

University of Science and Technology  
Biomedical Engineering Program  
Fourth Year  
Analytical Instruments & Bioanalysis  
Midterm Exam  
2/1/2011

- 1) Analytical Methods is classified in to..... ?  
a) Qualitative and Quantitative      b) all of them      c) Classical and Instrumental  
**d) a and c**      e) chromatography      f) none of the above
- 2) Some of the BELOW instrumental methods are used for qualitative and quantitative analysis like.....  
a) UV/VIS spectrophotometry      b) Ion chromatography      c) Mass spectrometry  
d) Capillary electrophoresis      e) Electrochemistry      **f) ALL of the above**
- 3) Analytical chemistry is critical to our understanding of .....  
a) biochemistry      b) materials science      c) medicinal chemistry  
d) biology      e) geochemistry      **f) ALL of the above**
- 4) The difference between Emission spectroscopy and Absorption spectroscopy is the....  
a) radation source      b) The Property they measure      c) radation detector  
d) the nature of substance      **e) ALL of the above**      f) None of the above
- 5) What makes this water smell bad?" This question is consider as .....  
**a) Qualitative**      b) Quantitative  
c) Quantitative or Qualitative      d) none of the above
- 6) Mass spectrometry could measure the substances which have.....property  
a) Electrical resistance      **b) Mass-to-charge ratio**      c) Radiation rotation  
d) Radiation emission      e) Electrical current      f) Radiation absorption
- 7) The components of any Instrumental Analysis are .....  
**a) Stimulus, Analytical response, Transducer, Data processor, Readout**  
b) None of the above  
c) Stimulus, Transducer, Analytical response, Data processor, Readout  
d) Stimulus, Analytical response, Readout, Transducer, Data processor,  
e) Transducer, Stimulus, Analytical response, Readout, Data processor,  
f) None of the above
- 8) The difference between Transducer and Sensor is that  
a) Transducer converts non-electrical to electrical data  
b) Sensor converts chemical to electrical data  
c) They indicate change in environment  
**d) All of the above**  
e) None of the above
- 9) Precision means .....  
**a) How reproducible?**      b) What range of amounts?      c) How good is measurement?  
d) How much interference? -      e) How close to true value?      f) None of the above
- 10) Calibration curves is drawn between the .....

- a) Signal and Instrument Response**                      b) ALL of the above  
 c) Signal and Signa Blank                                d) None of the above  
 e) Instrument Response and the concentration        f) Instrument Response and Signa Blank
- 11) The main components of the photometer are.....  
 a) Attenuated light beam,Tungsten lump, photocell, Current, Current meter  
 b) ALL of the above  
 c) photocell,Tungsten lump, Attenuated light beam, Current, Current meter  
**d) Tungsten lump, Attenuated light beam, photocell, Current, Current meter**  
 e) Current,Tungsten lump, Attenuated light beam, photocell, Current meter
- 12) The main components of the Atomic emission spectrometer are.....  
 a) chart recorder, flame,UV or visible radiation, photomultiplier tube, electrical potential, amplifier  
 b) flame,UV or visible radiation, photomultiplier tube, electrical potential, amplifier, chart recorder  
 c) amplifier, flame,UV or visible radiation, photomultiplier tube, electrical potential, chart recorder  
**d) flame,UV or visible radiation, photomultiplier tube, electrical potential, amplifier, chart recorder**  
 e) electrical potential,flame,UV or visible radiation, photomultiplier tube,, amplifier, chart recorder  
 f) UV or visible radiation,flame, photomultiplier tube, electrical potential, amplifier, chart recorder
- 13) Flame photometry is used in .....  
 a) Molecular Analysis    **b) Elemental Analysis**    c) Elemental and molecular Analysis  
 d) none of the above    e) all of the above
- 14) One of the below is non destructive instrument.....  
 a) X-ray diffraction            b) Raman spectrometry    c) Nuclear magnetic resonance  
 d) UV/VIS spectrometry    **e) All of the above**            f) Atomic emission spectrometry
- 15) If the results of the instrument is shown in the beside figure, the instrument is ...  
 a) Not precise Not accurate    b) ALL of the above            c) Not precise But accurate  
**d) Precise And accurate**    e) Precise But not accurate
- 16) Every analytical measurement is made up of two components:signal and noise. Why we need to reduce the noise?  
 a) it degrades the accuracy and precision of an analysis  
 b) because it becomes impossible to detect a signal when the signal-to-noise ratio becomes less than 3.  
 c) to increase the s/n ratio  
**d) All of the above**  
 e) None of the above
- 17) Noise can also be classified as .....  
 a) fundamental or non-fundamental.            b) random noise and nonrandom noise  
**c) all of the above**                                    d) Chemical noise or Instrumental noise  
 e) white or Gaussian noise
- 18) Random noise can be fundamental or nonfundamental

- noise, but nonrandom noise is never .....
- a) **fundamental noise**                      b) randome                      c) nonfundamental noise  
d) Gaussian noise                      e) non randome                      f) None of the above
- 19) Methods to improve the signal-to-noise ratio of an instrumental method, are ....  
a) hardware    b) software  
**c) hardware and software**                      d) None of the above
- 20) One of the below is software method to reduce noise.....  
a) GROUNDING AND SHIELDING                      **b) ensemble averaging**  
c) INSTRUMENT AMPLIFIERS                      d) MODULATION  
e) ANALOG FILTERING
- 21) One part per million (ppm) by weight is one .....
- a) microgram of analyte in a gram of sample**                      b) one nanogram of element in a gram of sample  
c) picograms of element per gram of sample                      d) None of the above
- 22) Colorimeter is .....
- a) Is an optical electronic devise that measures the color intensity of substance that have been aspirated into a flame (sodium and potassium)  
b) Is a device to measures the number of red and white blood cells per scaled volume  
c) Is optical device that measure light absorption at various wavelengths for a given liquid sample.  
**d) Is an optical devise that measures the color concentration of a substance in solution**  
e) Is a device which measure blood Ph, Po<sub>2</sub>, Pco<sub>2</sub>
- 23) Who said that Light is Electromagnetic Wave?  
a) Thomas Young    **b) Maxwell**  
c) Newton    d) None of the above
- 24) If the quantum transition is of bounding of the electron type, so the type of spectroscopy is.....  
a) UV visible emission                      b) UV visible absorption                      c) UV visible fluorescenc  
**d) All of the above**                      e) infrared absorption                      f) gamma ray emission
- 25) THE Mass number is equal...  
a) #electrons    b) Atomic Number  
**c) #protons + # Neutrons**                      d) None of the above
- 26) Isotopes has the .....
- a) same Z    b) different A  
**c) all of the above**                      d) None of the above
- 27) When Light Strikes Matter.....  
a) Transmission                      b) Reflection and refraction                      c) Scattering  
d) Interference                      **e) all of the above**
- 28) The Excitation methods are.....  
a) EM radiation                      b) Particle bombardment                      c) Spark/discharge/arc  
d) Chemiluminescence                      **e) all of the above**

- 29) The Absorption Spectra is the plot of .....
- a) **Absorbance vs. wavelength**
  - b) ionization potential vs. wavelength
  - c) emission intensity vs. wavelength
  - d) None of the above
- 30) The beer Law stat that.....
- a) substance concentration is proportional to the absorabance
  - b) substance concentration is inversally proportional to the transmatince
  - c) substance concentration is proportional to the cuvet lenght
  - d) the total absorbation of the mixture of the solutions is equal to the addiation of absorbance of each solution
  - e) **ALL of the above**
  - f) None of the above
- 31) When light of E energy fall to sample x. The sample x will absorb the light when.....
- a)  $E_m - E_n$  equal E
  - b) matching between light energy and any two substance levels energy
  - c) **all of the above**
  - d) None of the above
- 32) We use the wavelength selector because.....
- a) only unique electrons transit to higher level
  - b) to get accurate measurement of concentration
  - c) to get single wavelenght
  - d) to measure the appropriate property of the measured substance
  - e) **ALL of the above**
  - f) None of the above
- 33) The unit of the absorptivity constant is.....
- a) cm/gm
  - b) gm<sup>2</sup>/cm
  - c) gm/cm
  - d) **cm<sup>2</sup>/gm**
  - e) None of the above
- 34) The wavelength of UV is .....than IR
- a) greater
  - b) **smaller**
  - c) equal
  - d) None of the above
- 35) Given that the ionization potential of H is 13.6 e.v and the energy level of any orbit of order n in the excited state is proportional to  $1/n^2$ . the highest excitation energy level reached is .....when excited to 13.4 e.v
- a) **7**
  - b) 6
  - c) 5
  - d) 4
  - e) None of the above
- 36) The wavelength of the red is .....than the violet
- a) **greater**
  - b) smaller
  - c) equal
  - d) None of the above