



JAMMU AND KASHMIR PUBLIC SERVICE COMMISSION

RESHAM GHAR COLONY, BAKSHI NAGAR, JAMMU - 180016

Website: <http://jkpsc.nic.in>

Subject: Conduct of Written Examination for the post of Scientific Officer (Chemistry & Toxicology) in J&K Forensic Science Laboratory, Home Department- Provisional Answer Key thereof.

Notification No. PSC/Exam/S/2026/27

Dated: 08.03.2026

In pursuance of Rule 10(c) of the Jammu & Kashmir Public Service Commission (Conduct of Examination) Rules, 2022, as amended upto date, the Provisional Answer Key of Question Paper pertaining to the **Written Test for the post of Scientific Officer (Chemistry & Toxicology)** held on **08.03.2026**, is hereby notified for seeking objections from candidates:

Provisional Answer Key

Scientific Officer (Chemistry & Toxicology)

Test Booklet Question No. (Series A)	
Q1	B
Q2	A
Q3	A
Q4	C
Q5	A
Q6	C
Q7	B
Q8	B
Q9	B
Q10	C
Q11	B
Q12	A

Test Booklet Question No. (Series A)	
Q13	C
Q14	A
Q15	B
Q16	B
Q17	B
Q18	B
Q19	B
Q20	D
Q21	D
Q22	B
Q23	C
Q24	B

Test Booklet Question No. (Series A)	
Q25	C
Q26	B
Q27	A
Q28	B
Q29	D
Q30	B
Q31	D
Q32	C
Q33	B
Q34	C
Q35	C
Q36	C

Test Booklet Question No. (Series A)	
Q37	D
Q38	C
Q39	A
Q40	B
Q41	B
Q42	C
Q43	B
Q44	B
Q45	C
Q46	B
Q47	C
Q48	C
Q49	B
Q50	C
Q51	A
Q52	C
Q53	B
Q54	B
Q55	C
Q56	C
Q57	C
Q58	C

Test Booklet Question No. (Series A)	
Q59	B
Q60	B
Q61	A
Q62	C
Q63	C
Q64	C
Q65	A
Q66	B
Q67	C
Q68	A
Q69	C
Q70	C
Q71	A
Q72	A
Q73	C
Q74	B
Q75	B
Q76	C
Q77	C
Q78	B
Q79	C
Q80	B

Test Booklet Question No. (Series A)	
Q81	B
Q82	C
Q83	B
Q84	D
Q85	C
Q86	D
Q87	D
Q88	B
Q89	B
Q90	D
Q91	A
Q92	C
Q93	D
Q94	B
Q95	C
Q96	D
Q97	B
Q98	D
Q99	B
Q100	C

The candidates are advised to refer to **Question Booklet (Series A)** to match the corresponding question(s) in their respective Question Booklet Series and if any candidate feels that the key to any of the question(s) is/are wrong, he/she may represent on prescribed format/proforma annexed as **Annexure-A** along with the documentary proof/evidence (**hard copies only**) and fee of Rs.500/- per question in the form of Demand Draft drawn in favour of **COE, J&K PSC** (refundable in case of genuine/correct representation) to the Controller of Examinations, Jammu & Kashmir Public Service Commission, from Monday i.e. 09.03.2026 to 11.03.2026. **The candidates are further advised to clearly mention the question(s) objected to with reference to its serial number as it appears in the Question Booklet of Series A of the provisional answer key(s).**

Any objection/application not accompanied by the requisite Demand Draft of Rs.500/- as prescribed, shall not be considered/entertained under any circumstances. Candidates are, in their own interest, advised to adhere to these instructions and not submit any objection unaccompanied by the Demand Draft as required under extant rules. The Commission shall not entertain any such representation(s) after the expiry of the stipulated period i.e. after 11.03.2026 (Wednesday), 05.00 pm.

Further, objection(s) submitted in any other mode will not be entertained.

The provisional answer key is also available on the website of the Commission <http://www.jkpsc.nic.in>.

Sachin Jamwal
08/03/26

(Sachin Jamwal) JKAS

Controller of Examinations

J&K Public Service Commission

No. PSC/Ex-Secy/2026/17

Dated: 08.03.2026

Copy to the: -

1. Director, Information and Public Relations, J&K for publication of the notice in all leading newspapers published from Jammu/Srinagar.
2. P.S. to Hon'ble Chairman, J&K Public Service Commission for information of the Hon'ble Chairman.
3. P.S. to Hon'ble Member, Shri _____ for information of the Hon'ble Member.
4. P. A. to Secretary, J&K Public Service Commission for information of the Secretary.
5. Main file/Stock file/Notice Board.

Annexure-A

Representation regarding objection(s) to any Question/Answer pertaining to the Written Test conducted for the post of Scientific Officer (Chemistry & Toxicology) in FSL, Home Department on 08.03.2026.

(NOTE: USE SEPARATE FORMS FOR SEPARATE QUESTIONS)

Name of the Applicant: _____

Roll No. : _____

Correspondence Address : _____

Contact/Mobile No. : _____

Date of Application: -03-2026

Demand Draft Details: No. _____ Date _____ Amount _____

Candidates Account No.(16 digit) & IFSC Code : _____

Question No. and Series	Details of the Objection	Resource Material (copy to be enclosed)	Details of the Website (if any)

Correct Answer/Option as per candidate :

Signature of the Candidate

Note : Application for each question/answer shall be made on separate page in the given format, otherwise the first question entered in the format shall only be considered.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

Booklet Serial No. 331917

Test Booklet Series

TEST BOOKLET
SCIENTIFIC OFFICER
CHEMISTRY AND TOXICOLOGY
Written Test - 2026
(32)

A

Time Allowed: Two Hours

Maximum Marks: 100

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside.
DO NOT write anything else on the Test Booklet.
4. This Test booklet contains **100** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer /Response Sheet provided. See directions in the Response Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer /Response Sheet, the response to various items in the Test Booklet, you have to fill in some particulars in the Answer /Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer /Response Sheet**. You are permitted to take away with you the Test Booklet and **Candidate's Copy of the Response Sheet**.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. While writing Centre, Subject and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use **"ONLY BALL POINT PEN"**.
11. **Penalty for wrong answers:**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTION PAPER).
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(0.25)** of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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(32)(A) /2026

[P.T.O.]

1. What does the term "Forensis" mean?
 - A) Investigation
 - B) On or before the Forum
 - C) By the forum
 - D) For the forum

2. The Basic principle of forensic science as 'Every contact leaves a trace' is known as?
 - A) Locard's Exchange Principle
 - B) Principle of Modern Physics
 - C) Principle of Relativity
 - D) All of the Above

3. "*Corpus Delicti*" refers to
 - A) Body of the crime
 - B) Crime scene
 - C) Mode of death
 - D) Hypothesis

4. Fingerprints that cannot be seen with the naked eye and require different developmental techniques are called:
 - A) Plastic Fingerprints
 - B) Printed Fingerprints
 - C) Latent Fingerprints
 - D) Patent Fingerprints

5. What is the most effective method to search for evidence in an indoor crime scene?
 - A) Zonal Method
 - B) Grid Method
 - C) Strip Method
 - D) Wheel Method

6. Which is the best packaging option for wet blood evidence?
- A) Plastic tube
 - B) Glass vial
 - C) Air dried paper bag
 - D) None of them
7. A forensic analyst measures the refractive index of 10 glass fragments. What measure of central tendency should be used to determine the most typical value if outliers are present?
- A) Mean
 - B) Median
 - C) Mode
 - D) Standard deviation
8. In the context of forensic sample collection, random sampling helps in:
- A) Maximizing control over the population
 - B) Reducing selection bias
 - C) Ensuring highest probability of evidence detection
 - D) Maximizing differences within groups
9. The most common packaging method of the trace evidences is?
- A) Plastic cover
 - B) Druggist Fold
 - C) Cardboard Boxes
 - D) Glass bottles
10. _____ is the statistical-based criminal profiling method.
- A) Turvey's Method
 - B) FBI Method
 - C) Canter's Method
 - D) All of the above

11. Repeatability of measurement is called:

- A) Accuracy
- B) Precision
- C) Calibration
- D) Error

12. As per Section 39 of the Bhartiya Sakshya Adhiniyam, 2023, what are the areas on which opinions of the experts are relevant fact?

- I. foreign law
- II. science
- III. art, or any other field,
- IV. handwriting
- V. finger impressions

Choose the correct option:

- A) I, II, III, IV, V
- B) I, II, III, IV
- C) I, II, III, V
- D) I, II, IV, V

13. Which is not a Natural Opium derivatives:

- A) Thebaine
- B) Codeine
- C) Pethidine
- D) Morphine

14. Under the NDPS Act, 1985, the presumption of culpable mental state is provided under:

- A) Section 35
- B) Section 37
- C) Section 54
- D) Section 50

15. The pharmacological activity of coca paste made from coca plant leaves is
- A) Antipsychotic
 - B) Cardiovascular
 - C) Depression
 - D) Hallucinogen
16. As per the NDPS Act, the search of a person must comply with which mandatory safeguard to avoid vitiation of trial?
- A) Informing grounds of arrest under Section 52
 - B) Informing right to be searched before Magistrate/Gazetted Officer under Section 50
 - C) Sending sample to FSL within 72 hours
 - D) Recording statement under Section 67
17. Find the Odd one
- A) Morphine
 - B) Aspirin
 - C) Heroin
 - D) Codeine
18. Which of the following qualifies as a primary explosive?
- A) TNT
 - B) Lead azide
 - C) ANFO
 - D) Semtex
19. Which forensic technique allows determination of thermal stability, decomposition onset, and compatibility in explosives via heat flow analyses?
- A) GC-MS
 - B) Differential Scanning Calorimetry (DSC)
 - C) Ion chromatography
 - D) UV-Vis spectroscopy

20. The technique is NOT used for analysing inorganic explosive residue in post-blast investigation
- A) Raman spectroscopy
 - B) Capillary Electrophoresis
 - C) Ion Chromatography
 - D) Gas Chromatography
21. The shattering power of explosives is known as
- A) Combustion
 - B) Sensitivity
 - C) Flash Point
 - D) Brisance
22. In forensic drug analysis, Thin Layer Chromatography (TLC) confirmation is primarily based on:
- A) Melting point determination
 - B) R_f value comparison with standard
 - C) UV absorbance maxima
 - D) Mass fragmentation pattern
23. Which statement correctly contrasts low-order with high-order explosions?
- A) High-order leaves more unreacted residues
 - B) Only high-order explosions can occur indoors
 - C) Low-order explosions typically leave greater amounts of unreacted residues
 - D) They are indistinguishable
24. Which describes the forensic value of colorimetric spot tests in explosive residue screening?
- A) Definitive and conclusive
 - B) Rapid, presumptive, and field-deployable
 - C) Better than GC-MS in precision
 - D) Only usable on metals
25. What term describes the sequence-primary → secondary → booster → that ensures proper initiation of a main explosive charge?
- A) Explosive cascade
 - B) Initiation ladder
 - C) Explosion train
 - D) Detonation series

26. The term "oxygen balance" in explosive chemistry refers to:

- A) The fire hazard of an explosive.
- B) The ability of the explosive to combust fully, affecting detonation velocity.
- C) Detonator sensitivity affected by the presence of oxygen.
- D) Particle's oxygen emission rate.

27. Match items in Column-I with their correct definitions from Column-II:

Column - I	Column - II
i. Primary explosives	1. Used to trigger larger, less sensitive explosives; highly sensitive initiators.
ii. Explosion train	2. Sequential initiation mechanism: detonator → booster → main charge.
iii. Ion Mobility Spectrometry (IMS)	3. Field technique separating ions by mobility for rapid explosives detection.
iv. Secondary explosives	4. Relatively insensitive explosives (e.g., TNT, RDX), requiring initiation.

Choose the correct matching:

- A) i-1, ii-2, iii-3, iv-4
- B) i-2, ii-1, iii-3, iv-4
- C) i-1, ii-3, iii-2, iv-4
- D) i-4, ii-2, iii-1, iv-3

28. Which statement best describes primary explosives?

- A) They are stable and require powerful ignition
- B) They are highly sensitive and used to detonate secondary explosives
- C) They burn rather than detonate
- D) They are not used in detonation systems

29. Which explosive was originally synthesized for medicinal research rather than military use?

- A) PETN
- B) ANFO
- C) TNT
- D) RDX

30. Match the explosive with its chemical class:

- | | |
|----------|------------------|
| i. RDX | 1. Nitroaromatic |
| ii. PETN | 2. Nitroamine |
| iii. TNT | 3. Nitrate ester |

Which mapping is correct?

- A) i-1, ii-2, iii-3
- B) i-2, ii-3, iii-1
- C) i-3, ii-1, iii-2
- D) i-1, ii-3, iii-2

31. Main component of High explosive 'Picratol' is

- A) TNT and PETN
- B) RDX and Ammonium Picrate
- C) Ammonium nitrate and Ammonium Picrate
- D) TNT and Ammonium Picrate

32. Which class of drug is commonly detected with the Marquis reagent?

- A) Cannabinoids
- B) Benzodiazepines
- C) Opioids and amphetamines
- D) Steroids

33. What is the color test used for detecting barbiturates?
- A) Marquis test
 - B) Dille-Koppanyi test
 - C) Scott test
 - D) Duquenois-Levine test
34. Which extraction technique employs a fiber coated with a sorbent phase to sample volatile and non-volatile analytes directly from complex matrices?
- A) Dispersive Liquid-Liquid Microextraction (DLLME)
 - B) Single-Drop Microextraction (SDME)
 - C) Solid-Phase Microextraction (SPME)
 - D) Liquid-Liquid Extraction (LLE)
35. The separation technique for charged molecules by their interaction with the opposite-charged stationary phase is called?
- A) Adsorption Chromatography
 - B) Column Chromatography
 - C) Ion Exchange Chromatography
 - D) Flash Chromatography
36. Which of the following is the method depends on the absorption of the light by the chemical when a beam of light passes through a sample solution?
- A) Centrifugation
 - B) ELISA
 - C) Spectrophotometry
 - D) Chromatography
37. An analytical technique dealing with the separation of the compounds from a mixture on the basis of density by spinning them at high speeds
- A) Chromatography
 - B) Mass Spectrometry
 - C) UV-transilluminator
 - D) Centrifugation

38. Ion Mobility Spectrometer (IMS) used _____ the explosive residues in the field or in the laboratory
- A) For screening
 - B) For detection
 - C) Both (A) and (B)
 - D) None from (A) and (B)
39. What is the formula to calculate theoretical plates, where V_e is retention time and W_b is peak width
- A) $N = 16\left(\frac{V_e}{W_b}\right)^2$
 - B) $N = 18\left(\frac{V_e}{W_b}\right)^2$
 - C) $N = 16\left(\frac{V_e}{W_b}\right)^3$
 - D) $N = 18\left(\frac{V_e}{W_b}\right)^3$
40. In Gas Chromatography, separation is primarily based on differences in:
- A) Molecular weight only
 - B) Boiling point and interaction with stationary phase
 - C) UV absorption
 - D) Ionic charge
41. Nuclear forensics integrates which types of evidence?
- A) Only isotope ratios
 - B) Physical debris traits, isotopic/chemical data, and conventional forensic evidence
 - C) Only radiological data
 - D) Only witness testimonials

42. One practical use of nuclear forensics is:
- A) Improving nuclear fuel efficiency
 - B) Monitoring radioactivity in consumer products
 - C) Identifying source of environmental uranium contamination
 - D) Enhancing radiation therapy precision
43. Which correctly categorizes chemical warfare agents?
- A) Radioactive, Metallic, Gaseous
 - B) Nerve agents, blister agents, choking agents, blood agents, riot-control agents, toxins
 - C) Explosive, Radioactive, Incendiary
 - D) Biological, Radiological, Nuclear
44. Which classification of CWAs is correctly matched with an example?
- A) Blister agent - Phosgene
 - B) Blood agent - Hydrogen cyanide
 - C) Choking agent - Sulfur mustard
 - D) Nerve agent - Phosgene
45. Gas chromatography is unsuitable for?
- A) Volatile compounds
 - B) Thermally stable compounds
 - C) Non-volatile, thermally unstable compounds
 - D) Hydrocarbons
46. A fire transitions from smouldering to flaming combustion. Regarding energy release and physical evidence, which is most accurate?
- A) Smouldering produces more visible flame than flaming combustion.
 - B) Flaming combustion emits significantly more heat and often results in distinctive soot and flame evidence.
 - C) Smouldering is hotter and more intense than flaming combustion.
 - D) These two forms of combustion are indistinguishable in forensic scenes.

47. In FTIR spectroscopy, the fingerprint region lies approximately between:

- A) 4000-2500 cm^{-1}
- B) 2500-2000 cm^{-1}
- C) 1500-400 cm^{-1}
- D) 400-50 cm^{-1}

48. Zwitterion form of amino acids exists at which pH?

- A) Low pH
- B) High pH
- C) Isoelectric point
- D) Neutral only

49. The oxygen-binding curve of haemoglobin is:

- A) Hyperbolic
- B) Sigmoidal
- C) Linear
- D) Exponential

50. There is a suspected case of involvement of date rape drugs. In order to investigate which drug was administered by the culprit the victim, which of the following samples will you collect from the victim as a toxicologist for identification of the date rape drugs?

- I. Blood - As it tells the half-life of the drug
- II. Urine- As it tells the current load of the drug on the body
- III. Blood- As it tells about the absorption and distribution of the drug
- IV. Urine- Metabolites are excreted in urine, which can be detected

Choose the correct option:

- A) I and II
- B) I, II and IV
- C) III and IV
- D) All of the above

51. Which is true about the LD50?
- A) Dose of a substance that kills 50% of animals exposed.
 - B) Dose of a substance to which 50% of animals do not show any response.
 - C) 50% of the dose of a substance that can kill an animal.
 - D) Dose of a substance that can kill 50 animals.
52. In GC-MS drug profiling, the most reliable identification parameter is
- A) Retention time alone
 - B) Peak area
 - C) Mass spectral fragmentation pattern
 - D) Carrier gas flow rate
53. Uranium enrichment level is typically determined by measuring the ratio of:
- A) U-238 / Pu-239
 - B) U-235 / U-238
 - C) Cs-137 / Sr-90
 - D) Th-232 / U-234
54. A forensic toxicologist is analyzing a seized sample containing a carbonyl-bearing synthetic opioid (e.g., Methadone) using UV-Visible spectrophotometry. Upon changing the solvent from Cyclohexane (non-polar) to Ethanol (polar/protic), a specific spectral shift is observed for the weak n to π^* transition (R-band) around 280-300 nm.
- Which of the following correctly describes the observed shift and the underlying quantum mechanical reason for it?
- A) Bathochromic (Red) Shift: The polar solvent stabilizes the excited π^* state more than the ground state, decreasing the energy gap (ΔE).
 - B) Hypsochromic (Blue) Shift: The polar solvent stabilizes the non-bonding (n) electrons in the ground state via hydrogen bonding, increasing the energy gap (ΔE) required for excitation.
 - C) Bathochromic (Red) Shift: The Franck-Condon principle dictates that the nuclear geometry changes in polar solvents, increasing the wavelength of maximum absorption.
 - D) Hypsochromic (Blue) Shift: The polar solvent destabilizes the π^* orbital due to increased dipole-dipole repulsion, lowering the energy gap.

55. Methanol poisoning primarily affects which organ?
- A) Liver
 - B) Kidneys
 - C) Eyes
 - D) Heart
56. The standard preservative used for viscera preservation is:
- A) Formalin
 - B) Ethanol
 - C) Saturated saline
 - D) Acetone
57. Which poison is a cholinesterase inhibitor?
- A) Cyanide
 - B) Atropine
 - C) Organophosphates
 - D) Barbiturates
58. What is the toxic effect of carbon monoxide?
- A) Liver necrosis
 - B) CNS stimulation
 - C) Prevents oxygen binding to hemoglobin
 - D) Kidney failure
59. Which spectral method helps in identifying organic functional groups?
- A) AAS
 - B) Infrared Spectroscopy (IR)
 - C) Neutron Activation
 - D) SEM

60. Which of the following poison having local remote action?
- A) Opium
 - B) Carbolic acid
 - C) Aconite
 - D) Ricin
61. Magnan's sign is associated with
- A) Cocaine Withdrawal
 - B) Ethanol intoxication
 - C) Methanol Poisoning
 - D) Ecstasy Administration
62. Which of the following enhances the detectability of UV-absorbing substances?
- A) IR detector
 - B) Flame detector
 - C) Photodiode array detector
 - D) Conductivity cell
63. The Stas-Otto method is primarily used for extraction of:
- A) Metallic poisons
 - B) Volatile poisons
 - C) Acidic basic organic poisons
 - D) Inorganic acids
64. Which of the following poisons is detected by the Marsh test?
- A) Cyanide
 - B) Mercury
 - C) Arsenic
 - D) Lead

65. Metabolism of methanol results in formation of:
- A) Formic acid
 - B) Acetaldehyde
 - C) Ethylene glycol
 - D) Acetone
66. The term "zero-order kinetics" in toxicology applies to:
- A) Metabolism of arsenic
 - B) Alcohol elimination
 - C) Paracetamol metabolism
 - D) Morphine excretion
67. Neutron Activation Analysis is best suited for detecting:
- A) Narcotics
 - B) Volatile liquids
 - C) Trace elements
 - D) Bacterial toxins
68. Which sampling matrix is least susceptible to post-mortem redistribution?
- A) Femoral Blood
 - B) Liver
 - C) Lung
 - D) Spleen
69. Which method is most useful for polar toxicants?
- A) GC
 - B) TLC
 - C) HPLC
 - D) AAS

70. Which sample is most resistant to decomposition in postmortem cases?
- A) Peripheral blood
 - B) Gastric content
 - C) Vitreous humor
 - D) Liver tissue
71. Headspace analysis is useful to
- A) analyse volatile compounds from solid or liquid samples
 - B) determine the psychological state of the tutor
 - C) analyse the column contents
 - D) determine non-volatiles
72. Which poison form is correctly classified by both its chemical nature and mode of action in forensic toxicology?
- A) Oleandrin - neurotoxin via sodium-potassium pump inhibition
 - B) Ricin - cardiac glycoside acting on heart muscle
 - C) Strychnine - proteolytic enzyme from *Jatropha curcas*
 - D) Colchicine - hemagglutinin produced by *Abrus* species
73. Which poison is often found in rat poison?
- A) Atropine
 - B) Nicotine
 - C) Zinc phosphide
 - D) Methanol
74. What is the antidote for organophosphate poisoning?
- A) Naloxone
 - B) Atropine
 - C) Flumazenil
 - D) Charcoal

75. Peculiar findings on nails in arsenic poisoning?
- A) Mydriasis
 - B) Mees lines
 - C) Delirium
 - D) Jaundice
76. The biological matrix most affected in lead poisoning is:
- A) Liver
 - B) Kidney
 - C) Bone
 - D) Muscle
77. Which organ is primarily responsible for metabolizing toxins?
- A) Kidney
 - B) Heart
 - C) Liver
 - D) Stomach
78. Phase I reactions in drug metabolism involve:
- A) Glucuronidation
 - B) Oxidation
 - C) Methylation
 - D) Conjugation
79. What is the term for the study of adverse drug reactions?
- A) Pharmacology
 - B) Toxicology
 - C) Pharmacovigilance
 - D) Genetics

80. The "first-pass effect" refers to:
- A) A drug's immediate effect after injection
 - B) Metabolism of orally administered drugs before they enter systemic circulation
 - C) Drugs given intravenously reaching full potency
 - D) A drug's effect solely on the liver
81. Which route of drug administration bypasses absorption and achieves near 100% bioavailability?
- A) Oral
 - B) Intravenous (IV)
 - C) Topical
 - D) Sublingual
82. Which element among the following has the highest electronegativity?
- A) Oxygen (O)
 - B) Nitrogen (N)
 - C) Fluorine (F)
 - D) Carbon (C)
83. Why do strong acids like HCl and HNO₃ exhibit identical strength when dissolved in water?
- A) Water is a nonreactive solvent
 - B) The leveling effect causes both to fully dissociate into H₃O⁺
 - C) They adjust to the same pK_a value in solution
 - D) Water neutralizes all differences in structure
84. Which property generally increases across a period from left to right in the periodic table?
- A) Atomic radius
 - B) Number of electron shells
 - C) Metallic character
 - D) Ionization energy
85. In a chelate-based solvent extraction of a metal ion, why are neutral chelates preferred?
- A) They increase aqueous solubility
 - B) They're more easily masked by pH
 - C) They dissolve readily in organic solvents
 - D) They are less selective and more generic

86. The salting-out technique enhances extraction efficiency by:
- A) Masking co-extracted species
 - B) Chelating metal ions for neutral complex formation
 - C) Changing pH to favour ionization of the analyte
 - D) Raising ionic strength to reduce analyte solubility in water, pushing it into the organic phase
87. SPME is a 'green' extraction technique in forensic science because it:
- A) Uses solvents in trace amounts only
 - B) Is limited to volatile compounds only
 - C) Requires no equipment
 - D) Collects analytes directly via absorption onto a coated fiber, with no solvent needed
88. The distribution ratio (D) differs from the distribution coefficient (K_o) because D:
- A) Only applies to non-ionizable analytes
 - B) Represents the ratio of all species (ionized + un-ionized) across phases
 - C) Ignores the ionized species presence
 - D) Involves chelating agent behavior
89. The oxidation state of Fe in the complex $[\text{CpFe}(\text{CO})_2]_2$ is:
- A) +2
 - B) +1
 - C) 0
 - D) -1
90. Which is not a requirement of a primary standard?
- A) High purity
 - B) Stability
 - C) Non-hygroscopic
 - D) Low equivalent mass
91. The bandgap of a semiconductor nanoparticle _____ with decrease in size.
- A) Increases
 - B) Decreases
 - C) Remains same
 - D) Becomes zero

92. The Van Deemter equation describes relationship between?
- A) Flow rate and response
 - B) Detector response and solute concentration
 - C) Plate height and flow rate
 - D) Column length and retention
93. Which of these detectors is NOT used in gas chromatography?
- A) Flame ionization detector
 - B) Electron capture detector
 - C) Thermal conductivity detector
 - D) UV-visible spectrometer
94. Efficiency of column separation is
- A) Directly proportional to HETP
 - B) Indirectly proportional to HETP
 - C) Does not depend on HETP
 - D) Equal to square root of HETP
95. Which chromatography separates compounds based on molecular size?
- A) Ion exchange
 - B) Partition
 - C) Gel permeation
 - D) Affinity
96. Which of the following is the disadvantage of nitrogen, which can be used as carrier gas in gas chromatography?
- A) Dangerous to use
 - B) Expensive
 - C) High density
 - D) Reduced Sensitivity

97. Which chromatographic approach allows direct analysis of untreated biological fluids such as plasma or urine?
- A) Partition Chromatography
 - B) Micellar Liquid Chromatography (MLC)
 - C) Headspace GC only
 - D) Ion-exchange Chromatography
98. In forensic chromatography, why are calibration curves with isotopically labeled internal standards preferred in quantitative LC-MS/MS analyses?
- A) They reduce run time by eliminating chromatography altogether
 - B) They are useful only in GC-MS but used in LC-MS/MS as a standard practice
 - C) They negate the need for sample cleanup pre-analysis
 - D) They compensate for matrix effects and correct instrument variability
99. Which of the following is a genuine advantage of HPTLC over traditional TLC for quantitative forensic sample analysis?
- A) Lower plate cost and simpler sample loading
 - B) Higher spot resolution and reproducible densitometric quantification
 - C) Ability to analyze gaseous samples directly without extraction
 - D) Less sensitivity but faster analysis compared to TLC
100. Which statement correctly contrasts GC-MS and LC-MS for forensic purposes?
- A) GC-MS is better for polar, non-volatile analytes.
 - B) Derivatization is generally required for LC-MS.
 - C) LC-MS simplifies analysis of polar, less volatile compounds without derivatization
 - D) LC-MS offers lower selectivity than immunoassays and lacks sensitivity.