

Write your name and date on the cover page  
Do not open exam until instructed to do so

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Midterm Exam

Chem. 250

Do not open exam until told to do so.

Get out your pencil, eraser, and scientific nongraphing calculator.

Put everything else under the desk or on the floor.

Turn off or silence then stow all electronic devices.

You may leave the exam room after turning in your exam.

You may not return to the exam room after leaving (until the exam is over).

Provide the best answers as requested.

You must show work for credit.

Label your work should you use the back side of the paper.

If you have any questions during the exam, write them on the exam.

When told to do so, check that exam has all of its pages.

- 1) The statement, “admissible scientific evidence must be generally accepted in the field to which it belongs,” is known as:
  - a) The federal rules of evidence (Daubert vs. Merrel Dow Pharmaceuticals, Inc.)
  - b) The trial judge is gatekeeper (Kumho Tire Co. vs. Carmichael)
  - c) The trial judge admits scientific evidence (Coppolino vs. State of Florida)
  - d) The scientific standard of evidence (Hanzo vs. Shura)
  - e) **The Frye standard (Frye vs. US)**
  
- 2) The first police officer arriving at a crime scene should do what first?
  - a) round up everyone at the scene for questioning
  - b) **secure and isolate the scene**
  - c) search for evidence
  - d) attempt to solve the crime
  - e) call the lead investigator
  
- 3) The forensic term used to describe a fingerprint that is invisible to the naked eye is
  - a) **latent**
  - b) hidden
  - c) undiscovered
  - d) undeveloped
  - e) secret
  
- 4) Which technique can detect and quantify trace elements, such as those in a bullet, down to a billionth of a gram?
  - a) mass spectrometry
  - b) **neutron activation analysis**
  - c) x-ray diffraction
  - d) atomic emission
  - e) x-ray fluorescence
  
- 5) Which separation technique works well for volatile, non-labile organic mixtures like petroleum?
  - a) **gas chromatography**
  - b) pyrolysis gas chromatography
  - c) electrophoresis
  - d) mass spectrometry
  - e) liquid chromatography

- 6) Which of these might be able to link a suspect to a crime scene using a shoe print?
- a) PDQ
  - b) IAFIS
  - c) CODIS
  - d) NIBIN
  - e) **SICAR**
- 7) When there are bodies at a crime scene, the lead investigator must establish with whom to secure items from the body for laboratory examination?
- a) first police officer on scene
  - b) mayor
  - c) **coroner**
  - d) chief of police
  - e) deputy investigator
- 8) Using 1 inch=2.54cm, convert 45.2cm into inches
- a) 452in
  - b) 115in
  - c) **17.8in**
  - d) 0.0452in
  - e) 0.115in
- 9) Which type of glass breaks into squares rather than splinters?
- a) float glass
  - b) laminated glass
  - c) dense glass
  - d) pyrex glass
  - e) **tempered glass**
- 10) What term describes the microscope lens closest to the specimen?
- a) specimen lens
  - b) chris lens
  - c) ocular lens
  - d) **objective lens**
  - e) subjective lens

- 11) Which type of evidence would be considered to have class characteristics?
- a) fingerprints
  - b) bullet striations
  - c) random tool marks
  - d) handwriting
  - e) **blood type**
- 12) This term describes a visible boundary that sometimes appears between matter
- a) pyrolysis
  - b) spectrogram
  - c) **phase**
  - d) deposition
  - e) condensation
- 13) Which three ridge characteristics provide the primary basis for fingerprint classification?
- a) arches, bridges, and throughfares
  - b) hoops, whorls, and loops
  - c) whorls, minutiae, and loops
  - d) **loops, whorls, and arches**
  - e) dots, loops, and whorls
- 14) Which technique analyzes the light given off by excited atoms to determine the type and quantity present?
- a) mass spectrometry
  - b) neutron activation analysis
  - c) x-ray diffraction
  - d) **atomic emission**
  - e) atomic absorbance
- 15) Which of the following would **not** be considered physical evidence?
- a) **a suspect is angry**
  - b) a suspect's clothing has cat hair on it
  - c) a suspect smells of alcohol
  - d) a rough pattern found in the dirt
  - e) money in the suspect's possession looks fake

- 16) Locard's exchange principle states:
- a) whenever two items come into contact, there is an exchange of materials between them
  - b) unopened, purchased goods can always be exchanged at the store for goods of equal value
  - c) 1 Euro dollar can be exchanged for 1.42 US dollars on the currency exchange
  - d) the FBI must exchange crime-related information with local law enforcement
  - e) local law enforcement must exchange crime-related information with the FBI
- 17) Which of these describes an **improper** use of safety equipment?
- a) Tyvek shoe covers for body fluids
  - b) particle masks for scraping dried blood
  - c) biohazard bags for contaminated gloves
  - d) latex gloves for collecting bloodstained glass shards
  - e) Kleengard suits for handling large quantities of body fluids
- 18) Which separation technique produces a "fingerprint" of a nonvolatile sample by first heating the sample to break it into volatile components?
- a) gas chromatography
  - b) pyrolysis gas chromatography
  - c) electrophoresis
  - d) mass spectrometry
  - e) liquid chromatography
- 19) Which of these might be able to link a suspect to a crime scene using DNA?
- a) PDQ
  - b) IAFIS
  - c) CODIS
  - d) NIBIN
  - e) SICAR
- 20) Which physical property is calculated by dividing a substance's mass by its volume?
- a) density
  - b) boiling point
  - c) refractive index
  - d) temperature
  - e) weight

- 21) Which type of evidence would more likely to have individual characteristics?
- a) drug residue
  - b) gunshot residue
  - c) gasoline can from arson scene
  - d) soil from shoes
  - e) **handwritten note**
- 22) Science can prove with complete confidence that a suspect is guilty:
- a) Always
  - b) When there is a confession by the suspect
  - c) When the suspect fails a lie-detector test
  - d) When the suspect returns to the scene of the crime
  - e) **Never**
- 23) The best way to tell if two inorganic substances came from the same source is to use
- a) FTIR
  - b) chromatography
  - c) bulk element analysis
  - d) finite element analysis
  - e) **trace element analysis**
- 24) How do alternate light sources, such as LEDs, help to locate fingerprints?
- a) by making them visible directly
  - b) by making them visible through fluorescence
  - c) **by making them visible through a chemical developer and visible fluorescence**
  - d) by directly converting UV light to visible light
  - e) digitally
- 25) Which of the following is **not** a lawful exception to search without a warrant?
- a) existence of emergency circumstances
  - b) **prior conviction for exactly the same crime**
  - c) preventing immediate loss or destruction of evidence
  - d) person and property is within immediate control of an lawfully arrested individual
  - e) all parties consent

- 26) The difference between evidence possessing individual characteristics from evidence possessing class characteristics is
- a) both classes of evidence have similar value
  - b) individual characteristics can be associated with a particular source with high probability, but class characteristics cannot
  - c) class characteristics can be associated with a particular source with high probability, but individual characteristics cannot
  - d) individual characteristics can be associated with a group of possible items, but class characteristics cannot
  - e) class characteristics can be associated with a group of possible items, but individual characteristics cannot
- 27) Which physical property is intensive?
- a) mass
  - b) volume
  - c) temperature
  - d) weight
  - e) length
- 28) Which term describes a change from a liquid to a gas?
- a) condensation
  - b) deposition
  - c) freezing
  - d) sublimation
  - e) none of the other answers
- 29) What discipline would be useful to obtain evidence when all soft tissue in the body has been completely decomposed?
- a) algor mortis
  - b) forensic engineering
  - c) forensic odontology
  - d) forensic entomology
  - e) corpus mortis
- 30) Blood soaked garments should be stored in which packaging?
- a) plastic tubs
  - b) paper bags
  - c) plastic bags
  - d) cardboard tubes with end caps
  - e) paint cans

- 31) What unit of a crime lab determines the presence of absence of drugs in body fluids?
- a) biology unit
  - b) entomology unit
  - c) physical sciences unit
  - d) toxicology unit
  - e) crime scene investigation unit
- 32) Which method is not used to see if glass fragments came from the same source?
- a) fracturing
  - b) density matching
  - c) refractive index matching
  - d) trace element analysis
  - e) fitting glass fragments together
- 33) Which microscope is most useful to identify crystal material?
- a) compound microscope
  - b) scanning electron microscope
  - c) comparison microscope
  - d) stereo microscope
  - e) polarizing microscope
- 34) Which answer best explains the reason(s) that absorption and emission spectra of matter are important for forensic science?
- a) spectra are explained by a theory
  - b) spectra are coded in constitutional law
  - c) spectra are coded in state law
  - d) spectra are used to identify and quantify atoms, elements, and compounds
  - e) Locard's exchange principle
- 35) Which technique works with gas chromatography to produce a fragmentation pattern that can be unique for each molecule?
- a) gas chromatography
  - b) pyrolysis gas chromatography
  - c) electrophoresis
  - d) mass spectrometry
  - e) liquid chromatography

- 36) Which federal case upheld the legality of fingerprint evidence as a means of criminal identification?
- a) Daubert vs. Merrel Dow Pharmaceuticals, Inc.
  - b) **United States vs. Bryon C. Mitchell**
  - c) Kumho Tire Co. vs. Carmichael
  - d) Coppolino vs. State of Florida
  - e) Frye vs. US
- 37) What principle is used to link a suspect to a crime scene using physical evidence?
- a) **Locard's exchange**
  - b) AFIS
  - c) CODIS
  - d) NIBIN
  - e) SICAR
- 38) Which of the following is **not** one of the search strategies used at a crime scene?
- a) strip search
  - b) quadrant search
  - c) grid search
  - d) spiral search
  - e) **star search**
- 39) The trial judge can admit even new scientific evidence because of:
- a) Daubert vs. Merrel Dow Pharmaceuticals, Inc.
  - b) Kumho Tire Co. vs. Carmichael
  - c) **Coppolino vs. State of Florida**
  - d) Hanzo vs. Shura
  - e) Frye vs. US
- 40) Which type of glass fractures protrude away from the point of impact?
- a) simple
  - b) compound
  - c) concentric
  - d) **radial**
  - e) Becke line

- 41) An organic compound must contain which element?
- a) carbon
  - b) calcium
  - c) carborundum
  - d) carbonate
  - e) carbon dioxide
- 42) A list of all the known atoms listed by atomic number can be found on a(n)
- a) pyrolysis chart
  - b) periodic table of the elements
  - c) electrophoretogram
  - d) mass spectrogram
  - e) phase diagram
- 43) Which type of bullet produces a symmetrical glass fracture?
- a) small bullet
  - b) fast bullet
  - c) large bullet
  - d) slow bullet
  - e) more than one of the above
- 44) Which technique can quantify mixtures of elements from atomic number 11 and up by looking at the emission spectra generated by incoming x-rays?
- a) mass spectrometry
  - b) neutron activation analysis
  - c) x-ray diffraction
  - d) atomic emission
  - e) x-ray fluorescence
- 45) What term describes a illumination through a sample in a microscope?
- a) vertical illumination
  - b) transillumination
  - c) cross illumination
  - d) cisillumination
  - e) visillumination

- 46) Which of the following describes the three methods used to document **at** the crime scene?
- a) CAD drawings, notes, and photography
  - b) notes, sketches, and presentations,
  - c) sketches, notes, and photography
  - d) text messaging, photography, and sketches
  - e) photography, memory, and notes
- 47) A description of forensic science is:
- a) Application of law to criminals
  - b) Application of law to science
  - c) Application of science to criminals
  - d) Application of science to law
  - e) Application of justice to criminals
- 48) The analysis of soil is called
- a) forensic odontology
  - b) forensic entomology
  - c) forensic geology
  - d) forensic engineering
  - e) forensic soilology
- 49) Which of these describes a substrate control?
- a) uncontaminated material collected nearby
  - b) a computer database that keeps track of manufacturers of different surfaces
  - c) the controller for a microscope that can see below a surface
  - d) measures used to subdue an unruly suspect
  - e) none of the above
- 50) A chain of custody does which of the following?
- a) keeps prisoners from running away
  - b) keeps prisoner's hands at waist level
  - c) keeps track of the location of evidence and who handled it
  - d) subdues an unruly suspect
  - e) more than one of the above