BIOLOGY

1. (a) Mention any **four** necessities of a transport system.

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b) Give **four** requirements of a transport system.

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c) (i) State **three** structural differences and **two** functional differences between the **xylem** and **phloem tissues**.

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ii) State any **two** forces responsible for water up the plant in the xylem.

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2. (a) Distinguish between **osmosis** and **diffusion**.

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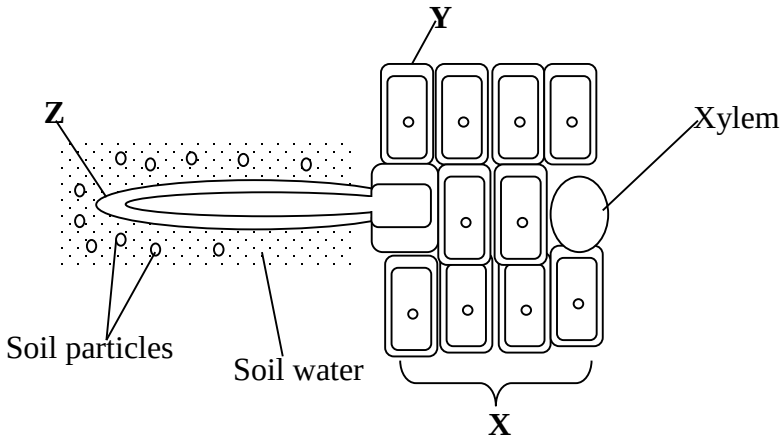
b) The figure below shows part of the root system. Study it carefully and answer the questions that follow;



(i) Name the parts labeled **X, Y** and **Z**.

X .....

Y. .....

Z. .....

(ii) State the role played by **Z**.

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b) (i) Briefly describe how water leaves the soil through part **Z** to the xylem.

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ii) State **three** ways how part **Z** is adapted to its functions;

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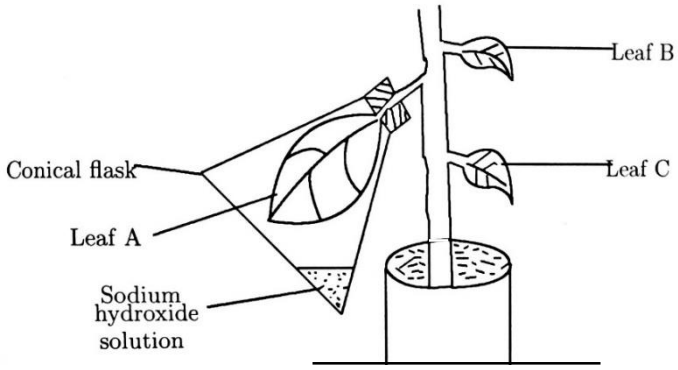
3. To investigate the effects of carbon dioxide on photosynthesis, a green plant was destarched by leaving it in darkness for 24 hours. After destarching, leaf **A** was put in a conical flask shown in fig 3 while leaf **C** was immediately tested for starch. The set up was then left in light for 12 hours after which leaves **A** and **B** were tested for starch.



a. Why was sodium hydroxide used in the experiment?

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b. State two reasons why the plant was placed in darkness for 24 hours it became destarched.

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c. State the purpose of including each of leaves **B** and **C** in the experiment.

(i) Leaf **B**

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(ii) Leaf **C**

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d. What was observed when each of the leaves **A**, **B** and **C** were tested for starch?

(i) Leaf **A**

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(ii) Leaf **B**

……

(iii) Leaf **C**

……

e. Give reasons why each of the following is carried out while testing a leaf for starch.

(i) Put a leaf in boiling water

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(ii) Put a leaf in hot ethanol

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4. (a) Draw and label a transverse section of a stem of a dicotyledonous plant.

(b) State the functions of five of the parts that can be identified in the section.

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(c) Describe how stems are modified to perform other functions other than conducting materials within the plant.

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5. (a) Give three ways of maintaining soil fertility.

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(b) State four ways in which soil organism contribute to soil fertility.

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(c) While analyzing a soil sample, the following results were obtained.

Volume of sand = 200cm^3

Volume of water = 300cm^3

Volume of sand and water after stirring = 450cm^3.

Calculate the percentage of air in the sand.

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6. A potted dicot plant was placed in darkness for 3 days. Four leaves A, B, C and D from the plant were then treated as shown in the table below, without removing the leaves.

   (a) Read in the table below and state the expected colour change for each leaf after treatment with iodine solution. Use the phrase intense blue black, faint blue black, very faint blue black and brown.

Leaf	Treatment	Observation after iodine test
A	Upper surface only coated with petroleum jelly	
B	Lower surface only coated with petroleum jelly	
C	Both upper and lower surface coated with petroleum jelly	
D	Both surfaces not coated with	

(b) Give reasons for the colour changes you recorded in (a) for each of the leaves **A, B, C** and **D.**

A:

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……..

B:

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C:

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D:

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(c) Give any three importance of photosynthesis.

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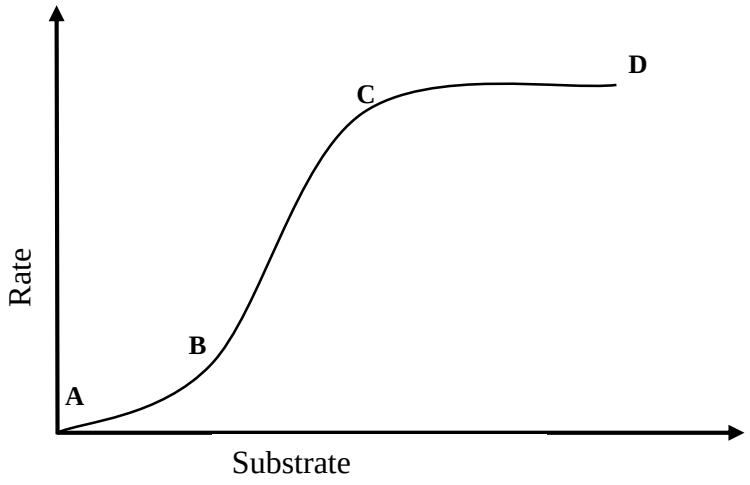
7. The graph below shows the effect of substrate concentration on the rate of enzyme controlled reaction.



a) Describe the shape of the graph.

i) Between A and B.

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……

ii) Between B and C.

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iii) Between C and D.

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b) Explain the shape of the graph between C and D

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c) Give the **two** types of inhibitors.

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d) Give any **three** properties of enzymes.

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8. The table below shows the effect of temperature on the activity of amylase on starch. Six test tubes, each containing a mixture of starch and amylase were placed in water baths maintained at $0^{\circ}C$, $10^{\circ}C$, $20^{\circ}C$, $30^{\circ}C$, $40^{\circ}C$ and $50^{\circ}C$, and allowed to stand. Study the table and answer the questions that follow.

Test tube	**Temperature (°C)**	**Time taken for starch to be hydrolyzed (minutes)**
1	0	Starch still present after 60 minutes
2	10	22
3	20	11
4	30	5
5	40	3.5
6	50	Starch still present after 60 minutes

a) How does temperature affect the action of amylase?

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b) Give one reason in each case for the results obtained in the test tubes kept at

(i) O°C

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(ii) 30°C

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(iii)50°C

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c) Suggest the time it would take amylase to hydrolyse starch if the temperature was kept at O°C.

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d) Suggest with a reason what would happen to starch when the test tube at O°C and 50°C were transferred to a water bath at 30°C.

(i) Test tube from O°C.

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(ii) Test tube from 50°C.

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e) Describe the test you would carry out to determine the substance into which starch has been hydrolysed and write the possible observation.

(i) Description of the test

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(ii) Possible observation

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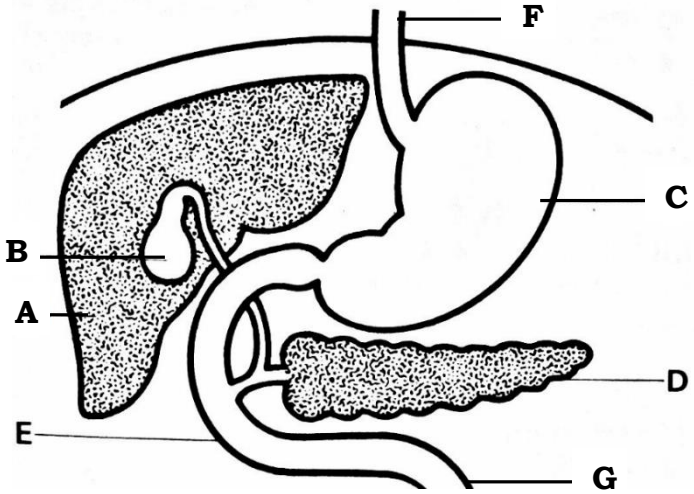
9. The f*igure* below shows part of the human alimentary canal.



(a) Name the parts labeled A-E

A……

B……

C……

D……

E……

(b) State the function of parts labelled C & D

C:

……

……

……

……

D:

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(c) Name and describe the process which moves food through part F.

……

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(d) Briefly describe the process of digestion that takes place in part labelled E, by filling in the table below.

Enzyme	**Food substance acted upon**	**Product(s)**

(e) Describe how part labelled G is adapted for absorption of food.

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10. You are provided with specimen **K (Hibiscus leaf)**, which is a plant organ.

(a) (i) Identify the specimen.

……

(ii) Give two reasons for your identity.

……

……

(b) Describe;

(i) lamina of specimen **K**.

……

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(ii) petiole of specimen **K**.

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(c) What are the functions of specimen **K** to the plant?

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(d) How is specimen **K** adapted for the above functions?

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(e) Carefully remove the petiole, draw and label the remaining portion of specimen K in the space provided below. State your magnification.

11. You are provided with freshly killed animals, **X (Housefly)** and **Y (Tick)**. Study the specimens carefully and answer the questions that follow.

a) i) Name the phylum and class to which specimens **X** and **Y** belong.

pecimen	**Phylum**	**Class**
X		
Y		

b) Give three structural differences and similarities between specimen **X** and **Y**

Differences

Specimen X	**Specimen Y**
i)	
ii)	
iii)	

Similarities

i) ……

ii) ……

iii) ……

c) Give one economic importance of each of the specimen **X** and **Y**

X:

……

Y:

……

d) With the use of a hand lens, make a clearly labeled drawing of anterior view of the head region showing the mouth parts of specimen **X**.

CHEMISTRY

1. Some elements in period 3 of the periodic table are shown in the table below.

Group	I	II	III	IV	V	VI	VII
Element	E	Q	Z	X	T		W

a) Write the formula of the compound formed when

i) T reacts with W

……

ii) E reacts with W

……

b) State the type of bounding;

i) Between the atoms of Q.

……

ii) When T reacts with W.

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c) State four properties of compound formed between E and W.

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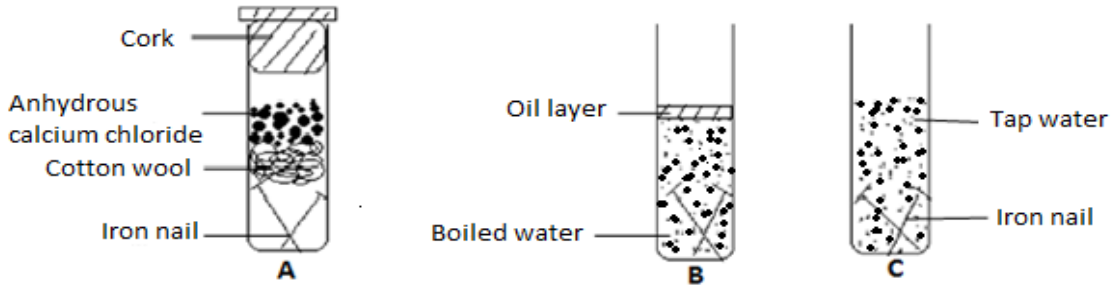
2. The set up below shows the arrangement of apparatus and materials used to investigate on whether oxygen and water/moisture are the conditions for rusting to occur.



a) What was the purpose of;

i. Anhydrous calcium chloride in set up A?

……

ii. Oil layer in set up B

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iii. Boiling water in set up B

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……

b) (i) In which setup did iron nails rust?

……

ii) Give **a** reason for your answer in b (i) above.

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c) Mention **five** ways how iron can be prevented from rusting?

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3. a) A burning Magnesium ribbon was lowered in a gas jar of oxygen gas,
(i) State what was observed.

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……

(ii) Write a **word equation** for the reaction that took place.

……

……

b) Write the chemical names of the new substances formed when each of the following elements is burnt in excess oxygen gas.

i. Calcium ……

ii. Carbon ……

iii. Sodium ……

iv) sulphur ……

c) Explain the following observations.

i. Both potassium and Sodium tarnish when exposed to air but Potassium tarnishes more rapidly than Sodium.

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ii. When a burning candle is covered by a gas jar, its flame gradually gets smaller and then goes out.

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4. a) Name one process by which the components of the following mixtures can be separated.

(i) Pigments of a green leaf.

……

(ii) Water and ethanol.

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(iii) Iodine and potassium chloride.

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(iv) Copper II sulphate and sand.

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b) (i) Define a compound.

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……

(ii) State any three differences between a mixture and a compound.

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c) Write the chemical formula of the following compounds.

(i) Potassium Chlorate.....

(ii) Zinc Nitrate .....

(iii) Aluminium oxide .....

(iv) Ammonium sulphate: .....

(v) Sodium carbonate: .....

5. Draw diagrams to show how the following elements use their outer most electrons to dorm the following compounds. (Atomic numbers C = 6, O = 8, Cl = 17,Ca = 20)
(a) Carbon and hydrogen to form methane.

(b) Calcium and chloride to form calcium chloride.

(c) Balance the following equations.

(i) $KClO_{3(s)} \longrightarrow KCl_{(s)} + O_{2(g)}$

.....

(ii) $CU(NO_3)_{2(s)} \longrightarrow CUO_{(s)} + NO_{2(g)} + O_{2(g)}$.

.....

(iii) $Pb(OH)_{2\ (s)} \longrightarrow PbO_{(s)} + H_20_{\ (l)}$

.....

6. Magnesium can react with steam and produces gas **P**. When gas **P** is collected, mixed with air and ignited it gives a small pop sound. A white solid **Q** remains in the test tube when the reaction stopped.

a) Name:

i) Gas P .....

ii) Product formed when gas **P** reacted with air.

.....

b) i) Name white solid Q .....

ii) Write the equation of reaction between magnesium and steam.

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c) i) Name **one** other metal which could safely be used to react with steam to produce gas **P** instead of magnesium.

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ii) When magnesium reacts with hydrochloric acid gas **P** is produced. Write the equation of reaction leading to formation gas **P**.

.....

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d) A sample of dry hydrogen can be prepared in the laboratory using zinc and dilute sulphuric acid in the presence of a catalyst.

(i) Draw a diagram to show a setup of the apparatus that can be used to prepare dry hydrogen in the laboratory.

(ii) Name the catalyst that can be used in this reaction.

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(i) Write equation for the reaction leading to the formation of hydrogen.

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(ii) State how hydrogen can be identified.

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7. a) Give a reason why:

i) Graphite conducts electric current whereas diamond does not.

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ii) Diamond is used as a cutting tool whereas graphite is used in pencils.

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b) What is meant by the term "Allotrope"?

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(c) Name the two crystalline allotropes of carbon.

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(d) Give one use of each allotrope.

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(e) (i) Draw a well labeled diagram showing the set up that can be used to prepare a dry sample of carbon dioxide in the space below.

(ii) Write the ionic equation for the reaction in e (i) above.

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(f) State what is observed when the following carbonates are strongly heated.

(i) Lead (ii) carbonate.

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(ii) Zinc carbonate.

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(iii) Calcium carbonate.

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(g) Describe a test for a carbonate.

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8. Figure 3 shows the setup of an apparatus used to identify the products of a burning candle.

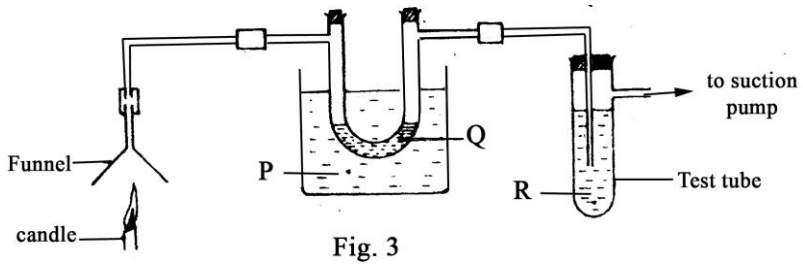

Fig. 3

(a) Name substance P, Q and R.

P……

Q……

R……

(b) State the role of P.

……

……

(c) State what is observed in the test tube.

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……

9. (a) Define the terms:

(i) Solute.

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(ii) saturated solution.

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(b) The solubilities of potassium chloride and potassium nitrate at certain temperatures are shown in the table below.

Temperature /°C	0	11	15	30	40	50	57
Solubility of potassium chloride per 100 g of water	27.9	31.0	32.0	36.5	40.0	43.0	45.0
Solubility of potassium nitrate per 100 g of water	14.0	21.5	25.0	43.0	63.0	84.0	102.0

(i) Plot on the same axes, a graph of solubility against temperature for the solubilities of potassium chloride and potassium nitrate. **(use the graph on next page)**

(ii) State which one of the two salts has a solubility which increases less rapidly with increase in temperature.

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(iii) Determine the temperature at which the solubilities of the two salts are equal.

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(c) A saturated solution of potassium nitrate at **30°C** was cooled to **5°C**. Calculate the number of moles of potassium nitrate crystal formed.

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(i) State any three factors that affect the solubility of a salt.

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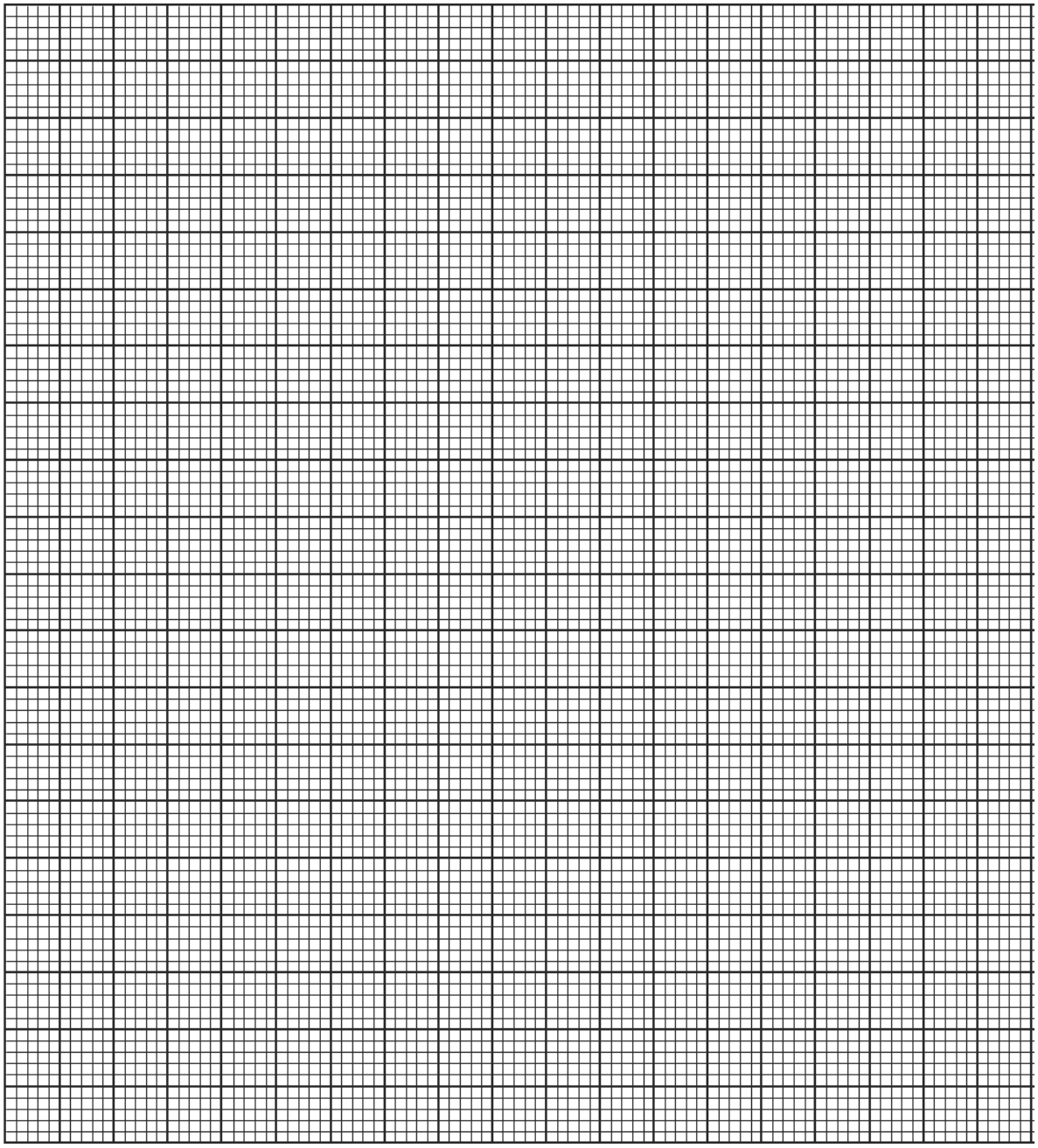

(ii) Give two uses of solubility curves.

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10. Hydrogen gas was passed over Yg of strongly heated copper II oxide until there was no further change. 4g of solid product was formed.

(a) State what was observed.

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(b) Write equation for the reaction.

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(c) Determine the value of Y.

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11. (a) Smoke was placed in a glass cell and viewed under a microscope.

(i) State what was observed.

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(ii) Explain the observation in (i) above.

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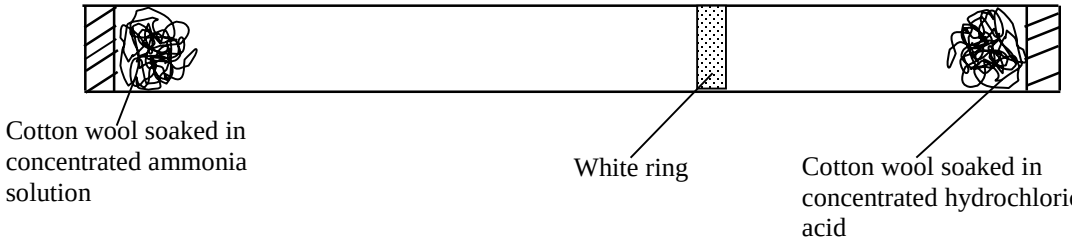
(b) Two pieces of cotton wool were soaked in different solutions, and placed in a glass tube as shown below.



(i) Name the substance that formed the white ring.

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(ii) Explain why the ring was formed in position A, and not in the middle of the tube.

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12. (a) (i) What is water pollution?

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(ii) How can you tell that water is polluted? (give four ways)

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(b) (i) What is sewage?

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(ii) How does sewage pollute water?

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(ii) Describe how urban sewage is treated.

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Each of the questions 13-22 consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.

A. If both the assertion and reason are true statements and the reason is a correct explanation of the assertion.

B. If both the assertion and reason are true statements but the reason is not a correct explanation of the assertion.

C. If the assertion is true but the reason is not a correct statement.

D. If the assertion is incorrect but the reason is a true statement.

SUMMARY OF INSTRUCTIONS

Assertion	Reason
A. True	True (reason is a correct explanation)
B. True	True (reason is not a correct explanation)
C. True	Incorrect
D. Incorrect	True

13. Ionic compounds are Solids at room temperature	*because*	The electrons are held together by electrostatic forces.	
14. Zinc(ii) oxide reacts with Sodium hydroxide solution but has no reaction with acids.	*because*	All acids produce hydrogen ions in dilute solutions.	
15. Iron(ii) chloride is prepared prepared by direct synthesis	*because*	Iron displaces hydrogen gas from dilute acids.	
16. Hydrogen gas can be collected by upward delivery during preparation	because	it is denser than water	
17. Carbondioxide and carbon Monoxide are pollutants	because	both of them are reducing agents	
18. The number of protons in an atom is equal to the number of neutrons	because	the mass of a proton is approximately equal to that of a neutron	
19. Graphite and diamond show different chemical properties	because	graphite and diamond are allotropes of carbon.	

20. Pollen grains in water are in continuous motion because pollen grains collide with moving water molecules. ☐

21. Iodine is a solid at room temperature because Iodine may be purifies by sublimation ☐

22. Magnesium can displace copper from aqueous copper(II) sulphate because the ions of both magnesium and copper a positive charge of two. ☐

In each of the following 21 to 35, one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following;

A. If 1, 2, 3 only are correct **B. If 1, 3 only are correct**
C. If 2, 4 only are correct **D. If 4 only is correct**

SUMMARY OF INSTRUCTIONS;

A	B	C	D
1, 2, 3	1,3	2,4	4
Only correct	Only correct	Only correct	Only correct

23. Which of the following substance(s) is/are used to prepare acids? ☐
    1. potassium nitrate 2. Copper(ii) hydroxide
    3. Phosphorus(v) oxide 3. Carbonmonoxide gas

24. Copper (ii) Sulphate crystals can be prepared by the action of dilute sulphuric acid on ☐
    1. Copper(ii) hydroxide 2. Copper(ii) carbonate
    3. Copper(ii) Oxide 3. Copper metal

25. Which of the reactions represents both oxidation and reduction ☐

    1. $PbO_{(s)} + H_2(g) \longrightarrow PbO_{(s)} + H_{2(g)}$
    2. $PbCO_{3(s)} \longrightarrow PbO_{(s)} + CO_{2(g)}$
    3. $Pb_{(s)} + 2AgNO_{3(aq)} \longrightarrow Pb(NO_3)_{2(aq)} + 2Ag_{(s)}$
    4. $Pb_{(s)} + ZnO_{(s)} \longrightarrow PbO_{(s)} + Zn_{(s)}$

26. Which of the following is/ are about diamond and graphite? ☐
    1. They have the same mass number.
    2. They are isotopes.
    3. They are allotropes.
    4. They show similar physical properties.

27. Which of the following properties make carbondioxide useful in fire extinguishers?
    1. It is denser that air.
    2. It is lighter than air.
    3. It is non-flammable.
    4. It is an inert gas.

28. The observation(s) made when a burning magnesium is plunged into a jar of carbondioxide is/are?
    1. Bright light.
    2. White ash
    3. Black solid.
    4. Colourless gas.

29. Which of the following is true about the kinetic theory of gases?
    1. Gas molecules consist of tiny particles.
    2. Gas particles collide with one another.
    3. Gas particles are in a state of continues motion.
    4. There are large forces of attraction between gas particles.

30. Which one of the following substances does not exhibit allotrophy?
    1. Carbon
    2. Sulphur
    3. Phosphorus
    4. Chlorine.

31. Which of the following reactions occur when sodium metal is exposed to moist air?
    1. $4Na_{(s)} + O_{2(g)} \longrightarrow 2Na_2O_{(s)}$
    2. $Na_2O_{(s)} + H_2O_{(l)} \longrightarrow 2NaOH_{(aq)}$
    3. $2NaOH_{(aq)} + CO_{2(g)} \longrightarrow Na_2CO_3H_2O_{(s)}$
    4. $2Na_{(s)} + 2H_2O_{(l)} \longrightarrow 2NaOH_{(aq)} + H_{2(g)}$

32. Which of the following are characteristic of metals low in the reactivity series?
    1. The nitrate is decomposed by heat
    2. The carbonate is not decomposed by heat
    3. Not attacked by dilute mineral acids
    4. Are extracted from their ores by electrolysis

33. Which of the following can be used to distinguish between hydrogen and carbon monoxide?
    1. Colour of flame when burning in air
    2. Solubility in water
    3. Effect on moist litmus paper
    4. Explosive combination with oxygen

34. Carbon is similar to sulphur in the both
    1. are non metallic solids
    2. exist in allotropic forms
    3. form covalent compounds
    4. form neutral oxides

35. When zinc metal is placed in a solution of copper (II) sulphate
    1. a brown solid is formed
    2. a colourless gas is evolved
    3. the solution fades in colour
    4. no observable reaction is made

36. Which of the following are observed when potassium metal is put in water?
    1. The metal reacts violently and catches fire.
    2. The metal floats but moves about the water surface.
    3. The resultant solution turns litmus blue.
    4. Bubbles of a gas can be seen.

37. Which of the following substances contain(s) the same number of atoms?
    (C = 12; Ca = 40; Cu = 64; S = 32)
    1. 16 g of copper
    2. 12 g of carbon
    3. 10 g of calcium
    4. 16 g of sulphur

Success is no accident. It is hard work, perseverance, learning, studying, sacrifice and most of all, love of what you are doing or learning to do ~~~PELE