

Question Source:

## Florida Middle Grades General Science Sample Test

A gas is at standard temperature and pressure. If the volume is doubled and the temperature is held constant, the pressure of the gas is

- A. halved.
- B. doubled.
- C. tripled.
- D. squared.

Correct Answer: A

Competency 1

Question Source:

Florida Middle Grades General Science Sample Test

Which of the following models calculates energy levels and determines the number of electrons orbiting the nucleus of an atom?

- A. the Bohr model
- B. the Dalton model
- C. the Rutherford model
- D. the Thomson model

Correct Answer: A

Competency 1

Question Source:

Florida Middle Grades General Science Sample Test

Element X exists as a diatomic molecule and is not hydrogen.

Where on the periodic table is element X located?

- A. the right side
- B. the left side
- C. the middle
- D. the bottom

Correct Answer: A

Competency 1

Question Source:

Florida Middle Grades General Science Sample Test

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There are two electrons in the outer energy level of calcium and six electrons in the outer energy level of oxygen. What type of bond would form between calcium and oxygen?

- A. ionic
- B. covalent
- C. metallic
- D. nuclear

Correct Answer: A

Competency 1



Question Source:

## Florida Middle Grades General Science Sample Test

The information about toxic chemicals and hazards that schools must make available to teachers can be found in

- A. material safety data sheets.
- B. Occupational Safety and Health Administration codes.
- C. National Institutes of Health guidelines.
- D. fire safety codes.

Correct Answer: A

Competency 8

Question Source:

Florida Middle Grades General Science Sample Test

Although scientific knowledge is durable and robust, it is also

- A. highly subjective.
- B. recognized as static.
- C. open to change.
- D. associated with philosophy.

Correct Answer: C

Competency 9

Question Source:

Florida Middle Grades General Science Sample Test

Students in a beginning chemistry class frequently use computer simulations to work with volatile substances. What is the best reason for using these simulations?

- A. Models of dangerous activities are safer.
- B. Exercises are completed more quickly.
- C. Students get better, more reliable results.
- D. Virtual labs provide hands-on experience.

Correct Answer: A

Competency 9

Question Source:

FTCE (Florida) Chemistry Sample Test

Which of the following is an example of a pure substance?

- A. solid concrete
- B. ocean water
- C. liquid mercury
- D. Earth's atmosphere

Correct Answer: C

Competency 1



Question Source:

## FTCE (Florida) Chemistry Sample Test

How many milliliters of 18 *M* sulfuric acid ( $\text{H}_2\text{SO}_4$ ) must be added to water in order to make a total volume of 250 mL of 0.20 *M*  $\text{H}_2\text{SO}_4$ ?

- A. 28.0 mL
- B. 5.6 mL
- C. 2.8 mL
- D. 1.4 mL

Correct Answer: C

Competency 1

Question Source:

## FTCE (Florida) Chemistry Sample Test

A teacher wishes to demonstrate crystallization of sodium acetate. Which of the following procedures would allow the teacher to accomplish this?

- A. Prepare a dilute solution of sodium acetate in cold water and then allow it to warm to room temperature. Adding more water will cause crystallization.
- B. Prepare a dilute sodium acetate solution at room temperature and then heat it. Crystallization will start when the solution begins to boil.
- C. Prepare a concentrated sodium acetate solution in hot water and then allow it to cool. Adding a grain of sodium acetate will initiate crystallization.
- D. Prepare a concentrated solution of sodium acetate at room temperature and then cool the solution. Crystallization will begin when the solution reaches  $0^{\circ}\text{C}$ .

Correct Answer: C

Competency 1

Question Source:

FTCE (Florida) Chemistry Sample Test

The density of hydrogen sulfide gas ( $\text{H}_2\text{S}$ ) at STP is

- A. 0.94 g/L.
- B. 1.52 g/L.
- C. 2.16 g/L.
- D. 2.79 g/L.

Correct Answer: B

Competency 1

Question Source:

FTCE (Florida) Chemistry Sample Test

A sealed tube contains 1.0 mole of neon gas. When the temperature of the sample is increased, the pressure also increases. In terms of kinetic molecular theory, which of the following most appropriately explains this change?

- A. A chemical decomposition reaction has occurred.
- B. Ideal gas molecules exert no attraction to one another.
- C. The atoms of neon are considered to be point masses.
- D. Particles collide more frequently with the container walls.

Correct Answer: D

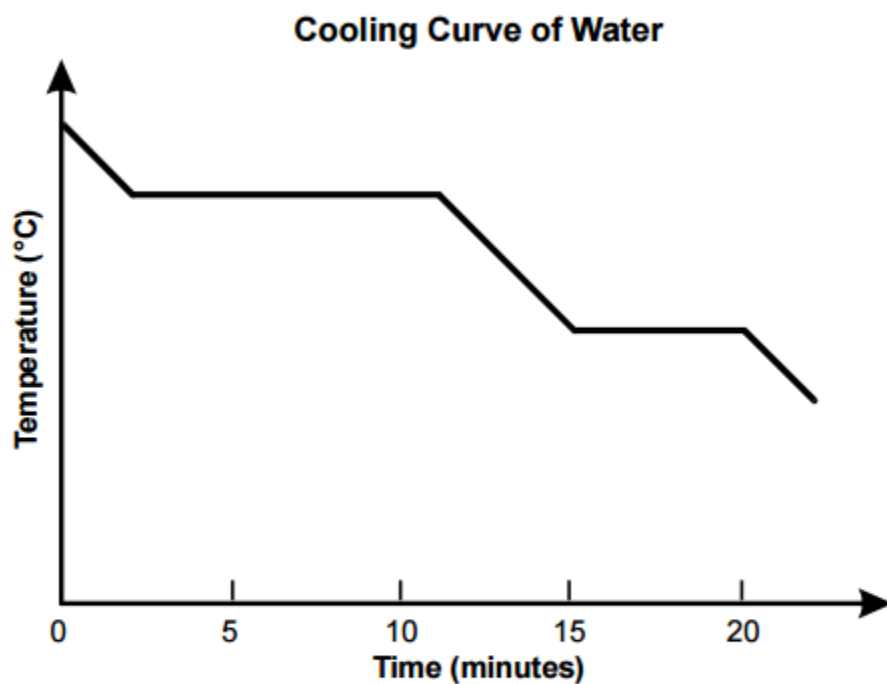
Competency 2



Question Source:

FTCE (Florida) Chemistry Sample Test

Given the following cooling curve for a closed container of  $\text{H}_2\text{O}$  placed in a thermostated cooling bath, what is the most likely initial temperature of the  $\text{H}_2\text{O}$ ?



- A.  $0^{\circ}\text{C}$
- B.  $25^{\circ}\text{C}$
- C.  $100^{\circ}\text{C}$
- D.  $105^{\circ}\text{C}$

Correct Answer: D

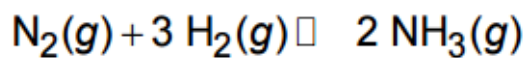
Competency 2

Question Source:

FTCE (Florida) Chemistry Sample Test

What is the standard free-energy change ( $\Delta G_{\text{rxn}}^{\circ}$ ) for the following reaction at 298K?

$$[\Delta G_{\text{f}}^{\circ}(\text{NH}_3) = -16.66 \text{ kJ/mol}]$$



- A.  $-16.66 \text{ kJ}$
- B.  $-17.89 \text{ kJ}$
- C.  $-33.32 \text{ kJ}$
- D.  $-49.65 \text{ kJ}$

Correct Answer: C

Competency 2

Question Source:

FTCE (Florida) Chemistry Sample Test

The production of steam in a nuclear power plant is an example of a transformation from nuclear energy to

- A. chemical energy.
- B. electromagnetic energy.
- C. electrical energy.
- D. thermal energy.

Correct Answer: D

Competency 2

Question Source:

FTCE (Florida) Chemistry Sample Test

An aqueous solution of which of the following is LEAST likely to conduct electricity?

A.  $\text{MgBr}_2$

B.  $\text{HCl}$

C.  $\text{SO}_2$

D.  $\text{CH}_4$

Correct Answer: D

Competency 3



Question Source:

FTCE (Florida) Chemistry Sample Test

Molecular orbital theory describes the respective bond orders in  $\text{H}_2$ ,  $\text{H}_2^+$ , and  $\text{H}_2^-$  as

- A. 1, 0, and 0.
- B. 1, 0, and  $\frac{1}{2}$ .
- C. 1,  $\frac{1}{2}$ , and  $\frac{1}{2}$ .
- D. 1,  $\frac{1}{2}$ , and 0.

Correct Answer: C

Competency 3

Question Source:

FTCE (Florida) Chemistry Sample Test

The correct IUPAC name for  $\text{CuSO}_4$  is

- A. copper(II) sulfide.
- B. copper(II) sulfite.
- C. copper(II) sulfate.
- D. copper(II) persulfate.

Correct Answer: C

Competency 3

Question Source:

FTCE (Florida) Chemistry Sample Test

Which of the following functional groups causes the greatest increase in the aqueous solubility of an organic compound?

- A.  $\text{R-COOH}$
- B.  $\text{R-OH}$
- C.  $\text{R-CHO}$
- D.  $\text{R-O-R}$

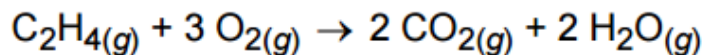
Correct Answer: A

Competency 3

Question Source:

FTCE (Florida) Chemistry Sample Test

According to the following equation, what volume of oxygen gas, measured at STP, is theoretically required for the complete combustion of 28.05 g of ethylene ( $\text{C}_2\text{H}_4$ ) to produce carbon dioxide and water?



- A. 11.2 L  $\text{O}_2$
- B. 22.4 L  $\text{O}_2$
- C. 33.6 L  $\text{O}_2$
- D. 67.2 L  $\text{O}_2$

Correct Answer: D

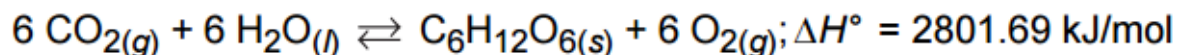
Competency 4



Question Source:

FTCE (Florida) Chemistry Sample Test

According to Le Châtelier's principle, what is the effect of a decrease in temperature on the following equilibrium reaction?



- A. The equilibrium shifts to the right.
- B. The equilibrium shifts to the left.
- C. The equilibrium remains unchanged.
- D. The equilibrium shift is unpredictable.

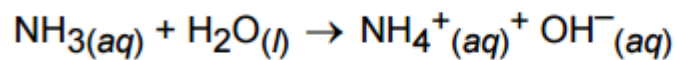
Correct Answer: B

Competency 4

Question Source:

FTCE (Florida) Chemistry Sample Test

What is the conjugate acid of  $\text{NH}_3$  in the following reaction?



- A.  $\text{H}_2\text{O}$
- B.  $\text{H}_3\text{O}^+$
- C.  $\text{NH}_4^+$
- D.  $\text{OH}^-$

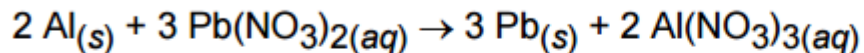
Correct Answer: C

Competency 4

Question Source:

FTCE (Florida) Chemistry Sample Test

Which half reaction indicates the oxidation process for the following reaction?



- A.  $\text{Al}_{(s)} + 3 \text{e}^- \rightarrow \text{Al}^{3+}_{(aq)}$
- B.  $\text{Al}_{(s)} \rightarrow \text{Al}^{3+}_{(aq)} + 3 \text{e}^-$
- C.  $\text{Pb}^{2+}_{(aq)} + 2 \text{e}^- \rightarrow \text{Pb}_{(s)}$
- D.  $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + 2 \text{e}^-$

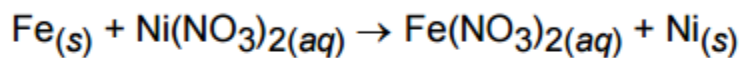
Correct Answer: B

Competency 4

Question Source:

FTCE (Florida) Chemistry Sample Test

The given chemical reaction is an example of which class of chemical reactions?



- A. single displacement
- B. combustion
- C. decomposition
- D. combination

Correct Answer: A

Competency 4



Question Source:

FTCE (Florida) Chemistry Sample Test

An atom containing 50 protons, 50 electrons, and 69 neutrons has a mass number of

- A. 50.
- B. 69.
- C. 119.
- D. 169.

Correct Answer: C

Competency 5

Question Source:

FTCE (Florida) Chemistry Sample Test

A complete octet of valence electrons usually leads to an element that has

- A. high stability and high reactivity.
- B. low stability and low reactivity.
- C. high stability and low reactivity.
- D. low stability and high reactivity.

Correct Answer: C

Competency 5

Question Source:

FTCE (Florida) Chemistry Sample Test

The alpha emitter  $^{226}_{88}\text{Ra}$  has a half-life of 1590 years. How much of a 12 g sample of  $^{226}_{88}\text{Ra}$  would remain after  $1.27 \times 10^4$  years?

- A. 0.024 g
- B. 0.047 g
- C. 0.096 g
- D. 0.190 g

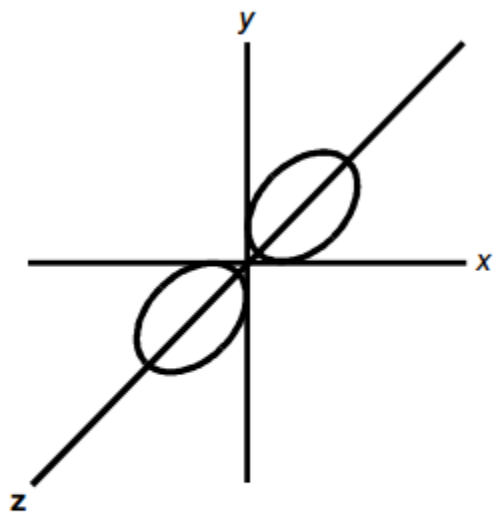
Correct Answer: B

Competency 5

Question Source:

FTCE (Florida) Chemistry Sample Test

The contour representation depicted in the diagram corresponds to which of the following orbitals?



- A. 2s
- B. p<sub>z</sub>
- C. d<sub>xz</sub>
- D. d<sub>z</sub><sup>2</sup>

Correct Answer: B

Competency 5



Question Source:

FTCE (Florida) Chemistry Sample Test

A team of researchers performs an experiment and obtains results they did not expect. Which of the following actions would be most appropriate for the researchers to do next?

- A. alerting the media about the new discovery and holding a press conference
- B. consulting other scientists regarding their opinions on the results
- C. redesigning the experiment based on the assumption that it is flawed
- D. repeating the experiment and comparing the second results with the first

Correct Answer: D

Competency 6

Question Source:

FTCE (Florida) Chemistry Sample Test

In a solubility experiment, students add various solutes (e.g., salt, sugar) to the same amount of water. The students observe that equal amounts of water dissolve different amounts of solutes. Identify the independent variable in the experiment.

- A. amount of solvent present
- B. amount of dissolved solute
- C. type of solute dissolved
- D. type of solvent utilized



Question Source:

FTCE (Florida) Chemistry Sample Test

The discovery in the 1940s that the nuclei of many elements possess an inherent spin is the basis of what modern day technology?

- A. x-ray machine
- B. magnetic resonance imaging
- C. ultrasound device
- D. computerized axial tomography

Correct Answer: B

Competency 6

Question Source:

FTCE (Florida) Chemistry Sample Test

Which of the following is equivalent to 550 nm?

A.  $5.5 \times 10^{-9} \text{ m}$

B.  $5.5 \times 10^{-7} \text{ m}$

C.  $5.5 \times 10^7 \text{ m}$

D.  $5.5 \times 10^9 \text{ m}$

Correct Answer: B

Competency 7



Question Source:

FTCE (Florida) Chemistry Sample Test

The expected result from a laboratory activity is 3.50 grams of a substance. Which of the following sets of values shows high precision and low accuracy?

- A. 2.48 g, 2.49 g, 2.50 g
- B. 2.49 g, 1.49 g, 4.49 g
- C. 3.49 g, 3.50 g, 3.48 g
- D. 3.59 g, 2.49 g, 1.49 g

Correct Answer: A

Competency 7

Question Source:

FTCE (Florida) Chemistry Sample Test

Find the density of an object with a mass of  $1.50 \times 10^2$  g and a volume of  $3.0 \times 10^1$  cm<sup>3</sup>.

A.  $D = 5.0 \times 10^0$  g/cm<sup>3</sup>

B.  $D = 5.0 \times 10^3$  g/cm<sup>3</sup>

C.  $D = 4.5 \times 10^1$  g • cm<sup>3</sup>

D.  $D = 4.5 \times 10^3$  g • cm<sup>3</sup>

Correct Answer: A

Competency 7

Question Source:

## FTCE (Florida) Chemistry Sample Test

A student would like to observe the pigments that make up the ink in a water-soluble black marker. Which of the following techniques is most appropriate for conducting this experiment?

- A. filtration
- B. distillation
- C. chromatography
- D. spectrophotometry

Correct Answer: C

Competency 8

Question Source:

FTCE (Florida) Chemistry Sample Test

School chemical waste disposal procedures are governed by the

- A. ACS Chemical Health and Safety Referral Service.
- B. Flinn Scientific Catalog/Reference Manual.
- C. CRC Handbook of Chemistry and Physics.
- D. U.S. Environmental Protection Agency.

Correct Answer: D

Competency 8



Question Source:

FTCE (Florida) Chemistry Sample Test

Which of the following is a violation of chemistry laboratory safety procedures?

- A. rolling up long sleeves
- B. tying back long hair
- C. using goggles and aprons
- D. wearing open-toed shoes

Correct Answer: D

Competency 8