

Q. 6. (a) Explain the principle of fluorometry.

(b) Explain the principle of photoacoustic spectroscopy.

OR

(a) Explain Jablonski diagram.

(b) Write notes on the following :

(i) Fluorescence quenching

(ii) Differentiate between Nephelometry and Turbidimetry

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CHSE-12T

M.Sc. Chemistry (Semester-II)
Examination, Jan.-June, 2025

(Regular)

(NEP)

INSTRUMENTAL METHODS OF ANALYSIS

Time Allowed : Three Hours

Maximum Marks : 70

Note : Question paper is divided into two sections. Attempt questions of all two sections as per direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Choose the correct answer. Each question carries 1 mark. [10×1=10]

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[P.T.O.]

Q. 1. Reverse aqua regia is :

- (a) $\text{HCl} + \text{HNO}_3$ (Volume ratio 1 : 3)
- (b) $\text{HCl} + \text{HNO}_3$ (Volume ratio 3 : 1)
- (c) $\text{HCl} + \text{HNO}_3$ (Volume ratio 1 : 1)
- (d) All of the above

Q. 2. Which of the following sampling is called probability sampling method?

- (a) Random Sampling
- (b) Judgemental Sampling
- (c) Systematic Sampling
- (d) Stratified Sampling

Q. 3. Half wave potential $E_{1/2}$ is the potential at one half of the distance between :

- (a) Residual current and limiting current
- (b) Residual current and diffusion current
- (c) Residual current and migration current
- (d) Migration current and diffusion current

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Q. 4. Dropping mercury electrode cannot function above +0.4 volt because :

- (a) Hg begins to oxidise to Hg(I)
- (b) Hg begins to evaporate
- (c) Hg is oxidised to Hg(II)
- (d) Hg begins to stick on the glass surface

Q. 5. Which flame is preferable for the analysis of elements like Al, Tc, Mo and V?

- (a) Air-acetylene
- (b) Acetylene-oxygen
- (c) Nitrous oxide-acetylene
- (d) Propane-acetylene

Q. 6. Which of the following technique is best suitable for the analysis of mercury ions from soil sample?

- (a) HG-AAS
- (b) GF-AAS

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(3)

[P.T.O.]

(c) Flame-MS

(d) CV-AAS

Q. 7. AAS can be used to quantitative analysis of following elements :

i. Metals

ii. Metalloids

iii. Noble gases

iv. Halogens

(a) i and ii

(b) i and iii

(c) i and iv

(d) All of the above

Q. 8. When suspended particles have high concentration producing large scattering, the method preferred is :

(a) Nephelometry

(b) Fluorometry

(c) Phosphorimetry

(d) Turbidimetry

Q. 9. The difference in wavelength of absorption and fluorescence is known as :

(a) Low excitation coefficient

(b) Vertical transition

(c) Stokes Shift

(d) High ISC rate

Q. 10. If the time gap between absorptional and emission is 10 sec or greater, the phenomenon is known as :

(a) Fluorescence

(b) Phosphorescence

(c) Turbulence

(d) Nephelometry

Q.2. Attempt all questions. Each question carries 04 marks. [5×4=20]

- (i) Differentiate between 'Dry' and 'Wet' ashing.
- (ii) Explain different types of current in Polarographic analysis.
- (iii) Compare AAS and FES.
- (iv) Explain the factors affecting fluorescence.
- (v) Explain Sensitivity and Detection limit in atomic absorption spectroscopy.

SECTION-B

Note : Answer all questions. Each question carries 5 marks. [4×10=40]

- Q.3. (a) Explain the sampling method of Water.
- (b) Explain the calibration curve method for quantitative analysis.

OR

- (a) What are the criteria for representative sample?
- (b) Explain the sampling method of coal.

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Q.4. (a) Derive polarographic wave equation.

- (b) Explain the application of polarographic technique in simultaneous determination of metal ions.

OR

- (a) Explain the construction and working of DME (Dropping Mercury Electrode).
- (b) Discuss the principle of Amperometric titration.

Q.5. (a) Explain the principle of AAS.

- (b) Explain the theory of cold vapour atomic absorption spectroscopy (CV-AAS).

OR

- (a) Explain the construction and working of Hollow Cathode Lamp.
- (b) Explain the generation of D_1 and D_2 lines of Na atom.

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[P.T.O.]