



# UNIVERSITY OF THE PUNJAB

**B.S. 4 Years Program :Seventh Semester – 2020**

Paper: Analytical Chemistry (Sp. Theory-I)

Course Code: CHEM-412

Part – I (Compulsory)

Time: 15Min. Marks: 10

Roll No. in Fig. ....

Roll No. in Words. ....

**Attempt this Paper on this Question Sheet only.**

**Division of marks is given in front of each question.**

**This Paper will be collected back after expiry of time limit mentioned above.**

Signature of Supdt.:

**Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)**

(i)- Which is a common carrier gas in gas chromatography?

- (a) He                      (b) NH<sub>3</sub>                      (c) HCl                      (d) SO<sub>3</sub>

(ii)- Which property is measured in Differential scanning calorimetry(DSC)?

- (a) Thermal Expansion                      (b) Electrical conductivity  
(c) Specific Heat                      (d) Impact Energy

(iii)- Calomel is?

- (a) Mercuric chloride                      (b) Plumbic chloride  
(c) Mercurous chloride                      (d) Plumbous chloride

(iv)- In which thermal analysis temperature difference between sample and inert reference material is measured?

- (a) Differential scanning calorimetry                      (b) Thermogravimetric analysis  
(c) Differential thermal analysis                      (d) Evolved gas analysis

(v)-In normal phase HPLC, there is?

- (a) Non polar solvent/polar column                      (b) Polar solvent/non polar column  
(c) Non polar solvent/non polar column                      (d) Any of the above

(vi)Which of the following is the disadvantage of hydrogen, when used as carrier gas in gas chromatography?

- (a) Dangerous to use                      (b) Expensive                      (c) Reduced sensitivity                      (d) High density

(vii)Which of the following is not true about High pressure liquid chromatography (HPLC)?

- (a) It requires high pressure for the separation                      (b) There is no need to vaporize the samples  
(c) It is performed in columns                      (d) It has high sensitivity

(viii)Percentage of Silica in glass membrane is?

- (a) 52%                      (b) 62%                      (c) 72%                      (d) 82%

(ix) For the separation of which of the following substances, Gas-solid chromatography is being used?

- a) Thermally stable organic components                      b) Volatile organic components  
c) Thermally stable inorganic components                      d) Low molecular weight gaseous species

(x) Differential scanning calorimetry is used to determine?

- (a) Glass transition temperature                      (b) Enthalpies                      (c) Both a & b                      (d) None of these



**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

**Q.2. Give short answers of the following: (10x2=20)**

- (i) What are the main advantages High Performance Liquid Chromatography?
- (ii) Write a note on flame ionization detector?
- (iii) What are the advantages and disadvantages of Ag/AgCl
- (iv) What is Gradient Elution?
- (v) Write a note on UV detectors used in HPLC?
- (vi) What is glass transition temperature?
- (vii) What is alkaline error in potentiometry?
- (viii) Write note on gas sensing probes?
- (ix) How TGA can be used to evaluate the thermal stability of a material?
- (x) What is the basic theory of DTA?

**Answers the following questions. (3x10=30)**

- Q.3 (a) Write a note on instrumentation used for Thermometric titration.  
(b) Discuss the factors affecting differential thermal analysis.
- Q.4 (a) Discuss Calomel electrode and its advantages?  
(b) Write a note on Electron Capture Detector.
- Q.5 (a) Write a note on open tubular columns in Gas Chromatography?  
(b) Write a note on potentiometric acid base titration.