FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION
H-8/4, ISLAMABAD

NO.1-1/FBISE/RESH/CC/HSSC/01 21 July 2014

NOTIFICATION

It is notified for information of all concerned that revised curriculum 2006 in the subject of Chemistry at HSSC level shall stand implemented w.e.f. the academic session 2014-2016. Accordingly, the students to be admitted in class-XI in August 2014 and subsequently promoted to class-XII in August 2015 shall be examined in accordance with the revised curriculum in HSSC Part-I and Part-II examinations to be held in the years 2015 and 2016 respectively. Contents of syllabus of class XI are enclosed herewith.

2. The book to be published by National Book Foundation, Islamabad is hereby prescribed.

3. A copy of the curriculum 2006 in the subject of Chemistry for class XI are enclosed and also being uploaded on the FBISE's website www.fbise.edu.pk for the benefit of all stakeholders.

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All heads of institutions affiliated
with FBISE at HSSC level

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CHEMISTRY

For Class-XI

1. STOICHIOMETRY

Introduction

1.1 Mole and Avogadro's Number
1.2 Mole Calculations
1.3 Percentage Composition
1.4 Excess and Limiting Reagents
1.5 Theoretical Yield and Actual Yield as percentage

2. ATOMIC STRUCTURE

Introduction

2.1 Discharge Tube Experiments
2.2 Application of Bohr's Model
  2.2.1 Derivation of Radius, Energy, Frequency, Wave Length, Wave Number
  2.2.2 Spectrum of Hydrogen Atom
  2.2.3 Defects of Bohr's Theory
2.3 Planck's Quantum Theory_
  2.3.1 Postulates With Derivation of E =hcv
2.4 X-Rays
  2.4.1 Production, Properties and Uses
  2.4.2 Types
  2.4.3 X-rays and Atomic Number
  2.4.4 Moseley's Experiment
  2.4.5 Moseley's Law
2.5 Quantum Numbers and Orbitals
  2.5.1 Principle Quantum Number
  2.5.2 Azimuthal Quantum Number
  2.5.3 Magnetic Quantum Number
  2.5.4 Spin Quantum Number
  2.5.5 Shapes of s, p and d Orbitals
2.6 Electronic Configuration
  2.6.1 Aufbau Principle
  2.6.2 Pauli's Exclusion Principle
  2.6.3 Hund's Rule
  2.6.4 Electronic Configurations

3. THEORIES OF COVALENT BONDING AND SHAPES OF MOLECULES

Introduction

3.1 Shapes of molecules
  3.1.1 VSEPR
  3.1.2 Resonance
3.2 Theories of covalent bonding
  3.2.1 VBT and hybridization
  3.2.2 MOT
3.3 Bond Characteristics
  3.3.1 Bond Energy

3.3.2 Bond Length
3.3.3 Ionic Character
3.3.4 Dipole Moment

3.4 Effect of Bonding on Physical and Chemical Properties
3.4.1 Solubility of Ionic and Covalent Compounds
3.4.2 Reactions of Ionic and Covalent Compounds
3.4.3 Directional and Non Directional Nature of Ionic and Covalent Bonds

4. STATES OF MATTER I: GASES

Introduction

4.1 Kinetic Molecular Theory of Gases
4.1.1 Postulates of Kinetic Molecular Theory
4.1.2 Pressure and Its Units

4.2 Absolute Temperature Scale on the Basis of Charles Law
4.2.1 Brief recall of Boyle's and Charles' Law
4.2.2 Graphical Explanation of Absolute Zero

4.3 Avogadro's Law

4.4 Ideal Gas Equation
4.4.1 Derivation
4.4.2 Gas Constant and its Units

4.5 Deviation From Ideal Gas Behavior
4.5.1 Graphical Explanation
4.5.2 Causes for Deviation

4.6 Van der Waals Equation
4.6.1 Volume Correction
4.6.2 Pressure Correction

4.7 Dalton's Law of Partial Pressure

4.8 Graham's Law of Diffusion and Effusion

4.9 Liquefaction of Gases
4.9.1 Joule-Thomson Effect
4.9.2 Linde's Method of Liquefaction of Gases

4.10 Fourth State of Matter: Plasma

5. STATES OF MATTER II: LIQUIDS

Introduction

5.1 Kinetic Molecular Interpretation of Liquids
5.1.1 Simple properties of Liquids Describing Diffusion, Compression, Expansion, Motion of Molecules, Kinetic Energy

5.2 Intermolecular Forces (Vander Waals Forces)
5.2.1 Dipole-Dipole interaction
5.2.2 Hydrogen Bonding
5.2.3 London Forces

5.3 Energetics of Phase Changes
5.3.1 Molar Heat of Fusion, Molar Heat of Vaporization, Molar Heat of Sublimation
5.3.2 Energy Changes and Intermolecular Attractions
5.3.3 Change of State and Dynamic Equilibrium

5.4 Liquid Crystals
5.4.1 Brief Description
5.4.2 Uses from Daily Life

6. STATES OF MATTER III: SOLIDS

Introduction

- 6.1 Kinetic Molecular Interpretation of Solids
  - 6.1.1 Simple Properties of Solids Describing Vibration of Molecules, Intermolecular Forces, Kinetic Energy
- 6.2 Types of Solids
  - 6.2.1 Amorphous
  - 6.2.2 Crystalline
- 6.3 Properties of Crystalline Solids
  - 6.3.1 Symmetry
  - 6.3.2 Geometrical Shape
  - 6.3.3 Melting Point
  - 6.3.4 Cleavage Plane
  - 6.3.5 Habit of Crystal
  - 6.3.6 Crystal Growth
  - 6.3.7 Anisotropy
  - 6.3.8 Isomorphism
  - 6.3.9 Polymorphism
  - 6.3.10 Allotropy
  - 6.3.11 Transition Temperature
- 6.4 Crystal Lattice
  - 6.4.1 Unit Cell
  - 6.4.2 NaCl Crystal
  - 6.4.3 Lattice Energy
- 6.5 Types of Crystalline Solids
  - 6.5.1 Ionic Solids
  - 6.5.2 Covalent Solids
  - 6.5.3 Metallic Solids
  - 6.5.4 Molecular Solids

7. CHEMICAL EQUILIBRIUM

Introduction

- 7.1 Reversible Reactions and Dynamic Equilibrium
  - 7.1.1 Concept and Explanation
  - 7.1.2 Law of Mass Action and Expression for Equilibrium Constant
  - 7.1.3 Relationship between K_c, K_p, K_x, K_n
  - 7.1.4 Importance of K and Reaction Quotient
- 7.2 Factors Affecting Equilibrium (Le-Chatelier's Principle)
  - 7.2.1 Effect of Change in Concentration
  - 7.2.2 Effect of Change in Pressure or Volume
  - 7.2.3 Effect of Change in Temperature
- 7.3 Industrial Application of Le-Chatelier's Principle (Haber's Process)
- 7.4 Solubility Product and Precipitation Reactions
- 7.5 Common Ion Effect

8. ACIDS, BASES AND SALTS

Introduction

- 8.1 Acidic, Basic and Amphoteric Substances
- 8.2 Bronsted-Lowery Definitions of Acids and Bases
  - 8.2.1 Proton Donors and Acceptors

10.5 Colloids
10.5.1 Properties of Colloids
10.5.2 Types of Colloids

11. THERMOCHEMISTRY

Introduction
11.1 Energy in Chemical Reactions
11.2 Thermodynamics
11.3 Internal Energy
11.4 First Law of Thermodynamics
11.5 Standard State and Standard Enthalpy Changes
11.6 Heat Capacity
11.7 Calorimeter
11.8 Hess's Law: Enthalpy Change Calculations
11.9 Born Haber Cycle

12. ELECTROCHEMISTRY

Introduction
12.1 Oxidation-Reduction Concepts
12.1.1 Oxidation and Reduction
12.1.2 Oxidation Numbers
12.1.3 Recognizing Oxidation Reduction Reactions
12.1.4 Balancing Oxidation Reduction Equations by Oxidation Number Method
12.1.5 Balancing Oxidation Reduction Equations by the Half Reaction Method
12.1.6 Chemistry of Some Important Oxidizing and Reducing Agents
12.2 Electrode, Electrode Potential and Electrochemical Series
12.3 Types of Electrochemical Cells
12.3.1 Electrolytic Cells
12.3.2 Electrolysis of Aqueous NaCl
12.3.3 Voltaic Cells
12.3.3.1 Standard State Cell Potential for Voltaic Cell
12.3.3.2 Standard State Reduction Half Cell Potential
12.3.3.3 Standard State Cell Potentials and Spontaneous Reaction
12.3.4 Batteries
12.3.4.1 Primary Batteries
12.3.4.2 Secondary Batteries
12.3.4.3 Fuel Cells
12.3.5 Corrosion and its Prevention

LIST OF PRACTICALS

	PRACTICALS	EQUIPMENT	CHEMICALS
1.	**Introduction to Stoichiometry**		
1.	Estimate the Amount of Ba^{+2} in the Given Solution of $BaCl_2$ Gravimetrically.	analytical balance, oven, funnel, wash bottle, Whatman filter paper # 42, glass rod, beakers, desiccators, pipette, burner, matches, safety goggles	distilled water, potassium chromate solution, barium chloride solution

Chapter 2 & 3		None	None
4.	**States of Matter I: Gases**		
1.	Demonstrate that Gases spread by diffusion to Areas of lower Concentration	Glass tube 40cm long and 1cm in internal diameter, ring stand, clamp, clamp holder, cotton balls, forceps, dropper, rubber stoppers, safety googles	Concentrated NH_3 solution, concentrated HCl
5.	**States of Matter II: Liquids**		
1.	Separate the Given Mixture of Inks by Paper Chromatography	Whatman filter paper # 1, glass cylinder with a glass support, rubber bung, lead pencil	Water – alcohol mixture, mixture of inks
2.	Separate the following ions from a given Mixture of their Salts (Ni^{+2}, Co^{+2}, Cu^{+2}) by Paper Chromatography	Whatman filter paper # 1, glass cylinder with a glass support, rubber bung, lead pencil	1% solutions of the chlorides of Ni, Co, Cu^{+2}, spraying solution (0.1% rubeanic acid in ethyl alcohol), solvent mixture (acetone, distilled water and concentrated HCl mixed in ratio 43:3:4)
3.	Separate Lead and Cadmium in a mixture solution by Paper Chromatography	Whatman filter paper # 1, glass cylinder with a glass support, rubber bung, lead pencil	Sample reagent (mixture of solutions of $PbCl_2$ and $CdCl_2$), solvent mixture (n-butanol + 3M HNO_3), spraying agent (H_2Sgas)
4.	Prove that the Loss of Thermal Energy When a Liquid Evaporate Will Lower the Temperature of the Liquid	Beaker, thermometer, safety goggles	Acetone
6.	**states of Matter III: Solids**		
1.	Crystallize Benzoic Acid from water	China dish, burner, tripod stand, wire gauze, matches, beakers, funnel, filter paper, stirrer, safety goggles	Distilled water and benzoic acid
7.	**Chemical Equilibrium**		
1.	Purify a given sample of Sodium Chloride by passing HCl Gas (application of common ion effect)	Beaker 500 ml, funnel, round-bottom flask, glass tubing, wire gauze, thistle funnel, burner, stirrer, graduated flask and physical balance	Distilled water, common salt, concentrated H_2SO_4
2.	Demonstrate a shift in the equilibrium point of a reaction by changing concentration (Le Chatelier's Principle)	3 beakers of 150ml, 4 beakers of 50ml, safety goggles	0.1M K_2CrO_4, 0.1M $K_2Cr_2O_7$, 1M HCl, 1M NaOH, 0.1M $Ba(No_3)_2$
8.	**Acid, Bases and Salts**		
1.	Determine the Exact Molarity of the Given Solution of H2SO4 and the Volume of this Acid Required to Prepare 500 ml of 0.02 M Acid by Volumetric Method	burette, pipette, funnel, conical flask, beakers, iron stand	phenolphthalein, 0.1M NaOH, 0.2M H2SO4, distilled water
2.	Determine the Percentage of NaOH in the Given Solution by Volumetric Method.	burette, pipette, funnel, conical flask, beakers, iron stand	phenolphthalein, 0.1M NaOH, 0.1M HCl, distilled water, solution containing 8gms of a mixture of NaCl and NaOH
3.	The given solution contains 6gms of Na2CO3 dissolved per dm3. Determine the Percentage Purity of the Sample Solution by Volumetric	burette, pipette, funnel, conical flask, beakers, iron stand	methyl orange, 0.1M Na2CO3, 0.1M HCl, Distilled water, solution of 6 gms of Na2CO3 in 1 liter

	Method.		
4.	Determine the Value of X by Volumetric Method in the Given Sample of 6.3g of $(COOH)_2$. XH_2O Dissolved per dm^3.	burette, pipette, funnel, conical flask, beakers, iron stand	phenolphthalein, 0.1M NaOH, 0.1 (COOH)2.2H2O, Distilled Water
5.	Determine the Solubility of Oxalic Acid at Room Temperature Volumetrically.	burette, pipette, funnel, conical flask, beakers, iron stand	Phenolphthalein, 0.1M NaOH, 0.1 (COOH) 2.2H2O, Distilled water.
9.	**Chemical Kinetics**		
1.	Show that the Addition of a Catalyst Increases the Rate of Reaction.	500 ml flask, spatula, tray, safety goggles	10% H2O2, 0.1gm MnO2, distilled water
Chapter 10		None	None
11.	**Thermochemistry**		
1.	Determine the Heat of Neutralization of NaOH and HCl.	calorimeter with stirrer, thermometer, balance	1M NaOH, 1M HCl, distilled water
12.	**Electrochemistry**		
1.	Standardize the Given Solution of KMnO4 and Calculate the Volume of KMnO4 Required for Preparing 1 dm3 of 0.01M KMnO4 Solution Volumetrically.	burette, pipette, funnel, conical flask, beakers, iron stand, test tube	0.1M FeSO4 solution, 0.02M KMnO4 solution, dilute H2SO4, distilled water
2.	Determine the Amount of Iron in the Given Sample Volumetrically.	burette, pipette, funnel, conical flask, beakers, iron stand, test tube	0.05M FeSO4 solution, 0.01M KMnO4 solution, dilute H2SO4, distilled water
3.	Determine the Percentage Composition Volumetrically of a Solution Mixture of K2C2O4 and K2SO4.	burette, pipette, funnel, conical flask, beakers, iron stand, test tube	solution mixture of K2C2O4 and K2SO4, 0.01M KMnO4 solution, dilute H2SO4, distilled water
4.	Determine the Solubility of Mohr's Salt at Room Temperature Volumetrically.	burette, pipette, funnel, conical flask, beakers, iron stand, test tube	0.05M Mohr's salt solution, 0.01M KMnO4 solution, dilute H2SO4, distilled water