

Test: Chemistry NCE

Question 1 of 75

What term refers to a homogeneous substance dispersed through a second substance?

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- A) Supernatant
 - B) Colloid
 - C) Pellet
 - D) Precipitate

Question 2 of 75

What French scientist disproved the Phlogiston theory and developed the law of mass conservation?

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- A) Antoine Lavoisier
 - B) Jean-Marie Lehn
 - C) Yves Chauvin
 - D) Henri Moissan

Question 3 of 75

What element's white allotrope is toxic while its red form is still used as an additive in matches?

-
- A) Chromium
 - B) Phosphorous
 - C) Selenium
 - D) Sulfur

Question 4 of 75

What phenomenon refers to the electron sharing in a molecule that results in many contributing structures?

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- A) Resonance
- B) Charge transfer
- C) Electron shift
- D) Induction

Question 5 of 75

What six carbon ring compound with formula C_6H_{12} has boat and chair conformations?

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- A) Cyclobutene
- B) Cyclohexane
- C) Cyclobutane
- D) Cyclohexene

Question 6 of 75

What 19th century German chemist created a namesake "burner"?

-
- A) Robert Bunsen
- B) Wilhelm Ostwald
- C) Otto Hahn
- D) Adolf von Baeyer

Question 7 of 75

Which of the following atomic orbitals is commonly described as "dumbbell shaped"?

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- A) f-orbital
- B) p-orbital
- C) d-orbital
- D) s-orbital

Question 8 of 75

What element's nucleus is called an alpha particle

- A) Geranium
- B) Helium
- C) Potassium
- D) Hydrogen

Question 9 of 75

Deuterium and Tritium are what kind of atom with respect to hydrogen?

- A) Cistope
- B) Transmer
- C) Isotope
- D) Isomer

Question 10 of 75

What element's dioxide is the active ingredient in sunscreen?

- A) Helium
- B) Titanium
- C) Sodium
- D) Lead

Question 11 of 75

What technique removes heavy metals from the body?

- A) Adaptation
- B) Chelation
- C) Matriculation
- D) Radiation

Question 12 of 75

Which of the following elements has the highest atomic radius?

- A) Francium
- B) Uranium
- C) Rutherfordium
- D) Sodium

Question 13 of 75

What compounds contain four fused rings and are capable of mimicking hormones like testosterone in the body?

- A) Neurotransmitters
- B) Steroids
- C) Tannins
- D) Alkaloids

Question 14 of 75

What technique separates a sample into fragments that are then recorded by their mass to charge ratio?

- A) Charge Spectrometry
- B) Interstitial Spectrometry
- C) Fragment Spectrometry
- D) Mass Spectrometry

Question 15 of 75

What type of reaction results in a loss of electrons?

- A) Oxidation reaction
- B) Induction reaction
- C) Combustion reaction
- D) Reduction reaction

Question 16 of 75

What part of Van der Waals forces caused by induced instantaneous dipoles is the weakest of the intramolecular forces?

-
- A) Dipole-Dipole Force
 - B) Ionic Bonds
 - C) London Dispersion Forces
 - D) Hydrogen Bonds

Question 17 of 75

What law states that a pressure change in one part of a fluid is transmitted to every portion of the fluid?

-
- A) Pascal's Law
 - B) Montesquieu's Law
 - C) Derrida's Law
 - D) Franklin's Law

Question 18 of 75

What chemist's electronegativity scale placed fluorine at a value of 3.98?

-
- A) Robert S. Mulliken
 - B) Vladimir Prelog
 - C) Linus Pauling
 - D) John Pople

Question 19 of 75

What compound is known as the universal solvent?

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- A) Water
 - B) THF
 - C) Methanol
 - D) Benzene

Question 20 of 75

6.022×10^{23} is the approximate value for which constant?

- A) Boltzmann's constant
- B) Avogadro's number
- C) Planck's constant
- D) Gas constant

Question 21 of 75

Silyl ethers are used to protect which functional group, which contains -OH?

- A) Aldehyde
- B) Peroxide
- C) Alcohol
- D) Acid

Question 22 of 75

"Prussian" is a type of what color, which is the color of litmus in basic conditions?

- A) Green
- B) Blue
- C) Yellow
- D) Red

Question 23 of 75

What functional group is oxidized to form disulfide bonds?

- A) Alcohol
- B) Nitrile
- C) Enone
- D) Thiol

Question 24 of 75

The equilibrium constant is symbolized with what letter?

- A) K
- B) B
- C) A
- D) C

Question 25 of 75

"Phase-transfer" is a type of what compounds, which are not consumed during chemical reactions?

- A) Products
- B) Transition states
- C) Catalysts
- D) Reactants

Question 26 of 75

What group of compounds contains many repeated units and includes rubber?

- A) Monomers
- B) Xanthates
- C) Plastics
- D) Polymers

Question 27 of 75

Ethidium bromide is an intercalating agent that can wedge into which compound?

- A) DNA
- B) Benzene
- C) Toluene
- D) Cubane

Question 28 of 75

Rubber can be cracked by the action of what gas?

- A) Chlorine
- B) Ozone
- C) Nitrogen
- D) Oxygen

Question 29 of 75

What quantity is the amount of energy needed for a reaction to occur?

- A) Specific expansion
- B) Activation energy
- C) Gibbs free energy
- D) Thermodynamic potential

Question 30 of 75

ICE tables are used to find the concentration of solution at what point, when the forward and reverse rates of reaction are equal?

- A) Isoelectronic point
- B) Equilibrium point
- C) Halfway point
- D) Critical point

Question 31 of 75

Cyclic structures of what sort of compounds can be represented with Haworth projections?

- A) Sugars
- B) Polymers
- C) Proteins
- D) Fats

Question 32 of 75

Which scientist developed a formula to determine the spectral lines of hydrogen?

-
- A) Albert Einstein
 - B) Louis de Broglie
 - C) Johannes Rydberg
 - D) Max Planck

Question 33 of 75

What spectroscopy technique measures absorbance using Beer-Lambert's Law at two levels of electromagnetic radiation?

-
- A) UV-vis spectroscopy
 - B) Gamma-X spectroscopy
 - C) Microwave-IR spectroscopy
 - D) UV-IR spectroscopy

Question 34 of 75

What was the first plastic made from synthetic components?

-
- A) Bakelite
 - B) Nylon
 - C) Teflon
 - D) Polystyrene

Question 35 of 75

What microscopy technique has transmission and scanning subtypes?

-
- A) Positron microscopy
 - B) Neutron microscopy
 - C) Proton microscopy
 - D) Electron microscopy

Question 36 of 75

Which scientist names a theorem stating that velocity out of an opening in a tank is proportional to the square root of the vertical distance and twice the acceleration due to gravity [i.e. $v = (2gh)^{1/2}$]?

- A) Evangelista Torricelli
- B) Primo Levi
- C) Stanislao Cannizzaro
- D) Giulio Natta

Question 37 of 75

Which scientist names a rule that $4n + 2\pi$ electrons must be present for aromaticity?

- A) Erich Hückel
- B) Josiah Willard Gibbs
- C) Svante Arrhenius
- D) Jacobus Henricus van 't Hoff

Question 38 of 75

What experimental gas law relates volume expansion to a raise in temperature when pressure is held constant?

- A) Charles's law
- B) Boyle's law
- C) Avogadro's law
- D) Gay-Lussac's law

Question 39 of 75

What reagent is useful in forming carbon-carbon bonds takes the form $R-Mg-X$ where X is a halogen and R is an organic group?

- A) Maux Reagent
- B) Haplo Reagent
- C) Tethers Reagent
- D) Grignard Reagent

Question 40 of 75

What reagent forms a silver mirror when detecting aldehydes?

- A) Tollens Reagent
- B) Aldol Reagent
- C) Fairfield Reagent
- D) Maillard Reagent

Question 41 of 75

Crystal structure is determined with which of the following techniques?

- A) Liquid-liquid extraction
- B) X-ray diffraction
- C) Chromatography
- D) Distillation

Question 42 of 75

Which scientist's esterification reacts a carboxylic acid and an alcohol?

- A) Karl Barry Sharpless
- B) Victor Grignard
- C) Emil Fischer
- D) E. J. Corey

Question 43 of 75

What element is used in most atomic clocks because the second is defined based on it?

- A) Americium
- B) Carbon
- C) Cesium
- D) Rhodium

Question 44 of 75

The Wittig reaction produces which compounds from carbonyls?

- A) Alkynes
- B) Alkanes
- C) Alkaloids
- D) Alkenes

Question 45 of 75

What quantity of ligand describes the number of atoms that bind to the central atom of a coordination complex?

- A) Bardity
- B) Ladacity
- C) Denticity
- D) Hapticity

Question 46 of 75

Claisen, McLafferty, and Cope all name what type of reaction that yields a structural isomer?

- A) Substitution
- B) Ring opening
- C) Rearrangement
- D) Elimination

Question 47 of 75

The iodide of which element is used for cloud seeding?

- A) Rhodium
- B) Gold
- C) Tellurium
- D) Silver

Question 48 of 75

On the NFPA diagram, what color represents health hazards?

- A) Blue
- B) Yellow
- C) Green
- D) White

Question 49 of 75

Purification of which element is done in the Mond process?

- A) Carbon
- B) Astatine
- C) Tungste
- D) Nickel

Question 50 of 75

What type of solution, such as 96% ethanol and 4% water, can't be separated using simple distillation?

- A) Racemates
- B) Aerosols
- C) Colloid
- D) Azeotrope

Question 51 of 75

What power in the Lennard-Jones potential describes attractive interactions?

- A) 12
- B) 3/2
- C) 6
- D) 3

Question 52 of 75

Aluminum oxide is dissolved in what substance to extract aluminum?

- A) Covellite
- B) Chalcopyrite
- C) Bauxite
- D) Cryolite

Question 53 of 75

Ziegler-Natta catalysts are used to produce which class of compounds?

- A) Liquid crystals
- B) Polycyclic aromatic hydrocarbons
- C) Polymers
- D) Chlorides

Question 54 of 75

What compound has formula N_2H_4 ?

- A) Azapride
- B) Pyrrole
- C) Hydrazine
- D) Pyridine

Question 55 of 75

The Jahn-Teller effect most often affects compounds with which symmetry?

- A) Tetrahedral
- B) Octahedral
- C) Bilateral
- D) Cyclic

Question 56 of 75

Which equation includes a term of RT over zF ?

-
- A) Clausius-Clapeyron equation
- B) Boltzmann's equation
- C) Gibbs equation
- D) Nernst equation

Question 57 of 75

Which factor is used to describe colligative properties?

-
- A) Lewis
- B) Riedel
- C) Randall
- D) van 't Hoff

Question 58 of 75

Scotch tape is used in the creation of what material?

-
- A) Graphene
- B) Diamond
- C) Optic fibers
- D) Brass

Question 59 of 75

The half life of a first order reaction is proportional to what power of the concentration?

-
- A) -1
- B) 3
- C) 0
- D) 1

Question 60 of 75

Which of the following expressions is not a valid expression for the change in Gibbs free energy?

- A) $a \cdot \exp(-E_a/RT)$
- B) $-RT \ln K$
- C) $\Delta H - T\Delta S$
- D) $-nF\varepsilon^0$

Question 61 of 75

What type of redox reaction results in two compounds one of higher and one of lower oxidation states?

- A) SnAcyl
- B) Disproportionation
- C) Electrophilic Aromatic Substitution
- D) SN2

Question 62 of 75

What chemist won the Nobel Prize in Chemistry in 1984 for his invention of solid phase peptide synthesis?

- A) Gerhard Ertl
- B) John A. Pople
- C) Roger Kornberg
- D) Robert Bruce Merrifield

Question 63 of 75

What catalyst consists of palladium poisoned with lead and quinoline to allow for selective hydrogenation of alkynes to alkenes?

- A) Popelar's catalyst
- B) Rotmar's catalyst
- C) Trenton's catalyst
- D) Lindlar's catalyst

Question 64 of 75

What form of supramolecular chemistry describes how molecules and ions interact through non-covalent bonds?

- A) Alpha-beta chemistry
- B) Master-slave chemistry
- C) Host-guest chemistry
- D) Capture-release chemistry

Question 65 of 75

Whose postulate states that exothermic reactions have transition states whose energy level resembles the reactants while endothermic reactions have transition states whose energy level resembles the products?

- A) Harold Varmus
- B) Richard Heck
- C) George Hammond
- D) Richard Henderson

Question 66 of 75

What is the lightest diatomic molecule to have its anti sigma bonding orbital lower than its anti pi bonding orbital?

- A) Chlorine Gas
- B) Oxygen Gas
- C) Hydrogen Gas
- D) Nitrogen Gas

Question 67 of 75

Brownian motion is the random motion of particles that also takes what Greek name for "leaping"?

- A) Saltation
- B) Pedesis
- C) Podosis
- D) Salasis

Question 68 of 75

Vanadium pentoxide is a catalyst for what process that produces sulfuric acid?

- A) Bessemer process
- B) Iron-carbon process
- C) Contact process
- D) Frasch process

Question 69 of 75

Nanoparticles of what element are made in the Brust-Schiffrin method?

- A) Gold
- B) Iron
- C) Zinc
- D) Copper

Question 70 of 75

mCPBA can be used instead of which typically brown-bottled compound in the Baeyer-Villiger reaction?

- A) Phosphorus trioxide
- B) Acetone
- C) Butadiene
- D) Hydrogen peroxide

Question 71 of 75

Which element forms hydrides that can be nido or arachno under Wade's rules?

- A) Nitrogen
- B) Ruthenium
- C) Boron
- D) Lithium

Question 72 of 75

Chemical vapor deposition is used to produce which materials?

- A) Optic fibers
- B) Fused silica
- C) Thin films
- D) Sapphires

Question 73 of 75

For an ideal gas at a certain chemical potential, which quantity is the same as pressure?

- A) Flammability
- B) Hapticity
- C) Fugacity
- D) Vapor pressure

Question 74 of 75

What technique ionizes a solvated sample before mass spectrometry and can produce multiple-charged ions?

- A) MALDI
- B) LIAD-CI
- C) APPI
- D) ESI

Question 75 of 75

Which sandwich compound was discovered when Pauson and Kealy scientists tried to synthesize fulvalene?

- A) Ruthenocene
- B) Osmocene
- C) Ferrocene
- D) Chromocene