol} \quad (05)$$

- * Measure and get the 2.65g of Na_2CO_3 on the watchglass by using four beam balance. (05)
- * Add the 2.65g of Na_2CO_3 into the 250cm³ of volumetric flask by adding water step by step until it reaches the 250cm³ of volume level. (05)

PART - II

⑤

- I.
- give to fluoresce
 - produce to positive rays
 - Rotate the blades of the paddle wheel
 - heat the & metal substances
 - produce to x-rays
- (4 x 05 = 20 marks)

- II.
- They observed that the majority of particles penetrated the foil either unreflected.
 - They also noticed that a few α -particles were scattered at a large angle.
 - Very few α -particles bounced back in the direction from which it came.
- (3 x 5 = 15 marks)

- III.
- The display of electromagnetic radiation arranged in order of increasing wavelength is called the electromagnetic spectrum.
- (08 marks)

- IV.
- The principal quantum number - This quantum number defines the main energy level that the electron occupies in the atom.

- The angular momentum quantum number:- This quantum number defines the shape of the orbital.

- The magnetic quantum number:- This quantum number describes the orientation of the orbital in space.

* The spin quantum number :-

Two possible values are allowed $-\frac{1}{2}$ or $+\frac{1}{2}$ which indicate the two opposite directions in which the electron can spin.

(4 x 0.5 = 20 marks)

V. • Resonance for equal resonance structures the bond length in the resonating unit becomes equal.

• The resonance hybrid has comparatively lower energy and thus a greater stability than any of the contributing structures.

• Equivalent resonance structures make equal contribution to the resonance hybrid.

• Resonance structures do not have real existence.

(3 x 0.5 = 15 marks)

VI. Directly

- Distribution of valence electrons
- Charges of atoms.

(2 x 0.5 = 10 marks)

not directly

- shape
- hybridization
- nature of orbitals occupied by lone pairs
- bond angle.

(2 x 0.5 = 10 marks)

VII. Anion Same

Cation Charge Same:

but size increases $Mg^{2+} < Ca^{2+} < Sr^{2+} < Ba^{2+}$

So, Polarizing power decreases $Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+}$

(5 x 0.5 = 2.5 marks)

Therefore ionic character $MgCl_2 < CaCl_2 < SrCl_2 < BaCl_2$

VIII.

	H_2S	SO_3^{2-}	SO_4^{2-}
hybridization of S	sp^3	sp^3	sp^3
charge of S	0	0	0
oxidation state of S	-2	+4	+6

(3 x 3 = 09 marks)

hybridization and charge are same. So electronegativity depends on oxidation state of S. — (04)

Higher oxidation state greater the electronegativity than neutral — (05)

Therefore electronegativity of S $SO_4^{2-} > SO_3^{2-} > H_2S$ — (05)

18
marks

150

6) I. In $100g$ Sodium hydroxide solution

$$\text{Mass of NaOH} = 10g = 10g$$

$$\text{mole of NaOH} = \frac{10g}{40g/mol} = \frac{10g}{40g/mol}$$

$$= 0.25 \text{ mol} = 0.25 \text{ mol}$$

$$\text{mass of } H_2O = 90g$$

$$\text{mole of } H_2O = \frac{90g}{18g/mol} \checkmark$$

$$= 5 \text{ mol} \checkmark$$

$$\text{mole fraction of NaOH} = \frac{0.25 \text{ mol}}{5 \text{ mol} + 0.25 \text{ mol}} \checkmark$$

($\checkmark 6 \times 3 = 18$ marks)

$$= 0.048 \checkmark$$

9

$$\text{II. ppm} = \frac{4 \times 10^{-3} \text{ g} \times 10^6}{2000 \text{ g}}$$

$$= 2$$

(5) marks

III. • extremely pure

• stable

• not hydrated and highly water soluble

• high molecular weights

(4x5 = 20 marks)

IV.

$$\text{Mass Percentage of O} = \frac{48 \text{ g} \times 32 \text{ g}}{160 \text{ g}}$$

$$= 9.6\%$$

(07 marks)



$$b) \text{ No. of mole of C} = \frac{54.55 \times 88 \text{ mol}}{100 \times 12}$$

$$= 4 \text{ mol} \quad \text{--- (5)}$$

let, $C_xH_yO_z = 88 \text{ g mol}^{-1}$

$$4 \times 12 \text{ g mol}^{-1} + x \times 1 \text{ g mol}^{-1} + y \times 16 \text{ g mol}^{-1} = 88 \text{ g mol}^{-1} \quad \text{--- (5)}$$

$$x + 16y = 40 \quad \text{--- (5)}$$

$y=1 \dots x=24 \dots$ not possible

$y=2 \dots x=8 \dots$ possible (5)

So, Molecular formula $C_8H_{16}O_2$ (5)



c) mass of solution in $1 \text{ cm}^3 = 1.84 \text{ g}$

mass of solution in $1000 \text{ cm}^3 = 1840 \text{ g} \checkmark$

mass of H_2SO_4 in $100 \text{ g sol}^n = 98 \text{ g}$

mass of H_2SO_4 in $1840 \text{ g sol}^n = \frac{98}{100} \times 1840 \text{ g} \checkmark$

mass of H_2SO_4 in $1 \text{ dm}^3 \text{ sol}^n = \frac{98 \times 1840}{100} \text{ g} \checkmark$

No. of mole H_2SO_4 in $1 \text{ dm}^3 \text{ sol}^n = \frac{98 \times 1840 \text{ g}}{100 \times 98 \text{ g mol}^{-1}}$

$$= 18.4 \text{ mol} \checkmark$$

$$\text{Molarity of } \text{H}_2\text{SO}_4 = 18.4 \text{ mol dm}^{-3} \checkmark$$

Amount of ~~the~~ H_2SO_4 moles in 600 cm^3 of
 2.3 mol dm^{-3} H_2SO_4 solution

$$\begin{aligned} &= 2.3 \text{ mol dm}^{-3} \times 600 \times 10^{-3} \text{ dm}^3 \checkmark \\ &= 1380 \times 10^{-3} \text{ mol} \checkmark \end{aligned}$$

The required volume of the concentrated
 H_2SO_4 solution is $V \text{ cm}^3$ ✓

$$1380 \times 10^{-3} \text{ mol} = \frac{18.4 \text{ mol} \times V}{1000 \text{ cm}^3} \checkmark$$

$$V = 75 \text{ cm}^3 \checkmark$$

$$1 \times 5 = 55$$

Accurately measured volume of 75 cm^3
of concentrated H_2SO_4 is diluted up to
the mark of the volumetric flask
to prepare the solution of 600 cm^3
of 2.3 mol dm^{-3} H_2SO_4 . (20)

$$50 + 25 + 55 + 20 = 150$$

Q7

i. Molar masses of NO and O₂ are comparable but boiling point of NO is greater than O₂. Hence the relative strength of inter molecular interaction forces among NO molecules should be greater than the O₂ molecules.

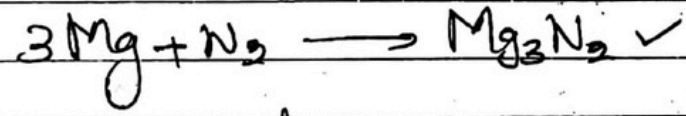
Oxygen molecular is a non polar molecule. polar NO has dipole-dipole attractions among the molecules. So, Inter molecular force NO > O₂
boiling point NO > O₂

15 marks

- ii. • Number of electrons donated by atoms to create the metallic bond
- Atomic radius
- Atomic nature

09 marks

iii.



$$\text{No. of moles of Mg} = \frac{0.48\text{g}}{24\text{g mol}^{-1}} \checkmark$$

$$= 2 \times 10^{-2} \text{ mol} \checkmark$$

$$\text{No. of moles of N}_2 = \frac{0.14\text{g}}{28\text{g mol}^{-1}} \checkmark$$

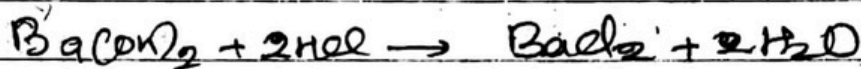
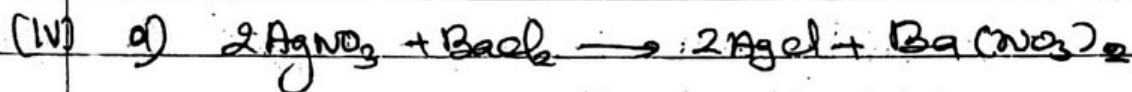
$$= 5 \times 10^{-3} \text{ mol} \checkmark$$

$$\frac{n_{\text{Mg}}}{n_{\text{N}_2}} = \frac{3}{1} \checkmark$$

The no. of moles N_2 required to complete consumption = $\frac{1}{3} \times 2 \times 10^{-2}$
 $= \frac{2}{3} \times 10^{-2} \text{ mol}$
 $= 6.6 \times 10^{-3} \text{ mol} \quad \checkmark$

So, limiting reagent is $N_2 \quad \checkmark$

$8 \times 0.2 = 16 \text{ marks}$



(10 marks)

b) No. of mole of $\text{HCl} = 20 \times 10^{-3} \text{ mol dm}^{-3} \times 100 \times 10^{-3} \text{ dm}^3$
 $= 2 \times 10^{-3} \text{ mol} \quad \checkmark$

$\frac{n_{\text{Ba}(\text{OH})_2}}{n_{\text{HCl}}} = \frac{1}{2} \quad \checkmark$

$n_{\text{Ba}(\text{OH})_2} = \frac{1}{2} \times 2 \times 10^{-3} \text{ mol} \quad \checkmark$
 $= 1 \times 10^{-3} \text{ mol} \quad \checkmark$

$c_{\text{Ba}(\text{OH})_2} = 1 \times 10^{-3} \text{ mol} / 0.1 \text{ dm}^3 \quad \checkmark$
 $= 0.01 \text{ mol dm}^{-3} \quad \checkmark$

($\checkmark \times 5 = 35 \text{ marks}$)

c) $\frac{n_{\text{BaCl}_2}}{n_{\text{HCl}}} = \frac{1}{2} \quad \checkmark$

$$n_{\text{BaCl}_2} = \frac{1}{2} \times 2 \times 10^{-3} \text{ mol} \checkmark$$

$$= 1 \times 10^{-3} \text{ mol} \checkmark$$

$$\frac{n_{\text{AgCl}}}{n_{\text{BaCl}_2}} = \frac{2}{1} \checkmark$$

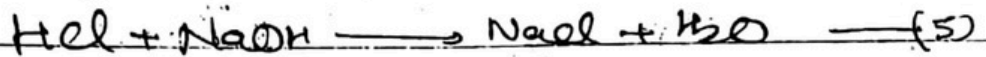
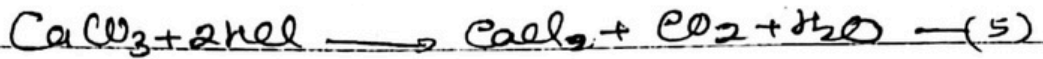
$$n_{\text{AgCl}} = 2 \times 10^{-3} \text{ mol} \checkmark$$

$$W_{\text{AgCl}} = 2 \times 10^{-3} \text{ mol} \times 143.5 \text{ g mol}^{-1} \checkmark$$

$$= 0.287 \text{ g} \checkmark$$

($\checkmark 7 \times 0.5 = 3.5$ marks)

V.



Number of moles of initial HCl

$$= 1 \text{ mol dm}^{-3} \times 30 \times 10^{-3} \text{ dm}^3 \checkmark$$

$$= 30 \times 10^{-3} \text{ mol} \checkmark$$

Number of moles of NaOH

$$= 1 \text{ mol dm}^{-3} \times 10 \times 10^{-3} \text{ dm}^3 \checkmark$$

$$= 10 \times 10^{-3} \text{ mol} \checkmark$$

$$n_{\text{NaOH}} : n_{\text{HCl}} = 1 : 1 \quad \checkmark$$

So, remaining HCl moles = ~~$30 \times 10^{-3} - 20 \times 10^{-3}$~~
 $= 10 \times 10^{-3} \text{ mol} \checkmark$

Therefore, reacted moles of HCl with

$$\text{CaCO}_3 = 30 \times 10^{-3} - 10 \times 10^{-3} \checkmark$$

$$= 20 \times 10^{-3} \text{ mol} \checkmark$$

$$\frac{n_{\text{CaCO}_3}}{n_{\text{HCl}}} = \frac{1}{2} \quad \checkmark$$

$$\text{No. of moles of CaCO}_3 = \frac{1}{2} \times 20 \times 10^{-3} \checkmark$$
$$= 10 \times 10^{-3} \text{ mol} \checkmark$$

$$\text{Weight of CaCO}_3 = 10 \times 10^{-3} \text{ mol} \times 100 \text{ g mol}^{-1} \checkmark$$
$$= 1 \text{ g} \quad \checkmark$$

$$\text{mass percentage of CaCO}_3 = \frac{1 \text{ g}}{1.25 \text{ g}} \times 100 \checkmark$$

$$(15 \times 2 = 30 \text{ marks}) \quad = 80\% \quad \checkmark$$



எங்கள் குறிக்கோள்

எண்ணிம உலகத்தில் மாணவர்களிற்கென சிறந்ததொரு கற்றல் கட்டமைப்பை உருவாக்குதல்.

அனைத்தும் டிஜிட்டல் மயப்படுத்தப்பட்ட இந்த காலத்தில் பல்வேறு துறைகளும் கால ஓட்டத்துடன் இணைந்து டிஜிட்டல் தளத்தில் பல்கிப்பெருகி வருகின்றன. அந்த வகையில் கல்வித்துறையும் இதற்கு விதிவிலக்கல்ல. இணையவழி கல்வியின் மூலம் கல்வித்துறை புதியதொரு பரிமாணத்தை எட்டியுள்ளது. குறிப்பாக கொரோனா பேரிடர் காலத்தில் நாடே முடக்கப்பட்டிருந்தது. இதனால் மாணவர்களிற்கும் பாடசாலை, கல்வி நிறுவனங்களிற்கு இடையிலான தொடர்பு துண்டிக்கப்பட்டது. அந்த இக்கட்டான சூழ்நிலையில் இணையவழி வகுப்புகள் மாணவர்களிற்கு வரப்பிரசாதமாக அமைந்தது என்பதே உண்மை.


இன்று தொழில்நுட்பம் மாணவர்களை தவறான பாதைக்கு இட்டு செல்வதாக ஓர் எண்ண ஓட்டம் மக்கள் மத்தியில் உள்ளது. தொழில்நுட்பம் என்பது ஒரு கருவி மட்டுமே அதை எவ்வாறு பயன்படுத்துகிறோம் என்பதில் அதன் ஆக்க மற்றும் அழிவு விளைவுகள் தீர்மானிக்கப்படுகிறது. உளியை கொண்டு சிலையை செதுக்க நினைத்தால் அவன் நிச்சயம் சிற்பி ஆகலாம். இங்கு பிரச்சினையாக காணப்படுவது மாணவர்களை வழிப்படுத்த தொழில்நுட்ப உலகில் ஓர் முறையான கட்டமைப்பு இல்லாமையே. அதை உருவாக்குவதே எங்கள் நோக்கம். அதை நோக்கியே எங்கள் பயணம் அமையும்.

எமது இணையத்தினூடக ஊடக உங்களிற்கு தேவையான பரீட்சை வினாத்தாள்களை இலகுவான முறையில் தரவிறக்கம் செய்து கொள்ளமுடியும்.

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கல்வி சார் செய்திகளை உடனுக்குடன் அறிந்து கொள்ள எமது சமூக ஊடக தளங்களின் ஊடக உடனுக்குடன் அறிந்து கொள்ள முடியும்.

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