This print-out should have 54 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Campion 05 Ex 01 04
001 10.0 points
How much heat is required to change the temperature of two cups of water (500 mL) from room temperature (25°C) to boiling?

1. 7.85 kJ
2. 15.7 kJ
3. 157 kJ
4. 1.57 kJ
5. 78.5 kJ
6. 0.785 kJ

Holt da 12 1 practice 1
002 10.0 points
What quantity of heat energy is released when 531 g of liquid water freezes?
Answer in units of kJ.

Holt da 12 rev 19b
003 10.0 points
The standard molar heat of vaporization for water is 40.79 kJ/mol. How much energy would be required to vaporize 43.0 g of water?
Answer in units of kJ.

Mlib 00 6035
004 10.0 points
The specific heat of liquid water is 4.184 J/g·°C. Calculate the energy required to heat 10.0 g of water from 26.5°C to 83.7°C.

1. None of these
2. 572 J
3. 837 J
4. 239 J
5. $2.39 \times 10^3$ J

LDE Electronic Configuration 006
005 10.0 points
What is the correct electronic configuration of magnesium, Mg?

1. $1s^22s^22p^8$
2. $1s^22s^22p^63s^2$
3. $1s^22s^{10}$
4. $1s^22s^42p^6$
5. $1s^22s^22p^23s^2$

LDE Electronic Configuration 009
006 10.0 points
What is the electronic configuration of an antimony atom (Sb)?

1. $[\text{Ar}]5s^24f^{14}4d^{10}4p^3$
2. $[\text{Kr}]5s^23d^{10}4p^3$
3. $[\text{Kr}]5s^24d^{10}4p^3$
4. $[\text{Kr}]5s^24d^{10}5p^3$
5. $[\text{Ar}]5s^24d^{10}4p^3$

Mlib 02 4059
007 10.0 points
What is the electronic configuration of calcium (Ca)?

1. $1s^22s^22p^63s^23p^44s^23d^2$
2. $1s^22s^22p^63s^23p^64s^2$
3. $1s^22s^22p^62d^{10}$
4. $1s^22s^23s^22p^63p^63d^2$
5. $1s^22s^22p^63s^23p^63d^2$

Brodbelt 05 10
What is the electron configuration of Mg$^{2+}$?

1. $1s^2 2s^2 2p^6 3s^2 3p^2$
2. $1s^2 2s^2 2p^6 3s^1$
3. $1s^2 2s^2 2p^6$
4. $1s^2 2s^2 2p^6 3s^2$
5. $1s^2 2s^2 2p^5$

Rank the following atoms in terms of decreasing atomic radius.

1. F, Mg, Na, O, N
2. F, O, N, Mg, Na
3. F, O, N, Na, Mg
4. Na, N, O, Mg, F
5. Na, Mg, N, O, F

Convert 58.5 calories to Joules.
Answer in units of $J$.

3010 J of heat are added to a 22.3 g sample of iron at 29°C. What is the final temperature of the iron? The specific heat of iron is 0.449 J/g · K.
Answer in units of $K$.

Rank the following species by radius, from largest to smallest: Cl$, K^+, Ca^{2+}, Ar, S^{2-}$.

1. S$^{2-}$, Cl$, Ar, K^+, Ca^{2+}$
2. Ca$^{2+}$, S$^{2-}$, Cl$, Ar, K^+$
3. Ar, K$^+$, Cl$, Ca^{2+}, S^{2-}$
4. Ar, K$^+$, Ca$^{2+}$, S$^{2-}$, Cl$^-$
5. K$^+$, Ca$^{2+}$, S$^{2-}$, Cl$^-$, Ar

How many valence electrons are in a Rn atom?

1. 8
2. 0
3. 7
4. 2
5. 16

Write the electron-dot notation for the element Cl.

1. . Cl :
2. Cl ·
3. : Cl :
4. . Cl ·
5. None of these
6. Cl :
7. . Cl :
8. Cl ·
9. Cl ·

Draw the Lewis structure for PCl$_3$. 
Which of the following is the correct Lewis formula for water (H₂O)?

1. $\cdot\cdot\cdot \overset{\cdot}{H} \overset{\cdot}{O} \overset{\cdot}{H} \cdot\cdot\cdot$
2. $\cdot\cdot\cdot \overset{\cdot}{H} \overset{\cdot}{O} \overset{\cdot}{H} \cdot\cdot\cdot$
3. $\cdot\cdot\cdot \overset{\cdot}{H} \overset{\cdot}{O} \overset{\cdot}{H} \cdot\cdot\cdot$

The electronic geometry of NH₃ (ammonia) is

1. trigonal planar.
2. linear.
3. trigonal pyramidal.
4. tetrahedral.
5. bent.

Use VSEPR theory to predict the molecular shape of the molecule whose Lewis structure is

\[ \cdot\cdot\cdot \overset{\cdot}{Cl} \overset{\cdot}{P} \overset{\cdot}{Cl} \cdot\cdot\cdot \]

1. linear
2. None of these
3. bent or angular
4. trigonal-bipyramidal
5. octahedral
6. trigonal-planar
7. tetrahedral
8. trigonal-pyramidal

The shape of a water molecule is
1. bent.
2. spherical.
3. linear.

Which of the following is the correct Lewis formula for carbon dioxide (CO$_2$)?

1. $\cdot \cdot \cdot O - C - O$
2. $\cdot \cdot \cdot : O - \cdot C - \cdot O \cdot$
3. $\cdot \cdot \cdot O - C \equiv O$
4. $\cdot \cdot \cdot : O - C = O$
5. $\cdot \cdot \cdot : O - C \equiv O$
6. $\cdot \cdot \cdot : O - \cdot C - \cdot O \cdot$
7. $\cdot \cdot \cdot O - \cdot C - \cdot O \cdot$
8. $\cdot \cdot \cdot : O - C - O$
9. $\cdot \cdot \cdot O = C = O$
10. $\cdot \cdot \cdot : O - C - \cdot O \cdot$

A 6.35 L sample of carbon monoxide is collected at 55.0°C and 0.892 atm. What volume will the gas occupy at 1.05 atm and 59.0°C?

1. 6.10 L
2. 6.68 L
3. 5.46 L
4. 1.96 L
5. 4.82 L

A(n) 3.9 L sample of gas at STP is cooled to $-55 ^\circ$C at 808 mm Hg pressure. What is the new volume?

1. 2.9 L
2. 5.2 L
3. 3.3 L
4. 4.6 L

A weather report gives a current atmospheric pressure reading of 608.1 mm Hg. Express this reading in atmospheres. Answer in units of atm.

Convert the pressure of 608.1 mm Hg to torrs. Answer in units of torr.

Convert the pressure of 608.1 mm Hg to kilopascals. Answer in units of kPa.
The lines in an atomic line emission spectrum are due to

1. the movement of electrons from lower energy states to higher energy states in atoms.

2. the movement of electrons from higher energy states to lower energy states in atoms.

3. nuclear transitions in atoms.

4. the presence of isotopes.

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**Bond Type Ionic**

**027 10.0 points**

Which pair of elements is most likely to form an ionic compound?

1. magnesium and fluorine

2. nitrogen and sulfur

3. sodium and aluminum

4. oxygen and chlorine

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**Mlib 00 7015**

**028 10.0 points**

All of the following elements are composed of diatomic molecules under normal conditions, except

1. nitrogen.

2. neon.

3. iodine.

4. fluorine.

5. oxygen.

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**Mlib 76 1086**

**029 10.0 points**

Which physical state is most highly ordered?

1. All are the same.

2. solid

3. liquid

4. gas

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**CIC T05 19**

**030 10.0 points**

Which figure best describes the hydrogen bonding between two water molecules?

1. [Diagram]

2. [Diagram]

3. [Diagram]

4. [Diagram]

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**Compounds 10**

**031 10.0 points**

In a solution, the substance that does the dissolving is the

1. solvent.

2. solute.

3. gas.

4. liquid.

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**Brodbelt 20054100**

**032 10.0 points**

Which of the following is true for strong acids?

1. They are almost totally ionized or dissociated in aqueous solutions.

2. They react only with weak bases.
3. After they lose a proton, they give rise to strong conjugate bases.

4. They are weak electrolytes.

5. Aqueous solutions of strong acids have a high pH.

6. They react only with strong bases.

Which of the following is NOT a property of bases?

1. Bases taste bitter.

2. Bases produce hydrogen ions, $\text{H}^+$, when added to water.

3. Bases make indicators change colors.

4. Bases feel slippery.

5. Bases react with acids.

A solution has a pH of 4.35. Find the pOH.

1. None of these

2. 4.35

3. 18.35

4. 9.65

A solution has $[\text{H}^+] = 2.0 \times 10^{-5}$ M. Find the pOH of this solution.

1. 5.20

2. 4.70

3. $-4.70$

Consider the chemical equation below:

$$\text{N}_2\text{O}_3(g) + 3\text{H}_2(g) \rightleftharpoons 3\text{H}_2\text{O}(g) + \text{N}_2(g)$$

What would $K_{eq}$ be for this reaction?

1. $K_{eq} = \frac{[\text{H}_2\text{O}]^3}{[\text{N}_2\text{O}_3][\text{H}_2]^3}$

2. $K_{eq} = \frac{[\text{H}_2\text{O}]^3[\text{N}_2]}{[\text{N}_2\text{O}_3][\text{H}_2]^3}$

3. $K_{eq} = \frac{[\text{N}_2\text{O}_3][\text{H}_2]^3}{[\text{H}_2\text{O}]^3[\text{N}_2]}$
4. \( K_{eq} = \frac{[N_2O_3][H_2]^3}{[H_2O]^3} \)

ChemPrin3e T09 42
039  10.0 points
Which of the following is TRUE?

1. A small value of \( K \) means that the equilibrium concentrations of the reactants are small compared to the equilibrium concentrations of the products.

2. When the value of \( K \) is small, the equilibrium lies on the product side of the equilibrium reaction.

3. A large value of \( K \) means that the equilibrium concentrations of products are large compared to the equilibrium concentrations of the reactants.

4. When the value of \( K \) is large, the equilibrium lies on the reactant side of the equilibrium reaction.

5. When the value of \( Q \) is large, the equilibrium lies on the product side of the equilibrium reaction.

Msci 12 1200
040  10.0 points
Which of the following statements about the Kinetic Theory of gases is false?

1. The distance between molecules is much larger than the diameter of each molecule.

2. All of the other answers are false.

3. Gases consist of molecules in continuous, random, straight-line motion.

4. Collisions between molecules are elastic.

5. The average kinetic energy of a gas molecule is independent of the temperature.

041  10.0 points
Which gas would have the highest velocity at 60°C, He or Ne?

1. Both would have the same velocity.

2. He

3. Ne

ACAMP304 E1 42
042  10.0 points
Hydrocarbons

1. react with oxygen to give \( H_2 \) and \( CO_2 \) plus heat.

2. are compounds of carbon, hydrogen, and oxygen.

3. react to give only water and carbon dioxide in every instance.

4. are compounds composed of carbon and hydrogen.

Correct name 1
043  10.0 points
A student who stresses too much about his grades has incorrectly named an organic compound 3-propylhexane. What is the correct name?

1. None of these

2. 1,1-dipropylpropane

3. 4-ethylhexane

4. 3-ethylhexane

5. 3-propylhexane

6. 4-ethylheptane

Mlib 12 1143
044  10.0 points
The ending -yne designates
1. a carbon-carbon single bond.
2. a carbon-carbon triple bond.
3. a carbon-carbon double bond.

In organic compounds, carbon usually forms
1. one bond.
2. four bonds.
3. three bonds.
4. two bonds.

The primary structure of a protein is the
1. overall shape or conformation of the molecule.
2. identity and sequence of amino acids present.
3. intermediate level of molecular organization.
4. association of one protein chain with another.

Determine the oxidation number of S in Na$_2$SO$_3$ if the oxidation number of Na is +1 and O is −2.
1. +1
2. −1
3. −4
4. +5
5. +4

What is the oxidation state of nitrogen in the molecule N$_2$?
1. 2
2. 3
3. 1
4. zero

What is the oxidation number of C in CH$_4$?
1. −2
2. +2
3. −4
4. +4
5. 0

Classify the reaction
2 HgO(s) → 2 Hg(ℓ) + O$_2$(g).
1. combustion
2. decomposition
3. synthesis
4. water forming

The chemical reaction
2 Bi + 3 H$_2$O → Bi$_2$O$_3$ + 3 H$_2$
represents a
1. single-replacement reaction.
2. decomposition reaction.
3. synthesis reaction.
4. double-replacement reaction.

Balance Equation 105

When the equation

\[ \text{? PbS} + \text{? O}_2 \rightarrow \text{? PbO} + \text{? SO}_2 \]

is balanced, the coefficients are

1. 1; 2; 1; 1
2. 2; 3; 2; 2
3. 2; 6; 4; 4
4. 4; 12; 4; 4
5. 2; 2; 1; 2

Brodbelt 434

Consider the reaction

\[ \text{CaCN}_2 + 3 \text{H}_2\text{O} \rightarrow \text{CaCO}_3 + 2 \text{NH}_3 . \]

How much \( \text{NH}_3 \) is produced if 187 g of \( \text{CaCO}_3 \) are produced?

1. 63.6 mol
2. 2.13 mol
3. 1.06 mol
4. 3.74 mol
5. 72.3 mol
6. 36.1 mol

What type of radiation is given off in the nuclear reaction

\[ ^{14}_6\text{C} \rightarrow ^{14}_7\text{N} + ? \]

1. gamma
2. neutron
3. alpha
4. beta