

注意！背面亦有試題

單、複選擇題 1 至 16 題每題 5 分，17、18 題各 10 分

1. Among the following gas chromatography detectors, which are concentration-sensitive (a) thermal conductivity (b) atomic emission (c) thermionic (d) electron capture.
2. For chromatographic separations, which of the following would lead to zone broadening? (a) small particles for stationary phases (b) large column diameters (c) low temperature (d) thin liquid stationary phases.
3. Which of the following are true for Micellar electrokinetic capillary chromatography (MECC)? (a) it is used for the separation of neutral species (b) the micelles serve as the mobile phase (c) the sulfonic acid anionic micelles move toward the positive electrode (d) MECC, in general, has higher column efficiencies over HPLC.
4. Which of the following are true for supercritical fluid chromatographic separation (a) it permits the separation of thermally labile compounds (b) increase the flow rate would always reduce the elution time (c) increase the pressure would decrease the solvent power of the mobile phase and decrease the elution time (d) increase the temperature would reduce the elution time.
5. Which statements is true? (a) increase temperature would shorten the elution time for gas chromatography (b) increase temperature improves the resolution for gas chromatography (c) increase the polarity of mobile phase shorten elution time for liquid chromatography using C-18 bonded phase (d) flame ionization detector is a suitable detector for liquid chromatography.
6. For the two surface analytical techniques: scanning tunneling microscope (STM) and atomic force microscope (AFM), which statements may be true (a) the sensing tip of STM never makes physical contact with the sample surface. (b) Both STM and AFM do not require the sample to be a conductor of electricity. (c) the sensing tip of AFM never makes physical contact with the sample surface (d) only STM requires the sample to be a conductor.
7. A spectrum has a signal-to-noise ratio of 8/1. How many spectra must be averaged to increase the signal-to-noise ratio to 24/1? (a) 3 (b) 6 (c) 9 (d) 18
8. Which of the following are correct for spectrophotometers? (a) decreasing monochromator slit width improves the resolution (b) increasing monochromator slit width increases the noise (c) increasing the number of grooves of a grating improves the resolution (d) none of the above.
9. Photomultiplier tube can be used as a photon detector for (a) infrared (b) visible (c) ultraviolet (d) microwave detection.

(背面仍有題目,請繼續作答)

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10. Which is correct? (a) inductively coupled plasma (ICP) is suitable for multielement analysis (b) flame atomic absorption (FAA) provides higher temperature than ICP (c) ICP is less expensive than FAA (d) graphite furnace is used to improve the performance of ICP.
11. Which of the following may be correct for extraction? (a) the extraction of an acid HA from water into hexane is more effective with a more acidic aqueous pH (b) the extraction of a base into water should be done with a more acidic aqueous pH (c) It is easier to extract the AlL_2^- complex than the AlL_3 complex into an organic solvent (d) it is more effective to do one extraction with 300 mL of extracting solvent than three extractions with 100 mL extracting solvent.
12. Which of the following is correct for the Kjeldahl titration method (a) it is for the determination of N in organic materials (b) it is for the determination of O (c) the N has to be converted to NH_4^+ and then directly titrated with OH^- (d) O is converted to OH^- and titrated with HCl.
13. Which is correct for redox titration (a) MnO_4^- shows its strongest oxidizing power in alkaline solutions (b) $KMnO_4$ is a primary standard (c) $(NH_4)_2Ce(NO_3)_6$ is a primary standard oxidizing agent (d) $Cr_2O_7^{2-}$ shows its strongest oxidizing strength in alkaline solutions.
14. Which are correct? (a) Buffer solutions can resist changes in pH (b) buffer is a mixture of an strong acid, HA, and a strong base, A^- (c) dilution of a buffer solution would change the pH of the buffer significantly (d) Henderson-Hasselbalch equation is normally used to calculate the pH of a buffer solution.
15. What are the purposes of adding supporting electrolyte in an electrochemical cell? (a) decrease the viscosity (b) increase the conductance (c) control the ionic strength (d) minimize the effect of migration.
16. Which of the following are the advantages of a potentiometric titration relative to a titration with visual indicators? (a) potentiometric titration is faster (b) potentiometric titration is less expensive (c) potentiometric titration is more accurate (d) potentiometric titration can be used for colored solutions.
17. The resistance of the galvanic cell $Pt/Fe(CN)_6^{4-} (3.60 \times 10^{-2}M), Fe(CN)_6^{3-} (2.70 \times 10^{-3}M) // Ag^+(1.65 \times 10^{-2}M)/Ag$ is 4.10 ohm. What will be the initial potential if 0.0106A is drawn from this cell. (a) -0.357V (b) -0.298V (c) 0.357V (d) 0.298V.
18. The ion-accelerating voltage in a particle quadrupole mass spectrometer is 5.00 V. How long will it take a singly charged benzene ion (mass = 1.30×10^{-25} kg/ion) to travel the length of the rod assembly, a distance of 15.0 cm? (a) 56×10^{-3} s (b) 43×10^{-3} s (c) 5.6×10^{-5} s (d) 43×10^{-5} s.