

系所組別： 化學系

考試科目： 分析化學

考試日期： 0306 · 節次： 4

※ 考生請注意：本試題 可 不可 使用計算機**Multiple-Answers' test (Answer's choice are from none to all)
5% for each question**

- Which of the following factors will not influence the analytes' retention time if they are analysis by chromatography method?
 - The phase ratio of the separation column.
 - The solvent strength of liquid mobile phase in LC or column temperature in GC.
 - The polarity of stationary phase.
 - The mobile phase average speed
 - The diameter of column.
- Which of the following statements about electroosmotic flow (EOF) is incorrect?
 - The speed of EOF is proportional to the zeta potential of the electric double layer developed at the inner surface wall of fused-silica tubing
 - The speed of EOF is inversely proportional to the dielectric constant of the buffer solution.
 - The speed of EOF is inversely proportional to the viscosity of the buffer solution.
 - The speed of EOF is proportional to the radius of the ion of the buffer solution.
 - The EOF has a parabolic profile across the tube.
- Derivatization reactions are often used in preparation samples for chromatographic separation, which of the following statements are not the advantages of these reaction?
 - Increasing the detection sensitivity.
 - Increasing separation resolution for chiral compounds.
 - Increasing the application range of chromatographic analysis.
 - Decreasing the analytes reaction with the separation column.
 - Decreasing the retention time of analytes.
- Which of the following gas chromatographic detectors are nondestructive types?
 - Flame ionization detector.
 - Flame photometric detector.
 - Thermo-conductance detector.
 - Nitrogen phosphor detector.
 - Mass spectrometry detector.
- What kinds of ionic sources can be used in time of flight mass spectrometer?
 - Electron impact
 - Field desorption.
 - Electro-spray ionization.
 - Matrix assisted laser desorption/ionization.
 - Fast atom bombardment secondary ionization.

(背面仍有題目,請繼續作答)

系所組別： 化學系

考試科目： 分析化學

考試日期： 0306，節次： 4

※ 考生請注意：本試題 可 不可 使用計算機

6. Which of the following experiment procedures can be used as sample pre-treatment method for determine organic compounds in sample?
- Solid phase extraction.
 - Acid digestion.
 - Microwave extraction.
 - Pressurized solvent extraction
 - Purge and trap.
7. Which of the following test are used for determine system error in experiment?
- Blank test
 - Duplicate test
 - Standard reference material test
 - Standard addition recover test.
 - Blind sample test.
8. A monochromator had a focal length of 0.65 m was equipped with an echellette grating of 2000 blazes per millimeter. If 3.0 centimeter of the grating were illuminated, please calculate the reciprocal linear dispersion (in nm/mm); resolving power, minimum difference of wavelength (in nm) can be resolved and slit width (in μm) of the instrument for the first order spectra at approximately 560 nm.

$$D^{-1} = \frac{d}{nF},$$

$$\text{Give the equations: } \Delta\lambda_{\text{eff}} = wD^{-1},$$

$$R = \frac{\lambda}{\Delta\lambda} = nN$$

- 0.77 nm/mm, 6.0×10^4 , 0.0093 nm, 6.0 μm
 - 0.57 nm/mm, 6.0×10^4 , 0.0063 nm, 12 μm
 - 0.57 nm/mm, 7.2×10^4 , 0.0093 nm, 6.0 μm
 - 0.77 nm/mm, 7.2×10^4 , 0.0063 nm, 6.0 μm
 - 0.77 nm/mm, 6.0×10^4 , 0.0093 nm, 12 μm
9. Which of the following regents can be used for preparation of sand samples for determine there metal contain?
- Nitric Acid.
 - Sulfuric Acid.
 - Aqua Regia.
 - Hydrofluoric Acid.
 - Hydrochloric Acid.
10. Laboratory samples of solids often contain water that is equilibrium with the atmosphere. Which of the following water should not be the type of nonessential water that contained in solid sample?
- Adsorbed water.
 - Sorbed water.
 - Occluded water.
 - Constituted water.
 - Crystallized water.

系所組別 化學系

考試科目 分析化學

考試日期 · 0306 · 節次 · 4

※ 考生請注意：本試題 可 不可 使用計算機

11. Which of the following UV/Vis radiation transducer is the most sensitive one?
- CdS photoconductivity cell.
 - GaAs photovoltaic cell.
 - Photomultiplier tube.
 - Silicon photodiode.
 - CdSe photoconductivity cell.
12. Which of the following statements are correct?
- Relative standard deviation (RSD) is used to estimate the precision of data.
 - Relative errors are always caused by the system errors.
 - Random errors usually only affect the precision of data.
 - Increasing experiment number can reduce relative errors.
 - Determine errors only can be produced by system errors.
13. Which of the following volumetric apparatus should not be used for preparing of a standard solution in organic solvent?
- Transfer pipet.
 - Measuring (Mohr) pipet.
 - Micropipet.
 - Lambda pipet.
 - Burets
14. A gas chromatographic column was used to separate a pair of compounds. The retention times for these two compounds were 11.56 minutes and 11.71 minutes respectively. If the dead time for mobile phase was 1.60 minutes and the theoretic plate height (HETP) was 0.28 mm under the separation condition, what is the column length (in meter) and peak width (in seconds) for these compounds should be when they need to be just totally resolved? Give the equation: $R_r = \frac{\sqrt{N}}{4} \left(\frac{\alpha - 1}{\alpha} \right) \left(\frac{k'_B}{1 + k'_B} \right)$
- ~80 m and ~6 s.
 - ~70 m and ~8 s.
 - ~60 m and ~7 s.
 - ~55 m and ~6 s.
 - ~50 m and ~8.0 s.
15. Concentration polarization decreased the voltage of a galvanic cell and increases the magnitude of the voltage for a electrolysis cell. Which of the following methods can decrease the concentration polarization of the cell solution?
- Increasing the stirring of the solution.
 - Raising the temperature of the solution.
 - Changing the ionic strength of the solution.
 - Increasing the electrode surface areas.
 - Applying a DC voltage to the electrode.
16. Which of the following items were not the factors that affect the luminescence strength of a molecule?
- Quantum yield.
 - Structure rigidity. (背面仍有題目,請繼續作答)

系所組別：化學系

考試科目：分析化學

考試日期：0306 · 節次：4

※ 考生請注意：本試題 可 不可 使用計算機

- c) Transition type of the electron state.
 - d) Temperature and type of solvent.
 - e) Heavy atom.
17. Which of the following components can influence both the resolution and sensitivity of a spectrometer?
- a) The entrance slit width of monochromater.
 - b) The material of grating of monochromater.
 - c) The width of each groove of monochromater.
 - d) The intensity of the source of the spectrometer.
 - e) The exit slit width of monochromater.
18. Which of the following spectrometers usually requires very high resolution and more expensive optical equipment due to their highly complex spectrum lines?
- a) Induced coupled plasma atomic emission spectrometer.
 - b) Flame fluorescence atomic spectrometer.
 - c) Electrothermal atomic absorption spectrometer.
 - d) Fourier transform IR spectrometer.
 - e) Spark source atomic spectrometer.
19. Which of the following factors can result in line broaden for an atom emission line width?
- a) Collision between atom and other species in measurement system.
 - b) The lifetime of the atomic transition states are finite, usually the lifetime of ground state is longer the lifetime of excited state.
 - c) The direction of the fast moving atom, toward to or receding from a radiation transducer in measurement system.
 - d) Solvent type used for dissolving sample.
 - e) Types of energy source for excitation atom in measurement system.
20. Which of the following is/are not the sources of an instrument noise?
- a) Shot noise.
 - b) Flicker noise.
 - c) Chemical noise.
 - d) Environmental noise.
 - e) Thermal noise.