

FORM 3 CHEMISTRY CLUSTER EXAM MS 2026 – END TERM 2

**Q1.a).** 12g of C in 44 of CO<sub>2</sub> in 4.4  
 $= \frac{12}{44} \times 4.4 = 1.2 \sqrt{1/2}$   
 0.105 mk

2g of H in 18gH<sub>2</sub>O in 2  
 $= \frac{2}{18} \times 2 = 0.88 \sqrt{1/2}$   
 mk

C	H	O
$\frac{1.2}{12}$	$\frac{0.22}{1}$	$\frac{1.68}{16}$
0.1		0.22
1	2.2	1.05
1	: 2	: 1

Mass of O =  $3.1 - [1.2 + 0.88]$   
 $= 1.68 \sqrt{1/2}$  mk

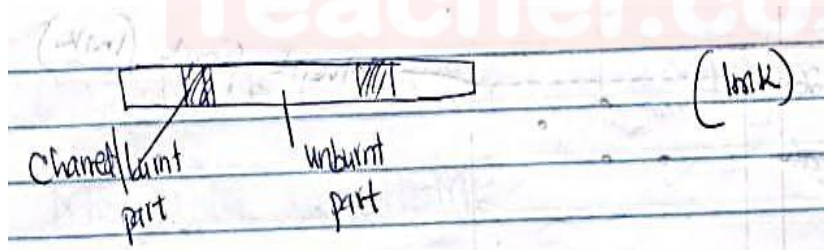
E.F = CH<sub>2</sub>O  $\sqrt{1/2}$  mk

**b.)** E.F = CH<sub>2</sub>O  
 Formula mass = 62  
 $[12 + 2 + 16]n = 62 \sqrt{1}$  mk

$30n = 62$   
 $n = 2.06$   
 $n \approx 2.0 \sqrt{1/2}$  mk

[C H<sub>2</sub> O]<sub>2</sub>  $\sqrt{1/2}$  mk  
 C<sub>2</sub> H<sub>4</sub> O<sub>2</sub>

- Q2 . a.)** Non luminous  
 b.) Air hole is open  
 c.) (1 mk)



- Q3. a.i.** water
- ii. – Oxygen gas is slightly soluble in water
  - Oxygen is less dense than water
  - iii. Blue litmus remained blue and red litmus remained red. Oxygen gas is a neutral gas.
  - iv. – Steel making
  - Oxy-acetylene welding flame
- b.i.** - Concentrated sulphuric (VI) acid
- To dry the gas
  - ii.  $2 \text{NaOH}_{(aq)} + \text{CO}_2(g) \rightarrow \text{Na}_2\text{CO}_3(aq) + \text{H}_2\text{O}(l)$   
 $\text{Na}_2\text{CO}_3(aq) + \text{CO}_2(g) \rightarrow 2 \text{NaHCO}_3$
  - iii. Brown copper solid turns to black solid
  - iv. I. Mg<sub>3</sub>N<sub>2</sub> /Magnesium Nitride  
 II.  $\text{Mg}_3\text{N}_2(s) + 6 \text{H}_2\text{O}(l) \rightarrow 3\text{Mg}(\text{OH})_2(aq) + 2 \text{NH}_3(g)$

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c. B – No rust

A – Rusting occurred

In A, - Copper is less reactive than iron and hence cannot prevent it from rusting.

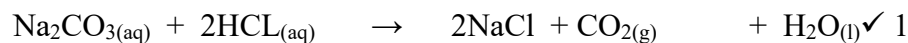
In B, – Zn is more reactive than Fe and hence reacts preferentially with oxygen and moisture preventing iron from rusting.

**Q4.**  $200 - 160 \checkmark \frac{1}{2} = 40 \checkmark \frac{1}{2}$

$$\frac{40}{200} \times 100\% \checkmark \frac{1}{2} = 20\% \checkmark \frac{1}{2}$$

**Q5.**  $0.8 \rightarrow 1000\text{cm}^3$

$$? \leftarrow 25\text{cm}^3 \quad \frac{0.8 \times 25}{1000} = 0.02 \text{ mole of HCl} \checkmark \frac{1}{2}$$



$$\text{Mole of NaCO}_3 = \frac{0.02}{2} = 0.01 \text{ mole} \checkmark \frac{1}{2}$$

$$\text{Mass of Na}_2\text{CO}_3 = 0.01 \times 10^{-6} = 1.06\text{g}$$

$$1.06\text{g} \rightarrow \frac{20\text{cm}^3}{\leftarrow 1000\text{cm}^3} = \frac{1.06 \times 1000}{20} \checkmark \frac{1}{2}$$

$$= 53\text{g/litre} \checkmark \frac{1}{2}$$

**Q6.** (a) - Iron nails rusted  $\checkmark 1$

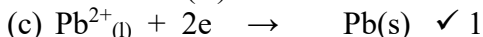
- Water will flow into  $\checkmark 1$  the delivery tube.

(b) Conditions necessary for rusting were met and therefore the iron nails rusted.  $\checkmark 1$ .

Oxygen gas was used and water rose in the delivery tube  $\checkmark \frac{1}{2}$  to occupy the volume that had been occupied by oxygen.

**Q7.** (a) On the diagram  $\checkmark 1$

(b) In solid lead (II) iodide the ions are fixed position.  $\checkmark \frac{1}{2}$  and not mobile to conduct electric current. Lead (II) iodide should be heated in order to mobilize the ions.  $\checkmark \frac{1}{2}$



**Q8.** Deliquescent salts absorb water from atmosphere to form a solution while hygroscopic salts absorb water from atmosphere and does not form a solution.

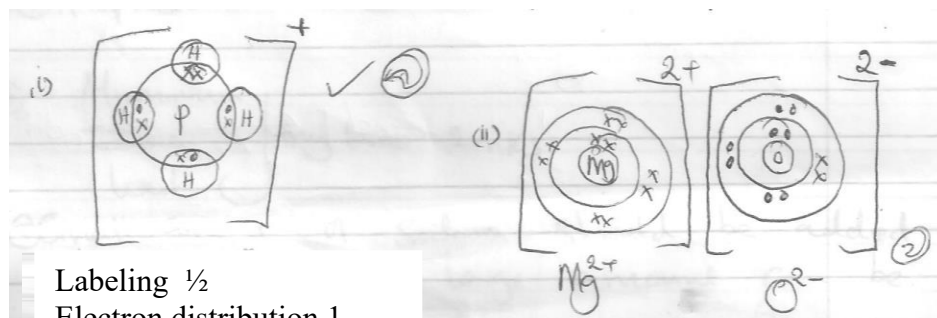
**Q9.** Put dilute  $\text{H}_2\text{SO}_4$  and warm.  $\checkmark \frac{1}{2}$ . Add copper (II)oxide into warm  $\text{H}_2\text{SO}_4$  until in excess. Filter to remove excess  $\checkmark \frac{1}{2}$  copper (II) oxide from copper II sulphate solution. Evaporate water from copper (II) sulphate  $\checkmark \frac{1}{2}$  solution by heating to saturation .cool saturated solution for crystals to form. Dry the crystals between filter papers.  $\checkmark \frac{1}{2}$

**Q10.** (a) A - Super heated water  $\checkmark 1$

B - Molten sulphur  $\checkmark 1$

(b) To force molten sulphur up pipe B.

Q11.



Labeling  $\frac{1}{2}$   
 Electron distribution 1  
 Charge  $\frac{1}{2}$

- 12.(a)  $C(s) + CO_2(g) \rightarrow 2CO(g)$  ✓ 1  
 (b) Redox /reduction ✓ 1  
 (c) Concentrated sodium hydroxide. ✓ 1

13..  $T_x = \sqrt{mx}$   
 $T_y = \sqrt{my}$  ✓  $\frac{1}{2}$

$140\text{cm}^3$  of x  $\rightarrow 72$  secs  
 $210\text{cm}^3$  of x  $\rightarrow x$

$$x = \frac{210 \times 72}{140} = 108 \text{ secs,}$$

$$\frac{108}{T_y} = \frac{\sqrt{16}}{\sqrt{64}} \quad \checkmark \quad 1$$

$$T_y = \frac{108 \times \sqrt{64}}{\sqrt{16}} \quad \checkmark \quad 1 = 216 \text{ secs.} \quad \checkmark \quad \frac{1}{2} \quad (3 \text{ marks})$$

Q 14. (a) (i)(1mk)

- Monoclinic sulphur ✓( $\frac{1}{2}$ mk)
- Rhombic sulphur ✓( $\frac{1}{2}$ mk)

(b) (i) (1mk) -Sulphur ✓( $\frac{1}{2}$ mk),zinc blende ✓( $\frac{1}{2}$ mk), galena, copper pyrite, iron pyrite, gypsum(any 2)

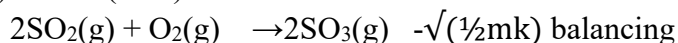
(ii) (1mk)

- Arsenic compounds ✓( $\frac{1}{2}$ mk) , dust particles ✓( $\frac{1}{2}$ mk) (reject any other impurity given)

(iii)(1mk)

- To prevent/avoid poisoning of the catalysts. ✓(1mk)

(iv) (1mk)



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(v) (1mk)

-Platinized asbestos  $\sqrt{(1/2mk)}$ , Vanadium (V) oxide  $\sqrt{(1/2mk)}$

(vi)(1mk)

-Vanadium (V) oxide  $\sqrt{(1mk)}$

-cheaper/readily available than platinized asbestos  $\sqrt{(1/2mk)}$

-It is not easily poisoned by impurities compared to platinized asbestos  $\sqrt{(1/2mk)}$

(vii) (1mk)

-Reaction is highly exothermic producing a mist of concentrated sulphuric (VI) acid  $\sqrt{(1mk)}$

(c) (i) (1mk)

-Sulphur (IV) oxide  $\sqrt{(1mk)}$

(ii) (1mk)

-Scrubbing the gas (passing it through calcium hydroxide solution)  $\sqrt{(1mk)}$  (any 1)

-Recycling the gas

-reacting the gas with calcium oxide or calcium carbonate or hot carbon

(iii)(1mk)

▪ Manufacture of paints and pigments  $\sqrt{(1/2mk)}$

▪ processing of natural fibres and manufacture of synthetic fibres such as rayon  $\sqrt{(1/2mk)}$  (any 2)

▪ manufacture of detergents /soap

▪ pickling of iron and steel (removing oxide layer on iron and steel)

▪ Manufacture of chemicals such as hydrochloric acid, metal sulphates

▪ manufacture of plastics

▪ manufacture of explosives

▪ manufacture of drugs

▪ filling of storage batteries such as car batteries, solar batteries.

▪ manufacture of sulphate fertilizers such as ammonium sulphate.

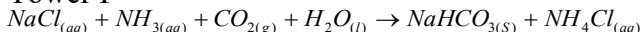
▪ in processing of metal ores

**Q15.** a) A - carbon (IV) oxide **1 mark**

B - Ammonia **1 mark**

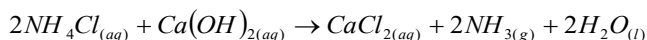
b) D - Sodium hydrogen carbonate **1 mark**

c) Tower P



**1 mark**

Chamber R



Chamber G



**1 mark**

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d) Calcium chloride **1 mark**

### Uses

- drying agent in anhydrous form
- lower melting point of rock salt/sodium chloride during extraction of sodium

Q16.. a) Sodium hydroxide.

b) Blue precipitate was formed which later dissolves to form a deep blue solution.

Q17. a) X increases the surface area for condensation.

b) Methanol. It has lower boiling point compared to propanol since its van der waal's forces are weaker than those of propanol.

Q 18 a)  $2\text{Li}_{(s)} + \text{H}_2\text{O}_{(g)} \rightarrow \text{Li}_2\text{O}_{(s)} + \text{H}_{2(g)}$

b) Potassium is very reactive and would react violently with steam.

c) To generate steam

Q 19. a) Moles of Zinc =  $\frac{1.96}{65.4} = 0.03$

Moles of HCl =  $\frac{100 \times 0.2}{1000} = 0.02$

Zinc was in excess since 0.02 moles of HCl needs to react with 0.01 Moles of Zinc.

b) Moles of  $\text{H}_2$  produced = 0.001

**Volume =  $0.01 \times 22.4 = 0.224$  litres or  $224\text{cm}^3$ .**

Q 20 .a) Platinum – rhodium

b) as a fertilizers.  
To make explosives.

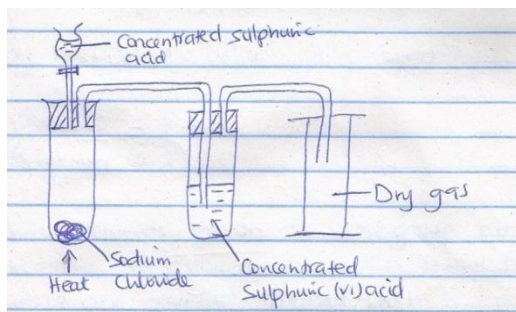
c) To prevent decomposition of the acid by light to  $\text{NO}_2$  and water.

Q21 . I conducts.

II ionic

III Covalent

Q22.



Q23. a) i) I – Condensation  
II – Melting

ii) Iodine, Benzoic acid, camphor, Dry ice(solid  $\text{CO}_2$ ) Naphthalene.

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- ii)  $\text{H}_2\text{O}_{(g)} \rightarrow \text{H}_2\text{O}_{(s)}$   
 b) i) I – Van der waals and hydrogen bonding.  
 II – Van der waals forces.

Q 24. a) i) Element R. Because it has the largest atomic radius hence its outer electron is not held strongly by the protons.

ii) P has more protons than N hence greater nuclear charge.  
 The electrons of P are therefore attracted strongly to the nucleus making it small.



moles of  $\text{H}_2$   
 $\frac{24\text{dm}^3}{24} = 1 \text{mole}$   
 $\frac{0.2\text{dm}^3}{24} = ?$   
 $\frac{0.2 \times 1}{24} = 0.00833 \text{moles}$

moles of M  
 $0.00833 \times 2 = 0.0167$   
 But 1 Mole Of M \_\_\_\_\_ 7g  
 0.0167 Moles \_\_\_\_\_ ?  
 $\frac{0.0167 \times 7}{1} = \mathbf{0.1169 \text{ g.}}$

