COURSE OUTCOME (CO):: M.Sc. in Chemistry under CBCS(2020-2021)
Class: M.Sc.(Semester-I)

PAPER: CEM 101(Physical Chemistry)(Mathematical preliminaries & Quantum Mechanics-I, Thermodynamics, Statistical Mechanics-I, fundamentals of Nanoscience and technology and Principle of molecular spectroscopy-I)	**COURSE: CO1**

- **Mathematical preliminaries & Quantum Mechanics-I**

1. To enable the students to **a**pply the basic concepts of calculus to concepts in chemistry.
2. Enable to get idea of Extremum Principles, Constrained Extremization, power Series, Fourier transformation, Vectors and vector space etc.
3. To study the basic postulates of quantum mechanics and also to study the properties of operators and commutators.
4. To enable the students to solve the bound status: box with infinite and finite walls
5. Enable to understand the quantum mechanical aspect of angular momentum operator

- **Thermodynamics**

1. To know the basic concepts of chemical potential, partial molar properties, fugacity and activity coefficient for solutes and solvents.
2. To know the basic concepts of thermodynamic properties of gases with special reference to real gases in pure state and mixtures and to learn the thermodynamics of ideal and non-ideal binary solutions.

- **Statistical Mechanics-I**

On successful completion of this topic the students have the ability

1. To understand the basic concepts of phase cell, macrostate, microstate, thermodynamic probability.
2. To describe the various ensembles.
3. To correlate and differentiate Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.
4. Explain the partition function and the derivation of thermodynamic properties in terms of molecular partition function.
5. To know the different aspects of statistical thermodynamics and its applications.

- **Fundamentals of Nanoscience and technology**

1. To know the basic concepts of nanoscience and technology.
2. To carry out the synthesis and characterization and to know the properties and applications of nanomaterials.

- **Principle of molecular spectroscopy-I**

1. Explain the nature of electromagnetic radiation, shapes and width and intensity of spectral lines.
2. To understand the principle and instrumentation of microwave, vibration-rotation Raman and infra-red spectroscopy and interpret microwave, vibration-rotation Raman and infra-red spectra for chemical analysis.

CEM 102(Organic Chemistry) Pericyclic reaction-I, Organic transformations/synthesis/reagents chemistry-I, natural products-terpenoids, Natural products-alkaloids, Retro-synthesis-I	**COURSE: CO2**

- **Pericyclic reaction-I**

1. To enable the students to learn about characteristic features of Pericyclic reactions.
2. Explain the conservation of orbital symmetry MO of different polyenes.
3. To understand the electrcyclic, cycloaddition and sigmatropic reactions.
4. To enable the students to learn about rationalisation of different example with the basis of frontier orbital interaction.
5. To understand Wood Word Hofmann symmetry rules for pericyclic reactions, exceptions to symmetry rules, correlation diagram of different perecyclic reactions.

- **Organic transformations/synthesis/reagents chemistry-I**

1. To understand the Cation-olefin cyclization reaction and apply it to the synthesis of tritepenes.
2. To enable the students to learn about biogenetic isoprene rule for monocyclic, bicyclic, tricyclic, tetracyclic and pentacyclic ring systems.
3. Study the various name reaction with examples.

- **Natural products-terpenoids**

1. To enable the students to learn about Isoprene rules.
2. Learn biogenesis terpenoides.
3. Study the structure and synthesis of Higherterpenoids: sesqui-, di-, sester-, tri-, tetra- terpenoids.

- **Natural products-alkaloids**

1. Study the structure and synthesis of Phenyl ethyl amine, quinine, nicotine, peptides, nucleoside and

nucleotide.
2. Learn biogenesis alkaloids.

- **Retro-synthesis-I**

1. To understand the Organic Synthesis Strategy and the disconnection approach.
2. Retrosynthetic approach to planning organic syntheses.

CEM 103(Inorganic Chemistry)Symmetry and Group theory-I, Solid state Chemistry and Crystallography, Bioinorganic chemistry-I	**COURSE: CO3**

- **Symmetry and Group theory-I**

1. To know the applications of group theory in chemical bonding.
2. To enable the students to learn about the concept of groups, subgroups, classes and the related theorems.
3. To understand the commutative (abelian) groups and cyclic groups and their examples.
4. To enable the students to learn about group multiplication tables, the rearrangement theorem, Symmetry elements and operations, products of symmetry operations, equivalent symmetry elements and equivalent atoms.
5. To know the Hermann–Mauguin (HM) notations, optical activity and dipole-moment on the basis of point group symmetry; similarity transformation and the invariance of characters.
6. To know the Matrix representation of symmetry operations, characters of symmetry operations in a representation, invariance of character under similarity transformation, the row / column orthogonality of characters, reducible and irreducible representations, the "Great Orthogonality Theorem" and its corollaries.

- **Crystallography**

1. To know the defects in solids.
2. Students are able to determine the equilibrium concentration of Schottky and Frenkel defects.
3. Describe the Free electron theory, electronic specific heat, Hall effect, electrical and thermal conductivity of metals.
4. Learn single crystal and polycrystal (twinning problem) lattice, unit cell-primitive and non-primitive unit cells, unit cell parameters and crystal systems.
5. To know the Bragg‟s equation, reciprocal lattice and its relation to direct lattice.

- **Bioinorganic chemistry-I**

After completion of this topic, students are able to

1. Know the essential elements in Biology (major and trace), beneficial and toxic elements, role of metal ions.
2. Explain the Bioenergetic principle and role of ATP.
3. Explain the O2–uptake proteins: hemoglobin, myoglobin, hemerythrin and hemocyanin, structure, function and model study.
4. Understand the Electron transport protein: Fe-S proteins, cytochromes. Metal ions transport and storage proteins: ferritin, transferin, ceruloplasmin.
5. Know the Transport across biological membrane - Na^+-K^+-ATPase, ionophores. Hydrolytic enzymes: carbonic anhydrase, carboxy peptidase, urease.

CEM 104(Food processing and preservation-I and Computer basics-I+II)	**COURSE: CO4**

- **Food processing and preservation-I**

1. To understand the Constituents of Food and their sources and physico-chemical and functional properties.
2. To understand the factors influencing the growth and survival of microorganisms in food, role of microbes in fermented foods and types and causes of food spoilage.
3. To understand the Principles and methods of food preservation.

- **Computer basics**

On successful completion of this subject the students have the ability

1. to acquaint knowledge about Hardware, Software, Memory, Storage devices.
2. to understand the decimal number system, the binary number system, hexadecimal notation, octal number system.
3. to know the Logical operations AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
4. to understand the basic definitions, theorems of Boolean algebra.

CEM 195(Inorganic Chemistry Practical)	**COURSE: CO5**

- **Inorganic Chemistry Practical**

1. The students will get training in the quantitative analysis of metal ions using gravimetric method.
2. The students will get training in the quantitative analysis of metal ions in alloys.
3. To impart skill to students in the Equilibrium studies on various inorganic reactions.

4. To impart skill to students in the Spectrophotometric Estimation.
   5The students will get training in theSynthesis and Characterization of inorganic compounds.

CEM 196(FOOD PROCESSING, PRESERVATION & PACKAGING LAB)	COURSE: CO6

- **FOOD PROCESSING, PRESERVATION & PACKAGING LAB**

1. The students will develope basic skills in the Preparation of jams, jellies, syrups, squashes, mixed fruit juices: Aloe vera mixed with lichi, mango, pine apple, water melon, etc.
2. The students will get training in the Estimation of Food Values (carbohydrate, fat, protein, vitamins) and Food Safety Test.
3. The students will get training in the Preservation of processed food and Packaging of processed and preserved food.

COURSE OUTCOME (CO):: M.Sc. in Chemistry under CBCS(2020-2021)
Class: M.Sc.(Semester-II)

CEM 201(Quantum Mechanics-II, Chemical kinetics, electrochemistry-II, molecular spectroscopy-II)	COURSE: CO7

- **Quantum Mechanics-II**

1. To enable the students to solve the bound status: box with infinite and finite walls.
2. To enable the students to solve the simple quantum mechanical models such as simple harmonic oscillator, H atom etc.

- **Chemical kinetics**

1. Students will understand Flow and relaxation methods of measurements of reaction rates.
2. Students are able to understand flash photolysis, Kinetics of fast reaction, Homogeneous and heterogeneous catalysis, Enzyme catalysis and inhibition, autocatalysis, oscillatory reactions, redox reactions.
3. The students will get Preliminary idea of Transition State Theory.

- **electrochemistry-II**

After completing this topic, students must have a basic knowledge to

1. explain non stationary processes in electrolytic solutions.
2. derive Onsager conductance equation.
3. explain the effect of high electric field and frequency on ion conductance.
4. understand basic principles of cyclic voltammetry and coulometry, polyelectrolyte.

- **molecular spectroscopy-II**

After completing this topic, students must have a basic knowledge to

1. understand the Classical Theory of Raman Scattering and quantum mechanical Picture of Raman Scattering.
2. describe Characteristic parameters of Raman lines, Pure Rotation and Vibrational Raman spectra.
3. understand the basic Principles of a Raman spectrometer, application of Raman Spectroscopy.
4. acquire knowledge on Electronic Spectroscopy.

CEM 202(Pericyclic reaction-2, Organic transformations/synthesis/reagents chemistry-2,Retrosynthesis II,Stereochemistry-1,Stereochemistry-2)	COURSE: CO8

- **Pericyclic reaction-2**

After completing this topic, students must have a basic knowledge to

1. understand Perturbation molecular orbital theory (PMO).
2. explain the energy diagram of ethylene and butadiene system with different substitutions.
3. understand the cycloaddition reactions of ethylene and butadiene system.
4. understand Regioselectivity, Periselectivity and Site selectivity, secondary interactions in pericyclic reactions, cheletropic reactions.
5. Know how to solve the Problems relating to above reactions.

- **Organic transformations/synthesis/reagents chemistry-2**

After completing this topic, students must have a basic knowledge to

1. understand Woodward prevost hydroxylation, Sharpness asymmetric expoxidation, AD-mix reactions and Transformation of expoxides
2. know the use of various reagents in organic transformation.
3. understand Organic Synthesis Strategy

- **Retrosynthesis II**

After completing this topic, students must have a basic knowledge to

1. understand the Organic Synthesis Strategy and the disconnection approach.
2. know Retrosynthetic approach to planning organic syntheses.

- **Stereochemistry-2**

After completing this topic, students must have a basic knowledge to

1. understand different projection formulae and their interconversions.
2. Know the Conformational and configurational enantiomers.
3. Know the Stereochemical nomenclatures.
4. explain the Stereochemical features of cyclohexane and its derivatives.
5. understand the computation of stereoisomers of different systems.

- **Stereochemistry 2**

After completing this topic, students must have a basic knowledge to

1. understand Prochirality, Prostereoisomerism, Topicity etc.
2. explain the addition of a chiral reagents to chiral ketones and aldehydes.
3. describe models of stereochemical control in terms of Cram, Felkin and Karabatsos.
4. explain Stereospecific, stereoselective reactions and Sharplessexpoxidation reaction.

CEM 203(Organometallic chemistry –I, Group theory-II, Chemistry of p and d-block elements)	**COURSE: CO9**

- **Organometallic chemistry –I**

After completing this topic, students must have a basic knowledge to

1. understand the use of Ligands in organometallic chemistrySynthesis.
2. describe the bonding and reactivity of Metal-alkyl, -alkene, -alkyne, -allyl, -carbene, -carbyne and -carbide complexes.
3. learn about Agostic interaction, Stereochemical non-rigidity and fluxional behaviour of organometallic compounds with typical examples.

- **Group theory-II**

After completing this topic, students must have a basic knowledge to

1. understand the Character tables for various point groups and concept of Projection operator.
2. gain knowledge of representation for cyclic groups, wave functions as bases for Irreducible representations and the standard reduction formula.
3. describe the direct product representation and its decomposition.
4. identify nonzero matrix elements.
5. describe the spectral transition probabilities and selection rules.

- **Chemistry of p and d-block elements**

After completing this topic, students must have a basic knowledge to

understand the synthesis, reactions, structures bondings and uses of p and d-block elements.

CEM 204: Nanotechnology: Principles and Practices (Introduction, synthesis of nanomaterials, analysis techniques, application of nanotechlogy)	**COURSE: CO10**

- **Introduction, synthesis of nanomaterials**

After completing this topic, students must have a basic knowledge to

1. understand Bulk and Nano materials and also the differences between these.
2. understand also the Geometric structure, Magic numbers, co-ordination number of small clusters.
3. gain idea of Synthesis, characterisation, Electrical and optical properties and applications of nano systems.

- **Analysis techniques**

After completing this topic, students must have a basic knowledge to

1. analyze the Nano materials using Microscopes, Optical microscopes, Electron microscopes, Scanning electron microscope, Transmission electron microscope, Scanning probe microscope, Scanning tunneling microscope, Atomic force microscope.
2. analyze the Nano materials using XRD and Spectroscopies like UV-VIS-NIR, Infrared (FTIR), Photo luminescence, XPS (X-ray photo electron spectroscopy), Anger electron spectroscopy.

- **Application of nanotechlogy**

After completing this topic, students must have a basic knowledge to

1. get a basic understanding of application of nanotechnology.

CEM 295(Physical Practical)	**COURSE: CO11**

To impart experimental skills to students in the conductivity meter, potentiometer, pH meter, spectrophotometer.

CEM 296(Organic Practical)	**COURSE: CO12**

- **Organic Practical**

1. Students will gain an understanding of methods of qualitative analysis of liquid sample.
2. The students will develop basic skills in the techniques of TLC, boiling point determination; functional groups tests, UV-VIS spectral characterizations.

3. Understand to assign 1H-NMR, 13C-NMR spectra.
4. To enable the students to learn about the extraction principles of Renewable chemicals.

COURSE OUTCOME (CO):: M.Sc. in Chemistry under CBCS(2020-2021)
Class: M.Sc.(Semester-III)

CEM 301(PhotophysicalProcesses, LASER and its application, ESR spectroscopy, PES and NQR)	**COURSE: CO13**

- **Photophysical Processes**

After completing this topic, students must have a basic knowledge to

1. explain the Photophysical processes of unimolecular processes, delayed fluorescence, Kinetics of bimolecular processes.
2. Understand the collision quenching, Stern-Volmer equation, Concentration dependence of quenching and excimer formation.
3. explain theExcited state electron transfer processes: Exciplex, Twisted intramolecular charge transfer processes and proton couple intra and intermolecular electron transfer processes.

- **LASER and its application**

After completing this topic, students must have a basic knowledge to

1. understand the general feature and properties of LASER.
2. understand the method of obtaining population inversion, Laser cavity modes, Q-switching and Mode locking.
3. explain the different examples of LASER e.g., Ruby laser, Nd-YAG laser, diode laser, He-Ne laser, N2 laser, Ar laser, excimer and exciplex laser, Dye laser.

- **ESR spectroscopy**

After completing this topic, students must have a basic knowledge to

1. explain the principle of ESR spectroscopy and comparison to NMR spectra.
2. explain the concept of spin Hamiltonian.
3. understand the derivation of energy of spinning electron in a magnetic field.
4. know the EPR-instrumentation, representation of EPR spectrum, X-band and Q-band spectra, line width, hyperfine splitting, magnetically equivalent and nonequivalent sets of nuclei.
5. gain the concept of *g*-anisotropy.
6. explain the spectra of simple organic free radicals, transition metal complexes and their expected number of lines and intensities.
7. understand the metal hyperfine anisotropic spectra, zero-field splitting.

- **PES and NQR**

After completing this topic, students must have a basic knowledge to

1. understand the concept of Photoexcitation and photoionization.
2. understand the concept of core level (XPS, ESCA) and valence level (UPS) photoelectron spectroscopy.
3. understand the basic concept of XPS and UPS experiments.
4. Know the concept of chemical shift.
5. get a deep insight into the detection of atoms in molecules and differentiation of same elements in different environments form XPS.
6. have an idea of the nature of molecular orbitals from UPS.
7. learn the Principle of NQR, nuclear quadrupole coupling constant and structural information from NQR spectra.

CEM 302(Pericyclic reaction-III, Linear free energy relationship I and II, Organometallic chemistry)	**COURSE: CO14**

- **Pericyclic reaction-III**

After completing this topic, students must have a basic knowledge to

1. learn about characteristic features of Pericyclic reactions.
2. understand the applications of MO theory to Electrocyclic reactions, Sigmatropic rearrangement, cycloaddition and cycloreversion reactions, cheletropic reactions and ene reaction.
3. have a basic idea of Frontier Molecular Orbital theory.
4. have a concept of aromaticity of Transition States, orbital correlation diagrams, Huckel MO theory- MO‟s of chains and rings alternants and nonalternants.

- **Linear free energy relationship I and II**

After completing this topic, students must have a basic knowledge to

1. understand the quantitative correlations of rate and equilibria.
2. Know the Linear free energy relationships with special reference to Hammett, Taft, Yukawa-Tauno and Grunwald-Weinstein equations.
3. Study the application of Linear Free Energy Relationship to aromatic, aliphatic, polynuclear and hetero-

aromatic systems.

4. Have an elementary ideas of multiparameter correlation reactions.
5. Study the Electrophilic substitutions SE1 and SE2 reactions in aliphatic systems.

- **Organometallic chemistry**

After completing this topic, students must have a basic knowledge to

1. understand the Preparation and reactions of pi-complexes.
2. get an idea about heptonumbers, rules for nucleophilic addition to complexes and applications to typical synthesis.
3. understand the use of transition metals in organic synthesis.

CEM 303(Bioorganic and supramolecular Chemistry-1,2, and 3, Peptides and nucleic acids, Green chemistry)	**COURSE: CO15**

After completing this course, students must have a basic knowledge of supramolecular Chemistry to

1. understand the discovery, nomenclature, synthesis, properties and applications of Crown ethers.
2. Know the structures and applications of Cryptands.
3. Study the definition, examples of molecular recognition utilizing H-bonding, electrostatic, solvophobic, pi-pi interaction, etc and its application.
4. know the introduction to molecular mechanics calculation and its use in the design of molecular receptors.
5. sudy the mechanism, kinetics and application of enzymes in organic synthesis.
6. know the basic idea of vesicles, fibers and tubules.
7. understand the basic concepts of amphiphiles, bola-amphiphiles and Self-replication.
8. Know the definition, classification, examples of Gels, morphology and rheology of gels.
9. understand the applications of Chemical sensors.

- **Peptides and nucleic acids**

By the end of this topic students must have a basic knowledge to

1. know the Structure and Functions of Peptides and Proteins.
2. be familiarise with the α-helix, β-pleated sheet, β-turn, 3.10 helix, Ramachandran plot.
3. understand the structure, functions and replication of nucleic acids.

- **Green chemistry**

By the end of this topic students must have a basic knowledge to

1. understand the current status of chemistry and the environment.
2. know the definition of green chemistry.
3. know the applications of green chemistry for sustainable development.
4. know the Principles, methodologies and techniques in Green Chemistry.
5. describe the Synthesis in aqueous media and Catalytic methods in synthesis.
6. know the examples of green chemistry.
7. be familiarise with the future trends in green chemistry.

CEM 304(Introduction of Pharmaceutical Chemistry, Classification and nomenclature of drugs, Theory of drog action and factors affecting the drugs, Types of drugs, Antimalarial drugs)	**COURSE: CO16**

- **Introduction of Pharmaceutical Chemistry, Classification and nomenclature of drugs**

By the end of this topic students must have a basic knowledge to

1. know the important aspects of pharmaceutical chemistry.
2. know the classification of drugs and their nomenclature.

- **Theory of drug action and factors affecting the drugs, Types of drugs, Antimalarial drugs**

By the end of this topic students must have a basic knowledge to

1. know the Theory of drug action and factors affecting the drugs
2. have an idea of Hyponotics, sedative drugs, Anticonvulsivant and analgesic drugs.
3. understand the concept of general anaesthetics and local anaesthetics.
4. have an idea of expectorant, psychoactive and nervous system stimulant drugs.
5. have an idea ofantiperkinson, antihistamine, anti-inflammatory and antipyretic drugs.
6. understand the basic idea of Antiamoebic, antifungal and antiviral drugs, antineoplastic agents, disinfectant and antiseptic, thyroid hormones and antithyroid drugs, Vitamins, sulfonamides and antibiotics.
7. know the Malaria parasite and its life cycle, chemotherapy of malaria using antimalarial drugs.

CEM 395(Project work: Organic Chemistry spl.)	**COURSE: CO17**

By the end of this topic, students must have a basic knowledge to

1. capable of thinking the various field of Chemistry and to develop a sense of investigation.
2. define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data,

establish hypotheses.

3. plan, execute and report the results of an experiment or investigation and employ modern library search tools to locate, improve, and evaluate chemistry-related information.

COURSE OUTCOME (CO):: M.Sc. in Chemistry under CBCS(2020-2021)
Class: M.Sc.(Semester-IV)

CEM 401(Spectroscopy for Structure Elucidation)	**COURSE: CO18**

By the end of this topic, students must have a basic knowledge to

1. understand the thorough revise of 1H NMR and preliminary aspects of 13C NMR, CW and FT techniques.
2. understand the combined application of spectroscopic techniques (UV, IR, NMR, MS) in elucidation of structure and study of reactions of organic compounds.

CEM 402(Organic Photochemistry-1+2), Biological Active Molecules, Vitamins and co-enzymes, Vitamins and co-enzymes and Hetercycles-2)	**COURSE: CO19**

- **Organic Photochemistry-1+2**

By the end of this topic, students must have a basic knowledge to

1. have an idea of fundamental concepts of organic Photochemistry and Jablonski diagram.
2. Know the Photochemistry of organic compounds, Norrish type- I and type II processes.
3. Know Patterno Buchi reaction, Barton reaction, addition reaction, oxidation reaction, Photochemical reduction, substitution reaction, cis-trans isomerism, photochemistry of butadiene, di-pi methane rearrangement and related processes.

- **Biological Active Molecules, Vitamins and co-enzymes**

By the end of this topic, students must have a basic knowledge to

obtain the knowledge of Biological Active Molecules, Vitamins and co-enzymes.

- **Hetercycles-2**

By the end of this topic, students must have a basic knowledge to

understand the generalized approach to the synthesis of heterocycles possessing 5-,6-, and 7- membered rings with one or two heteroatoms per ring and reactions of heterocycles.

CEM 403(Stereochemistry-3+4+5+6+7)	**COURSE: CO20**

By the end of this topic, students must have a basic knowledge to

1. understand Curtin-Hammett principle, its derivation under different conditions and applications.
2. derive Winstein Holress equation and Eliel equation and their applications.
3. understand the Stereochemistry of Fused ring systems, *trans* and *cis* declaims.
4. describe the steroid and nonsteroid conformation, symmetry, torsion angle enthalphy, entropy, free energy, substituted declains q-methyldecalins and 9,10 dimethyldecalins, decalones.
5. Know the Sterochemistry of 4-10 membered rings, transanular reactions, perhydrophenanthrenes and perhydroanthracenesconformation, energy, symmetry and optical activity, relative stability, sterochemistry of perhydrodiphenic acids and perhydrophenanthrenes, conformations of some triterpenes.
6. Know the modern concepts of nucleophilic addition to carbonyl compounds, Felkin model, Burzi Dunitz trajectory, Cieplak model and examples.
7. Know the concept of optical rotation, specific and molecular rotations-their units.
8. Understand Brewster rule, Lowe's rule , circular birefrigence, optical rotatory dispersion octant rule, axial haloketone rule and application.

CEM 404(FOOD PROCESSING AND PRESERVATION-II)	**COURSE: CO21**

By the end of this topic students must have a basic knowledge to

1. Know the processing and preservation of milk products, Cereals legumes and nuts.
2. Know the chemical composition, nutritional importance of dietary oils and fats, Production and processing of Edible vegetable oils and fat, hydrogenated fat.
3. Acquire the knowledge of food safety.

CEM 495 Project(Organic Special)	**COURSE: CO22**

By the end of this Research Work, students must have the ability to

1. Have an exposure to the literature review.
2. Have an idea of designing and execution of the small reaction schemes.
3. Frame the Project report.

Department of Chemistry

MAPPING OF CO AND PO (PG Course)

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	CO1	CO17	CO1	CO15	CO17	CO15	CO1	CO1	CO15	CO5
CO2	CO2	CO22	CO4		CO22		CO4	CO10		CO6
CO3	CO3		CO10				CO6	CO15		CO11
CO4	CO7		CO15				CO10	CO16		CO12
CO5	CO8		CO16				CO16	CO17		CO17
CO6	CO9		CO21				CO21	CO22		CO22
	CO17									
	CO22									