UNIVERSITY OF KERALA

B.Sc. Degree Chemistry Programme

CH1646 Project/dissertation, Factory/R&D Institute Visit and Project based Viva-voce
Evaluation of the Project & Factory/Research institution visit report
Semester VI

The Project work may be conducted individually or by a group comprising of a maximum of 5 students during semester V and VI. The work of each student/group shall be guided by one faculty member. After the completion of the work, the student shall prepare 2 copies of the Project report. The copies certified by the concerned guide & the Head of the Department shall be submitted prior to the completion of the sixth semester. The typed copy of the report may have a minimum of 25 pages. It should contain Title page, Introduction, Review, Result and Discussion, References etc. These reports will be evaluated by a board of two Examiners appointed by the University. The examiners should affix their dated signatures in the facing sheet of the Project report. The evaluation/Viva voce of the Project report is conducted on a separate day. The students have to present their work individually before the examiners on the Viva-Voce day. The examiners shall consult each other and award grades based on the various components given in the Table 1 below. There shall be no continuous assessment for dissertation /project work.

The Factory/ research institution visit report should submitted during the Lab course examination/Viva voce and the report must be evaluated and the examiners should affix their dated signatures in the facing sheet. Good presentation of any one Chemical Factory/Research centre visit may be considered for A grade. Other presentations are graded accordingly into B, C, D etc. Candidate is expected to make individual report. So variety must be appreciated. Weightage for study tour report is 4.

III **EVALUATION OF THE PROJECT AND FACTORY/RESEARCH INSTITUTE VISIT (CHEMISTRY)**

Total weight; 30

No.	**Main component**	**Weight**	**Sub components**	**Grade**
1	Dissertation	4	Introduction, Review and Objectives	Excellent : A Very Good: B Good: C Average: D None: E
2	,,	4	Materials and methods	Excellent : A Very Good: B Good: C Average: D None: E
3	,,	4	Results and Discussion	Excellent : A Very Good: B Good: C Average: D None: E
4	,,	4	Conclusion and References	Excellent : A Very Good: B Good: C Average: D

				None: E
5	Project Presentation	5	i) Clarity and understanding ii) Effective presentation iii) Time Management iv) Interaction	All four: A Three: B Two: C One: D None: E
6	Factory/ research institution Visit	4	i) Brief Description of factory/Institute ii) Figures/flow charts iii) Details of instruments/facilities iv) Neatness of presentation	All four: A Three: B Two: C One: D None: E
	Total for Project	**25**		
7	Viva- Voce	5	Understanding of the i) Review ii) Objectives iii) Methodology iv) Results	All four: A Three: B Two: C One: D None: E
	Total for Viva-voce	**5**		

The grades for Project/dissertation shall be calculated by consolidating the grades secured for the submission of Project/dissertation and the project based via-voce, taking into account that the Project/dissertation has a weight of '3' and that of project based via-voce has a weight of '1'.

Open Course for Other Majors-Semester-5 Credit-2

Course-CH1551.**1**

2011 admission onwards

Essentials of Chemistry

Module 1:Atomic structure and Periodic Classification of Elements (9hrs)

Structure of atom- Fundamental particles, atomic mass, atomic number, isotopes. Bohr theory of atom. Orbitals- Quantum numbers, aufbau principle, Hund's rule; Pauli's exclusion principle. Electronic configuration of atoms- half and completely filled orbitals. Modern periodic table: Periods, Groups, Periodicity- valency, atomic radius, electronegativity, Ionisation potential, Electron affinity.

Module 2 :Nuclear Chemistry (9 hrs)

Natural radioactivity, Nature and types of radiations, Properties. Group displacement law. Radio active decay series. Decay rate. Half life period, Average life period, Unit of radioactivity. Radiation dose, artificial radioactivity, nuclear structure. Nuclear fission and Nuclear fusion. Rock dating- Radio carbon dating. (*elementary idea only*)

Module 3 :Polymer Chemistry (9 hrs)

Classification of polymer: Origin, structure, synthesis, Molecular forces. Commercially important polymers: Application of polyethylene, polystyrene, polyhaloolefines, Nylon-6, Nylon-66, Melamine, Terylene, Bakelite, Natural and synthetic rubber, vulcanization, inorganic polymer: (*Examples Only*).

Module 4 :Chemistry in Biological Process (9hrs)

Vitamins: Vitamin-A, Vitamin-B2, Vitamin-C, Vitamin-D, Vitamin-E and Vitamin-K- Name, Source, Function and deficiency diseases. Enzymes- Classifications, characteristics, role, examples. Hormones- Sex hormones- Androgens, oestrogens, progesterone, Example, function. Cortical hormones- A few examples with function. Nucleic acid- RNA, DNA: Introduction- role in life process (*No structure or chemical reactions needed*)

Module 5 : Chemistry in action (9hrs)

Dyes: classification based on constitution, application, examples, uses. Drugs: Antipyretic, analgesic, antiseptic, disinfectants, tranquilisers, antibiotics structure, name and uses only. Soaps and detergents: Hard and soft soaps, anionic, cationic and non-ionic detergents, cleansing action of soaps, Explosives: TNT, TNG, RDX, Gun cotton: name, structure and action. (*No structure or chemical reactions needed*)

Module 6 :Environmental Chemistry (9hrs)

Air Pollution: Types of pollutant in air- carbon monoxide, carbon dioxide, Nitrogen oxides, Sulphur dioxides, hydrogen sulphide, Cl_2, CFC, particulate matter, metals, fly ash, asbestos, hydrocarbons- source and influence. Acid rain, Green house effect, ozone layer and its depletion. Water Pollution: Various factors affecting purity of water, sewage water, industrial waste, agricultural pollution such as pesticides, fertilizers, detergents. Hard and soft water, Removal of hardness, disadvantage of hard water. Soil pollution : Due to pesticides, herbicide, fungicide, long term use of fertilizers, plastic waste.

References

1. M. C. Day and J. Selbin," Theoretical Inorganic Chemistry".
2. H. S. Arniker," Essentials of Nuclear Chemistry:
3. B.K. Sharma "Environmental Pollution".
4. Solomons- John- Wiley, "Fundamentals of Organic Chemistry".
5. F.A. Carey, Mc. Graw Hill ,"Organic Chemistry" Inc. 226

6. I.L Finar,"Organic Chemistry", Vol. 1 Longman
7. Tewari, Mehrotra- Vikas & Vishnoi,"A Text book for Organic Chemistry:
8. M.K. JainJain," Principles of Organic Chemistry".
9. A.K. Dey,"Environmental Chemistry".

University of Kerala
Model Question Paper
2011 admission onwards
Open Course for other Majors Course CH1551.1
Essentials of Chemistry

Time: Three Hours **Maximum Weightage : 30**

Section A, Weightage 0.25 eah
(answer in a word \ sentence)
Answer all questions

I 1. One orbital can accommodate a maximum of_____electrons.
2. _____states that orbitals are filled in the increasing order of energy.
3. There are _____quantum numbers.
4. The shape of s orbital is _____.

II 5. Who discovered radioactivity?
6. What is the mathematical expression for the half life period of a 1st order reaction?
7. Name any unit of radioactivity.
8. Who proposed Group Displacement law?

III. 9. Bakelite is a polymer of phenol and _____.
10. Monomer of Nylon 6,6 is _____.
11. An example of an inorganic polymer is _____.
12. Name any compound which causes acid rain.

IV. 13. Name an enzyme.
14. Write an example of a sex hormone.
15. What is the expansion of DNA?
16. Write an example for a dye. **0.25×16 = 4**

Section B, Weightage 1 each (Short answer type)
Answer any eight questions from the following. Each answer must contain 4 points.

17. Name the pollutants in air?
18. What are the factors affecting the purity of water?
19. Explain Hund's rule of maximum multiplicity with an example.
20. Define electron affinity, explain with an example.
21. Distinguish between half life period and average life period.
22. Explain artificial radioactivity.
23. Write the structure and applications of polyhalo olefins.
24. What is vulcanization of rubber?
25. What are corticosteroidal hormones? Explain with example.
26. Distinguish between DNA and RNA.
27. How are dyes classified?
28. Explain cleansing action of soap. **1×8 = 8**

Section C, Weightage 2 each (Short essay type)
Answer any five questions from the following. Each answer must contain 8 points.

29. Explain the source and hazards of fly ash and asbestos.
30. Explain briefly soil pollution.
31. What are periods and groups in the periodic table? What is periodicity?
32. Explain Bohr model of atom.
33. Distinguish between nuclear fission and nuclear fusion with examples.
34. What are Nylon 66, Melamine and Terylene?
35. What are the functions and deficiency diseases of Vitamin C, Vitamin D

and Vitamin E.
36. Write a note on explosives. **2×5 = 10**

Section D,
Weightage 4 each (Long essay type)
Answer any two questions.

37. Write an essay on plastic waste and long term use of fertilizers.
38. What are quantum numbers? Explain.
39. Explain Group Displacement law and radioactive decay series. **4×2 = 8**

Open Course For Other Majors-Semester-5 Credit-2
Course-CH1551.**2**
2011 admission onwards
Fundamentals of Chemistry & Its Application to Everyday Life

Module 1 Evolution of Chemistry ***9 hrs***

Evolution of Chemistry - ancient speculations on the nature of matter, early form of chemistry-alchemy, Robert Boyle and the origins of modern chemistry in the latter 1600s - origin of modern chemistry - Antoine Lavoisier and the revolution in chemistry - Role of Chemistry as a central science connecting Physics, Biology and other branches of science. Basic ideas of interdisciplinary areas involving Chemistry

Module 2 Atomic structure Atom- model of Dalton- Thomson – Rutherford and Bohr. Nature of electron proton and neutron – atomic number – mass number- isotopes -state the relative charges and approximate relative masses of a proton, a neutron and an electron - describe, with the aid of diagrams, the structure of simple atoms as containing protons and neutrons (nucleons) in the nucleus and electrons arranged in shells (energy levels) (no knowledge of s, p, d and f orbitals);

Module 3–Periodic table ***9 hrs***

The Periodic Table - Periodic trends, Group properties - describe the relationship between group number and the ionic charge of an element- similarities among the elements in the same group - metallic to non-metallic character from left to right across a period of the Period Table- Properties of elements in Group I and XVII using the Periodic Table

Module 4 Structure and properties of materials ***9 hrs***

Elements, compounds and mixtures – elementary idea of ionic bond and covalent bond- compare the structure of simple molecular substances, e.g. methane; water, carbon dioxide, iodine, with those of giant molecular substances, e.g. poly(ethene); sand (silicon dioxide); diamond; graphite in order to deduce their properties compare the bonding - structures of diamond – graphite , electrical conductivity.

Module 5 Chemicals used in everyday life. ***9 hrs***

Household materials – Major chemical ingredients (*No structural formula and preparation needed*), method of action and possible hazards/toxicity of : Match Box-Household bleach – Soap- detergent—cooking gas – tooth paste – shampoo-hair dye- nail polish- whitener-moth balls –fire crackers.

Module 6 Chemicals in food and beverages ***9 hrs***

Important chemical ingredients/ taste makers used in packed food - soft drinks - and its health hazards. Chemicals in food production - fertilizers used in natural sources -

Fertilizers urea, NPK and Super phosphates - uses and hazards. Adulterants in milk, ghee, oil, coffee powder, tea, asafoetida, chilli powder, pulses and turmeric powder - identification. artificial sweeteners - food preservatives.

References

1. M. C. Day and J. Selbin," Theoretical Inorganic Chemistry".
2. F. A. Cotton, G. Wilkinson and P. L. Gaus, "Basic Inorganic Chemistry"
3. J. D. Lee, "Concise Inorganic Chemistry"
4. M. C. Day and Selbin "Theoretical Inorganic Chemistry"
5. N.C. Datta "The Story of Chemistry"
6. Carl H. Snyder "The Extra Ordinary Chemistry Of Ordinary Things"
7. John Emsley " The Consumer's Good Chemical Guide"

University of Kerala
Model Question Paper
2011 admission onwards
Open Course for other Majors Course CH1551.2
Fundamentals of Chemistry & Its Application to Everyday Life

Time: Three Hours **Maximum Weightage : 30**

Section A, Weightage 0.25 eah

(answer in a word / sentence)

Answer all questions

I 1. The modern atomic theory is called:_____

2. _____states that orbitals are filled in the increasing order of energy.

3. Name an artificial sweetener?

4. The shape of s orbital is _____.

II 5. Who proposed the atomic theory?

6. The branch of chemistry which deals hydrocarbons and their derivative is called_____. .

7. What is superphosphate?

8. Who is the Father of Modern Chemistry?

III. 9. How many atoms are present in a molecule of ozone?

10. Two atoms with the same number of protons but different number of neutrons are called _____

11. What is a diamond made up of?

12. Which element has the electron configuration 2,1.

IV. 13. Name a liquid element.

14. What is the shape of water molecule?

15. How many valence electrons are there in carbon?

16. Name the main compound present in cooking gas.

0.25×16 = 4

Section B, Weightage 1 each (Short answer type)

Answer any eight questions from the following. Each answer must contain 4 points.

17. Name any two Toxic Chemicals in Cosmetics

18. Obtain the electron configuration for (a) N; (b) F.

19. Explain Hund's rule of maximum multiplicity with an example.

20. Define electron affinity, explain with an example.

21. Which of the following elements Li, Be, B, C, N, O, F and Ne are metals?

22. Explain Bohr model of atom.
23. Why is the electronegativity value of most noble gases equal to zero?
24.What are the Health Effects of Drinking Soda?
25. Which do you expect to have more metallic character, Lead (Pb) or Tin (Sn) ?
26 What is a Match Head of match stick made Of?
27. Explain why graphite conducts electricity whereas diamond doesn't.
28. Is the reactivity of group I metals increasing or decreasing down the group? Explain why?

$1 \times 8 = 8$

Section C, Weightage 2 each (Short essay type)

Answer any five questions from the following. Each answer must contain 8 points.

29. Explain the colour of firecrackers.
30. What is the difference between covalent and ionic bonding?
31. What are periods and groups in the periodic table? What is periodicity?
32. What are adulterants.
33. How is Thomson's model of the atom different from Dalton's model of atom?
34. What's the difference between an oxidation number and an ionic charge?
35. Explain the health hazards associated with drinking soft drinks ?
36. How can metallic character change across a period?

$2 \times 5 = 10$

Section D, Weightage 4 each (Long essay type)

Answer any two questions.

37. Describe clearly the link between increasing effective nuclear charge across a period and the changes in van der Waals radius
38. The pH of aqueous solutions of elements in the third period changes as the period is crossed. Explain how these changes are directly related to the changes in effective nuclear charge across the period.
39. Explain the role of some chemicals in household items **$4 \times 2 = 8$**

Open Course for Other Majors-Semester-5 Credit-2
Course-CH1551.**3**
2011 admission onwards
Environmental Chemistry

Module -I ***9 hrs***

Environmental Components: Structure and composition of the, Atmosphere, hydrosphere, biosphere and Lithosphere – composition of atmosphere

Module -II ***9 hrs***

Water pollution: Sources, its effect and control; Sampling and measurement of water quality and their analysis, water quality standards, BOD and COD Hard water – soft water Eutrophication and restoration of lakes.

Module -III ***9 hrs***

Air Pollution: Types and sources of air pollution, Common Air Pollutants - Effects of air pollution; Smog – ozone layer depletion – greenhouse effect – acid rain

Module -IV ***9 hrs***

Sources, types, effects and control of: Land pollution, Marine pollution, Thermal Pollution and Radioactive pollution. Waste separation, storage and disposal;Waste Reduction, Recycling and Recovery of materials. Plastics and their misuses.

Module -V ***9 hrs***

Major environmental disasters - - mercury poisoning in Minamata, Japan , Itai-itai disease due to cadmium poisoning in Japan - Love Canal toxic waste site, Seveso disaster chemical plant explosion - Bhopal disaster - Chernobyl incident.

Module -VI ***9 hrs***

Major environmental laws: Clean Air Act, Clean Water Act, Safe Drinking Water Act, Oil Pollution Act, Pollution Prevention Act, Toxic Substances Control Act, Occupational Safety and Health Act. Rio declaration- Montreal protocol, Kyoto protocol Introduction to Green chemistry (*elementary ideas only*)

References

1. A. K. Srivasthava and P. C. Jain, “Chemical Analysis”
2. B. K. Sharma “Air Pollution”.
3. V. K. Ahluwalia “Environmental Chemistry”
4. G.W. vanLoon and S. J. Duffy “Environmental Chemistry: A global perspective”
5. Rashmi Sanghi and M.M Srivasthava, “Green Chemistry Environment Friendly Alternatives”,

University of Kerala
Model Question Paper
2011 admission onwards
Open Course for other Majors Course CH1551.3
Environmental Chemistry

Time: Three Hours **Maximum Weightage : 30**

Section A, Weightage 0.25 eah
(answer in a word \ sentence)
Answer all questions

I 1. Organomercury poisoning occurred at_____ near Japan.
2. _____ is a major contributor to greenhouse effect.
3. Methyl isocyanate is related to the environmental tragedy occurred at _____.
4. The _____ is the rigid outermost shell of a rocky planet.

II 5. Which agency formulated the Pollution Prevention Act of 1990?
6. Triple R in waste management is Recover, _____ and Reuse.
7. The _____ Protocol is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances believed to be responsible for ozone depletion.
8. Primary sewage treatment removes _____ percentage of the BOD from domestic sewage.

III. 9. What type of pollution causes acid rain?
10. Itai-itai disease was caused due to _____
11 . What are the misuses of plastics?
12. Chlorofluorocarbons cause _____

IV. 13. What are the three major man made sources of air pollution?
14. _____ resulted in the highest known exposure to TCDD in residential populations
15. What kind of materials are discharged into the seas?
16. What increases the amount of carbon dioxide in the atmosphere?

0.25×16 = 4

Section B, Weightage 1 each (Short answer type)
Answer any eight questions from the following. Each answer must contain 4 points.

17. How is pollution related to acid rain?
18. How does ocean pollution affect sea animals?
19. What are the main concepts of Green Chemistry
20. Write short note on radioactive pollution
21. Discuss the major composition of earth's atmosphere
22. Write about the cause and consequence of Chernobyl incident
23. What are BOD and COD?
24. What causes radioactive pollution?
25. Distinguish between Hard water and soft water.
26 What is the goal of Toxic Substances Control Act?
27. What is the Greenhouse effect and what is its cause?
28. Write short note on causes and problems of ozone layer depletion?

1×8 = 8

Section C, Weightage 2 each (Short essay type)
Answer any five questions from the following. Each answer must contain 8 points.

29. Write short note on volatile organic compounds
30. How can thermal pollution be prevented?
31. How do you control radioactive pollution?

32. What is smog? How does smog arise?
33. What is Eutrophication?
34.What do you mean by Occupational Safety
35. Explain the various layers of the Atmosphere
36. What is Air Pollution? How can air pollution be minimized?

2×5 = 10

Section D, Weightage 4 each (Long essay type)

Answer any two questions.

37. Explain the causes of Hardness of water. What are the measures adopted to reduce or remove hardness of water.
38. Discuss the major environmental laws and their influence on regulating the pollution.
39. Discuss the various sampling techniques for water quality analysis. What are the major water quality standards? **4×2 = 8**