



Chumey Higher Secondary School

Bumthang, Bhutan

Annual Examination – 2022



Subject: Chemistry

Total Marks: 100

Class: IX

Time: 2 hrs 15 mins

INDEX CODE:									
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Invigilator's initial:

READ THE FOLLOWING DIRECTIONS CAREFULLY:

1. Do not write for the first **fifteen minutes**. This time is to be spent on reading the questions. After having read the questions, you will be given **two hours** to answer all the questions.
2. Make sure there are **eight** pages (1 – 15).
3. Write your **Index Code** correctly on the paper.
4. There are two sections; **A** and **B**. All the questions in **section A** are **compulsory** and from the seven sets of questions in **section B**, **attempt any six**.
5. The intended marks for each question are given in the **brackets []**.
6. Remember to write **quickly** but **neatly**.
7. **Do not** leave the examination hall before you have made sure that you have answered all the questions.

SECTION A [40 marks]

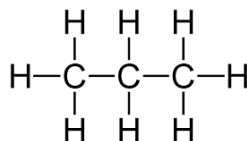
ANSWER ALL QUESTIONS

Question 1

- a. Direction: For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it with PEN. Do not circle more than ONE alternative. If there are more than ONE circled, NO score will be awarded. [25]**

- Moscovium is a newly discovered element with predicted electronic configuration of
2, 8, 18, 32, 32, 18, 5.
A. 7th period and 18th group. C. 7th period and 16th group.
B. 7th period and 17th group. D. 7th period and 15th group.
- Which of the following does **NOT** follow an octet rule?
A. Helium. C. Sodium.
B. Nitrogen. D. Aluminum.
- The Modern Period Law states that
A. the physical and chemical properties of the elements are periodic functions of their atomic weights.
B. the physical and chemical properties of the elements are the periodic functions of their atomic volume.
C. the physical and chemical properties of the elements are the periodic functions of their atomic numbers.
D. the physical and chemical properties of the elements are periodic functions of their atomic radii.
- A Chlorine atom with a mass number of 36 is often called chlorine-36. If its atomic number is 17, how many protons and neutrons does it have?
A. 19 protons and 17 neutrons. C. 17 protons and 17 neutrons.
B. 17 protons and 19 neutrons. D. 17 protons and 36 neutrons.
- The molecule with double covalent bond is
A. H₂. C. O₂.
B. Cl₂. D. N₂.

6. The only non-metal which exist in liquid state is
- A. bromine. C. flourine.
 B. carbon. D. chlorine.
7. Which of the following chemical equations is a balanced chemical equation?
- A. $\text{Ca} + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$.
 B. $\text{NaBr} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{Br}_2$.
 C. $\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$.
 D. $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$.
8. “Wachey under Lunana, one of the coldest places in the country spotted mosquitoes for three years in row” (24th Nov, 2020. BBS). Which of the following could be the reason for this?
- A. Decrease in atmospheric temperature.
 B. Increase in atmospheric temperature.
 C. Increase in amount of snow fall.
 D. Decrease in amount of snow fall.
9. What is the general formula of the compound given below?



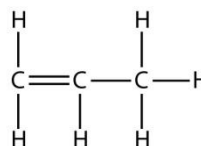
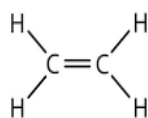
- A. C_nH_{2n} . C. $\text{C}_n\text{H}_{2n+1}$.
 B. $\text{C}_n\text{H}_{2n+2}$. D. $\text{C}_n\text{H}_{2n+1}\text{OH}$.

The part of a periodic table with element W, X, Y and Z is given below. Use the information in the table to answer 10 and 11.

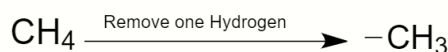
							W
X							
	Z					Y	

10. Which of the above two elements will form electrovalent bond?
- A. X and Y. C. Z and W.
 B. X and W. D. X and Z.

19. The atomic number is the number of protons present in a nucleus of an atom and electronic configuration is the distribution of electrons in the shells. However, we use the atomic number of the element for writing its electronic configuration because
- atomic number is equal to mass number.
 - number of protons is equal to the number of neutrons.
 - number of electrons is equal to the number of protons.
 - number of electrons is equal to the number of neutrons.
20. A and B are the structural formula of compounds belonging to the same homologous series. The best reason for placing the above two compounds under the same homologous series is



- both the compounds are hydrocarbon.
 - both the compounds are saturated hydrocarbon.
 - they differ by CH_2 group in their molecular formula.
 - both the compounds have the same molecular formula.
21. The following equation depicts the formation of



- Alkane.
 - Alkene.
 - Alkyl Group.
 - Functional Group.
22. In $\text{A} \rightarrow \text{B}$, the rate of reaction in terms of concentration of reactant can be given by

$$\text{A. } r = - \frac{\Delta [\text{A}]}{t}$$

$$\text{C. } r = \frac{\Delta [\text{A}]}{t}$$

$$\text{B. } r = - \frac{\Delta [\text{B}]}{t}$$

$$\text{D. } r = \frac{\Delta [\text{B}]}{t}$$

23. An element X has a valency 2 and element Y has valency 3. The compound formed by these two elements will have formula as
- X_2Y_3 .
 - X_3Y_2 .
 - XY_3 .
 - X_2Y .
24. Which of the following is used for filling balloons?
- Helium.
 - Neon.
 - Argon.
 - Xenon.

25. Hydrogen has

- A. 1 proton, 1 electron and 0 neutron.
- B. 1 proton, 0 electron and 1 neutron.
- C. 0 proton, 1 electron and 1 neutron.
- D. 1 proton, 1 electron and 1 neutron.

b. Match each item under column A with the item in column B. Rewrite the correct pairs in the column C by writing the alphabet against the given number. [5]

Column A	Column B	Column C
1. Atomic size.	A. Anomalous Behavior.	1 =
2. Most electronegative.	B. Metals.	2 =
3. Oxidizing agents.	C. Coordinate Compound	3 =
4. O ₃ .	D. Fluorine	4 =
5. Isomerism.	E. Shielding Effect	5 =
	F. Chlorine	
	G. Non-metals	
	H. Covalent Compound.	

c. Fill in the blanks with appropriate word(s). [5]

- 1. Reactive metals are placed above _____ in the activity series of metals.
- 2. The second member of alkene group is called _____.
- 3. The small repeating units of polymers are called _____.
- 4. The total number of principles of green chemistry is _____.
- 5. Electron affinity of argon is _____ due to stable configuration.

d. Write True or False by the side of each statement. [5]

1. Reactive metals occur in their native state.
2. A complete chemical equation gives us the symbolic representation of the reactants, products and their physical states.
3. Oxygen is a greenhouse gas.
4. Lithium is the most reactive metal.
5. Organic compounds contain ionic linkages.

SECTION B [60 marks]
ATTEMPT ANY SIX QUESTIONS

Question 2 [10]

a. The reactivity series of metals contain one non – metal. [3 × 1 = 3]

i. Write the name of this element.

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ii. Give **ONE** reason why it is included although it is a non – metal.

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iii. Name one metal which is more reactive than an element mentioned in question (i).

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b. Balance the following equations: [3 × 1 =3]

i. $P + HNO_3 \rightarrow H_3PO_4 + NO_2 + H_2O$.

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ii. $NaOH + Al_2(SO_4)_3 \rightarrow Na_2SO_4 + NaAlO_2 + H_2O$.

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c. Which of the two will have larger size; Na-atom and Na^+ and why? [2]

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d. Explain the tetra-covalency of carbon as one of the reasons for existence of large number of organic compounds. [2]

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Question 3

[10]

a. A part of the periodic table is given below with one element missing.

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	_____	S	Cl	Ar
K	Ca						

Based on the above table, answer the following questions:

- i. Name the element that has a duplet structure. [1]

- ii. Name the alkali metal having the smallest size. [1]

- iii. Name the halogen of period 2. [1]

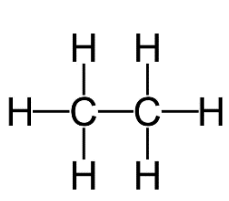
- iv. Identify the missing element. [1]

- b. List down the greenhouse gases. Why are they named so though they are not green in color? [3]

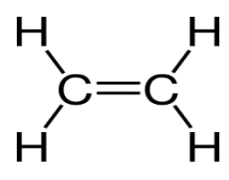
- c. Show how calcium oxide is being formed from calcium and oxygen atoms. [3]

Question 4 [10]

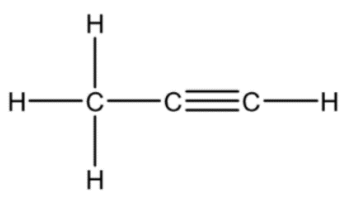
a. Examine the structural formula A to E and answer the following questions.



(A)



(B)



(C)

c. Which one of the two metals is more reactive; calcium or zinc? Why? [1]

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Question 5 [10]

a. Ethyne is represented by molecular formula C_2H_2 .

i. Explain the bond formation of C_2H_2 using Lewis dot structure. [3]

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ii. What and how many types of covalent bonds are present in C_2H_2 ? [1]

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b. Calculate the molecular masses of the following compounds. [4 × 1 = 4]

[Atomic mass: Ag = 108 and Pb = 207]

i. $AgNO_3$.

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ii. $Al_2(SO_4)_3$.

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iii. $PbCl_2$.

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iv. $5HCl$.

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c. "Homologous series has simplified the study of organic compounds". Justify. [2]

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Question 6

[10]

a. Draw the structural formula for the following compounds. [4 × 1 = 4]

i. 2 – Pentyne.

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ii. 2,3 – dimethyl hexane.

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iii. 2 – methyl propanol.

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iv. 2 – methyl propene.

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b. Define rate of reaction in terms of concentration of reactant. Write down the equation as well. [1]

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c. Which of the following reaction is **NOT** possible to take place? [1]

Reaction 1	Reaction 2
$\text{CuSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Cu}$	$\text{ZnSO}_4 + \text{Cu} \rightarrow \text{CuSO}_4 + \text{Zn}$

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- d. When magnesium forms compounds, it usually does so as cation with two unit charge.
- i. What change in electron structure occurs when magnesium atom becomes a magnesium ion? [1]
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- ii. Why the formula of the compound formed when magnesium and chlorine react is $MgCl_2$ and not $MgCl$? [2]
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- e. State one importance of organic compounds. [1]
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Question 7 [10]

- a. Two different chemical reactions take place in two separate test-tubes. The effects of the reactions are shown below:

Test tube	Effect of the reaction
A	Test tube become warm
B	Test tube become cold

Based on the information provided, identify the thermochemical reaction taking place in the test tube A and B. [2]

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- b. Saran have a beaker of water and 3 sugar cubes. In order for the Saran to dissolve the sugar faster (increase the rate of reaction), what should he do? List two methods. [2]
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- c. State any 2 principles of green chemistry and explain how they are interlinked to one another. [3]
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d. You are given with 5 carbons and 12 hydrogens. How many different structures can you make with it? Show your work. [3]

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Question 8 [10]

a. Read the following excerpt from Kuensel and answer the questions that follow.
“Farm Machinery Corporation Limited (FMCL) and B&B Korea Corporation Limited will establish the country’s first bio-fertilizer plant at Athang Gewog, Wangdue, next year. The plant’s fertilizer is expected to enhance organic agriculture..... The agriculture minister said that the country should not depend on imported chemical fertilizers but should enhance producing food without chemicals...”

- Kuensel, October 29th 2021.

i. What are the advantages of using bio-fertilizers? [1]

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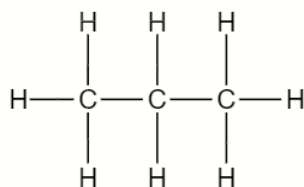
ii. Why do you think agriculture minister said that our farmers should not depend upon chemical fertilizers? Support your answer by discussing any TWO environmental consequences of overuse of chemical fertilizers. [2]

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b. Differentiate green chemistry and organic chemistry in your own words. [2]

Green Chemistry	Organic Chemistry

c. Answer the following question based on organic compound given below.



i. Write down the IUPAC name. [1]

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ii. Write down condensed and molecular formula of above compound. [1]

Condensed Formula	Molecular Formula

iii. Write down the name of corresponding alkyl group. [1]

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d. Explain why NaCl is a better conductor in the molten state than in the solid state. [2]

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