

Question Source:

MTLE (Minnesota) Chemistry Sample Test

Which of the following mathematical equations would be most helpful to a chemist trying to determine the age of a bone found at an archeological site?

a. $\ln(A/A_0) = -kt$

b. $y = mx + b$

c. $\Delta G = \Delta H - T\Delta S$

d. $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Correct Response: A

Question Source:

MTLE (Minnesota) Chemistry Sample Test

A chemistry teacher plans the student activities listed below as part of a new unit of study.

- **comparing new terminology with related terminology from previous units**
- **developing nonverbal representations (e.g., charts, illustrations) of new terminology**
- **classifying new terminology according to specific criteria**
- **generating analogies with new terminology**

These activities are likely to promote students' reading comprehension related to this unit primarily in which of the following ways?

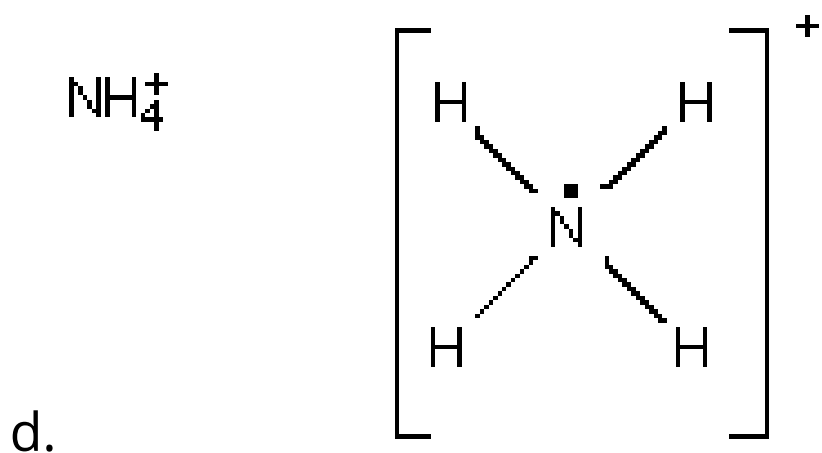
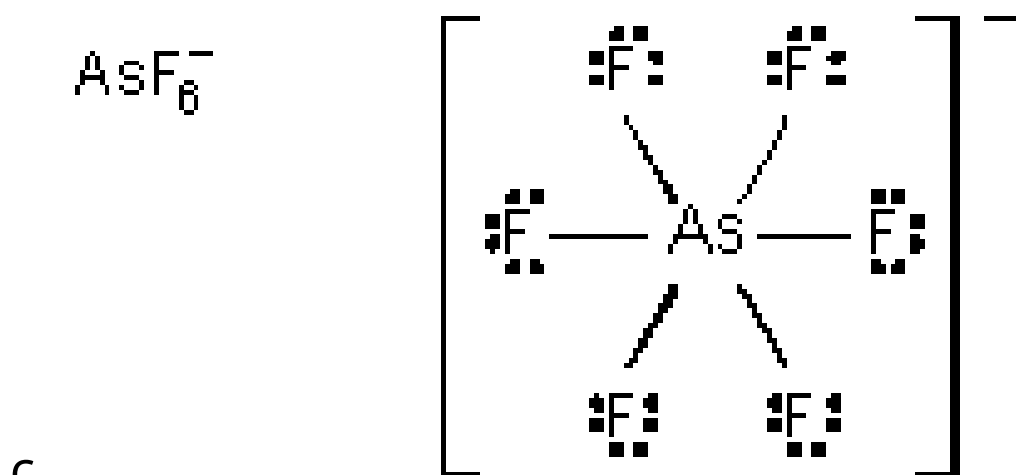
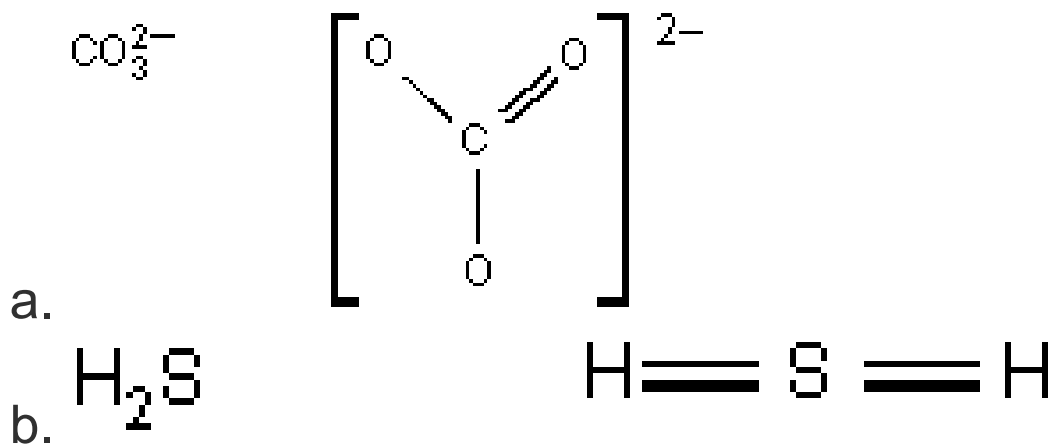
- a. by providing the students with strategies for determining the meaning of unfamiliar vocabulary as they read
- b. by promoting the students' ability to decode and spell new vocabulary words accurately
- c. by teaching the students how to use structural analysis as a strategy for building domain-specific vocabulary
- d. by broadening the students' understanding of new vocabulary words and their associated concepts

Correct Response: D

Question Source:

MTLE (Minnesota) Chemistry Sample Test

Which of the following compounds is paired with its correct Lewis dot structure?



Correct Response: C

Question Source:

MTLE (Minnesota) Chemistry Sample Test

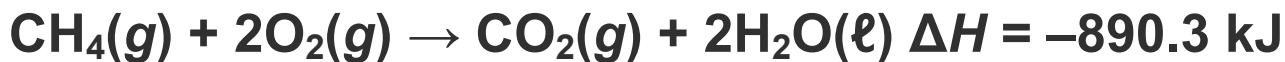
An ionic compound is most likely to form when a Group 1 element is reacted with an element from Group:

- a. 2.
- b. 6.
- c. 11.
- d. 17.

Correct Response: D

Question Source:

MTLE (Minnesota) Chemistry Sample Test



A chemical equation is shown and reads as follows; Capital C capital H subscript four, gas, reacts with two capital O subscript two, gas, to produce capital C capital O subscript two, gas, and two capital H subscript two capital O, liquid.

The enthalpy change for the reaction is equal to negative eight hundred ninety point three kilojoules.

Given the balanced equation for the combustion of methane shown above, how many moles of methane would need to be reacted in order to produce 3561 kJ of energy?

- a. 2
- b. 4
- c. 8
- d. 16

Correct Response: B

Question Source:

MTLE (Minnesota) Chemistry Sample Test



In the reaction shown above, 2 mol two moles of electrons are transferred to H^+ and the standard electrochemical cell potential is 0.25 V.zero point two five volts Based on this information, what is the value of the standard Gibbs free energy change for this reaction?

- a. -12 kJ/mol
- b. -24 kJ/mol
- c. -48 kJ/mol
- d. -220 kJ/mol

Correct Response: C

Question Source:

MTLE (Minnesota) Chemistry Sample Test

2. The widely different melting points of CaCl_2 and CH_4 shown in the table below can be attributed to which of the following differences between the two compounds?

Compound	Melting Point ($^{\circ}\text{C}$)
CaCl_2	775
CH_4	-182.5

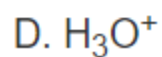
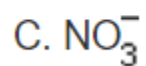
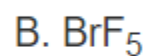
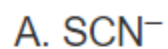
- A. The molar mass of CaCl_2 is greater than the molar mass of CH_4 .
- B. The two compounds are in different states at standard temperature and pressure conditions.
- C. The two compounds have a different number of valence electrons.
- D. The attractive forces between CH_4 molecules are weaker than the attractive forces present between the ions that form CaCl_2 .

Correct Response: D

Question Source:

MTLE (Minnesota) Chemistry Sample Test

3. Which of the following compounds has a linear molecular geometry?



Correct Response: A

Question Source:

MTLE (Minnesota) Chemistry Sample Test

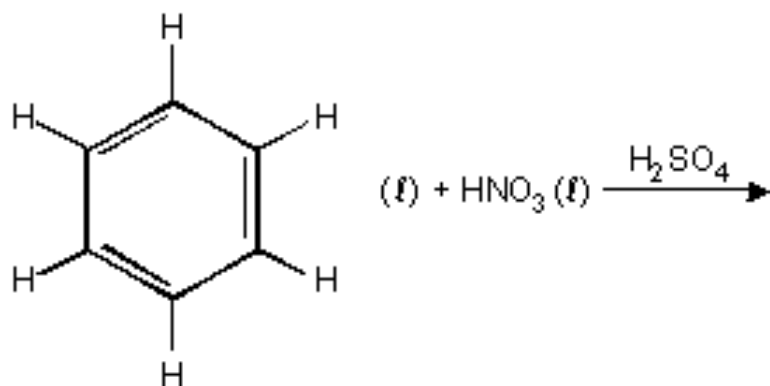
A chemical reaction is proposed to take place in a single elementary step. Which of the following provides the best evidence to support the proposed reaction mechanism?

- a. The balanced chemical equation for the reaction consists of a single reactant.
- b. The experimentally determined rate law is equal to the rate law consistent with a single elementary step.
- c. The reaction mechanism does not involve the formation of reaction intermediates.
- d. The rate constant for the rate law corresponding to the single elementary step is equal to one.

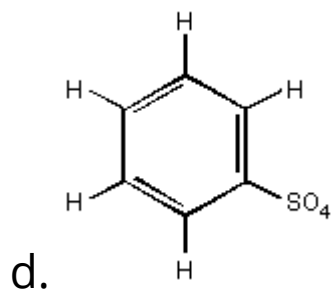
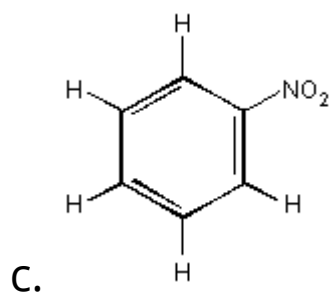
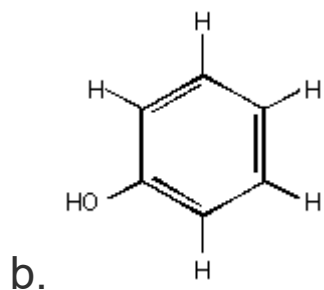
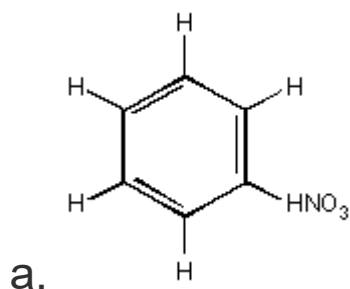
Correct Response: B

Question Source:

MTLE (Minnesota) Chemistry Sample Test



Which of the following is a product of the reaction shown above?



Correct Response: C

Question Source:

MTLE (Minnesota) Middle Level Science Sample Test

Radioactive isotope labeling using elements such as carbon and nitrogen has contributed most significantly to biology by facilitating the:

- a. creation of diffraction images for deducing the chemical structure of nucleotides.
- b. use of spectral analysis to determine the chemical composition of biomolecules.
- c. analysis of the movement of molecules during biochemical processes.
- d. ability to physically separate large macromolecules such as proteins from the cell cytoplasm.

Correct Response: C

Question Source:

MTLE (Minnesota) Middle Level Science Sample Test

During a unit on crime scene chemistry, students find a message written in blue ink on a piece of white paper. There are three different brands of blue-ink pens at the scene, and the students need to figure out which pen may have written the message. Which of the following techniques would be most appropriate for this activity?

- a. titration
- b. chromatography
- c. Distillation
- d. electrophoresis

Correct Response: B

Question Source:

MTLE (Minnesota) Middle Level Science Sample Test

A chemical substance with which of the following properties would be classified as a base?

- a. an aqueous substance that can accept hydrogen ions
- b. a substance that produces hydrogen ions during a reaction
- c. an ionic compound with a positive charge
- d. an element that reacts with negative ions to produce a neutral compound

Correct Response: A