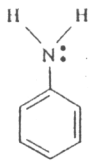
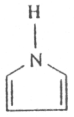
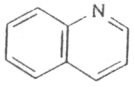
注意！ 背面仍有試題

一、選擇題 （每題答案可能多於一個）每題 4 分

1. Which of the following radiation transducers can be used in the visible radiation region? (a) silicon diode (b) thermocouple (c) phototube (d) photoconductor
2. Which of the following can improve the signal to noise ratio (S/N)? (a) signal chopping (b) analog filtering (c) signal averaging (d) increasing temperature.
3. Which of the following is correct? (a) inductively coupled plasma is more suitable for the determination of refractory compounds than flame atomic absorption (b) flame atomic absorption can not be used for the simultaneous multielement analysis (c) electrothermal atomization provides a noncontinuous atomization signal (d) electrothermal atomization can not be used for solid samples.
4. For atomic spectrometric methods, increasing the atomization temperature will (a) increase the atomization efficiency (b) decrease the atomic spectrum line width (c) increase the peak height (d) atomic absorption methods are more dependent upon temperature than atomic emission methods.
5. Which of the following is often used in a multichannel spectrometer? (a) photodiode arrays (b) charge-coupled device (c) Michelson interferometer (d) photomultiplier tube
6. Which of the following sources are used mainly for infrared spectrometry? (a) Nicrome wire (b) Xe lamp (c) Nernst lamp (d) Hollow cathod lamps
7. For the determination of solid sample with atomic spectrometry, the solid sample can be introduced into the atomizer by (a) pneumatic nebulizer (b) direct sample insertion (c) laser ablation (d) ultrasonic nebulizer.
8. Which of the following is correct for molecular fluorescene spectrometry? (a) the radiation is produced by a chemical reaction (b) it is due to a triplet to singlet transition (c) the analytical signal can be enhanced by increasing the excitation source intensity (d) in resonance fluorescene the emitted radiation has a shorter frequency than that used to cause the excitation.
9. Which of the following compound fluoresce

(a) aniline (b) pyridine (c) pyrrole (d) quinoline

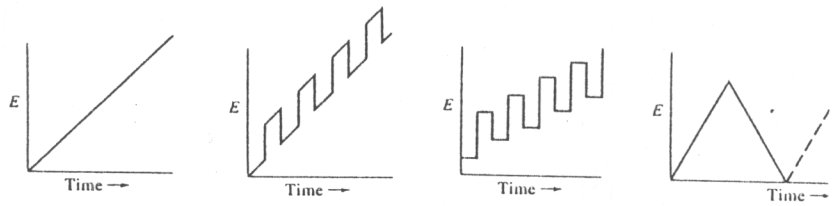


10. How do the mass spectra obtained with electron-impact (EI), field ionization (FI), and chemical ionization (CI) sources differ from one another? (a) CI produces more fragmentation than EI (b) EI produces more fragmentation than FI (c) EI is more sensitive than FI (d) FI is more sensitive than CI

（背面仍有題目，請繼續作答）

11. Which of the following potential waveforms represents the cyclic voltammetry
(a) (b) (c) (d)



12. Which of the following is true for chromatographic separations (a) lengthening the column improves the resolution of a given stationary phase (b) lengthening the column leads to band broadening (c) temperature programming is used with liquid chromatography (d) gradient elution is used with gas chromatography.
13. Which of the following stationary phases is suitable for the separation of nonpolar samples with gas chromatography? (a) polyethylene glycol (b) poly(dicyanoallyldimethyl) siloxane (c) Poly(trifluoropropyldimethyl) siloxane (d) polydimethyl siloxane.
14. Concerning the following liquid chromatography (LC) methods, which is correct? (a) normal-phase HPLC is for the separation of nonpolar samples (b) a suppressor column is often adapted for ion-pair chromatography (c) gel filtration chromatography is based on size exclusion (d) Micellar electrokinetic capillary chromatography is for the separation of neutral species.
15. What type of liquid chromatography is suitable for the separation of C_4H_9COOH and $C_5H_{11}COOH$? (a) Reverse-phase adsorption (b) ion-exchange (c) size exclusion (d) normal-phase partition.
16. For the reaction: $2A(g) + B(aq) + 3C(l) = D(s) + 3E(g)$, the concentrations at equilibrium are: A=2.8 x10^3 Pa, B= 1.2 x 10^{-2}M, C= 12.8M, and E= 3.6 x 10^4 torr. Which of the following is the numerical value of the equilibrium constant that would be in a conventional table of equilibrium constant? (Given that 1 atm = 1.013 x 10^5 Pa), (a) 1.2 x 10^{10} (b) 5.0 x 10^6 (c) 1.23 (d) 5.0 x 10^{-6}
17. A buffer solution is prepared by dissolving 0.100 mol of a weak acid HA (Ka = 1.00 x 10^{-5}) plus 0.050 mol of its conjugate base Na^+A^- in 1.00 L. The pH of the buffer is (a) 5.3 (b) 5.7 (c) 4.3 (d) 4.7
18. Which of the following is the reductant that can be used in a redox titration? (a) BiO_3^- (b) $Cr_2O_7^{2-}$ (c) SO_3^{2-} (d) MnO_4^-.

二、問答題

1. How does the pH affect the separation of amino acids by electrophoresis? (14%)
2. **Explain** when standard addition and internal standards are desirable, and why? (14%)