

Chem I+II Study Packet for Quality Core

Assume that an electron in an atom has a constant speed. As the wavelength of the electron increases, how are the energy and the frequency of the electron affected?

Ch 5

- ↑
- 1.
- A. The energy increases and the frequency increases.
 - B. The energy increases and the frequency decreases.**
 - C. The energy decreases and the frequency decreases.
 - D. The energy decreases and the frequency increases.

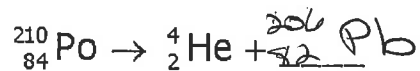
Ch 3

What is the name given to anything that takes up space and has mass?

- ↑
- 2.
- A. Compound
 - B. Matter**
 - C. Mixture
 - D. Substance

Ch 4
↓

In 1911, Marie Curie won the Nobel Prize in Chemistry for discovering radium (Ra) and polonium (Po). During the nuclear decay of polonium-210, alpha (α) particle emission occurs.



What other product forms?

- A. ${}_{86}^{214}\text{Rn}$
B. ${}_{82}^{206}\text{Pb}$
C. ${}_{84}^{208}\text{Po}$
3. D. ${}_{81}^{204}\text{Tl}$

Which statement accurately defines the law of conservation of energy in any chemical process?

- A. Energy can be created and destroyed.
B. Energy can be created but not destroyed.
C. Energy can not be created but can be destroyed.

- Gen- 4. D. Energy is neither created nor destroyed.

What is the balanced chemical equation for the reaction of solid aluminum hydroxide with aqueous hydrochloric acid?

- A. $\text{Al}(\text{OH})_2(s) + 2 \text{HCl}(aq) \rightarrow \text{AlCl}_2(aq) + \text{H}_2\text{O}(l)$
B. $\text{Al}(\text{OH})_2(s) + 2 \text{HCl}(aq) \rightarrow \text{AlCl}_2(aq) + 2 \text{H}_2\text{O}(l)$
C. $\text{Al}(\text{OH})_3(s) + 3 \text{HCl}(aq) \rightarrow \text{AlCl}_3(aq) + 3 \text{H}_2\text{O}(l)$
5. D. $\text{Al}(\text{OH})_3(s) + 3 \text{HCl}(aq) \rightarrow \text{AlCl}_3(aq) + 4 \text{H}_2\text{O}(l)$

Ch 10

When chemists bombard the nuclei of some isotopes with neutrons, the nuclei split into 2 lighter fragments. What is the name of this process?

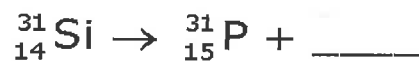
- ch 4
- A. Fission
 - B. Fusion
 - C. Mutation
 - 6. D. Neutron decay

1

What type of radiation resulting from nuclear decay reactions has the greatest energy and the greatest penetrating ability?

- ch 4
- A. Alpha particles
 - B. Beta particles
 - C. Gamma rays
 - 7. D. X-rays

For a research project, Ruth studies the nuclear decay of silicon-31 and identifies phosphorus-31 as 1 of the products. What other product forms?



- ch 4
- A. Proton
 - B. Gamma ray
 - C. Beta particle
 - 8. D. Alpha particle

Two students conducted an experiment to determine how temperature affects the solubility of Compound M in distilled water (H_2O). For each trial, they added Compound M to 10.0 mL of H_2O until it no longer dissolved in the H_2O . The students recorded their results in this table.

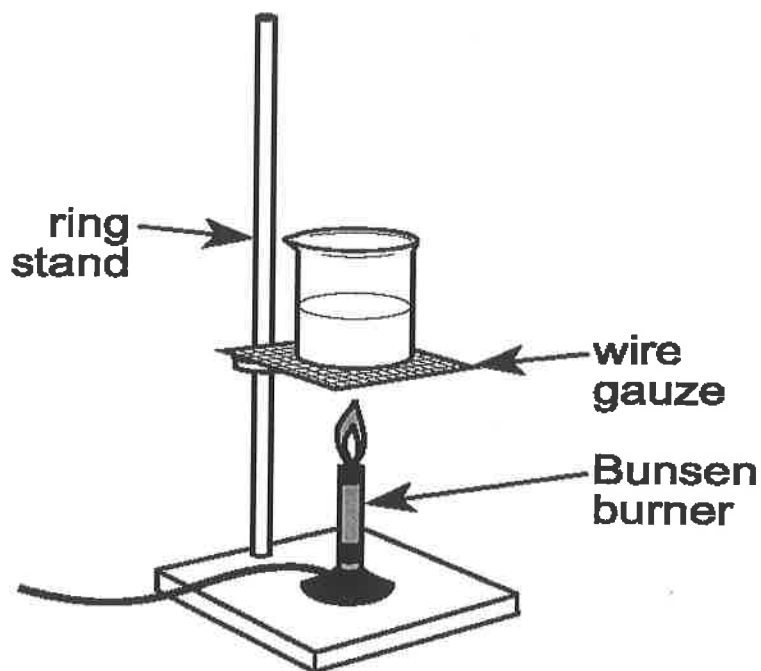
Solubility of Compound M in H_2O		
Trial	H_2O Temperature ($^{\circ}\text{C}$)	Mass of dissolved Compound M (g)
1	25.0	1.75
2	30.0	2.10
3	35.0	2.25
4	40.0	2.37

Identify the dependent variable(s) in this experiment.

- A. Mass of dissolved Compound M only
- B. Purity of Compound M and type of H_2O used only
- C. Temperature of H_2O used and purity of Compound M only
9. **D.** Volume of H_2O used and mass of dissolved Compound M only

A11

A chemistry student heats a beaker of water using a Bunsen burner, as shown in this diagram.



Why does the student most likely use the wire gauze?

- A. To absorb all of the heat from the beaker
- B. To transport the hot beaker after heating
- C. To provide a stable stage for heating the beaker**
- D. To protect the Bunsen burner if the beaker breaks

10.

111

Nanotechnology investigates the uses of carbon (C) compounds in products such as microchips and superconductors. Which criterion is NOT necessary for nanotechnology research to be considered scientific?

- A. Reporting of all results
- B. Alteration of experimental results to confirm hypotheses
- C. Submission of results to peer-reviewed journals that are open to critique
- D. Modification of hypotheses as new information and techniques become available

11.

Which statement is an example of a chemical law?

- A. The atomic mass of tin is 118.7 amu.
- B. The specific heat capacity of iron is $0.46 \text{ J/g}\cdot^{\circ}\text{C}$.
- C. The density of liquid water is greater than the density of ice.
- D. The temperature of a gas is directly proportional to the volume of the gas.

12.

Which property of an apple is different on Earth than it is on the Moon?

- A. Density
- B. Mass
- C. Volume
- D. Weight

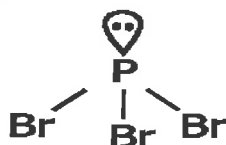
13.

White phosphorus (P_4) reacts with bromine (Br_2) to produce phosphorus tribromide (PBr_3).

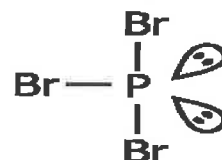


Use the valence-shell electron-pair repulsion (VSEPR) theory to determine the geometry of PBr_3 .

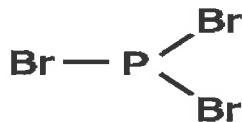
A. Trigonal pyramidal



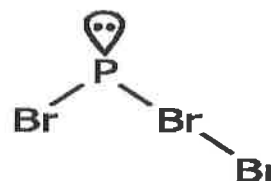
C. T-shaped



B. Trigonal planar



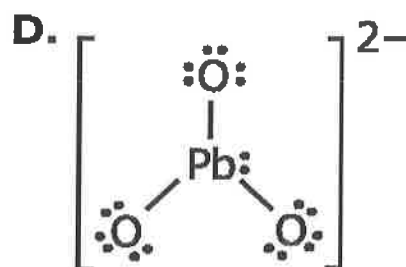
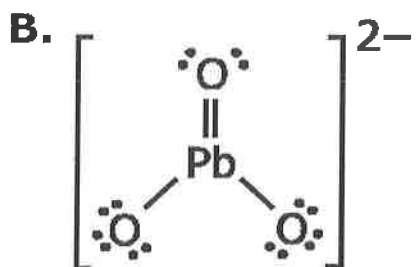
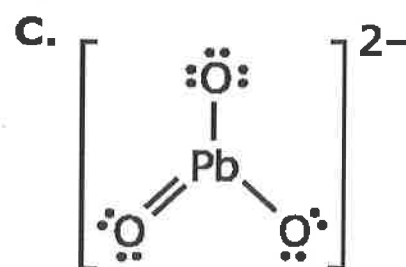
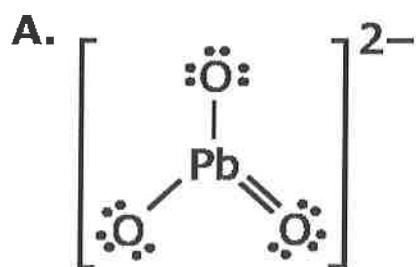
D. Bent



Ch 9

14.

In chemistry class, Jeremy learns that the plumbate ion (PbO_3^{2-}) has 3 resonance structures that obey the octet rule. Assume the chemical bonds in PbO_3^{2-} are polar covalent. Which structure is 1 of the resonance structures of PbO_3^{2-} ?



Ch 9

15.

Which molecule does NOT have a dipole moment?

- A. SO_2
- B. NH_3
- C. CHCl_3
- D. CCl_4

16.

Q9

What is the electron configuration of the chromium (Cr) ion in chromium trioxide (CrO_3) ?

- A. $[\text{Ar}]$
- B. $[\text{Ar}] 3d^3$
- C. $[\text{Ar}] 4s^2 3d^1$
- D. $[\text{Ar}] 4s^2 3d^4$

17.

Q6,7

Dr. Li, a visiting chemistry professor from a local university, performed a demonstration in the high school chemistry lab. Behind a protective shield in the fume hood, she carefully added a small piece of sodium (Na) to a beaker of water, and a very exothermic reaction occurred. Which property of Na would best explain this result?

- A. Small density
- B. Large atomic radius
- C. Low first ionization energy
- D. High electronegativity

18.

Q7,9

Which statement describes a property of all of the Group 4A elements?

- A. They are metals.
- B. They are nonmetals.
- C. They form anions with a $2-$ charge.
- D. They have 2 valence electrons in p orbitals.

19.

Q7

Which set of Lewis dot structures accurately describes the bonding in magnesium fluoride (MgF_2) ?



20.

The sulfide ion (S^{2-}) has an ionic radius of 184 picometers ($1 \text{ pm} = 10^{-12} \text{ m}$). Use the periodic table to determine the most likely ionic radii, in pm, for the oxide ion (O^{2-}) and the selenide ion (Se^{2-}).



21.

In a famous experiment, scientists bombarded a very thin gold (Au) foil with positively charged alpha particles. They found that most of the alpha particles passed right through the Au foil. However, a few of the alpha particles were deflected or bounced back toward the source. How did these scientists explain their results?

A. Negative charges are spread throughout the atom.

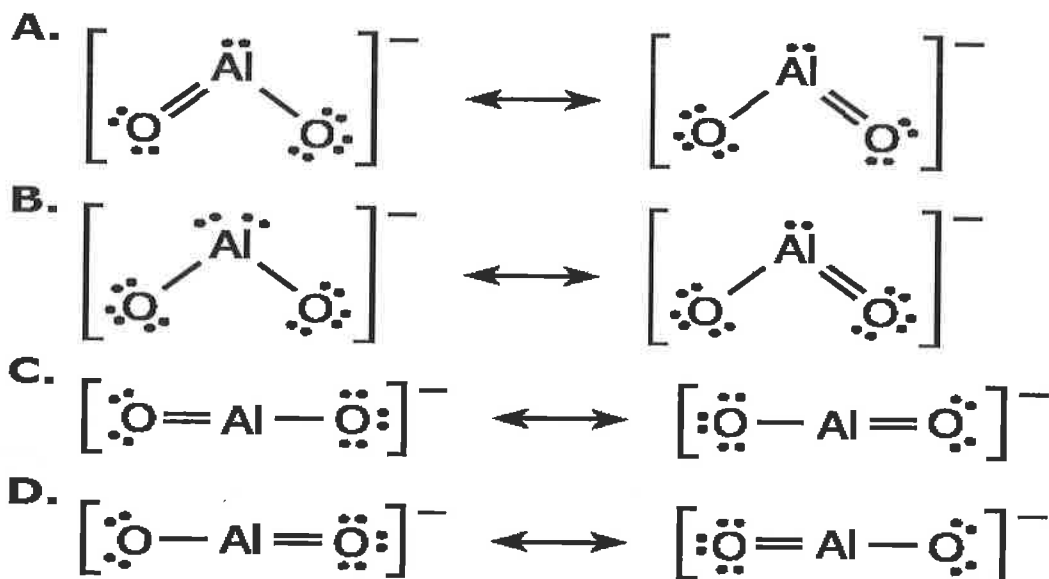
B. Negative charges are located in the tiny nucleus of the atom.

C. Positive charges are spread throughout the atom.

D. Positive charges are located in the tiny nucleus of the atom.

22.

In geology class, Lauren learns that the mineral chrysoberyl is an aluminate (AlO_2^-) of beryllium (Be). Using her chemistry knowledge, she decides to draw the Lewis dot structure(s) of AlO_2^- , and she finds that there are 2 resonance structures of AlO_2^- . Assuming the chemical bonds in AlO_2^- are polar covalent, what are the correct resonance structures of AlO_2^- ?



Ch 5

23.

Oxygen (O) and sulfur (S) are in the same group in the periodic table. However, hydrogen sulfide (H_2S) has a boiling point of -60.7°C , and water (H_2O) has a boiling point of 100.0°C . Which statement best explains this difference in boiling points?

- A.** H_2O has a larger molar mass.
- B.** H_2O has stronger intermolecular hydrogen bonds.
- C.** H_2S has a larger heat of vaporization.
- D.** H_2S has stronger intermolecular van der Waals forces.

Ch 13

24.

Which property of ionic compounds can a chemist use to differentiate between ALL ionic and covalent compounds?

- A. They are insoluble in water.
- B. They have low melting points.
- C. They are solids at room temperature.
- D. They conduct electricity when they melt.

Q. 4

25.

In sodium hypochlorite (NaOCl), chlorine (Cl) has an oxidation number of +1. What is the electron configuration of Cl^+ ?

- A. $[\text{Ne}] 3s^2 3p^3$
- B. $[\text{Ne}] 3s^2 3p^4$
- C. $[\text{Ne}] 3s^2 3p^5$
- D. $[\text{Ne}] 3s^2 3p^6$

Q. 5

26.

At 22°C , the air pressure in a car tire is 1293 torr. Convert this pressure to atmospheres (atm).

- A. 12.76
- B. 5.262
- C. 1.701
- D. 1.293

All

27.

Which statement correctly describes 1 mole of iodine (I_2) ?

- A. Its mass is 126.9 g.
- B. Its mass is 380.7 g.
- C. It contains 6.02×10^{23} atoms.
- D. It contains 6.02×10^{23} molecules.

28.

Q. 6

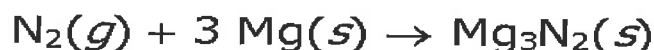
At 25°C, germanium(II) chloride (GeCl_2) rapidly reacts with chlorine (Cl_2) to produce germanium(IV) chloride (GeCl_4).



According to the law of conservation of mass, which statement correctly describes this reaction?

29. **A.** The sum of the masses of GeCl_2 and Cl_2 equals the mass of GeCl_4 .
- B.** The sum of the masses of Cl_2 and GeCl_4 equals the mass of GeCl_2 .
- C.** The mass of GeCl_2 is greater than the mass of GeCl_4 .
- D.** The mass of Cl_2 is greater than the mass of GeCl_4 .

At high temperatures, nitrogen (N_2) reacts with magnesium (Mg) to produce magnesium nitride (Mg_3N_2).



Which statement accurately describes the information represented by this balanced chemical equation?

30. **A.** 1 atom of N_2 reacts with 3 atoms of Mg to produce 1 atom of Mg_3N_2 .
- B.** 1 formula unit of N_2 reacts with 3 formula units of Mg to produce 1 formula unit of Mg_3N_2 .
- C.** 1 mole of N_2 reacts with 3 moles of Mg to produce 1 mole of Mg_3N_2 .
- D.** 1 molecule of N_2 reacts with 3 molecules of Mg to produce 1 molecule of Mg_3N_2 .

In the chemistry laboratory, a student adds aqueous ammonium chloride (NH_4Cl) to aqueous silver acetate ($\text{AgC}_2\text{H}_3\text{O}_2$) to produce aqueous ammonium acetate ($\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$) and solid silver chloride (AgCl). What is the net ionic equation for this reaction?

- A.** $\text{Cl}^-(aq) + \text{Ag}^+(aq) \rightarrow \text{AgCl}(s)$
B. $\text{NH}_4^+(aq) + \text{C}_2\text{H}_3\text{O}_2^-(aq) \rightarrow \text{NH}_4\text{C}_2\text{H}_3\text{O}_2(aq)$
C. $\text{NH}_4\text{Cl}(aq) + \text{AgC}_2\text{H}_3\text{O}_2(aq) \rightarrow \text{NH}_4\text{C}_2\text{H}_3\text{O}_2(aq) + \text{AgCl}(s)$
D. $\text{NH}_4^+(aq) + \text{Cl}^-(aq) + \text{Ag}^+(aq) + \text{C}_2\text{H}_3\text{O}_2^-(aq) \rightarrow \text{NH}_4^+(aq) + \text{C}_2\text{H}_3\text{O}_2^-(aq) + \text{AgCl}(s)$

Ch 10 31.

Chemists add ammonium lauryl sulfate ($\text{CH}_3(\text{CH}_2)_{11}\text{SO}_4\text{NH}_4$) to shampoo to reduce the surface tension of water. How many hydrogen (H) atoms are in 1 molecule of ammonium lauryl sulfate?

- A.** 9
B. 20
C. 25
D. 29

Ch 10-12 32.

What is the chemical formula of calcium cyanide?

- A.** CaCN
B. CaCN_2
C. $\text{Ca}(\text{CN})_2$
D. $\text{Ca}(\text{CN})_3$

Ch 8 33.

A sample of a compound containing only nickel (Ni) and oxygen (O) has a mass of 24.6 g. Analysis of the sample shows that 10.4 g is Ni and the remaining 14.2 g is O. What is the percent composition of Ni in this sample?

- A. 26.8%
- B. 42.3%
- C. 57.7%
- D. 73.2%

Q2?

34.

What is the gram formula mass, in g/mol, of aluminum nitrate ($\text{Al}(\text{NO}_3)_3$) ?

- A. 88.99
- B. 151.00
- C. 165.01
- D. 213.01

Q2?

35.

In the chemistry laboratory, Elise added aqueous ammonium carbonate to aqueous calcium nitrate to produce solid calcium carbonate and aqueous ammonium nitrate. What is the balanced chemical equation for this reaction?

- A. $\text{NH}_4\text{CO}_3(aq) + \text{Ca}(\text{NO}_3)_2(aq) \rightarrow \text{CaCO}_3(s) + 2 \text{NH}_4\text{NO}_3(aq)$
- B. $\text{NH}_4\text{CO}_3(aq) + \text{Ca}_2\text{NO}_3(aq) \rightarrow \text{Ca}_2\text{CO}_3(s) + (\text{NH}_4)_2\text{NO}_3(aq)$
- C. $(\text{NH}_4)_2\text{CO}_3(aq) + \text{Ca}_2\text{NO}_3(aq) \rightarrow \text{Ca}_2\text{CO}_3(s) + (\text{NH}_4)_2\text{NO}_3(aq)$
- D. $(\text{NH}_4)_2\text{CO}_3(aq) + \text{Ca}(\text{NO}_3)_2(aq) \rightarrow \text{CaCO}_3(s) + 2 \text{NH}_4\text{NO}_3(aq)$

ch 10

36.

In magnesium nitride (Mg_3N_2), nitrogen (N) has an oxidation number of -3 . What is the electron configuration of the N^{3-} ion?

- A. $[\text{He}] 2s^1$
- B. $[\text{He}] 2s^2$
- C. $[\text{He}] 2s^2 2p^3$
- D. $[\text{He}] 2s^2 2p^6$

39.

How many electrons does a calcium (Ca) atom lose when it bonds with 2 bromine (Br) atoms?

- A. 0
- B. 1
- C. 2
- D. 4

40.

Which type of bond exists between 2 atoms having identical electronegativities?

- A. Covalent bond
- B. Hydrogen bond
- C. Ionic bond
- D. Polar bond

41.

What type of solid is cesium bromide (CsBr) ?

- A. Ionic
- B. Metallic
- C. Molecular
- D. Network

42.

In chemistry class, Justin adds an aqueous solution of barium hydroxide ($\text{Ba}(\text{OH})_2$) to an aqueous solution of potassium sulfate (K_2SO_4). Use the solubility data in the table to predict the products and determine the balanced chemical equation for this reaction.

Solubility of Ionic Compounds in H_2O		
	Hydroxide	Sulfate
Ba^{2+}	soluble	insoluble
K^+	soluble	soluble

- A.** $\text{Ba}(\text{OH})_2(aq) + \text{K}_2\text{SO}_4(aq) \rightarrow 2 \text{KOH}(aq) + \text{BaSO}_4(s)$
B. $\text{Ba}(\text{OH})_2(aq) + \text{K}_2\text{SO}_4(aq) \rightarrow 2 \text{KOH}(s) + \text{BaSO}_4(aq)$
C. $2 \text{Ba}(\text{OH})_2(aq) + \text{K}_2\text{SO}_4(aq) \rightarrow 2 \text{K}(\text{OH})_2(aq) + \text{Ba}_2\text{SO}_4(s)$
D. $2 \text{Ba}(\text{OH})_2(aq) + \text{K}_2\text{SO}_4(aq) \rightarrow 2 \text{K}(\text{OH})_2(s) + \text{Ba}_2\text{SO}_4(aq)$

37.

Which element has this electron configuration?

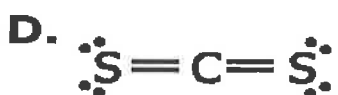
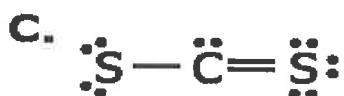
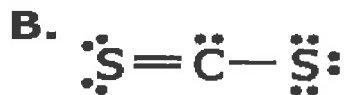
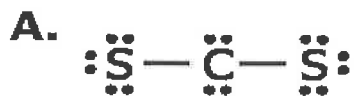


- A.** Nitrogen (N)
B. Oxygen (O)
C. Phosphorus (P)
D. Sulfur (S)

38.

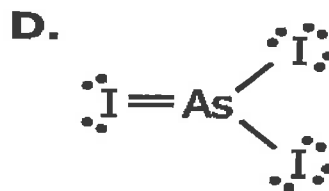
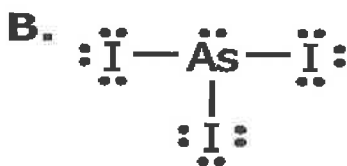
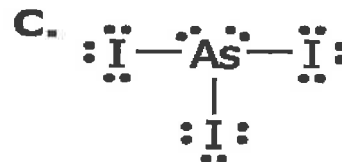
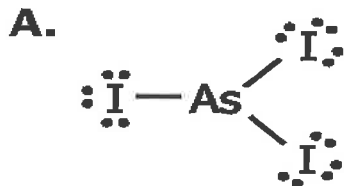
ch 5

A student finds a bottle of carbon disulfide (CS₂) in the chemistry stockroom. For a homework assignment, the instructor asks the student to draw the Lewis dot structure of CS₂. Which structure should the student draw?



43.

What is the Lewis dot structure of arsenic triiodide (AsI₃) ?



44.

Use the valence-shell electron-pair repulsion (VSEPR) theory to determine the molecular geometry of sulfur dichloride (SCl_2).

- A.** Trigonal planar
- B.** Tetrahedral
- C.** Linear

Ch 9

45. **D.** Bent

A pharmacist prepared a liquid medication and gave instructions to shake the medication well before using. How did the pharmacist most likely formulate the medicine?

- A.** As a suspension with particles that settled to the bottom of the container
- B.** As a true solution with particles that settled to the bottom of the container
- C.** As a colloid with particles that remain unevenly distributed throughout the container
- D.** As a homogeneous mixture with particles that remain unevenly distributed throughout the container

Ch 4

46.

The label on a bottle of water indicates the bottle contains 455 mL of water. How many liters of water are in the bottle?

- A.** 0.455
- B.** 4.55
- C.** 45,500
- D.** 455,000

Ch 2

47.

The mass of a dry, empty beaker is 81.05 g. Rachard places a wet solid in this beaker. Next, he places the beaker containing the wet solid in an oven at 100°C for 24 hours to dry the solid. He allows the beaker to cool for 1 hour, and then he determines that the mass of the beaker and the dried solid is 87.35 g. Using the correct number of significant figures, calculate the mass, in g, of the dried solid.

- A. 6.3
- B. 6.30
- C. 6.300
- D. 6.3000

Ch 2 48.

The speed of light in a vacuum is 299,800,000 m/sec. Express this number in correct scientific notation.

- A. 2.998×10^8
- B. 2.998×10^5
- C. 2.998×10^{-5}
- D. 2.998×10^{-8}

Ch 2 49.

In 1808, John Dalton proposed his atomic theory. Why is Dalton's proposal still considered a theory?

- A. Atoms are too small to test.
- B. Scientists are still testing it.
- C. There is no experimental evidence to support it.
- D. All of his hypotheses about atoms have proven false.

Ch 4 50.

A chemist creates a new element and reports the discovery. In order to confirm this discovery, what should another group of scientists do?

- A. Review the discoverer's notes and try to repeat the experiment
- B. Interview the discoverer and view the new element
- C. Discuss the discoverer's previous work
- D. Tour the discoverer's laboratory

Al. 51.

What is the percent by mass of chlorine (Cl) in $\text{BaCl}_2 \cdot 2 \text{H}_2\text{O}$?

A. 14.5%

B. 17.0%

C. 29.0%

Ch 10

52. **D.** 34.1%

A technician dissolves 20.0 g of magnesium bromide (MgBr_2) in 100.0 g of water (H_2O). What is the percent composition of MgBr_2 in the solution?

A. 10.9%

B. 13.0%

C. 16.7%

Ch 10

53. **D.** 20.0%

The boiling point of chlorine (Cl_2) is -34.6°C . What is this temperature in Kelvin?

A. 307.6 K

B. 238.4 K

C. -238.4 K

Ch 2

54. **D.** -307.6 K

A chemistry student finds a beaker in the laboratory containing a mixture of copper(II) sulfate (CuSO_4) and sand. The student adds water to the beaker, and the solution turns blue. What technique would best separate the blue CuSO_4 solution from the sand?

A. Chromatography

B. Distillation

C. Evaporation

Ch 3

55. **D.** Filtration

What scientist proposed that it is impossible to know both the location and the velocity of an electron in an atom at the same time?

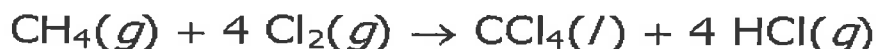
A. Maria Goeppert-Mayer

B. Werner Heisenberg

C. H. Friedrich Hund

Q4 56. **D.** Wolfgang Pauli

Methane (CH_4) reacts with chlorine (Cl_2) to produce carbon tetrachloride (CCl_4) and hydrogen chloride (HCl).



A student carries out the reaction of 5.00 g of CH_4 with 82.5 g of Cl_2 . What is the maximum number of grams of CCl_4 that the reaction can produce?

A. 17.5

B. 44.7

C. 47.9

Q12 57. **D.** 87.5

When Alex distills Substance X, he obtains 3 different pure liquids with boiling points of 150°C , 250°C , and 350°C . How should Alex classify Substance X?

A. Element

B. Compound

C. Mixture

Q3 58. **D.** Molecule

In a chemistry experiment, a student measures the density of iridium (Ir) metal as 21.52 g/cm^3 . The actual density of Ir metal is 22.65 g/cm^3 . What is the percent error of the student's measurement?

- A. 0.04989%
- B. 0.05251%
- C. 4.989%
- D. 5.251%

Ch 3

59.

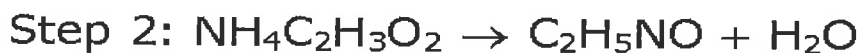
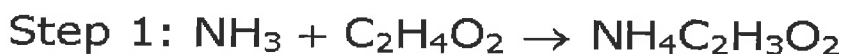
Fluorine gas reacts with aqueous iron(II) iodide to produce aqueous iron(II) fluoride and iodine liquid. What is the balanced chemical equation for this reaction?

- A. $\text{F}_2(g) + \text{FeI}_2(aq) \rightarrow \text{FeF}_2(aq) + \text{I}_2(l)$
- B. $\text{F}_2(g) + 2 \text{Fe}_2\text{I}(aq) \rightarrow 2 \text{Fe}_2\text{F}(aq) + \text{I}_2(l)$
- C. $2 \text{F}(g) + \text{FeI}_2(aq) \rightarrow \text{FeF}_2(aq) + 2 \text{I}(l)$
- D. $\text{F}(g) + \text{Fe}_2\text{I}(aq) \rightarrow \text{Fe}_2\text{F}(aq) + \text{I}(l)$

Ch 16

60.

A certain chemical reaction has 2 steps.



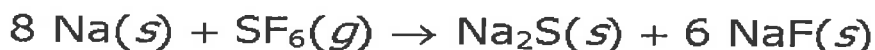
In Step 1, ammonia (NH_3) reacts with acetic acid ($\text{C}_2\text{H}_4\text{O}_2$) to produce ammonium acetate ($\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$). In Step 2, at high temperatures, $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$ converts into acetamide ($\text{C}_2\text{H}_5\text{NO}$) and water (H_2O). Classify the chemical reactions in Step 1 and Step 2.

- A. Synthesis and decomposition
- B. Synthesis and single replacement
- C. Decomposition and single replacement
- D. Double replacement and single replacement

61.

Ch 10

At room temperature, sodium (Na) reacts with sulfur hexafluoride (SF₆) to produce sodium sulfide (Na₂S) and sodium fluoride (NaF).



Which statement correctly describes the information provided by this balanced chemical equation?

- Ch 12 62.
- A. The products have a larger mass than the reactants.
 - B. The products have a smaller mass than the reactants.
 - C. The total number of moles of products is larger than the total number of moles of reactants.
 - D. The total number of moles of products is smaller than the total number of moles of reactants.

Assume that an electron in an atom has a constant speed. As the wavelength of the electron increases, how are the energy and the frequency of the electron affected?

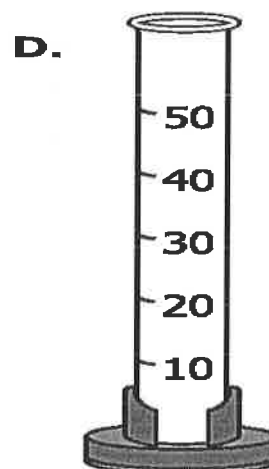
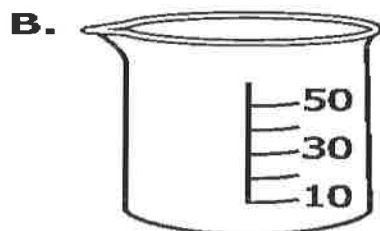
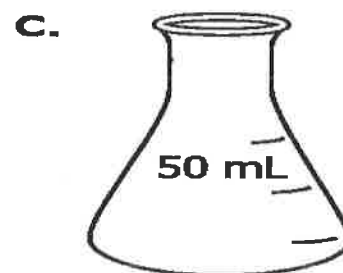
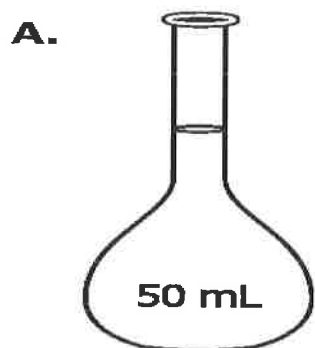
- WS 63.
- A. The energy increases and the frequency increases.
 - B. The energy increases and the frequency decreases.
 - C. The energy decreases and the frequency decreases.
 - D. The energy decreases and the frequency increases.

Which statement is an accurate description of Period 3 in the periodic table?

- A. It contains elements with the same number of protons.
- B. It contains elements with the same number of valence electrons.
- C. It contains elements with outermost protons in the same principal energy level.
- D. It contains elements with outermost electrons in the same principal energy level.

Ch 6 7 64.

Which device can a student use to most accurately measure 50 mL of water?



65.

A11

What is the volume, in mL, of a sample of glycerol with a density of 1.20 g/mL and a mass of 43.7 g ?

- A. 36.4
- B. 42.5
- C. 44.9
- D. 52.4

Ch 2 66.

Which statement is always true for a compound?

- A. It is homogeneous.
- B. It contains only 1 element.
- C. Its chemical composition varies.
- D. It decomposes by physical means.

Ch 3 67.

What is the correct chemical formula for iron(III) sulfide?

- A. Fe_2S_3
- B. Fe_3S_2
- C. $\text{Fe}_2(\text{SO}_4)_3$
- D. $\text{Fe}_3(\text{SO}_4)_2$

Ch 8 68.

Using a Bunsen burner, Melina heats a 12.50 g sample of a hydrate of iridium(III) bromide in a large crucible to drive off all of the associated water. After removing all of the water, the mass of the anhydrous salt was 10.72 g. What is the empirical formula of the hydrate?

- A. $\text{IrBr}_3 \cdot 2 \text{H}_2\text{O}$
- B. $\text{IrBr}_3 \cdot 3 \text{H}_2\text{O}$
- C. $\text{IrBr}_3 \cdot 4 \text{H}_2\text{O}$
- D. $\text{IrBr}_3 \cdot 5 \text{H}_2\text{O}$

Ch 10 69.


When a chemist drops potassium (K) metal into water (H₂O), hydrogen (H₂) gas is released and a solution of potassium hydroxide (KOH) forms. What is the balanced chemical equation for this reaction, including the appropriate symbols of state for each species?

- A.** $2 \text{K}(s) + 2 \text{H}_2\text{O}(l) \rightarrow \text{H}_2(g) + 2 \text{KOH}(aq)$
B. $2 \text{K}(s) + 2 \text{H}_2\text{O}(aq) \rightarrow \text{H}_2(g) + 2 \text{KOH}(s)$
C. $\text{K}(s) + \text{H}_2\text{O}(l) \rightarrow \text{H}_2(g) + \text{KOH}(aq)$
D. $\text{K}(s) + \text{H}_2\text{O}(aq) \rightarrow \text{H}_2(g) + \text{KOH}(s)$

ch 10

70.

Jovan placed 10 mL of aqueous aluminum sulfate (Al₂(SO₄)₃) into 2 separate test tubes. Then, he added a 2 g sample of magnesium (Mg) metal into one test tube and a 2 g sample of copper (Cu) metal into the other test tube. Use the Activity Series of Metals to determine which balanced chemical reaction occurs.

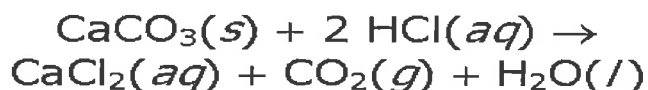
Activity Series of Metals		
decreasing activity 	Lithium	Li
	Potassium	K
	Calcium	Ca
	Sodium	Na
	Magnesium	Mg
	Aluminum	Al
	Zinc	Zn
	Iron	Fe
	Lead	Pb
	Copper	Cu
	Silver	Ag

- A.** $3 \text{Mg}(s) + \text{Al}_2(\text{SO}_4)_3(aq) \rightarrow 3 \text{MgSO}_4(aq) + 2 \text{Al}(s)$
B. $3 \text{Mg}(s) + \text{Al}_2(\text{SO}_4)_3(aq) \rightarrow 3 \text{MgO}(s) + \text{Al}_2\text{S}_3(aq) + 3 \text{O}_3(g)$
C. $3 \text{Cu}(s) + \text{Al}_2(\text{SO}_4)_3(aq) \rightarrow 3 \text{CuSO}_4(aq) + 2 \text{Al}(s)$
D. $3 \text{Cu}(s) + \text{Al}_2(\text{SO}_4)_3(aq) \rightarrow 3 \text{CuO}(s) + \text{Al}_2\text{S}_3(aq) + 3 \text{O}_3(g)$

ch 10

71.

Calcium carbonate (CaCO_3) reacts with hydrochloric acid (HCl) to produce calcium chloride (CaCl_2), carbon dioxide (CO_2), and water (H_2O).

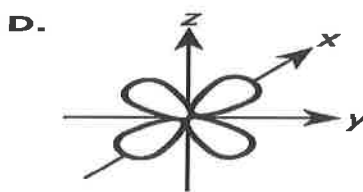
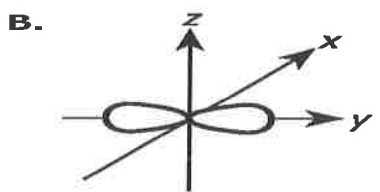
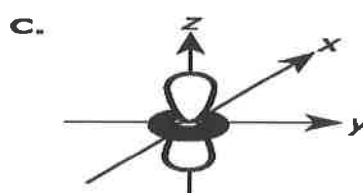
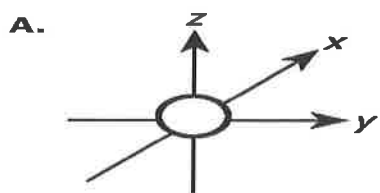


A chemistry student adds 21.54 g of CaCO_3 to an excess of HCl . Assuming the reaction goes to completion, how many grams of CO_2 does the reaction produce?

- A.** 3.877
B. 9.471
C. 23.88
D. 48.99

Ch 10 72.

These representations show 4 different types of atomic orbitals. Which type of atomic orbital contains the outermost electron in a neutral neon (Ne) atom?



Ch 3 73.

What is the electron configuration of a neutral arsenic (As) atom?

- A.** $[\text{Ar}] 4s^2 3d^{10} 4p^3$
B. $[\text{Ar}] 4s^2 3d^{10} 4p^4$
C. $[\text{Ar}] 4s^2 4d^{10} 4p^3$
D. $[\text{Ar}] 4s^2 4d^{10} 4p^4$

Ch. 7 74.

Cobalt-60 (${}^{60}_{27}\text{Co}$) is an isotope of elemental Co. How many protons and neutrons are in the nucleus of a neutral ${}^{60}_{27}\text{Co}$ atom?

- A. 27 protons and 33 neutrons
- B. 27 protons and 60 neutrons
- C. 33 protons and 27 neutrons
- D. 33 protons and 60 neutrons

Ch 5 75.

Hypothetical Element Q has 3 isotopes with the relative abundances shown in this table.

Isotopes of Element Q		
Isotope	Atomic mass (amu)	Relative abundance (%)
1	53.00	40.00
2	56.60	35.00
3	58.90	25.00

What is the average atomic mass, in amu, of Element Q ?

- A. 56.62
- B. 56.17
- C. 55.97
- D. 55.74

Ch 5 76.

Which set of elements has the same valence electron configuration as germanium (Ge) ?

- A. Aluminum (Al), antimony (Sb), and polonium (Po)
- B. Arsenic (As), bromine (Br), and gallium (Ga)
- C. Carbon (C), lead (Pb), and silicon (Si)
- D. Indium (In), oxygen (O), and phosphorus (P)

Ch 6 77.

What is the orbital diagram for the outermost electrons in the ruthenium(III) ion (Ru^{3+}) ?

- A.** $5s$ $\boxed{\uparrow\downarrow}$ $4d$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow}$ $\boxed{}$ $\boxed{}$
B. $5s$ $\boxed{\uparrow\downarrow}$ $4d$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{}$ $\boxed{}$
C. $5s$ $\boxed{\uparrow}$ $4d$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{}$
D. $5s$ $\boxed{}$ $4d$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$

What is the orbital diagram for the outermost electrons in a neutral chlorine (Cl) atom?

- A.** $3s$ $\boxed{\uparrow\downarrow}$ $3p$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\uparrow}$ $\boxed{\uparrow}$
B. $3s$ $\boxed{\uparrow\downarrow}$ $3p$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow}$
C. $3s$ $\boxed{\uparrow}$ $3p$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$
D. $3s$ $\boxed{\uparrow}$ $3p$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\uparrow}$

This table shows the percent composition data for an unknown organic compound.

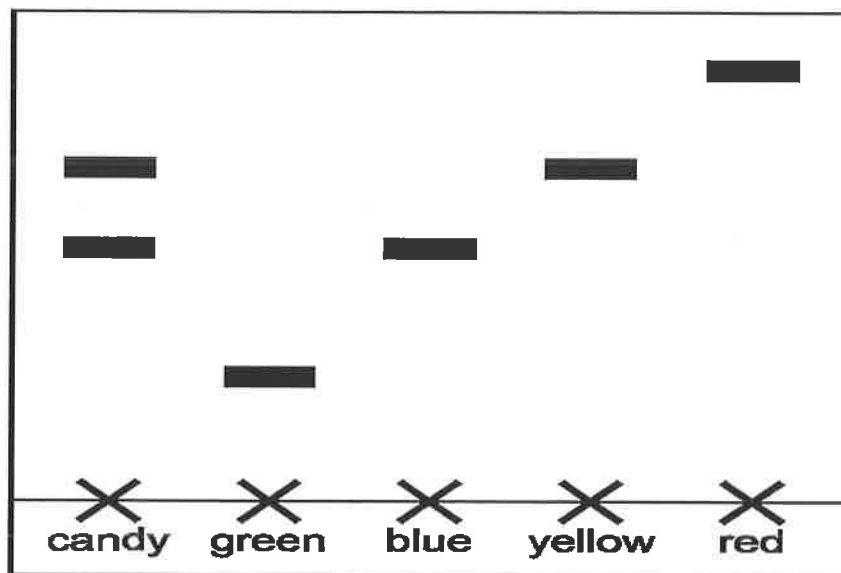
Element	% Composition
C	70.54
H	10.66
O	18.80

What is the empirical formula of this compound?

- A.** $\text{C}_5\text{H}_9\text{O}$
B. $\text{C}_6\text{H}_{11}\text{O}$
C. $\text{C}_7\text{H}_{10}\text{O}_2$
D. $\text{C}_8\text{H}_8\text{O}_2$

A student performs a chromatography experiment to identify the dye(s) present in a sample of candy. The student compares the results of this sample to the results obtained for pure samples of green, blue, yellow, and red dyes.

Results of Candy Chromatography Experiment



Which statement best describes the dye content of the candy sample?

- A. It contains only blue dye.
 - B. It contains only green dye.
 - C. It contains both blue and yellow dyes.
 - D. It contains both green and yellow dyes.
- 81.

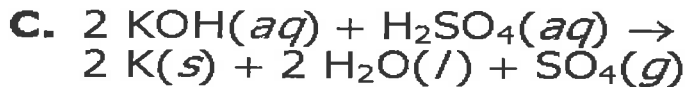
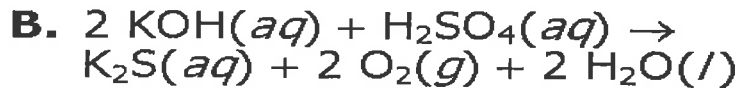
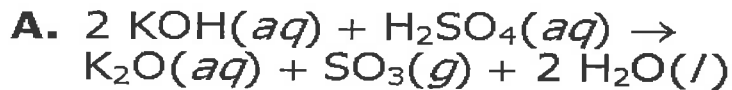
A11

At very high temperatures, aluminum metal reacts with chromium(III) oxide to produce aluminum oxide and chromium metal. What is the balanced chemical equation for this reaction?

- A. $2 \text{Al}(s) + \text{CrO}_3(s) \rightarrow \text{Al}_2\text{O}_3(s) + \text{Cr}(l)$
 - B. $2 \text{Al}(s) + \text{Cr}_2\text{O}_3(s) \rightarrow \text{Al}_2\text{O}_3(s) + 2 \text{Cr}(l)$
 - C. $3 \text{Al}(s) + \text{Cr}_3\text{O}_2(s) \rightarrow \text{Al}_3\text{O}_2(s) + 3 \text{Cr}(l)$
 - D. $6 \text{Al}(s) + \text{Cr}_3\text{O}_4(s) \rightarrow 2 \text{Al}_3\text{O}_2(s) + 3 \text{Cr}(l)$
- 82.

h/w

Chemists use sulfuric acid (H_2SO_4) to neutralize potassium hydroxide (KOH). What is the balanced chemical equation for this reaction?



Ch 10



What is the wavelength, in m, of red light with a frequency of 5.80×10^{14} Hz?

A. 3.85×10^{-19}

B. 5.17×10^{-7}

C. 1.93×10^6

Ch 5

84. **D.** 1.74×10^{23}

What is the shape of the atomic orbital occupied by the outermost electron in a neutral cesium (Cs) atom?

A. Cylinder

B. Dumbbell

C. Oval

Ch 5

85. **D.** Sphere

For a homework assignment, Keisha must determine which ground state element has the greatest number of unpaired electrons. Which element is her correct answer?

- A. Arsenic (As)
- B. Germanium (Ge)
- C. Iron (Fe)
- D. Selenium (Se)

Q5
86.

How did Henry G. J. Moseley change the periodic table created by Dmitri Mendeleev?

- A. He added all of the period 6 elements.
- B. He added a new column for the Group 1A metals.
- C. He ordered the elements using their atomic numbers.
- D. He ordered the elements in blocks of metals and nonmetals.

Q57
87.

Which element is a metal in period 5 of the periodic table?

- A. Strontium (Sr)
- B. Iodine (I)
- C. Calcium (Ca)
- D. Arsenic (As)

Q67
88.

Which list contains elements arranged in order of increasing electronegativity?

- A. Be, B, C, F
- B. Br, Se, Ga, K
- C. N, P, As, Sb
- D. O, Ge, In, Hg

Q7
89.

Which set contains only physical properties?

- A.** Color, taste, ability to rust
- B.** Boiling point, solubility, viscosity
- C.** Density, flammability, freezing point
- D.** Melting point, odor, reactivity to light

Ch 3

90.

A chemist purchases a small gas cylinder containing 150.0 g of phosphorus trifluoride (PF_3) gas. How many molecules of PF_3 are in the gas cylinder?

- A.** 3.531×10^{23}
- B.** 1.026×10^{24}
- C.** 3.734×10^{25}
- D.** 1.433×10^{26}

B 11

91.

Which balanced chemical equation is a single replacement reaction?

- A.** $2 \text{K}(s) + \text{Br}_2(l) \rightarrow 2 \text{KBr}(s)$
- B.** $2 \text{HgO}(s) \rightarrow 2 \text{Hg}(l) + \text{O}_2(g)$
- C.** $\text{Zn}(s) + \text{CuSO}_4(aq) \rightarrow \text{ZnSO}_4(aq) + \text{Cu}(s)$
- D.** $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{AgCl}(s)$

Ch 10

92.

Which balanced chemical equation contains the correct product(s) for the reaction of rubidium (Rb) solid with chlorine (Cl_2) gas?

- A.** $\text{Rb}(s) + \text{Cl}_2(g) \rightarrow \text{RbCl}_2(s)$
- B.** $\text{Rb}(s) + \text{Cl}_2(g) \rightarrow \text{RbCl}(s) + \text{Cl}(g)$
- C.** $2 \text{Rb}(s) + \text{Cl}_2(g) \rightarrow 2 \text{RbCl}(s)$
- D.** $2 \text{Rb}(s) + 3 \text{Cl}_2(g) \rightarrow 2 \text{RbCl}_2(s) + 2 \text{Cl}(g)$

Ch 10

93.

What is the correct balanced chemical equation for the complete combustion of octane (C_8H_{18}) ?

- Ch 10 94. **A.** $C_8H_{18}(l) + 4 O_2(g) \rightarrow 8 CO(g) + 9 H_2(g)$
B. $C_8H_{18}(l) + 8 O_2(g) \rightarrow 8 CO_2(g) + 9 H_2(g)$
C. $2 C_8H_{18}(l) + 17 O_2(g) \rightarrow 16 CO(g) + 18 H_2O(l)$
D. $2 C_8H_{18}(l) + 25 O_2(g) \rightarrow 16 CO_2(g) + 18 H_2O(l)$

In water, ammonia (NH_3) reacts with nitric acid (HNO_3) to produce ammonium nitrate (NH_4NO_3).



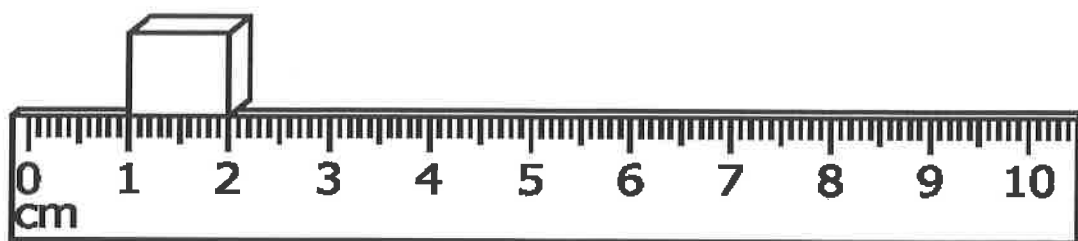
Dana carefully adds 0.550 mol of NH_3 to an excess of HNO_3 . What is the maximum number of grams of NH_4NO_3 that the reaction can produce?

- A.** 44.0
B. 53.4
C. 115
Ch 12 95. **D.** 146

A student measures the mass of a nickel on an analytical balance and records a result of 4.947 g in her laboratory notebook. The United States Mint has a specification of 5.000 g for the mass of a nickel. Assuming the United States Mint's specification is the actual mass of a nickel, what is the percent error associated with the student's measurement?

- A.** 1.071%
B. 1.060%
C. 0.01071%
Ch 12 96. **D.** 0.01060%

A student measures the side of a solid aluminum cube, as shown.



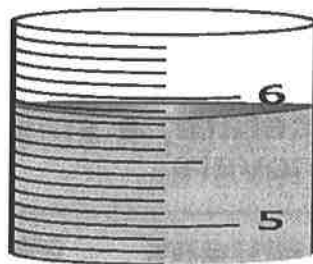
How many significant figures should the student use to report the measurement?

- A. 1; 1 cm
- B. 2; 1.0 cm
- C. 3; 1.00 cm
- D. 4; 1.000 cm

A))

97.

Report the measurement shown in the figure with the correct number of significant figures.



- A. 6 mL
- B. 5.8 mL
- C. 5.84 mL
- D. 5.840 mL

A))

98.

In which set of measurements are all 3 values reported with the same number of significant figures?

- A. 8900 m, 7.2 m, 0.060 m
- B. 1005 m, 250 m, 8.03 m
- C. 3800 m, 171 m, 0.525 m
- D. 6210 m, 49.0 m, 5.000 m

A))

99.

An irregular solid with a mass of 6.253 g is placed in a graduated cylinder with 6.01 mL of water. The volume in the graduated cylinder increases to 8.31 mL. Using the correct number of significant figures, what is the density of the irregular solid?

- A. 2.719 g/mL
- B. 2.72 g/mL
- C. 2.7 g/mL
- D. 3 g/mL

Ch 2 100.

Sodium stearate, a surfactant, is a common ingredient in soaps. Surfactants reduce the surface tension of water, allowing for easy removal of dirt from a surface such as human skin or clothing. The chemical formula for sodium stearate is $\text{CH}_3(\text{CH}_2)_{16}\text{COONa}$. How many carbon atoms are in 1 formula unit of sodium stearate?

- A. 3
- B. 18
- C. 20
- D. 36

Ch 11 101.

This table shows the mass composition of a sample of ethyl acetate, a solvent used in some fingernail polish removers.

Element	Mass Composition (g)
C	6.16
H	1.03
O	4.11

If the molar mass of ethyl acetate is 88.10 g/mol, what is the molecular formula for ethyl acetate?

- A. $\text{C}_2\text{H}_4\text{O}$
- B. $\text{C}_3\text{H}_4\text{O}_3$
- C. $\text{C}_4\text{H}_8\text{O}_2$
- D. C_6HO_4

102.

Ch 11