



Molecular and Atomic Spectroscopy and its Applications (IARSCS-810)

First Semester, Marks: 50, Time allowed: 45 minutes

Note: Attempt all questions

Name: _____ Surname: _____ Roll Number: _____

MCQs

1. The wavelength of UV /visible spectrophotometer lies in the range of, (1)
(A) 190 – 500 nm (C) 150 – 1100 nm
(B) 190 – 880 nm (D) 180 – 850 nm
2. Find out the component that is source of stray radiation in spectrophotometers, (1)
(A) Monochromator (C) Photoacoustic
(B) Thermal Detector (D) Filter
3. Choose the most correct statement, (1)
(A) Deuterium and Tungsten lamps are used for UV and visible region
(B) Hydrogen and Deuterium lamps are used for UV and visible region
(C) Deuterium and Xenon lamps are used for UV and visible region
4. Which of following material is filled in the tungsten lamp to increase the life time as compared to ordinary lamps, (1)
(A) I_2 (B) Xe (C) Silica (D) Quartz
5. The most common cell path length for studies in UV and visible region is, (1)
(A) 1 cm (B) 0.1 cm (C) 0.5 mm (D) 10 cm
6. The cuvette used in UV region is made of, (1)
(A) Glass (B) Silica (C) Quartz (D) Plastic
7. Select the one that indicates start/end among the range of UV region, (1)
(A) 150 nm (B) 200 nm (C) 250 nm (D) 350 nm
8. Which of following lamp give-up larger and brighter ball glow and size, (1)
(A) Deuterium 1 – 1.5 mm (C) Xenon 2 – 2.5 mm
(B) Hydrogen 1 – 2.5 mm (D) Tungsten 1 – 1.5 mm
9. Which of following lamp produces continuum spectrum in the region of 160 – 375 nm, (1)
(A) Tungsten (B) Deuterium (C) Xenon (D) Argon
10. Which of following lamp produces continuum spectrum in the region of 200 – 1000 nm, (1)
(A) Tungsten (B) Deuterium (C) Xenon (D) Argon
11. Select the material that does not absorb at wavelength below 350 nm, (1)
(A) Glass (B) Quartz (C) Silica (D) Ceramics



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12. Which of the following electronic energy level is not measurable by UV-visible spectrophotometer, (1)
(A) $\sigma \rightarrow \sigma^*$ (B) $n \rightarrow \sigma^*$ (C) $n \rightarrow \pi^*$ (D) $\pi \rightarrow \pi^*$
13. Select a lamp that is useful for wavelength region 350 – 2500 nm, (1)
(A) Tungsten (B) Deuterium (C) Xenon (D) Argon
14. Tungsten is enveloped in _____ material that sustains the operating temperature of greater than 3500 K, (1)
(A) Glass (B) Quartz (C) Silica (D) Teflon
15. Select the one choice that exactly represents essential parts of spectrophotometer in sequence, (1)
(A) Source, Wavelength selector, Grating, Radiation transducer, Signal processor and readout devices
(B) Source, Wavelength selector, Sample holder, Radiation transducer, Signal processor and readout device
(C) Source, Monochromator, Grid mirror, Radiation transducer, Signal processor and readout devices
(D) Source, Wavelength selector, Sample holder, Filter, Signal processor and readout devices
16. Which component makes spectrophotometer better than photometer, (1)
(A) Filter (B) Monochromator (C) Polychromator (D) Wavelength selector
17. The photometer is less sensitive than spectrophotometer due to one of the following component, (1)
(A) Monochromator (B) Glass Filter (C) Single beam (D) Wavelength selector
18. In modern spectrophotometers, the diode array transducer is a substitute and replaces the following, (1)
(A) Photomultiplier or Photovoltaic (C) Grating
(B) Microammeter or Readout (D) Silt
19. Select any one type of grating which is not reported in market or uncommon in sales, (1)
(A) Concave grating (B) Holographic (C) Plane (D) Convex
20. How the transmittance is adjusted in Spectronic 20 photo-meter, (1)



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- (A) V shaped slot that can be moved in or out of the beam in order to set the meter to 49%
- (B) V shaped slot that can be moved in or out of the beam in order to set the meter to 51%
- (C) V shaped slot that can be moved in or out of the beam in order to set the meter to 0% in presence of reference cell
- (D) V shaped slot that can be moved in or out of the beam in order to set the meter to 100%
21. Which of following component is used in double beam spectrophotometer and separates the beam on the basis of time, (1)
- (A) Mirror (B) Sector Mirror (C) Grid Mirror (D) Shutter
22. The photometers are disqualified because of, (1)
- (A) High radiant throughput (C) Spectral purity
(B) Signal to Noise Ratio (D) Cheap and simpler
23. Select one of most common range of molar absorptivity for UV visible spectroscopy, (1)
- (A) $10^{-5} - 10^{-6}$ (B) $0 - 10^3$ (C) $10^{-8} - 10^{-9}$ (D) $0 - 10^5$
24. Find most probable life time of excited specie (M^*) in reaction, $M^* \rightarrow M + h\nu$ (1)
- (A) $10^{-8} - 10^{-9}$ min. (B) $10^{-8} - 10^{-9}$ s (C) $0 - 10^3$ (D) $10^8 - 10^9$ s
25. Which of following compound is suitable to be determined in vacuum ultra violet region, (1)
- (A) C_5H_6N (B) CH_4 (C) C_6H_5OH (D) C_6H_6
26. The wavelength of vacuum ultra violet region covers, (1)
- (A) < 185 (B) > 185 (C) > 250 (D) < 350
27. Blue shift approximately corresponds to the energy of 30 KJ/mole and is equal to energy of, (1)
- (A) σ bond (B) π bond (C) Hydrogen bond (D) Ionic bond
28. Which of the following electronic molecular energy level lies in least energy range, (1)
- (A) $\pi \rightarrow \pi^*$ (B) $n \rightarrow \pi^*$ (C) $\sigma \rightarrow \sigma^*$ (D) $n \rightarrow \sigma^*$
29. Select one of molecular energy level responsible for highest molar absorptivity range, (1)
- (A) $\pi \rightarrow \pi^*$ (B) $n \rightarrow \pi^*$ (C) $\sigma \rightarrow \sigma^*$ (D) $n \rightarrow \sigma^*$



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30. The molar absorptivity range of $1000-13000 \text{ Lcm}^{-1}\text{mol}^{-1}$ or more for aromatics corresponds to, (1)
- (A) $n \rightarrow \pi^*$ (B) $\sigma \rightarrow \sigma^*$ (C) $n \rightarrow \sigma^*$ (D) $\pi \rightarrow \pi^*$
31. A functional group that does not absorb itself in UV region but it affects shifting chromophore peaks to higher intensities, (1)
- (A) Auxochromic (B) Bathochromic (C) Hypsochromic (D) Chromic acid
32. Select any one that is auxochromic, (1)
- (A) $-CH_3$ (B) $-NH_2$ (C) C_6H_6 (D) C_6H_5OH
33. Which of following is having the highest ligand field strength, (1)
- (A) I^- (B) H_2O (C) Ethylenediamine (D) CN^-
34. When the ligand field strength (Δ) of ligand increases in complex of transition metal, (1)
- (A) The wavelength of absorption maxima increases
(B) The wavelength of absorption maxima decreases
(C) It will effect on absorbance rather wavelength
(D) It will effect on transmittance and not to wavelength
35. In methods of plotting spectral data with abscissa that usually indicates following parameters on axis, (1)
- (A) Absorbance (B) Log Absorbance (C) Transmittance (D) Wavelength or Wave number
36. Which of following solvent is responsible to produce fine absorption spectrum of acetaldehyde, (1)
- (A) Water aq. (B) Heptane liq. (C) Heptane gas (D) Alcohol liq.
37. Biphenyl becomes more fluorescent due to the effect of structural rigidity by one of following, (1)
- (A) NH_3 (B) CH_3 (C) CH_2 (D) SiO_2
38. Intersystem crossing is responsible for the change of spin by heavy atoms (Br, I) or molecular oxygen to analyte and causes, (1)

