20. Chemistry Education

Unit-I : Language of Chemistry Teaching hours:08 Atoms, molecules, elements and compounds Symbols, valency and formula Chemical equation, types, significances and limitations Balancing the chemical equation (hit and trial, partial equation method) Unit-II : States of Matter Basic concepts of Kinetic theory of gas Three states of matter Basic concepts of Kinetic theory of gas Charles' Law, Kelvin scale of temperature Universal gas constant, Equation of state Dattors law of partial pressure Graham's law of diffusion Devision from ideal behaviour Laws of Stoichiometry Avogadro's Hypothesis Relation between Molecular weight and vapour density Properties of solid Teaching hours:12 Dattor's atomic theory Rutherford's atomic model Bohr's postulates Rutherford's atomic model Bohr's postulates Relation between Molecular weight and vapour density Properties of solid Teaching hours:12 Dattor's atomic theory Rutherford's atomic model Bohr's postulates Relation between Molecular weight and vapour density Concept of electrovalency, covalency and co-ordinate covalency with examples Basic principle, electronic configuration of atoms Electronic theory of valency	C	ourse Content			
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		Determination of equivalent weight by	y hydroge	en displacement n	nethod
	•				
 Simple acid, base titration 	•				
 Concept of pH 	•	Concept of pH			
Unit-VII : Chemistry of Non-metals Teaching hours:20	Unit-	II : Chemistry of Non-metals		· . · . 1	eaching hours:20
 General preparation and properties of Halogens and its compounds (HCI, HBr and HI) 	•	General preparation and properties o	f Haloger	ns and its compou	inds (HCI, HBr and HI)
General preparation and properties of compounds of Nitrogen (HNO3 and NH3)	•	General preparation and properties of	f compou	nds of Nitrogen (I	HNO3 and NH3)
General preparation and properties of compounds of Sulphur (H2S, H2SO4 and SO2)	•				
Manufacture of NH3 and H2SO4					2/

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Unit-VIII : Chemistry of Metals

- Introduction to metallurgy
- Mineral resources of Nepal
- Important processes in metallurgy (concentration, calcination, roasting, smelting and refining)
- Extraction of the following metals from their important ores and study of their physical and chemical properties and uses:
 - a. Iron

b. Sodium

- Preparation, properties and uses of the following compounds:
 - a. Green vitriol b. Blue vitriol
 - c. White vitriol

d. Sodium Carbonate Teaching hours:30

Unit-IX : Carbon and its compounds

- Definition classification and uses of organic compounds
- Empirical and molecular formulae
- Qualitative analysis of organic compounds (detection of N,X and S)
- Functional group and IUPAC Nomenclature
- Orbital, hybridization and bonding
- Introduction to aliphatic and aromatic hydrocarbons
- General preparation and properties of Alkane, Alkene and Alkyne, aldehyde, ketone, carboxylic acid and chloroform.

b. Ethane

d. Phenol

f. Aniline

- Lab preparation and properties of the following compounds:
 - a. Methane
 - c. Ethvi alcohol
 - e. Nitrobenzene
 - g. Benzoic acid

Unit-X : Uses of chemistry in daily life

- Structure uses and abuses of DDT, BHC
- Structures and uses of simple drugs [Analgeics and Antipyritics (aspirine and phenacetin)] Antibiotics(chloromycitin and penicillin)
- Polymers : synthetic polymers(nylon 66, dacron) and their uses
- Fertilizers : NPK fertilizers
 - a. Nitrogenous fertilizer(urea, ammonium sulphate)
 - b. Phosphorous fertilizer(supper-phosphate of lime)
 - c. Potassium fertilizer(potassium- nitrate, sulphate and chloride)

MODEL QUESTION

[HSEB Examination 2069 (2012)]

Time: 3 hrs.

Full Marks:- 75 Pass Marks:- 27

Teaching hours:15

Teaching hours:15

Group 'A'

Attempt any fifteen questions:

- 1. State Graham's law of diffusion.
- 2. At what condiion the value of P × V is always constant?
- Write the electronic configuration of the following in terms of s, p, d, f orbitals. a) Cl[−] b) Cu⁺⁺ [From Unit III]

15×2=35

[From Unit II]

[From Unit II]

4.	Give any two examples of ionic compound.	try Education 363 [From Unit III]
4. 5.	Write the molecular formula of Aluminium Sulphate and Magnesi	
5.	while the molecular formula of Aluminium Sulphate and Magnesi	[From Unit I]
6.	Write any two limitations of chemical equations.	[From Unit I]
7.	Define modern periodic law.	[From Unit IV]
8.	Write the equilibrium constant (Kc) for the following reaction.	
		[From Unit IV]
	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$	
9.	"Water acts as acid as well as base", Justify it in terms of Bronste	ed lowery concept.
		[From Unit V]
10.	Find the oxidation number of:	
	a) 'Mn' is KMnO4 b) 'C' in H2CO3	[From Unit V]
11.	Calculate the equivalent weigh of 'Fe' in Fe2O3.	[From Unit VI]
12.	Define P ^H value. What will be the P ^H of 0.02 MHCI.	[From Unit VI]
13.	Write a principle reaction for lab preparation of chlorine.	[From Unit VII]
14.	Why does conc. sulphric acid diluted by adding acid into water b in the laboratory.	ut not water into acid [From Unit V]
15.	Why does iron get rusted?	[From Unit VIII]
16.	Write the action of heat on white vitriol.	[From Unit VIII]
17.	Write the reaction of detection of halogen in laboratory.	[From Unit VII]
18.	Write the IUPAC names of the following compounds:	[From Unit IX]
	a) CH ₃ - CH ₂ - CH ₂ CH = CH ₂	er i garanterale i
	b)	1 7 9 C 1
	$CH_3 - CH_2 - CH_2 - CH_2 - CHO$	
	CH ₃	
19.	Write the structure and use of Brufane and analgesics drug.	[From Unit X]
20.	State any two uses of synthetic polymer.	[From Unit X]
	Group 'B'	
Attemp	ot any five questions.	5×5=25
21.	Define oxidation and reduction reaction. Balance the followin oxidation number method or ion electron method.	g redox-reaction by +4=5 [From Unit V]

 $KMnO_4 + H_2SO_4 + H_2S \rightarrow K_2SO_4 + MnSO_4 + H_2O+S$

State and explain the Faraday's first law of electrolysis. 22.

23. Write the chemistry of blue vitriol.

State avogadro's hypothesis prove that: 24. Molecular weight = 2 × vapour density

25. What are the anamolies of Mendeleef's periodic table? Explain.

5 [From Unit IV]

1+4=5[From Unit III]

1+4=5 [From Unit II]

2+2+1=5 [From Unit VIII]

26.	Write short notes on:		2.5+2.5=5
	a) Markovenikov's rule	i da se de la com	[From Unit IX]
14	b) Dehydration of alch	ohol	[From Unit IX]
27.	Write the names and i	mportances of nitrogenous ferti	lizer. 2+3=5[From Unit X]
	en staar in	Group 'C'	Astrony seamons in the
Atten	npt any two questions.		2×10=20
28.	Explain how iron car reactor with:	h be extracts from its principle	e ore. What happens when iron 8+2=10] [From Unit VIII]
	a) dil. HNO3	b) dil.HCl	
29.			the chemical reactions of Bromine 5+2+2+1=10 [From Unit VII]
	a) phosphorous	b) cold and dil.alkalies	c) magnesium
30.		nitrobenzene prepared in lab? acidic medium and neutral med	What happen when nitrobenzene dium? [From Unit IX]
	tok a sta		6+2+2=10
	Write short notes on:	(any two)	5+5
31.			[From Unit II]
31.	a) Law of multiple pro	portion	
31.	 a) Law of multiple pro b) Le-Chatelier's prin 		[From Unit IV]
31.		ciple	[From Unit IV] [From Unit IX]

Exam Questions

Unit I : Language of Chemistry

1	Write the molecular formula of Aluminium Sulphate and Magnet	sium nitride.
· · ·		[Q.N.5, 2069]
2.	Write any two limitations of chemical equations.	[Q.N.6, 2069]
3.	What are the significance of chemical equation ?	[Q.N.22,2068]

Unit II : States of Matter

1.	 State Graham's law of diffusion.	[Q.N.1, 2069]
2.	At what condiion the value of P × V is always constant?	[Q.N.2, 2069]
3.	State avogadro's hypothesis prove that:	1+4=5
	Molecular weight = 2 × vapour density	[Q.N.24, 2069]
4.	Write short notes on:	5+5
	a) Law of multiple proportion	[Q.N.31(a), 2069]
5.	Write any four properties of solid.	[Q.N.8,2068]
6.	What is absolute zero temperature ?	[Q.N.9,2068]
7.	What do you mean by stationary state ?	[Q.N.10,2068]
8.	State and explain the law of multiple proportion with example.	[Q.N.23,2068]
9.	Establish the relationship between molecular weight and relative d	ensity of a gas. [Q.N.24,2068]

-	Unit III : Atomic Structure and Valen	cy ,
1.	Write the electronic configuration of the following in terms of s, p	, d, f orbitals.
	а) СГ b) Cu ⁺⁺	[Q.N.3, 2069]
2.	Give any two examples of ionic compound.	[Q.N.4, 2069]
3.	State and explain the Faraday's first law of electrolysis.	1+4=5[Q.N.22, 2069]
4.	Why do the electron of an atom not jump into the nucleus ?	[Q.N.1,2068]
5.	Write the electronic configuration of Cr(24).	[Q.N.11,2068]
6.	Which one of the following has larger size ? Why ?	
	Na or Na ⁺	[Q.N.13,2068]
7.	State Faradays law of electrolysis. A current of 0.25 Amp. is pa	
	solution for 45 minutes. Calculate the amount of Cu deposite	
	63.6).	[Q.N.30,2068]
5.15	Unit IV : Periodic Classification and Chemical I	Equilibrium
1.	Define modern periodic law.	[Q.N.7, 2069]
2.	Write the equilibrium constant (Kc) for the following reaction.	1
		[Q.N.8, 2069]
	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$	
3.	What are the anamolies of Mendeleef's periodic table? Explain.	5 10 N 05 00001
4.	Write short notes on:	5 [Q.N.25, 2069]
	a) Le - Chatelier's principle	[Q.N.31(b), 2069]
1	Unit V :Acids, Bases and Salts, and oxidation	reduction
1.	"Water acts as acid as well as base", Justify it in terms of Bronste	ed lowery concept.
		[Q.N.9, 2069]
2.	Find the oxidation number of:	[Q.N.10, 2069]
	a) 'Mn' is KMnO ₄ b) 'C' in H ₂ CO ₃	and the second second
	The second	
3.	Why does conc. sulphric acid diluted by adding acid into water b in the laboratory.	ut not water into acid [Q.N.14, 2069]
3. 4.		[Q.N.14, 2069]
	in the laboratory. Define oxidation and reduction reaction. Balance the followin oxidation number method or ion electron method.	[Q.N.14, 2069]
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	in the laboratory. Define oxidation and reduction reaction. Balance the followin oxidation number method or ion electron method.	[Q.N.14, 2069] ng redox-reaction by
4.	in the laboratory. Define oxidation and reduction reaction. Balance the following oxidation number method or ion electron method. 1- KMnO ₄ + H ₂ SO ₄ + H ₂ S \rightarrow K ₂ SO ₄ + MnSO ₄ + H ₂ O+S	[Q.N.14, 2069] ng redox-reaction by +4=5 [Q.N.21, 2069]
4. 5.	in the laboratory. Define oxidation and reduction reaction. Balance the followin oxidation number method or ion electron method. 1- KMnO ₄ + H ₂ SO ₄ + H ₂ S \rightarrow K ₂ SO ₄ + MnSO ₄ + H ₂ O+S Write the structure of picric acid.	[Q.N.14, 2069] ng redox-reaction by +4=5 [Q.N.21, 2069] [Q.N.6,2068]

1.	Calculate the equivalent weigh of 'Fe' in Fe ₂ O ₃ .	[Q.N.11, 2069]
2.	Define pH value. What will be the pH of 0.02 MHCI.	[Q.N.12, 2069]
3.	Define pH. Find the hydrogen ion concentration whose pH is 5.5.	[Q.N.12,2068]

4.	Why is aqueous solution of FeCl3 acidic in nature ?	[Q.N.14,2068]
5.	Define equivalent weight.	[Q.N.15,2068]
6.	Write short notes on:	2×5=10
	(a) Activity for measuring the pH of soil.	[Q.N.31(d),2068]
	Unit VII: Chemistry of Non-metals	
1.	Write a principle reaction for lab preparation of chlorine.	[Q.N.13, 2069]
2.	Write the reaction of detection of halogen in laboratory.	[Q.N.17, 2069]
3.	How bromine can be extractd from carnallite? Write the chemica with: 5+2+2	I reactions of Bromine P+1=10 [Q.N.29, 2069]
	a) phosphorous b) cold and dil.alkalies c) magr	nesium
4.	Give the reaction of ammomia with copper sulphate.	[Q.N.3,2068]
5.	Give the name of a halogen which exist at solid state at room ten	
		[Q.N.4,2068]
6.	Differenciate between metal and non-metals.	[Q.N.25,2068]
7.	Write down the preparation, properties and uses of H ₂ S gas.	[Q.N.29,2068]
ter a	Unit VIII: Chemistry of Metals	
1.	Why does iron get rusted?	[Q.N.15, 2069]
2.	Write the action of heat on white vitriol.	[Q.N.16, 2069]
3.		-2+1=5 [Q.N.23, 2069]
4.		t happens when iron 3+2=10 [Q.N.28, 2069]
<u>.</u>	a) dil. HNO ₃ b) dil.HCl	
5.	Name two important ores of Iron and write down their formula ?	[Q.N.2,2068]
6.	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol.	[Q.N.2,2068]
	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol. Write short notes on:	[Q.N.2,2068] [Q.N.21,2068]
6.	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol. Write short notes on: (a) Process of extraction of metals are in metallurgy.	[Q.N.2,2068] [Q.N.21,2068] [Q.N.31(c),2068]
6.	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol. Write short notes on:	[Q.N.2,2068] [Q.N.21,2068]
6.	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol. Write short notes on: (a) Process of extraction of metals are in metallurgy.	[Q.N.2,2068] [Q.N.21,2068] [Q.N.31(c),2068]
6.	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol. Write short notes on: (a) Process of extraction of metals are in metallurgy. (b) Distinction between Metals and Nonmetals Unit-IX Carbon and its compounds Write the IUPAC names of the following compounds:	[Q.N.2,2068] [Q.N.21,2068] [Q.N.31(c),2068] [Q.N.31(d), 2069]
6. 7.	Name two important ores of Iron and write down their formula ? Write the chemistry of green vitriol. Write short notes on: (a) Process of extraction of metals are in metallurgy. (b) Distinction between Metals and Nonmetals Unit-IX Carbon and its compounds	[Q.N.2,2068] [Q.N.21,2068] [Q.N.31(c),2068]

- $CH_3 CH_2 CH_2 CH_2 CH_2$
- 2. How is dry and pure nitrobenzene prepared in lab? What happen when nitrobenzene under go reduction in acidic medium and neutral medium?

	6+2+2	2=10[Q.N.30, 2069]
3.	What is tollen's reagent ?	[Q.N.5,2068]
4.	Write possible isomers of C6H14 and give their IUPAC name.	[Q.N.16,2068]
5.	Write the structure of hex-1-en-5-yne.	[Q.N.17,2068]
6.	What is sulpha-drugs ?	[Q.N.18,2068]
7.	Write the structure of Aspirin.	[Q.N.19,2068]
8.	What is wurtz's reaction ? Give an example.	[Q.N.20,2068]

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[Q.N.26(b), 2069]

[Q.N.31(c), 2069]

[Q.N.31(b),2068]

[Q.N.26(a), 2069]

- How is acetylene prepared in laboratory ? What happens when acetylene gas is passed through ammonical solution of AgNO₃ ? [Q.N.27,2068]
- How is nitrobenzene prepared in laboratory ? Give its reduction reaction in different medium. [Q.N.28,2068]
- 11. Write short notes on:
 - a) Dehydration of alchohol
 - b) Laboratory preparation of methane
 - c) Uses of ethyl alcohol.
 - d) Markovenikov's rule

Unit-X: Uses of chemistry in daily life

1.	Write the structure and use of Brufane ar	nd analgesics drug.	[Q.N.19, 2069]
2.	State any two uses of synthetic polymer.		[Q.N.20, 2069]
3.	Write the names and importances of nitro	ogenous fertilizer.	2+3=5[Q.N.27, 2069]
4.	Write short notes on:	1. N. 1.	2×5=10
	(a) Abuses and effect of DDT.		[Q.N.31(a),2068]

The End