

注意！背面仍有試題

一、單、複選題 (每題答案可能多於一個)，每題 5 分

1. What types of noise are frequency independent? (a) flicker (b) thermal (c) shot (d) environmental.
2. A solution that contained  $1 \times 10^{-3}$  M of  $\text{Cr}^{6+}$  had a transmittance of 0.01 when measured in a 2.00-cm cell. What concentration would be required for the transmittance to be increased by a factor of 10 when a 1.00-cm cell was used? (a)  $1 \times 10^{-3}$  M (b)  $2 \times 10^{-3}$  M (c)  $5 \times 10^{-4}$  M (d)  $1 \times 10^{-2}$  M
3. Which of the following materials can not be used for the optical cell in the visible wavelength range? (a) NaCl (b) Silicate glass (c) Quartz (d) ZnSe
4. Photomultiplier tube is used as a photon detector in what wavelength range(s)? (a) Ultraviolet (b) Visible (c) infrared (d) far-infrared.
5. Which of the followings can be used for introduction of solid samples in atomic spectroscopy? (a) pneumatic nebulization (b) Ultrasonic nebulization (c) electrothermal vaporization (d) Laser ablation.
6. Which of the following is true for atomic spectroscopy? (a) Doppler broadening contributes to the natural line widths in atomic spectroscopy (b) flame is a noncontinuous atomizer (c) electrothermal furnace is a continuous atomizer (d) an electrothermal atomizer is more sensitive than a flame atomizer.
7. Which is true? (a) Inductively coupled plasma (ICP) consumes less argon than direct current plasma (DCP) does (b) ionization interferences are generally less severe in ICP than in flame emission spectroscopy (c) ICP is for single element determination (d) ion lines usually predominate in ICP spectra than in spark spectra.
8. In which solvent would the fluorescence of naphthalene be expected to be greatest? (a) 1-chloropropane (b) 1-bromopropane (c) 2-bromopropane (d) 1-iodopropane.
9. Which ionization source would you choose for the analysis (by mass spectrometry) of an analyte having molecular weight as large as  $10^5$  dalton. (a) Electron impact (b) chemical ionization (c) field ionization (d) matrix-assisted desorption/ionization

(背面仍有題目，請繼續作答)

10. Which of the following provides the chemical information about the surface of a solid? (a) atomic force microscopy (b) scanning tunneling microscopy (c) scanning electron microscopy (d) x-ray photoelectron spectroscopy
11. Which of the following hydroxide has the lowest molar solubility in  $H_2O$ ?  
(a)  $BiOOH$ ,  $K_{sp} = 4.0 \times 10^{-10} = [BiO^+][OH^-]$  (b)  $Be(OH)_2$ ,  $K_{sp} = 7.0 \times 10^{-27}$   
(c)  $Tm(OH)_3$ ,  $K_{sp} = 3.0 \times 10^{-24}$  (d)  $Hf(OH)_4$ ,  $K_{sp} = 4.0 \times 10^{-26}$ .
12. Karl Fisher titration is (a) for the determination of water (b) a precipitation titration method (c) for the determination of nitrogen (d) a neutralization titration.
13. Which of the following has the highest buffer capacity? (a) 0.10 M  $H_2PO_4^-$ /0.10 M  $HPO_4^{2-}$  (b) 0.10 M  $H_2PO_4^-$ /0.50 M  $HPO_4^{2-}$  (c) 0.50 M  $H_2PO_4^-$ /0.10 M  $HPO_4^{2-}$  (d) 0.50 M  $H_2PO_4^-$ /0.50 M  $HPO_4^{2-}$
14. What is the molar concentration of a 50.0% NaOH(w/w) solution (specific gravity is 1.52)? (a) 12 M (b) 24 M (c) 19 M (d) 38 M.
15. About EDTA (ethylenediaminetetraacetic acid) titration which are true (a) unless metal hydroxide is formed, EDTA is more effective as solution pH increases (b) in basic solution an auxiliary agent such as  $NH_3$  is needed (c) the efficiency of EDTA is independent of pH (d) can be used for the determination of water hardness.
16. Which of the followings are the general detectors used for gas chromatography?  
(a) refractive-index detector (b) flame ionization detector (c) fluorescence detector (d) electron-capture detector.
17. Which of the following electrochemical methods does not need a calibration curve for quantitative determination? (a) cyclic voltammetry (b) potentiometry (such as pH meter) (c) coulometry (d) conductometry.

二、問答題

1. What is the principle of micellar electrokinetic capillary chromatography? (10 分)
2. Define detection limit and sensitivity. (5 分)