

Note: Objective part is compulsory. Attempt any three questions from subjective part.

### Objective Part (Compulsory)

(2x16)

7Q3

Q.1. Answer the followings in few lines for each part.

- Why number of theoretical plates increases as the length of a column increases? *(cliff b/w gradiented dublin)*
- Define silanization
- What is capacity factor?
- Why a vegetable oil sample is transesterified before GC analysis?
- Why a vaporizable/volatile sample is necessary for analysis by gas liquid chromatography (GLC)?
- Give mathematical relationship between retention volume and linear flow rate *(n & k) is what is the effect of*
- Differentiate between retention time and adjusted (corrected) retention time *multivc path in CTC*
- What you understand by resolution of chromatographic peaks?
- How the resolution is related with relative retention?
- Discuss advantages of an open tubular column over a packed column *79Q.1. How we make cho*
- What is isocratic elution and gradient elution in high performance liquid chromatography (HPLC)? *gradient elu*
- What are the silent features of a carrier gas *& which elutes is not in circuit most until*
- What is difference between reverse phase HPLC and normal phase HPLC? *73Q.4.6. what happened in*
- What is isothermal analysis and gradient analysis in GLC? *63Q.7. what happened during scaling up of*
- Why a mobile phase in HPLC should be freed of air bubbles? *64Q.8. will framework calcu*
- What is co-chromatography? *of resolution of casy*

### Subjective Part

- Q.2. Discuss detailed applications of GLC and HPLC in different types of analyses *79Q.1. How we make cho*
- Q.3. Discuss different types of detectors used in HPLC and GLC *73Q.4.6. which elutes is not in circuit most until*
- Q.4. Describe different types of sample injection systems in GLC *63Q.7. what happened during scaling up of*
- Q.5. Compare open tubular columns and packed columns in terms of the aspects such as resolution, retention time, plate height, capacity factor and partition coefficient; give reasoning for each aspect. *64Q.8. will framework calcu*
- Q.6. What is plate height, discuss how Van deemter equation can be useful to explore the factors affecting the plate height *75Q.9. capting fact*

**PUACP**

- Q. What is preconcentration discuss plug and trap method? *discuss plug and trap method*
- 3 Diff b/w isocratic and gradient elution. discuss types of optimization in method development. *and injection and vtsi*
- (i) GC detector
- (ii) split injection

Note: Objective is compulsory. Attempt any three questions from subjective part.

**OBJECTIVE PART (Compulsory)**

Q. No. 1 Write short answers of the following on your answer sheet.

(2\*16)

- i. Which particle size of stationary phase is preferred in HPLC and why?
- ii. Which injection mode is preferred in GC for quantitative analysis?
- iii. Which detector is not usable for gradient mode in HPLC?
- iv. What are limitations of GC regarding choice of sample?
- v. What is retention time?
- vi. Differentiate Gradient time and Dwell time.
- vii. Give three mathematical expressions for capacity factor.
- viii. How we make choice, whether mode of analysis should be isocratic or gradient?
- ix. What happens with length during scaling up of column?
- x. Give formula for calculation of resolution for asymmetric peaks?
- xi. What is sample loop?
- xii. Which detector is considered universal in GC and why?
- xiii. What is fate of multiple paths in OTC?
- xiv. Why hydrogen is not preferred as a carrier gas.
- xv. What is meant by makeup gas?
- xvi. What is temperature range for HPLC column.

**SUBJECTIVE PART**

Maximum Marks: 48

Q. No. 2 What is preconcentration? Discuss Purge and Trap method in detail. Why is it preferred for quantitative estimation?

Q. No. 3 Discuss the effect of linear flow rate on plate height in the light of Van-Deemter equation. Provide reasoning and remedies for each effect.

Q. No. 4 Differentiate between Isocratic & Gradient Elution. Discuss steps of Optimization in method development for Reversed Phase chromatography.

Q. No. 5 Discuss construction, working and applications of different detectors employed in GC.

Q. No. 6 a) Draw labelled diagrams of split and splitless injectors used in Gas Chromatography.

b) Draw labelled diagrams of HPLC injector in (a) Load position (b) Inject position

# University of Sargodha

BS 7<sup>th</sup> Semester Examination 2016

Subject: Chemistry

Time Allowed: 2:30 Hours

Maximum Marks: 80

Paper: Advance Chromatographic Techniques (Chem:413)

**Note:** Objective part is compulsory. Attempt any three questions from subjective part.

## **Objective Part**

**(Compulsory)**

- Q.1.** Write short answers of the following in 2-3 lines on your answer sheet. (2\*16)  
i. What is adjusted retention time? N-545, D-G-875.  
ii. Why affinity chromatography is called most specific type of chromatography? N-543, SK-931  
iii. How resolution is related with relative retention?  
iv. Define dead time? SK-865.  
v. Why hydrogen is not preferred as carrier gas? N - 574.  
vi. What are advantages of open tubular column over packed column? N-557  
vii. What is capacity factor? D-G-878, SK-14 - N-545  
viii. We cannot analyze non-volatile samples by gas chromatography. Why?  
ix. Why we use guard column? N- 675  
x. Why we use on-column injection? N-579.  
xi. Bonded reverse phase chromatography is used for which type of samples in HPLC?  
xii. What is meant by scaling up of column?  
xiii. Define purging?  
xiv. Why A term is zero for open tubular column?  
xv. Why thermal conductivity is called universal detector? N-586, SK-893, D-G.Y-282.  
xvi. Differentiate between normal and reverse phase HPLC? N-603, D-G-891, 894.

## **Subjective Part**

**(3\*16)**

- Q.2.** Discuss different types of detectors used in HPLC?  
**Q.3.** What is plate height, discuss how Van Deemter equation can be useful to explain the factors effecting plate height?  
**Q.4.** Describe different types of sample injection systems used in GLC?  
**Q.5.** a) Draw labelled diagram of HPLC injector in load and inject position?  
b) What is silanization? How can we overcome this problem?  
**Q.6.** Explain method development in gas chromatography?

University of Sargodha

BS 7<sup>th</sup> Semester Exam 2019

15BSCHEMO66

Subject: Chemistry Paper: Advanced Chromatographic Techniques (Major) (CHEM:413)

Maximum Marks: 80

Time Allowed: 2:30 Hours

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

**Objective Part (Compulsory)**

(2\*16)

Q. No. 1. Write short answers of the following in 2-3 lines each.

- i.
- ii.
- iii.
- iv.
- v.
- vi.
- vii.
- viii.
- ix.
- x.
- xii.
- xiii.
- xiv.
- xv.
- xvi.

Differentiate between normal and reverse phase HPLC 2K18

Define Dead time?

What are the advantages of open Tubular column over packed Column?

Define Affinity chromatography?

What are the limitations of gas chromatography?

Define purging?

Why a mobile phase in HPLC should be freed of air bubbles?

Give mathematical relationships between retention volume and linear flow rate.

Which is physical state of stationary phase in paper chromatography? 2K18

Differentiate between gel permeation chromatography and molecular exclusion chromatography. 2K18

Give a mathematical expression for "Resolution" of chromatographic bands? 2K18

Name different types of Open Tubular Columns. 2K18

What is Eddy Diffusion term in chromatography? 2K18

What is meant by make-up gas?

What is principle of separation, for sample components, in Chromatography? 2K18

What is isocratic and gradient elution in HPLC? 2K18

**Subjective Part (3\*16)**

(8+8)

Q No 2. Write note on following:

1. Split injection in GC
2. Open Tubular column

Q No 3. What is resolution? Give different expressions for resolution. Sketch peak shapes for different resolutions. (16)

(16)

Q No 4 Discuss how Van-Deemter equation can be helpful to explore the factors affecting plate height. (16)

Q No 5 Discuss construction, working, application and limitation of one detector each for HPLC and GC. (16) 57c

Q No 6 Give the schematic approach towards method development for a chromatographic process. (16)

**University of Sargodha 16484**

**BS 7<sup>th</sup> Semester Examination 2020**

**Subject: Chemistry**

**Paper: Advanced Chromatographic Techniques (CHEM-413)**

**Maximum Marks: 80**

**Time Allowed: 2:30 Hours**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

**Objective Part (Compulsory)**

- Q.1. Write short answers of the following in 2-3 lines each on the given answer sheet. (2\*16)
- i. Which injection mode is preferred in GC for quantitative
  - ii. Why a vaporizable sample is necessary for analysis by GC?
  - iii. Give mathematical relation between capacity factor and partition coefficient.
  - iv. What is isothermal and gradient analysis in GC.
  - v. Why a mobile phase is required to be deaerated in HPLC?
  - vi. What is difference between dwell time and gradient time?
  - vii. Define purging.
  - viii. Give mathematical expression for Fick's first law of diffusion.
  - ix. How resolution is related with relative retention.
  - x. What is isocratic and gradient elution in HPLC?
  - xi. What is meant by scaling up of column?
  - xii. What are the advantages of open Tubular column over packed Column?
  - xiii. Define Affinity chromatography?
  - xiv. What is normal phase chromatography?
  - xv. What is capacity factor?
  - xvi. What is retention time?

**Subjective Part (4\*12)**

- Q.2. Explain different types of column used in chromatograph.
- Q.3. What is resolution? Give different expressions for resolution. Sketch peak shapes for different resolutions.
- Q.4. Discuss how Van-Deemter equation can be helpful to explore the factors affecting plate height.
- Q.5. Draw and discuss load position and injection position of injection valve for HPLC.
- Q.6. Give the schematic approach towards method development for a chromatographic process.
- Q.7. Discuss detailed applications of GC and HPLC in different type of analysis.
- Bawit Umar  
Abdul

23-06-2021 (۲۰۲۱)

University of Sargodha

17BSCHEM145]

56/80

Subject: Chemistry

BS 7<sup>th</sup> Semester/Term Exam 2021

Time Allowed: 3 Hours

Paper: Advanced Chromatographic Technique (CHEM-413)

Maximum Marks: 80

Note: Objective part is compulsory. Attempt any three questions from subjective part.

Objective Part (Compulsory)

Q.1

Write short answers of the following in 2-3 lines each on your answer sheet. (16\*2)

- i. What is Normal-phase chromatography?
- ii. Which injection mode is preferred in GC for quantitative analysis?
- iii. What is retention time?
- iv. Differentiate b/w Gradient time and Dwell time?
- v. What is meant by makeup gas?
- vi. What is capacity factor?
- vii. Write salient features of a carrier gas?
- viii. Why the number of theoretical plates increases as length of column increases?
- ix. What is Isothermal and Gradient analysis in GLC?
- x. What is meant by scaling up of column?
- xi. Why a vaporizable sample is necessary for analysis by GC?
- xii. Give mathematical relation between capacity factor and partition coefficient.
- xiii. Give formula for determination of number of theoretical plates at half-width of a band.
- xiv. Why a mobile phase is required to be free of air bubbles in HPLC?
- xv. What is difference between dwell time and gradient time?
- xvi. What is meant by post-column derivatization?

Subjective Part (16\*3)

PUACP

- Q.2. What is plate height, discuss how Van -deemter equation can be useful to explore the factors affecting plate height?
- Q.3. Describe different types of sample injection system in GLC?
- Q.4. Discuss different types of detectors used in HPLC?
- Q.5. Discuss different types of detectors used in Gas Chromatography?
- Q.6. Differentiate between isocratic and Gradient Elution. Discuss steps of optimization in methods development for reserved phase chromatography?

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# University of Sargodha

5744

BS 7<sup>th</sup> Semester, Final Term Exam 2018

Subject: Chemistry

Paper: Advanced Chromatographic Techniques (CHEM: 413)

Time Allowed: 2:30 Hours

Maximum Marks: 80

Note:

Objective part is compulsory. Attempt any three questions from subjective part.

## **Objective Part      (Compulsory)**

Q. No. 1

Write short answers of the following in 2-3 lines on your answer sheet. (2\*16)

Which is physical state of stationary phase in paper chromatography? Y- 371, 7, 4

Differentiate between gel permeation chromatography and molecular exclusion chromatography. N-543, SK- 143, C-21

Give a mathematical expression for "Resolution" of chromatographic bands? O- 61, 11, 15

Name different types of Open Tubular Columns. H- 101, 11, 12

What is Eddy Diffusion term in chromatography? L- 101, 12

Give mathematical expression for Fick's first law of diffusion. M- 101, 12

What is principle of separation, for sample components, in Chromatography? P- 101, 12

What is isocratic and gradient elution in HPLC? N- 543, 143, D- 101, 12

What is meant by scaling up of column? C- 101, 12

Why a vaporizable sample is necessary for analysis by GC?

Give mathematical relation between capacity factor and partition coefficient. F- 101, 12

Give formula for determination of number of theoretical plates at half-width of a band. G- 101, 12

Why a mobile phase is required to be deaerated in HPLC?

What is difference between dwell time and gradient time? H- 101, 12

What is meant by post-column derivatization? N- 543, 143, D- 101, 12

What is Normal-phase chromatography? C- 101, 12, D- 101, 12

## **Subjective Part      (3\*16)**

Q. No. 2

What is cryogenic focusing? Give a detailed note on mechanism and applications of Solid Phase Microextraction. SK- 857.

Q. No. 3

What is resolution? Give different expressions for resolution. Sketch peak shapes for different resolutions.

Q. No. 4

Discuss how Van-Deemter equation can be helpful to explore the factors affecting plate height.

Q. No. 5

Discuss construction, working, application and limitation of one detector each for HPLC and GC.

Q. No. 6

Give the schematic approach towards method development for a chromatographic process.

# University of Sargodha

**BS 7<sup>th</sup> Semester Examination 2022**

**Paper: Advanced Chromatographic Techniques (CHEM-413)**

**Maximum Marks: 80**

**Subject: Chemistry  
Time Allowed: 2:30 Hours**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

## **Objective Part (Compulsory)**

1. Write short answers of the following in 2-3 lines each on your answer sheet. (2\*16)
- i. Define silanization.
  - ii. How the resolution is related with relative retention?
  - iii. What is a temperature range for HPLC column?
  - iv. What is meant by make-up gas?
  - v. What is meant by scaling up column?
  - vi. Discuss advantages of OTC over a packed column.
  - vii. Why the number of theoretical plates increases as length of column increases?
  - viii. What is Isothermal and Gradient analysis in GLC?
  - ix. Give mathematical relationships between retention volume and linear flow rate.
  - x. Differentiate between normal phase and reverse phase HPLC.
  - xi. Which particle size of stationary phase is preferred in HPLC and why?
  - xii. Define Affinity Chromatography.
  - xiii. What are limitations of Gas Chromatography?
  - xiv. What is difference between dwell time and gradient time?
  - xv. Define Capacity factor.
  - xvi. What is eddy diffusion term in Chromatography?

## **Subjective Part (3\*16)**

- Explain different types of detectors used in HPLC.  
Discuss detail applications of GC and HPLC in different type of analysis?  
Explain Van-Deemter equation in detail?  
Describe different types of sample injection system used in Gas Chromatography.  
Elaborate the schematic approach towards method development for a chromatographic process.

# University of Sargodha

BS 7<sup>th</sup> Semester, Final Term Exam 2015

Subject: Chemistry

Course: Advanced Spectroscopy-I (Chem: 412)

Time Allowed: 2:30 Hours

Session: 2011-15

Maximum Marks: 60

**Note:** Objective part is compulsory. Attempt any three questions from subjective part.

## **Objective Part**

## **Compulsory**

- Q.1. Write short answers of the following questions on your answer sheet. (2\*12)
- i. What do you know about "Vaccum" UV-region? G.R.I - 529, Y - 23
  - ii. What are Auxochromes? G.R.E - 529, Y - 23, 24
  - iii. Differentiate red shift from blue shift.
  - iv. A narrow band width is required for most spectroscopic analysis. Why?
  - v. Give two advantage of electrode-less discharge lamp.
  - vi. What do you know about multi-element hollow cathode lamp?
  - vii. Why a cooler flame is found sufficient for the analysis of alkali metals?
  - viii. On what basis, different spectroscopic techniques have been categorized?
  - ix. Give main features of  $\pi-\pi^*$  transitions in organic compounds. G.R.I , 528
  - x. Atomic spectrum usually consists of a few discrete lines. Why?
  - xi. Why a high concentration of potassium salt is added to samples/standards to be analyzed by flame AAS.
  - xii. Differentiate spectrophotometers from spectrographs.

## **Subjective Part**

(6+6)

- Q.2. Discuss deuterium discharge lamp regarding its construction and functioning. (6+6)
- (a) Discuss deuterium discharge lamp regarding its construction and functioning.
  - (b) Derive mathematical relationship for Beer's law. How is it applicable to the analysis of mixtures? (8+4)
- Q.3. Differentiate the ICP from DCP regarding construction and working. (6+6)
- (a) Differentiate the ICP from DCP regarding construction and working.
  - (b) Give preparation of holographic gratings.
- Q.4. Explain construction and working of the following detectors: (6+6)
- (I) PMTs      (II) DADs
- Q.5. Write a note on following: (4+4+4)
- a) Cold-Vapour AAS
  - b) Hydride generation technique
  - c) Monochromator

3169..

University of Sargodha

BS 7<sup>th</sup> Semester Examination 2016

Subject: Chemistry

Paper: Advanced Spectroscopy-I (Chem: 412)

Time Allowed: 2:30 Hours

Maximum Marks: 60

Note: Objective part is compulsory. Attempt any three questions from subjective part.

**Objective Part (Compulsory)**

Q.1: Write short answers of the following in 2-3 lines on your answer sheet. (2\*12)

- i. What is source of excitation in Flame Emission Spectrometry? Flame, plasma, laser
- ii. What is Doppler Effect? 840 → 533 (I.C.)
- iii. How we take qualitative information in UV spectroscopy?
- iv. A narrow band width is required for most spectroscopic analysis. Why?
- v. Give two advantages of electrode discharge lamp? 860
- vi. What is limit of detection (LOD) of atomic absorption spectroscopy? 865
- vii. What is difference among different spectroscopic techniques? 520
- viii. Which compounds may undergo  $\pi-\pi^*$  transition in UV/Visible spectrophotometry? 528
- ix. What is atomization? 239
- x. What will be colour of solution having  $\lambda_{\text{max}} = 464 \text{ nm}$ ?  $\rightarrow$  Blue 533
- xi. What is Red Shift? 529, 530
- xii. Define sputtering. 860

**(SUBJECTIVE PART)**

(12×3=36)

Q.2: Write a complete note on graphite furnace atomic absorption. 1 (12)

Q.3: What is Interference? Discuss different types of interferences in atomic spectroscopy (12) 856

Q.4: Write a comprehensive note on principle, instrumentation and detectors of Flame Emission Spectrometry. 819, 512 (12)

Q.5: Derive mathematical relation between Beer's Law. How it is applicable to the analysis of mixtures? 720 (12)

Q.6: Write note on the followings: (6+6)

- a) Cold Vapour AAS. 858 → 865
- b) Hollow Cathode Lamp 525

# **UNIVERSITY OF SARGODHA**

## **BS 7<sup>th</sup> Semester, Final Term Exam 2018**

**Subject: Chemistry Course: Advanced Spectroscopy-1 (CHEM-412)**

Time Allowed: 2:30 Hours Session: 2014-18 Maximum Marks: 60

Note: Objective part is compulsory. Attempt any three questions for subjective part.

**Q.NO1** Answer the following question in 2-4 line each.

- i. What is meant by charge Transfer Absorption?
- ii. Why is source modulation employed in AAS?
- iii. What is sputtering? Give its significance.
- iv. What are Auxochromes?
- v. What do you know about Rowland circle?
- vi. Define Doppler effect?
- vii. Why cooler flame is found sufficient for the analysis of alkali metals?
- viii. Differentiate between Red shift and blue shift?
- ix. Give the two advantage of EDLs?
- x. Why we prefer grating over filter?
- xi. Difference between Qualitative and Quantitative analysis?
- xii. Give main features of  $\pi$  to  $\pi^*$  transitions in organic compound ?

### **Subjective Part**

**Q:2(a)** Write a note on Deutrium discharge lamp regarding its construction and working. (6+6)

(b) Write a note on Flame Atomizers.

**Q:3** Discuss the preparation and working of the following? (4+4+4)

- (i) Absorption filters.
- (ii) Concave gratings.
- (ii) Holographic gratings.

**Q:4(a)** Discuss applications of UV/VIS spectroscopy to nonabsorbing species. (8+4)

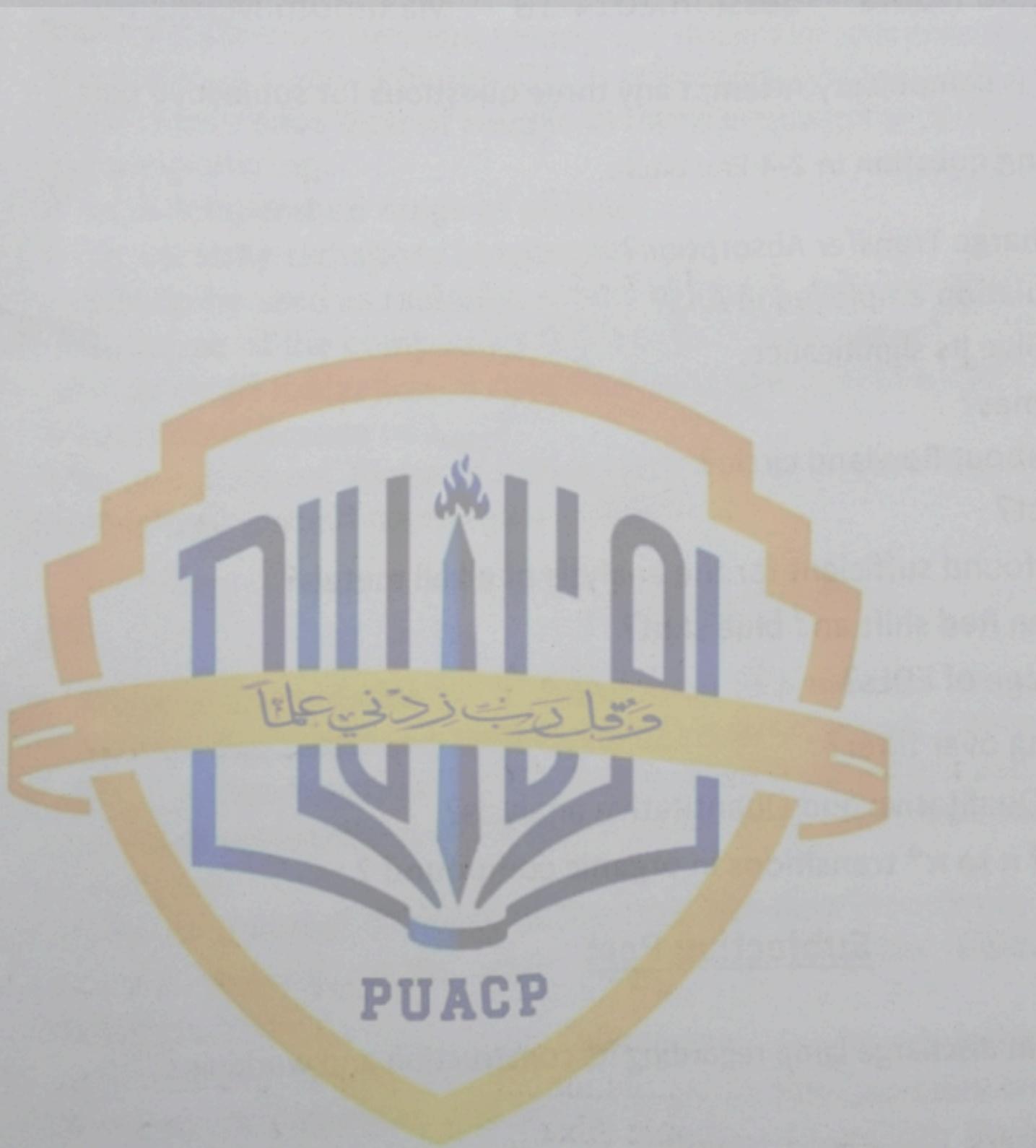
(b) what are interferences?

**Q:5(a)** Differentiate the ICP from DCP regarding construction an working. (6+6)

(b) Monochromator.

**Q:6** Write a note on the following: (6+6)

- (i) PMTs
- (ii) DAD



# University of Sargodha

BS 7<sup>th</sup> Semester Examination 2020 /6484

Subject: Chemistry

Course: Advanced Spectroscopy-I (CHEM-412)

Time Allowed: 2:30 Hours

Maximum Marks: 60

**Note:** Objective part is compulsory. Attempt any three questions from subjective part.

## **Objective Part (Compulsory)**

- Q.No.1. Write short answers of the following in 2-3 lines each. (2\*12)
- i) What is difference between atomic and molecular spectroscopy?
  - ii) What is magnitude of bandwidth in molecular spectroscopy?
  - iii) What is residence time of sample in flame employed in AAS?
  - iv) Define sputtering.
  - v) What is temperature range of plasma?
  - vi) What are stray radiations in spectroscopy?
  - vii) Can lamp be used as radiation source in atomic spectroscopy?
  - viii) Why some of the compounds don't exhibit flame test?
  - ix) How to avoid Ionization in Atomic Absorption Spectrometry?
  - x) What is significance of  $\lambda_{\max}$ ?
  - xi) What are different forms of Interaction between Electromagnetic radiation and matter?
  - xii) How is background corrected in AAS?

## **Subjective Part (3\*12)**

- Q.No.2. What characteristics of a radiation source used in atomic spectroscopy? Describe construction, principle, functions and limitations of Hollow Cathode Lamps. Also sketch the labelled diagram.
- Q.No.3. What is "atomization"? Describe in detail construction and working of Graphite Furnace alongwith comparison of Graphite Furnace Atomic Absorption Spectrometry (AAS) with other AAS techniques.
- Q.No.4. What is plasma? Discuss differences between inductively coupled, direct current and microwave-assisted plasma. Also give differences between Flame photometry and Atomic Emission Spectroscopy?
- Q.No.5. Discuss absorption process of UV/Vis. Spectrophotometry. Discuss representative applications. Also give construction, and working of any two detectors employed in UV/Vis. Spectrophotometry.
- Q.No.6. Write a comprehensive note on different Linewidth Problems encountered in AAS. Discuss their origin and remedies.

Abdul Basit Umail

Note: Objective part is compulsory. Attempt any three questions from subjective part.

**Objective Part (Compulsory)**

Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (2\*12)

- i. What do you know about the mass absorption coefficient?
- ii. How will you differentiate isotope peak from metastable ion peak?
- iii. Define Moseley's Law?
- iv. What is the role of a base peak regarding the interpretation of mass spectrum?
- v. What is tandem mass spectrometry?
- vi. What are secondary fluorescent sources of X-rays?
- vii. What is the difference between resolution and resolving power of a mass spectrometer?
- viii. What is selected ion monitoring?
- ix. What are secondary X-rays?
- x. What do you know about index of hydrogen deficiency?
- xi. PMT is not used as detector in x-ray spectroscopy. Why?
- xii. Give biological effects of X-rays.

(16)

**Subjective Part (3\*12)**

Q.2. Describe construction and working of electron multiplier detector and faraday cup detector in mass spectrometry. (6+6)

Q.3. a) What do you know about soft ionization source in mass spectrometry? (6+6)  
b) Discuss the Quadra-pole and Time of flight mass analyzer.

Q.4. What do you know about the X-ray tube and Gas filled detectors? (12)

Q.5. Give the instrumentation and application of electron microprobe method. (12)

Q.6. Write a note on the following: (6+6)

- i) Magnetic Sector Mass Analyzer
- ii) FAB

(24)

**PUACP**

**Note:** Objective part is compulsory. Attempt any three questions from subjective part.

**Objective Part (Compulsory)**

**Q.1**

Write short answers of the following in 2-3 lines each on your answer sheet.

(2\*12)

- i. What is shown in Grotian diagram?
- ii. Differentiate between monochromator and polychromator.
- iii. What is the major use of flame photometry?
- iv. What is ICP Atomic Emission Spectroscopy?
- v. Give names of three Plasma sources used in Plasma Emission Spectroscopy.
- vi. What is quantum yield?
- vii. What are bathochromic and hypsochromic shifts?
- viii. Why Atomic Absorption is not suitable for Qualitative analysis?
- ix. What are the advantages of using a GD source over a spark source for analysis of solids?
- x. What is meant by saturated fluorescence?
- xi. Define chromophore with examples.
- xii. Give the range of UV and Visible regions studied in UV-Vis Spectroscopy.

**Subjective Part (3\*12)**

**Q.2**

Compare Atomic Absorption and Atomic Emission Spectroscopic techniques. What are their advantages and disadvantages?

**Q.3.**

Predict the  $\lambda_{\text{max}}$  of the following using Woodward-Fieser rule.

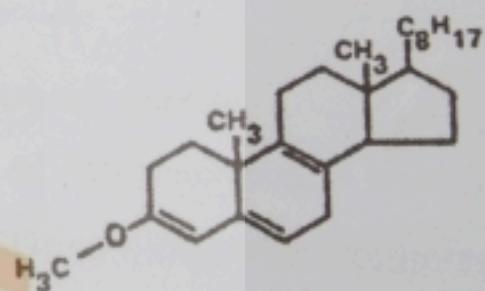
(i)



(ii)



(iii)



**Q.4.**

Explain different light sources used in UV-Vis Spectroscopy.

**Q.5**

What are phosphorescence, fluorescence and luminescence. Explain with examples.

**Q.6.**

Derive Beer's-Lambert law. What are its advantages and limitations?

**PUACP**

**LK-6161**

Objective Part (Compulsory) Maximum Marks: 24

Q.1. Write down short answers of the following questions on your answer book.

$$(2 \times 12 = 24)$$

- ✓ i) Define Nuclear Binding Energy with example.
- ii) Describe the structure of  $\text{SnCl}_2$  on the basis of VSEPR model.
- iii) Write balance nuclear equation for plutonium-242 when it emits alpha radiation during its decaying.
- iv) What is inert pair effect?
- ✓ v) What is meant by Nuclear Fission Reactor?
- ✓ vi) Define Linkage isomerism with example.
- vii) What is meant by Periodicity of Elements?
- viii) Why is a cation smaller than its parent atom?
- ix) Draw the Molecular Orbital Correlation diagram for  $[\text{Co}(\text{NH}_3)_6]^{+3}$  complex ion.
- ✓ x) Why is the 1<sup>st</sup> Ionization Energy decreases from IIA to IIIA group for 2<sup>nd</sup> period, while generally, it increases from left to right in the periodic table?
- xi) Arrange the following molecules in order of increasing their covalent character, HF,  $\text{CH}_4$ ,  $\text{NH}_3$  and  $\text{H}_2\text{O}$ .
- xii) Draw and write the names of the possible geometrical isomers of  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_4]$  complex.

Subjective Part (Maximum Marks 36)

Note: Attempt any FOUR questions. All questions carry equal marks.

- Q.2. Explain with examples various important applications of Radioactivity.
- ✓ Q.3. What is meant by Structural Isomerism? Explain its various types with examples.
- ✓ Q.4. Write down the postulates of VSEPR theory. How is this theory helpful to explain the molecular structure and geometry of  $\text{AB}_4\text{E}$  and  $\text{AB}_4\text{E}_2$  types of molecules?
- Q.5. Explain following with examples;
  - a) sigma ( $\sigma$ ) bond
  - b) pi ( $\pi$ ) bond
  - c) delocalized pi ( $\pi$ ) bond
  - d) hybridization
- Q.6. What is nuclear reaction? Differentiate between nuclear fission and fusion reactions.
- ✓ Q.7. What is meant by three centered-two electrons (3c-2e) bonds? Explain the structure of diborane on the basis orbital hybridization.

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## University of Sargodha

### BS 7<sup>th</sup> Semester, Final Term Exam 2015

Subject: Chemistry Course: Stereochemistry, Periodicity & Nuclear Chemistry (Chem: 464)

**Time Allowed: 2:30 Hours**

Session: 2011-15

**Maximum Marks: 60**

**Objective Part (Compulsory)      Maximum Marks: 24**

- Q.1. Write down short answers (about 2—4 lines) of the following questions on your answer book. (2 x 12 = 24)

  - i) Explain  $sp^3d^2$  hybridization with examples.
  - ii) Define *Nuclear Binding Energy* with example.
  - iii) Explain following structures with the help of VSEPR theory;  $BF_4^-$  and  $XeF_2$
  - iv) Amine oxides are more basic and form hydrates as compared to phosphine oxides.  
Justify this statement.
  - v) Give two theoretical arguments against participation of *d*-orbital in non-metals.
  - vi) What is meant by *Nuclear Fission Reactor*?
  - vii) Define *Linkage isomerism* with example.
  - viii) Give reasons for *diamagnetic* nature of  $R_2Ge$ ,  $R_2Sn$  and  $R_2Pb$ ,
  - ix) Why is a cation smaller than its parent atom?
  - x) Why some naturally occurring elements are stable while others are not?
  - xi) Why is the  $1^{st}$  *Ionization Energy* decreases from IIA to IIIA group for  $2^{nd}$  period, while generally, it increases from left to right in the periodic table?
  - xii) Draw and write the names of the possible geometrical isomers of  $[Pt(NH_3)_2Cl_2]$  complex.

## **Subjective Part (Maximum Marks 36)**

Note: Attempt any FOUR questions. All questions carry equal marks.

University of SargodhaBS 7<sup>th</sup> Semester Examination 2016Subject: Chemistry Course: Stereochemistry, Periodicity & Nuclear Chemistry (Chem:464)

Time Allowed: 2:30 Hours

Maximum Marks: 60

Objective Part (Compulsory)

**Q.1.** Write down short answers (about 2—4 lines) of the following questions on your answer book. (2 x 12 = 24)

- i) ✓ Write down the structure of  $P_4O_{10}$ .
- ii) ✓ Define *Nuclear Binding Energy* with example.
- iii) ✓ Explain following structures with the help of VSEPR theory;  $BF_4^-$  and  $XeF_2$
- iv) ✓ How racemic mixture can be separated?
- v) ✓ What are delocalized orbitals? Give examples.
- vi) ✓ What is meant by *Nuclear Fission Reactor*?
- vii) ✓  $O_2$  molecule is paramagnetic while  $O_2^{2+}$  and  $O_2^{2-}$  are diamagnetic. Explain with reason.
- viii) ✓ What is inert pair effect? Give examples.
- ix) ✓ Why is a cation smaller than its parent atom? Give example.
- x) ✓ What is diagonal relationship? Give examples.
- xi) ✓ 1<sup>st</sup> Ionization energy of group-II elements is more than that of group-I & II. Why? examples.
- xii) Draw and write the names of the possible geometrical isomers of  $[Pt(NH_3)_2Cl_2]$  complex.

Subjective Part

Note: Attempt any **FOUR** questions. All questions carry equal marks.

**Q.2.** a) Differentiate between nuclear fission and nuclear fusion reaction. (5)

b) What do you understand about half life time of radioactive isotopes? Also prove that for a radioactive element,  $t_{1/2} = 0.639/k$ , where k is decay constant. (4)

**Q.3.** What is meant by *Structural Isomerism*? Explain its various types with examples. (9)

**Q.4.** Define *Radioactivity*. Give various methods for its detection and measurement. (9)

**Q.5.** How inorganic compounds show geometrical isomerism? Explain geometrical isomerism in complex having coordination no 6. (9)

**Q.6.** Write down important postulates of VSEPR theory. Explain the shapes of following molecules on the basis of VSEPR Theory,  $NH_3$ ,  $NH_2^-$ ,  $NH_4^+$ ,  $SF_6$ . (9)

**Q.7.** What is meant by three centered-two electrons (3c-2e) bonds? Explain the structure of diborane on the basis orbital hybridization. (9)

# University of Sargodha

## BS 7<sup>th</sup> Semester Examination 2016

Subject: Chemistry

Paper: Stereochemistry Periodicity & Nuclear Chemistry (Chem:464)

Time Allowed: 2:30 Hours

Maximum Marks: 60

### (Objective Part) (Compulsory)

1. Write short answers of the following in 2-3 lines on your answer sheet. (2\*12)

- i. Discuss trend of ionization energy in transition metal elements.
- ii. Explain  $d^2sp^3$  hybridisation with examples.
- iii. What types of Oxygen ions give diamagnetic behaviour? Give examples.
- iv. What is meant by critical mass? Give example to explain.
- v. Define optical isomerism. Give examples from Inorganic compounds.
- vi. Differentiate between localized and delocalized  $\pi$  bonding. Give example in each case.
- vii. How does 1<sup>st</sup> member of each group differ from other elements?
- viii. What is inert pair effect? Show the case where inert pair effect does not exist, give examples.
- ix. Define half-life and write the name of units with symbol used for measuring the radioactivity.
- x. What are inner d and outer d transition elements? Give examples.
- xi. Give argument in favour of d orbital participation in non-metals.
- xii. Define stability. How elements achieve stability?

$\Rightarrow O_2^-$  = Paramagnetic  
 $\Rightarrow O_2^{+2}$  = Diamagnetic  
 $\Rightarrow O_2^{+2}$  = Diamagnetic (Pair  $e^-$ )  
 Small size  $\rightarrow$  High charge density  
 $\Rightarrow$  Methane,  $GeR_4, SnR_4$   
 $PbR_4$

### (Subjective Paper)

Note: Attempt any four questions (9×4)

2. (a). Explain the following molecules on the basis of VSEPR theory. (6)
- i-  $SnCl_2$       ii-  $IF_5$       iii-  $ICl_4^-$       iv-  $I_3^-$
- (b). Give various methods for detection of radioactivity. (3)
3. (a). Explain the following molecules on the basis of MOT. (6)
- i-  $N_2^{+2}$       ii-  $O_2^{-2}$       iii-  $O_2^{+2}$       iv- HF
- (b). Explain the three centres two electrons bonds. Give two examples. (3)
4. (a). What is Magic number? Write the types of nuclei which are more stable. (3)
- (b). Write a note on 1<sup>st</sup> and 2<sup>nd</sup> row anomalies. (6)
5. (a). Give arguments in favour of d Orbitals participation in non-metals. Explain with examples. (5)
- (b). Write a detail note on patterns of nuclear stability. Discuss on the basis of stability belt. (4)
6. (a). Write different types of radioactivity. Give their applications and biological aspects. (5)
- (b). Write basic components of Nuclear Reactor with functions. (4)
7. (a). Write names of different radioactive series. Explain uranium series in detail. (6)
- (b). Write the name of different radioactive isotopes of uranium. What type of isotope is used in nuclear reactor? (3)

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**University of Sargodha****BS 7<sup>th</sup> Semester, Final Term Exam 2018****Subject: Chemistry****Paper: Inorganic Chemistry | Stereochemistry Periodicity & Nuclear Chemistry (CHEM:464)****Time Allowed: 2:30 Hours****Maximum Marks: 60**

**Note:** Objective part is compulsory. Attempt any three questions from subjective part.

**Objective Part (Compulsory)**

- Q.1.** Write short answers of the following in 2-3 lines each. (2\*12)
- i. What is the shape of  $\text{SO}_4^{2-}$ ,  $\text{SnCl}_2$ ,  $\text{SF}_6$  and  $\text{XeF}_2$  according to VSEPR theory? G.R.I - J-notes + G.R.I-17, 81
  - ii. Why is  $\text{OH}^\circ$  more injurious to human being than  $\text{OH}^-$ ? G.R.I - 51
  - iii. Define half-life of an element? How is it calculated? G.R.I - 484-85
  - iv.  $\text{SiCl}_4$  undergoes hydrolysis but  $\text{CCl}_4$  does not undergo hydrolysis. Explain? why?
  - v. What is inert pair effect? Give examples G.R.I - 404, G-78
  - vi. Differentiate between nuclear fission and fusion reaction? G.R.I - 496
  - vii. What is the effect of electronegativity on the shape of molecules according to VSEPR theory? (H<sub>2</sub>, HF)
  - viii. What is artificial radioactivity? What is its importance? G.R.I - 418
  - ix. What is radioactive dating? give example.
  - x. How is radioactivity detected and measured? 482 - G.R.I
  - xi. Both boron and aluminum belong to the same Group but B differs from Al in chemical behavior. Why?
  - xii. What are nuclides? Give their classification.

Annuclide is a type of atom whose nuclei have specific no of protons and neutrons.

**Subjective Part**

- Q.2.** Explain the concept of hybridization as applied to the compounds of non-metallic elements. Explain the shapes of  $\text{SO}_4^{2-}$ ,  $\text{SnCl}_2$ ,  $\text{SF}_6$  and  $\text{XeF}_2$ . 12
- Q.3.** Explain with examples the first and second row anomalies in the periodic table. 12 ✓
- Q.4.** What is meant by three center-2 electron bond (3c-2e)? Explain with examples. Explain the effect of d-orbital participation in bonding of main group elements. 6+6
- Q.5.** Explain different radioactive series with examples. Describe the applications of radioactive isotopes. 12
- Q.6.** Write an extensive note on fission and fission reactions. What is significance of radioactive dating? 9+3

**PUACP**

Hydroxyl radical ( $\cdot\text{OH}$ ) can damage all types of macromolecules. The ( $\cdot\text{OH}$ ) radical has a very short in vivo half-life ( $\approx 10^{-9}$  seconds) and a high reactivity. It cannot be terminated by an enzymatic reaction. This makes it a very dangerous compound for human being. That's why  $\cdot\text{OH}$  is more dangerous than  $\text{OH}^-$ .

Q. What is difference b/w Radiochemistry and Radiation chemistry?

Q. What is difference b/w excitation and ionization of an atom?

is your studies inside the box

# University of Sargodha

## BS 7<sup>th</sup> Semester Exam 2019

Subject: Chemistry Paper: Stereochemistry Periodicity & Nuclear Chemistry (Minor) (CHEM:464)

Time Allowed: 2:30 Hours

Maximum Marks: 60

**Note:** Objective part is compulsory. Attempt any Four questions from subjective part.

### **Objective Part (Compulsory)**

**Q.1.** Write short answers of the following in 2-3 lines each. (2\*12)

- i. What is meant by Nuclear Fusion reaction? give example.
- ii. The impeding power of an element is one's intrinsic property, Give example?
- iii. The Cation of an element is always smaller than parent atom which in turn is smaller than the corresponding anion, justify with examples?
- iv. Define  $sp^3d^2$  hybridization with example?
- v. Radioactivity is the manifestation of subatomic chemical change, explain?
- vi. Draw possible geometric isomers in case of  $[Pt(NH_3)_2Cl_2]$ ?
- vii. The elements of second row differ from their heavier congeners, explain? *Peculiar Behavior*
- viii. Define half-life and write the names of units with symbol used for measuring radioactivity?
- ix. Define "Linkage Isomerism", Give an example?
- x. How second ionization energy differs from first ionization energy? *five example*.
- xi. What do you know about stability in case of phosphine oxides than N-oxides?
- xii. The elements of Boron family are electron deficient in their neutral compounds. This has imparted a special property to them. Explain with one example?  $\Rightarrow$  Accept e- pair *(Lewis Acid)*

### **Subjective Part (4\*9)**

*(Lewis Acid)*

- Q.2** a) Explain the following molecules on the basis of VSEPR Theory: 06  
 i)  $SnCl_2$       ii)  $IF_5$       iii)  $ICl_5^{-1}$       iv)  $I_3^{-1}$
- b) Write names of different series of Radioactive elements? 03
- Q.3** a) How potassium uranyl sulfate was employed to discover radioactivity? 05
- b) What do you know about impeding powers of different materials, particularly with respect to  $\alpha$ -,  $\beta$ - and  $\gamma$ -emissions? 04
- Q.4** What are the anomalies of second row of periodic table? How elements of this period differ from their heavier congeners? (*Li - B - C*) 09
- Q.5** a) What do you mean by Structural isomerism? Give at least two examples? 04
- b) Write a detailed note on pattern of nuclear stability? Discuss on the basis of stability belt? 05
- Q.6** a) Give a comprehensive comparison between oxides of 'N' & 'P'? 04
- b) What is the theoretical argument against d-orbital participation in nonmetals? 05
- Q.7** Write comprehensive notes on the following: 09  
 i) Hybridization      ii) Artificial Radioactivity

# University of Sargodha

BS 7<sup>th</sup> Semester Examination 2020

Subject: Chemistry Paper: Stereochemistry, Periodicity & Nuclear Chemistry (Minor) (CHEM-464)

**Time Allowed: 2:30 Hours**

**Maximum Marks: 60**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.** 16484

## Objective Part (Compulsory)

- Q.1. Write short answers of the following in 2-3 lines each. (2\*12)
- Define "inert pair effect" with an example? carbenes. methylene  $\rightarrow$  Sn
  - Why OH radical is more dangerous for human than OH negative ion?
  - What are the units of radioactivity and magnetic susceptibility?
  - Why AlCl<sub>3</sub> can accept more electrons? Electron deficient molecule.
  - Give balanced chemical equations for the hydrolysis of SiCl<sub>4</sub>?
  - Why sulfur shows variable valency although it is a non-transition metal? +2, +4, +6
  - What is difference between p<sub>π</sub>-p<sub>π</sub> and d<sub>π</sub>-d<sub>π</sub> bond? Involvement of d-orbital
  - How bond angles shift when the peripheral atoms are more electronegative according to VSEPR theory?
  - Define isomerism with an example?
  - How VSEPR theory predicts the structure of SF<sub>4</sub>?
  - Write down two arguments against the use of d-orbital by non-metals?
  - Write and explain the formula for determining half-life of elements?

## Subjective Part

- Q.2 What are radioactive series? Explain any one in detail? 12
- Q.3 a) What are the points of differences and similarities between "Lanthanide Contraction" & "Actinide Contraction"? 08
- b) Describe with the help of an example the bonding in AB<sub>5</sub>E type of molecules as per hybridization concept? 04
- Q.4 Explain all the aspects of Valence Shell Electron Pair Repulsion (VSEPR) theory? How can it be applied to different molecules? Predict shapes of molecules on the basis of this concept? 12
- Q.5 a) What are 2c-2e & 3c-2e bonds? Explain with at least one example in each case? 08
- b) What is radioactive dating? Give its importance? 04
- Q.6 Write comprehensive notes on: 12
- i) Nuclear Fusion
  - ii) Structural Isomerism

Abdul Basit Umair

# University of Sargodha

BS 7<sup>th</sup> Semester/Term Exam 2021

Paper: Advanced Inorganic Chemistry (Minor) (CHEM-464)

Subject: Chemistry

**Time Allowed: 02:30 Hours**

**Maximum Marks: 60**

15/2

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

## **Objective Part (Compulsory)**

- Q.1.** Write short answers of the following in 2-3 lines each on your answer sheet. (2\*12)
- What is meant by diagonal relationship? Give examples.
  - Why OH radical is more dangerous for human than OH<sup>-1</sup>.
  - Define ionization isomerism. Give examples.
  - Why third group elements are acidic in nature?
  - SiCl<sub>4</sub> undergoes hydrolysis but CCl<sub>4</sub> does not. Give reason.
  - Write two arguments in favour of d-orbital participation.
  - What is difference between artificial and natural radioactivity.
  - What is Arbusov principle?
  - How neutron can be converted to proton? Give reaction.
  - Sometime structural changes occur by involvement of d- orbital. Give example.
  - Write the units of radioactivity.
  - What are transuranium elements? Give examples.

## **Subjective Part (3\*12)**

**Q.2. a)** Explain the effect of d-orbital participation on the reactivity of non-metal compounds.

**b)** Explain any three types of structural isomers. Give examples.

**Q.3. a)** Explain the structure and function of Wilson Cloud Chamber.

**b)** Explain the anomalies of third row elements.

**Q.4. a)** What is radioactive dating? How this process is useful in determining the life of fossil.

**b)** Write different types of nuclear reactions. Explain with reactions.

**Q.5. a)** Explain the structures of following molecules. NH<sub>3</sub>, SF<sub>6</sub>, SOCl<sub>2</sub> and COCl<sub>2</sub>.

**b)** Why the behaviour of N-oxides are different from P-oxides. Give examples.

**Q.6. a)** Define bridge bond. Give three examples about bridge bonding having different centres.

**b)** What are contamination hazards? Write the factors responsible of hazardness.

# University of Sargodha

## BS 7<sup>th</sup> Semester Examination 2022

Subject: **Chemistry**

Paper: **Advanced Inorganic Chemistry: Stereochemistry, Periodicity & Nuclear Chemistry  
(Minor) (CHEM-464)**

**Time Allowed: 2:30 Hours**

**Maximum Marks: 60**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

### **Objective Part (Compulsory)**

- Q.1.** Write short answers of the following in 2-3 lines each on your answer sheet. (2\*12)
- i. What are early-transition metals? Give examples?
  - ii. The bond angles of  $\text{NO}_2^{+1}$  and  $\text{NO}_2^{-1}$  are  $180^\circ$  and  $115^\circ$ , respectively, justify?
  - iii. What is nuclear waste?
  - iv. How do the relativistic effects arise?
  - v. What happens when a radioactive element emits beta rays?
  - vi. Rationalize the structure of trisilyl amine?
  - vii. Radioactive materials pose hazards to human health. Give two examples?
  - viii. What is artificial radioactivity? Give an equation?
  - ix. How ionization energy is linked with electron affinity?
  - x. Define Arbusov reaction with an example?
  - xi. What is meant by  $3c-2e$  bond?
  - xii. Define nuclear binding energy?

### **Subjective Part**

- Q.2.** a) What is thermogravimetric analysis? Discuss its applications? (6)  
b) Give an account of different modes of radioactive decay? (6)
- Q.3.** a) Explain following structures on the basis of Hybridization approach: (9)  
i)  $\text{SO}_3$       ii)  $\text{PCl}_5$       iii)  $\text{SF}_4$
- Q.4.** b) Write important applications of Radioactivity? (3)  
Why second row of periodic table differs from others? What are its important advantages and disadvantages? (12)
- Q.5.** a) Give theoretical arguments against d-orbital participation in bonding in non-metals? (6)  
b) Define radioisotopes? Give their applications? (6)
- Q.6.** Write comprehensive notes on the following: (12)  
i) Stability in P-oxides and N-oxides  
ii) Molecular Orbital Correlation Diagrams

## **OBJECTIVE PART**

**Q.1. Give Short answers (3-5 line) of the following questions.** **2×16=32**

1. Why Forensic chemistry is useful to help law enforcement in criminal cases?
  2. What is the greatest weakness of class evidence? List two factors that contribute to this weakness
  3. What is the best way to maintain the integrity of evidence that is collected and submitted to the crime laboratory?
  4. Why DNA test helpful to resolve the murder or rape cases?
  5. Define the product rule and explain how it can be used to determine whether two blood samples come from the same source
  6. What is Forensic Chemistry?
  7. How fingerprinting improves criminal investigations?
  8. Give the limitations of Kastle Mayer test process?
  9. What is forensic serology?
  10. What is the difference between direct and indirect evidence?
  11. What is the main objective in collecting and packaging physical evidence?
  12. How PCR useful in forensic analysis?
  13. What is anthropometry?
  14. What does the FBI stand for?
  15. Give the classification of poisons?
  16. Give the use of antidotes?

## SUBJECTIVE PART

**Note: Attempt any four questions. All questions carry equal marks.**

- |  |                      |
|--|----------------------|
| Q.2. Write a brief note on DNA finger printing.  | 12                   |
| Q.3. What is the meaning of gastric lavage and how it is carried out in adults?  | 12                   |
| Q.4. Define the Physical evidence? Discuss different types of physical evidences potentially present at crime scenes and their evidential value. | 12                   |
| Q.5. write short note the following:   | 6+6                  |
| 1) Southern blotting   | 2) Northern blotting |
| Q.6. What is forensic serology? Discuss the Conventional Serological analysis used in forensic serology.   | 12                   |
| Q.7. What is forensic science and forensic chemistry? Discuss hair analysis in forensic toxicology.  | 12                   |

# University of Sargodha

3557  
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BS 7<sup>th</sup> Semester, Final Term Exam 2015

Subject: Chemistry

Course: Forensic Chemistry (Chem: 441)

**Time Allowed: 2:30 Hours**

**Session: 2011-15**

**Maximum Marks: 80**

**Note: Objective part is compulsory. Attempt any four questions from subjective part.**

**Objective Part      Compulsory**

- Q.1.** Write short answers of the following in 2-3 lines on your answer sheet. (2\*16)
- i. What is tandem repetitive of DNA?
  - ii. What is Forensic Botany?
  - iii. What is difference between PCR and qRT-PCR?
  - iv. Discuss the role of Punjab Forensic Science Agency of Pakistan?
  - v. What is Forensic Chemistry?
  - vi. How fingerprinting improves criminal investigations?
  - vii. Give the limitations of Kastle Mayer test process?
  - viii. What is forensic serology?
  - ix. What is the difference between direct and indirect evidence?
  - x. What is the main objective in collecting and packaging physical evidence?
  - xi. How forensic scientists help the Court in crime cases?
  - xii. What is anthropometry?
  - xiii. What does the FBI stand for?
  - xiv. Give the classification of poisons?
  - xv. Give the use of antidotes?
  - xvi. Why DNA test helpful to resolve the murder or rape cases?

**Subjective Part (12\*4)**

- Q.2.** Write a brief note on DNA finger printing and discuss how it helps to resolve the crime scene.
- Q.3.** What is the meaning of gastric lavage and how it is carried out in adults?
- Q.4.** Define the Physical evidence? Discuss different types of physical evidences potentially present at crime scenes and their evidential value.
- Q.5.** Write a short note the following: 6\*6=12
- 1) Gel electrophoresis    2) Northern blotting
- Q.6.** What is an explosive residue? Discuss the Role of Forensic Botany in Crime Scene Investigation?
- Q.7.** What is toxins? Discuss bullet and cartridge analysis used to resolve murder cases?

2015

# University of Sargodha

BS 7<sup>th</sup> Semester Examination 2016

Subject: Chemistry

Paper: Forensic Chemistry (Chem:441)

**Time Allowed: 2:30 Hours**

**Maximum Marks:**

**Note:**

**Objective part is compulsory. Attempt any four questions from subjective part.**

## **Objective Part (Compulsory)**

**Q.1.**

Write short answers of the following in 2-3 lines on your answer sheet.

(2\*16)

i. What is difference between PCR and qRT-PCR?

ii. Discuss the role of RFLP in DNA finger printing?

iii. What is Forensic Chemistry?

iv. How fingerprinting improves criminal investigations?

v. Give the limitations of Kastle Mayer test process?

vi. What is forensic serology?

vii. What is the difference between direct and indirect evidence?

viii. What is the main objective in collecting and packaging physical evidence?

ix. How forensic scientists help the Court in crime cases?

x. What is anthropometry?

xi. What is firearm micro-stamping?

xii. Write down the causes of explosions.

xiii. What are different search patterns for collection of evidence?

xiv. What is role of Punjab Forensic Science Agency in Pakistan?

xv. What is tandem repetitive of DNA?

xvi. What is Forensic Botany?

## **Subjective Part (4\*12)**

**Q.2.** What is toxins? Discuss bullet and cartridge analysis used to resolve murder cases?

**Q.3.** Define finger prints. What are various types of finger prints? Enlist various types of finger patterns.

**Q.4.** Write a brief note on DNA finger printing and discuss how it helps to resolve the crime.

**Q.5.** What is the meaning of gastric lavage and how it is carried out in adults?

**Q.6.** Define the Physical evidence? Discuss different types of physical evidences potentially present at crime scenes and their evidential value.

**Q.7.** Write a short note the following: (6\*6)

1) Gel electrophoresis

2) Southern blotting

# University of Sargodha

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BS 7<sup>th</sup> Semester, Final Term Exam 2018

Subject: Chemistry Paper: Forensic Chemistry (CHEM: 411)

Time Allowed: 2:30 Hours

Maximum Marks: 80

## **OBJECTIVE PART (Compulsory)**

**Q.1. Give Short answers (3-5 line) of the following questions.**  $2 \times 16 = 32$

- ✓ 1. Define Toxicants
  - ✓ 2. Draw labeled diagram of human skull
  - ✓ 3. What is a universal antidote?
  - ✓ 4. State Locard's exchange principle
  - ✓ 5. What is meant by the "B-negative" blood group
  - ✓ 6. Name the factors which effect the weight of explosive residue
  - ✓ 7. How Luminol is helpful to locate evidence?
  - ✓ 8. What is rifling?
  - ✓ 9. Define forensic Odontology.
  - ✓ 10. Differentiate between presumptive and confirmatory test
  - ✓ 11. Define restriction fragment length polymorphism (RFLP).
  - ✓ 12. Give one confirmatory test for saliva
  - ✓ 13. What are DNA probes?
  - ✓ 14. Define explosion \_\_\_\_\_ final
  - ✓ 15. Differentiate between endotoxin and exotoxin
  - ✓ 16. Discuss a few chemical methods used for developing the finger prints
- (2)

## **SUBJECTIVE PART**

Note: Attempt any four questions. All questions carry equal marks.

- |  |    |
|--|----|
| <b>Q 2.</b> a) How fire accelerants are isolated and concentrated from the crime scene?        | 06 |
| b) How hair analysis can be helpful in solving a crime?  | 06 |
| <b>Q 3.</b> Write a detailed note on the collection and importance of trace evidence.          | 12 |
| <b>Q 4.</b> What is blood spatter? Discuss the blood spatter as evidence for solving a murder. | 12 |
| <b>Q 5.</b> Enumerate the steps for constructing a DNA profile.                                | 12 |
| <b>Q 6.</b> Write a detailed note on poison classification.                                    | 12 |
| <b>Q 7.</b> a) How cartridge analysis is helpful in identifying a criminal?                    | 06 |
| b) Discuss the importance and applications of "Anthropology" to forensic sciences.             | 06 |

- Q.1
- i. What is meant by diagonal relationship? Give examples.
  - ii. Write down the units of radioactivity.
  - iii. Why OH radical is more dangerous for human than OH negative ion?
  - iv. Define linkage isomerism. Give examples.
  - v. What are electron deficient molecules? Give examples.
  - vi.  $\text{SiCl}_4$  undergoes hydrolysis but  $\text{CCl}_4$  does not. Explain with reason.
  - vii. What is difference between  $p_{\pi}-p_{\pi}$  and  $d_{\pi}-d_{\pi}$  bond?
  - viii. What is the effect of Electronegativity on the molecule according to VSEPR?
  - ix. What is Arbusov Reaction?
  - x. Write down two arguments against the use of d-orbital by non-metals.
  - xi. What is difference between radio-chemistry and radiation-chemistry?
  - xii. What are transuranium elements? Give examples.

## Theory

Note: Attempt any THREE Questions. All questions carry equal marks.

- Q.2      a) How the participation of d-orbital affect the reactivity of compounds of non-metals?  
             b) Explain any three types of structural isomerism.
- Q.3      a) Explain the structure and function of Wilson's cloud chamber.  
             b) What are contamination hazards? How these occur?
- Q.4      a) Explain with examples the anomalies second row elements.  
             b) What is meant by three centered -two electrons (3c-2e) bonds? Explain the structure of diborane on the basis orbital hybridization.
- Q.5      a)  Give a comprehensive comparison between oxides of 'N' & 'P'   
             b)  What is radioactive dating? Give its importance.
- Q.6      a)  Differentiate between Chemical reactions and nuclear reactions.  
             b) Explain the shapes of following molecules on the basis of VESPR theory,  
 $\text{NH}_3$ ,  $\text{NH}_2^-$ ,  $\text{NH}_4^+$ ,  $\text{SF}_6$ .

Note: Objective part is compulsory. Attempt any four questions from subjective part.

## Objective Part

(Compulsory) (3 How F. scientists help the court for solving case.

Q.1. Write short answers of the following in 2-3 lines each. (2\*16)

- ✓ 1. Differentiate between direct and indirect evidence.
- ✓ 2. Draw a labeled diagram of hair follicle.
- ✓ 3. What is a universal antidote?
- ✓ 4. State Locard's exchange principle
- ✓ 5. Give limitations of Kastle-Meyer test.
- ✓ 6. Differentiate between internal and external ballistics.
- ✓ 7. How Luminol is helpful to locate evidence?
- ✓ 8. Define forensic botany.
- ✓ 9. Define Restriction Fragment Length Polymorphism (RFLP).
- ✓ 10. Name a few aspects of poison classification.
- ✓ 11. What is the purpose of DNA profiling?
- ✓ 12. Define explosion and explosives. → Pending
- ✓ 13. Differentiate between endotoxin and exotoxin.
- ✓ 14. Define forensic serology with examples.
- ✓ 15. Differentiate between toxin and toxicant.
- ✓ 16. Name a few chemical methods used for developing the finger prints → Pending

## Subjective Part

(4\*12)

Q 2 Define trichology. How hair analysis can be helpful in solving a crime?

Q 3. Write a detailed note on the collection, analysis and documentation of Various types of physical evidences.

R Q 4 What is blood spatter? Discuss the blood spatter as evidence for solving a murder.

R Q 5 Enumerate the steps for constructing a DNA profile.

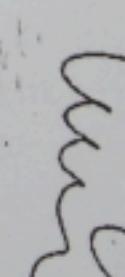
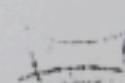
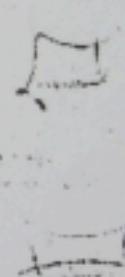
Q 6. (a) How Southern blotting is performed?

(b) Enumerate the characteristics of a good poison.

Q 7. What is meant by the gastric lavage? How it is carried out in adults?

Mohd. Aslam  
2nd year

Original work



# University of Sargodha 16484

BS 7<sup>th</sup> Semester Examination 2020

Subject: Chemistry

Paper: Forensic Chemistry (CHEM-441)

**Maximum Marks: 80**

**Time Allowed: 2:30 Hours**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

## **Objective Part (Compulsory)**

**Q.1. Write short answers of the following in 2-3 lines each. 2×16=32**

- i. Give two main types of associative evidence. Which one is preferred?.
- ii. What is "Anthropometry"?
- iii. What is a universal antidote?
- iv. State Locard's exchange principle
- v. Differentiate between presumptive test and confirmatory test.
- vi. How a DNA sample can be collected from a hair follicle?.
- vii. How Luminol is helpful to locate evidence?.
- viii. Define forensic botany.
- ix. Define Restriction Fragment Length Polymorphism (RFLP).
- x. Differentiate between PCR and qRT-PCR.
- xi. What is the role of Punjab Forensic Science Agency?
- xii. Define explosion and explosives.
- xiii. What do you mean by O-negative blood group?
- xiv. Define forensic serology with examples.
- xv. What is firearm microstamping?
- xvi. Name a few chemical methods used for developing the finger prints.

## **Subjective Part (3×16)**

**Q 2. Define Fingerprints. Discuss various patterns of fingerprints according to Henry's system.**

**Q 3. What is Rifling? Discuss bullet and the cartridge analyses used to resolve murder cases.**

**Q 4. What is forensic serology? Discuss the blood spatter as evidence for solving a murder.**

**Q 5. What are the toxins and toxicants? Give a detailed overview of poisons classification.**

**Q 6. What is DNA typing? Enumerate the steps for constructing a DNA profile.**

*Abdul Basit Umair*

# University of Sargodha

BS 7<sup>th</sup> Semester/Term Exam 2021

Subject: Chemistry

Paper: Forensic Chemistry (CHEM-441)

Time Allowed: 02:30 Hours

Maximum Marks: 80



Note: Objective part is compulsory. Attempt any three questions from subjective part.

## Objective Part (Compulsory)

Q.1 Write short answers of the following in 2-3 lines each on your answer sheet. (2\*16)

- i. Differentiate between radial and concentric fracture.
- ii. Draw a labeled diagram of hair follicle.
- iii. What is a universal antidote?
- iv. State Locard's exchange principle
- v. Why we need protective clothing, while searching a crime scene?
- vi. Differentiate between accident and arson.
- vii. How Luminol is helpful to locate evidence?
- viii. What does SDS-PAGE stands for?
- ix. What do you mean by "Short Tandem Repeats (STR)"?
- x. What is forensic document analysis?
- xi. What is the composition of a latent fingerprint?
- xii. Define criminalistics.
- xiii. Differentiate between endotoxin and exotoxin.
- xiv. Define forensic serology with examples.
- xv. Name a few techniques employed in forensic geology (soil analysis).
- xvi. What do you mean by "misuse" of drugs?

## Subjective Part (3\*16)

- Q.2 Write a detailed note on the collection, analysis and documentation of various types of evidence from a crime scene. **PUACP** 16
- Q.3 What is blood spatter? Discuss the blood spatter as evidence for solving a murder. 16
- Q.4 Enumerate the steps for constructing a DNA profile and discuss its significance. 16
- Q.5 a) How Southern blotting is performed? 08
- b) Write a note on glass analysis. 08
- Q.6 a) Define emesis and gastric lavage. 08
- b) How bullet and the cartridge analysis can be used for to solve a crime? 08

35

16

21  
2

# University of Sargodha

BS 7<sup>th</sup> Semester Examination 2022

Subject: Chemistry

Paper: Forensic Chemistry (CHEM-441)

**Time Allowed: 2:30 Hours**

**Maximum Marks: 80**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

## **Objective Part (Compulsory)**

**Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (2\*16)**

1. What is CODIS?
- ii. What Describe the glass fracture patterns used for forensic analysis?
- iii. What is Differentiate VNTRs and STRs?
- iv. How the explosive residues are analysed by forensic tests?
- v. What is Kastle Meyer test and its limitations?
- vi. How footprint forensic analysis is performed?
- vii. What are confirmatory tests for semen analysis?
- viii. How the fingerprints are classified?
- ix. Describe the chemical test for the identification of human blood.
- x. How we can classify the poisons?
- xi. What is universal antidote for poisons?
- xii. What are tests for hair analysis?
- xiii. What are emetics? Give example?
- xiv. How soil samples are analysed for forensic analysis?
- xv. What is forensic botany?
- xvi. How fingerprints are developed?

## **Subjective Part (3\*16)**

- Q.2. Write a detail note on RFLP?
- Q.3. How STRs and VNTRs are used for forensic analysis?
- Q.4. Describe the patterns and tests for Blood stain analysis?
- Q.5. What are physical evidences? their types and collection methods?
- Q.6. Describe the tests for finger print analysis and their limitations?

Time Allowed: 2:30 Hours

Note: Objective part is compulsory. Attempt any four questions from subjective part.

**Objective Part      (Compulsory)**

1. Write short answers of the following in 2-3 lines on you answer sheet.

(2\*16)

1. Define Condensation polymerization. Give two examples. -
2. Write the composition of different types of Steels.
3. What are food dyes? Give their side effects. -
4. Write chemical difference between liquid and solid soap.
5. Why continuous process is preferred over batch process for manufacturing the soap? -
6. What is Starch? Write the chemical composition of corn starch.
7. Write different source of volatile oils.
8. Define Iodine value. Write its use. -
9. Write structural formula of Maltose.
10. Define Antibiotics. Give structure of two antibiotic compounds. ..
11. How Nylon 6, 6 is prepared? Give reaction. -
12. Write the name of processes used for softening of hard water. -
13. Write the name of process used for preparation of pulp paper.
14. Write different types of detergents.
15. Write the name of fatty acids used for preparing the bath soap.
16. What is Polyester? Give a reaction for its preparation. -

**(Subjective Paper)**

Note: Attempt any four questions (12x4)

2. (a). What is Dacron? Write complete process for its manufacturing with flow sheet. (8)
   
(b). Give different classes of Synthetic fibres. (4)
3. (a). What is Starch? Write a process for its extraction from rice grains. (8)
   
(b). What is Nylon 6? Write its structure and preparation. (4)
4. (a). Define Surfactant. How surfactants are prepared by different methods? (8)
   
(b). How Sodium Glutamate is manufactured? Draw its flow sheet diagram with all necessary detail. (4)
5. (a). How Cane sugar is refined? Explain its process for preparation with flow sheet. (8)
   
(b). Write different types of hardness in water. Write methods for its softening. (4) -
6. (a). Write different ores of Iron. How Steel is manufactured from Iron? (8)
   
(b). Write composition of Corn grain and Corn kernel. (4)
7. (a). What is Fourdriener Machine? Write its function in paper Industries. (4) -
   
(b). What are PVC and polyesters? Give chemical reactions for their preparations. (8) -

# University of Sargodha

Bs 7<sup>th</sup> semester Examination 2018

Subject: Chemistry Paper: Industrial Chemistry ( Chem:461)

Time Allowed: 2: 30 Hours

Maximum Marks:80

Note: Objective part is compulsory. Attempt any four questions from subjective part.

## **Objective Part (Compulsory)**

1. Write short answers of the following in 2-3 lines on your answer sheet.
1. Define Condensation polymerization. Give two examples.
2. Differentiate between liquid and solid soap.
3. Continuous process is better than batch process for soap preparation why?
4. When Sucrose is dissolved in water it is converted into which components?
5. Give the different types of synthetic fibers?
6. Define the basic characteristics of fibers?
7. How Chemically differ washing soap and toilet soap?
8. What are resins? prepare any two resins.
9. What is lint? How it is removed.
10. Concentration of Carbon how classify the Iron?
11. What is saponification.? Give its chemical equation.
12. How Nylon 6,6 is prepared give its reaction?
13. What is the difference between soap and detergent?
14. Differentiate between Drug and Medicine?
15. How the polyester is formed?
16. What is the difference between mineral and vegetables oil?

## **Subjective Part**

1. (a) How different polymers are prepared by condensation polymerization. (8)  
(b) How polymers are classified? (4)
2. (a)What is Dacron? How it is prepared ? (6)  
(b) Give the flow sheet diagram for the preparation of pulp ? (6)
3. (a)Write in detail Kraft process (8)  
(b)Write composition of Corn grain and corn Kernel. (4)
4. (a) what are main types of hardness in water? How it is softened and conditioned? (2+4)  
(b) Give flow sheet diagram for preparation of steel. (6)
5. (a) What is fourdriener machine? How it is used. (6)  
(b) Give the different types of synthetic fibers. (6)
6. (a) How oil is extracted from cotton seed give method in detail? (5)  
(b) How the Corn starch can be prepared. (7)

University of SargodhaBS 7<sup>th</sup> Semester Exam 2019Subject: ChemistryPaper: Industrial Chemistry (CHEM:461)

Time Allowed: 2:30 Hours

Maximum Marks: 80

Note: Objective part is compulsory. Attempt any three questions from subjective part.

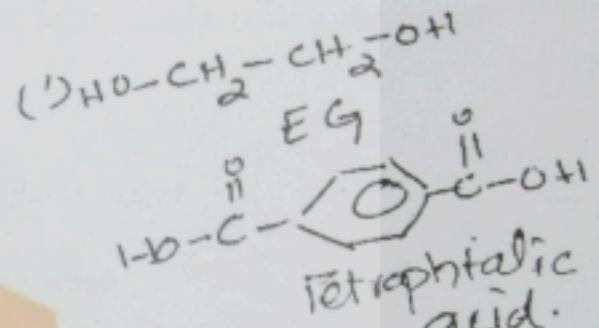
Objective Part (Compulsory)

Q.1. Write short answers of the following in 2-3 lines each.

(2\*16)

- ✓ i. Write the composition of Starch. → G.R.Organic Page # 472
- ✓ ii. Write important properties of Synthetic fibers.
- ✓ iii. How Dacron is prepared?
- iv. Write the name of steps where sweet water is used.
- v. Write types and names of dyes used for dyeing the Nylons?
- ✓ vi. Define copolymer Give two example of copolymer?
- ✓ vii. What is the difference between medicated soap and liquid soap?
- ✓ viii. Write the structural formula of Nylon 6, 6.
- ✓ ix. Write the chemical formula of any two detergents.
- ✓ x. What is condensation polymerisation? Give any two examples.
- ✓ xi. Write the chemical formula of Rayon.
- ✓ xii. Write the name of any two food colours. Notes → P-168
- ✓ xiii. Write the name of raw material used for manufacturing the detergent.
- ✓ xiv. Write the name of any two fatty acids used for preparing the bath soap.
- xv. Write the chemical formula of any two NSAIDs.
- ✓ xvi. How Glass is classified on the basis of its component?

Polyester are formed by polycondensation reaction b/w dicarboxylic acid and a diol.  
 Dacron is a polyester formed by polycondensation of a diol and a diacid



$\text{CH}_3^{\ominus}$  add both sides out H  
 Then it will be  
 DMTEA  
 Dimethyl tetraphthalate

Subjective Part (3\*16)

Q2. a) What is Dacron? Write its chemical composition and preparation with flow sheet (10)

b) Write the source and composition of Wax (6). Solution - Q = 13

Q3. a) Write the name of five fatty acids used for preparation of bath soap. Write all chemical processes used in its manufacturing (10)

b) Write different methods used for manufacturing of detergent (6)

Q4. a) How raw sugar is prepared from sugar beets. Write all types of clarifying agents and steps used for its preparation (8).

b) Explain basic properties of polymers. Write the preparation of Nylon 6, 6 (8)

c) How phenol formaldehyde is produced? Write its different uses.

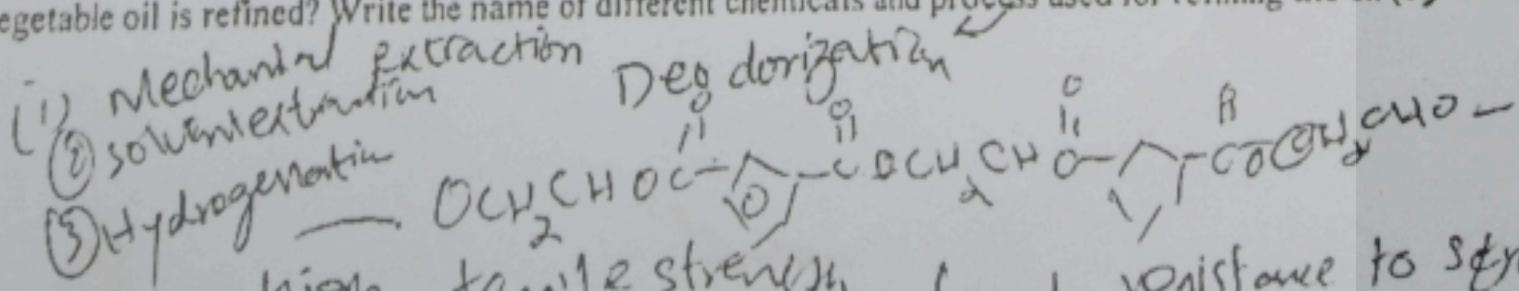
Organic Book 322.  
 Interstification

b) Differentiate between softening and conditioning of water. Write the physical and chemical processes used for treatment of water.

Q6. a) Explain the role of digester and fourdriner machine in paper industry. Explain with flow sheet (10)

b) How vegetable oil is refined? Write the name of different chemicals and process used for refining the oil (6)

occupational  
 exposure.



# University of Sargodha 16484

## BS 7<sup>th</sup> Semester Examination 2020

Subject: Chemistry  
**Time Allowed: 2:30 Hours**

Paper: Industrial Chemistry (CHEM-461)

**Maximum Marks: 80**

**Note: Objective part is compulsory. Attempt any three questions from subjective part.**

### **Objective Part (Compulsory)**

- Q.1. Write short answers of the following in 2-3 lines on your answer book. (2\* 16)
- i. Write structural formula of any disaccharide.
  - ii. How unsaturation is tested in fatty acid.
  - iii. Give the structure of any one anti-inflammatory drug.
  - iv. Write the structural formula of any cationic detergent.
  - v. Define Co-polymerization. Give two examples.
  - vi. What is Polyester? Give a reaction for its preparation
  - vii. Write the different types of Steels. Give concentration of carbon
  - viii. What are food dyes? Give their major side effects.
  - ix. Write chemical difference between deionize water and soft water.
  - x. Why continuous process is preferred over kettle process for manufacturing the soap?
  - xi. Write the chemical composition of wheat starch.
  - xii. Write different source of volatile and non-volatile oils.
  - xiii. How Nylon 6, 6 is prepared? Give reaction.
  - xiv. Write the name of processes used for softening of industrial water.
  - xv. How pulp paper is prepared.
  - xvi. Write the name of fatty acids used for preparing the bath soap.

### **Subjective Part (3\*16)**

- Q.2. a) Define Surfactant. How surfactants are prepared by different methods? (8)  
 b) Define unit operation and unit process. Write different techniques used for purification of any compounds. (8)
- Q.3. a) What is Rayon? Write complete process for its manufacturing with flow sheet. (10)  
 b) Give different classes of Synthetic fibres. (6)
- Q.4. a) Define Antibiotic? Give the preparation of any one antibiotic drug. (10)  
 b) Write the synthesis and uses of Sodium Glutamate with flow sheet diagram with necessary detail. (6)
- Q.5. a) What is the difference between raw sugar and refined sugar? How Cane sugar is refined? Explain its process for preparation with flow sheet. (10)  
 b) What is Nylon 6, 6? Write its structure and preparation. (6)
- Q.6. a) Write different ores of Iron. How Steel is manufactured from Iron? Give their applications. (10)  
 b) Write different types of hardness in water. Write different methods for its softening. (6)

Abdul Basit  
Umair

90/80

25-08-2021 (السبت) (جمعة)

17BSCHEM1451

University of Sargodha

BS 7<sup>th</sup> Semester/Term Exam 2021

Subject: Chemistry

Paper: Industrial Chemistry (CHEM-461)

Time Allowed: 02:30 Hours

Maximum Marks: 80

65  
100

Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (2\*16)

- i. Differentiate between the terms "Pulp" and "Paper"?
- ii. What is the difference in chemical composition of soap and detergent?
- iii. How sulphate process is different from sulphite process?
- iv. Define the terms "Oil" and "Fat"?
- v. How stearic acid is different from that of oleic acid?
- vi. What are margarines defined as, give at least one example from commercial market?
- vii. How vegetable oil is different from vanaspati ghee?
- viii. Define "Dacron" giving suitable equation?
- ix. How drug differs from that of a prodrug?
- x. Write balanced chemical equation for the synthesis of Acetylsalicylic acid?
- xi. What metals other than "Ni" can be used for hydrogenation of oil into Ghee?
- xii. Define unit process with an appropriate example?
- xiii. Define glass with general chemical formula?
- xiv. What is Chinese salt? Why is it regarded as human need?
- xv. Define ester? What is its significance in soap industry?
- xvi. Give names of at least two plants most suited for manufacturing craft paper?

(B)

Subjective Part (3\*16)

- Q.2. a). How detergents are manufactured on industrial scale? Write briefly? (08)  
b). What are the essential steps involved in the manufacture of paper through Kraft process? (08)
- Q.3. a). Draw complete flow-sheet diagram for the manufacture of steel? (06)  
b). How paper is formed by wet process. Write all necessary detail with suitable elaboration? (10)
- Q.4. Write in detail about glass industry giving all the pictures and diagrams involved in various processes along with safety hazards and their solutions? (16)
- Q.5. Define Fiber? What are natural and synthetic fibers? Write in detail about the manufacture of at least three types of synthetic fibers giving balanced chemical equations where required? (16)
- Q.6. Draw flow sheet diagram along with all necessary detail for the manufacture of sugar on industrial scale? How many chemical steps are involved in this process? (16)

(21)

60

14/1

# University of Sargodha

BS 7<sup>th</sup> Semester Examination 2022

Subject: Chemistry

Paper: Industrial Chemistry (CHEM-461)

Time Allowed: 2:30 Hours

Maximum Marks: 80

Note: Objective part is compulsory. Attempt any four questions from subjective part.

## **Objective Part (Compulsory)**

- Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (2\*16)
- i. How delignification is carried in "Kraft" process?
  - ii. How juice is purified in sugar industry?
  - iii. Differentiate between unit process and unit operation?
  - iv. What are cationic detergents?
  - v. How liquid soap is different from solid soap?
  - vi. Describe "Epoxy Resin" in term of their use and composition?
  - vii. Define reforming of petroleum?
  - viii. Give types of cracking used in petroleum industry?
  - ix. Give two example of co-polymer.
  - x. What is Nylon 6?
  - xi. Give nature and function of "MSG" in food industry?
  - xii. Name two antibiotic medicines.
  - xiii. Write down the types of steel?
  - xiv. Give woody and non-woody type of raw material of paper industry?
  - xv. What catalyst are used in hydrogenation process?
  - xvi. What is difference between thermoplastics and thermosets?

## **Subjective Part**

- Q.2. a) What is "Dacron" how it is prepared? (6+6)  
b) How soap and detergents are synthesized?
- Q.3. a) What are the types of detergents? (6+6)  
b) How cracking is carried out in petroleum industry?
- Q.4. a) How Nylon 66 is prepared? (6+6)  
b) Write suitable process for manufacturing of Antibiotics?
- Q.5. a) How MSG is synthesized in food industry? (6+6)  
b) Write a note on hydrogenation process of oil? (9+3)
- Q.6. a) What are main ores of iron? How steel is manufactured from iron? (6+6)  
b) Differentiate between fats and waxes?
- Q.7. a) Mention types of paper pulp? (6+6)  
b) How Kettle process of paper is carried from the manufacture of soap?