

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Lead (II) carbonate decomposes to give lead (II) oxide and carbon dioxide:

1) _____



How many grams of lead (II) oxide will be produced by the decomposition of 2.50 g of lead (II) carbonate?

- A. 0.41
- B. 2.61
- C. 2.50
- D. 2.09
- E. 0.00936

2) The formula weight of potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) is _____ amu.

2) _____

- A. 107.09
- B. 255.08
- C. 242.18
- D. 294.18
- E. 333.08

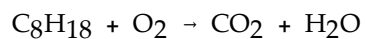
3) A combination of sand, salt, and water is an example of a _____.

3) _____

- A. solid
- B. heterogeneous mixture
- C. pure substance
- D. homogeneous mixture
- E. compound

4) When the following equation is balanced, the coefficients are _____.

4) _____



- A. 2, 25, 16, 18
- B. 2, 12, 8, 9
- C. 1, 4, 8, 9
- D. 2, 3, 4, 4
- E. 4, 4, 32, 36

5) Which atom has the largest number of neutrons?

5) _____

- A. potassium-39
- B. chlorine-37
- C. phosphorus-30
- D. argon-40
- E. calcium-40

6) There are _____ protons, _____ neutrons, and _____ electrons in $^{238}\text{U}^{+5}$.

6) _____

- A. 92, 92, 87
- B. 92, 146, 87
- C. 92, 146, 92
- D. 146, 92, 92
- E. 146, 92, 146

- 7) Which one of the following is an intensive property? 7) _____
- A. mass
 - B. amount
 - C. temperature
 - D. volume
 - E. heat content
- 8) Which compounds do not have the same empirical formula? 8) _____
- A. C_2H_4 , C_3H_6
 - B. CO, CO_2
 - C. $C_2H_5COOCH_3$, CH_3CHO
 - D. $C_2H_4O_2$, $C_6H_{12}O_6$
 - E. C_2H_2 , C_6H_6
- 9) An element cannot _____. 9) _____
- A. be part of a heterogeneous mixture
 - B. be part of a homogeneous mixture
 - C. be a pure substance
 - D. interact with other elements to form compounds
 - E. be separated into other substances by chemical means
- 10) How many atoms of nitrogen are in 10 g of NH_4NO_3 ? 10) _____
- A. 3.5
 - B. 2
 - C. 3.0×10^{23}
 - D. 1.5×10^{23}
 - E. 1.8

11) The correct answer (reported to the proper number of significant figures) to the following is _____ 11) _____

$$12.75 \times 1.3621 = \underline{\hspace{2cm}}$$

- A. 17.4
- B. 17.0
- C. 17.37
- D. 17.40
- E. 17.367

12) Of the following, _____ is the largest mass. 12) _____

- A. 2.5×10^{-2} mg
- B. 2.5×10^{15} pg
- C. 2.5×10^{10} ng
- D. 2.5×10^9 fg
- E. 25 kg

13) Elements _____ exhibit similar physical and chemical properties. 13) _____

- A. with similar chemical symbols
- B. with similar atomic masses
- C. on opposite sides of the periodic table
- D. in the same group of the periodic table
- E. in the same period of the periodic table

- 14) A cube of an unknown metal measures 0.250 cm on one side. The mass of the cube is 0.095 g. Which of the following is most likely the unknown metal? 14) _____

Metal	Density (g/cm ³)
rhodium	12.4
copper	8.96
niobium	8.57
vanadium	6.11
zirconium	6.51

- A. vanadium
B. zirconium
C. copper
D. rhodium
E. niobium
- 15) Calculate the percentage by mass of hydrogen in PtCl₂(NH₃)₂. 15) _____
- A. 0.672
B. 2.016
C. 0.034
D. 1.008
E. 1.558

- 16) The correct name for MgF₂ is _____. 16) _____
- A. manganese bifluoride
B. magnesium difluoride
C. magnesium fluoride
D. monomagnesium difluoride
E. manganese difluoride

17) Silver has two naturally occurring isotopes with the following isotopic masses:

17) _____

$^{107}_{47}\text{Ag}$	$^{107}_{47}\text{Ag}$
106.90509	108.9047

The average atomic mass of silver is 107.8682 amu. The fractional abundance of the lighter of the two isotopes is _____.

- A. 0.24221
- B. 0.51835
- C. 0.75783
- D. 0.90474
- E. 0.48168

18) Which of the following are combustion reactions?

18) _____

- 1) $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
 - 2) $\text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s})$
 - 3) $\text{PbCO}_3(\text{s}) \rightarrow \text{PbO}(\text{s}) + \text{CO}_2(\text{g})$
 - 4) $\text{CH}_3\text{OH}(\text{l}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- A. 2, 3, and 4
 - B. 3 and 4
 - C. 1, 3, and 4
 - D. 1 and 4
 - E. 1, 2, 3, and 4

Answer Key

Testname: PRACTICE_EXAM_1

- 1) D
- 2) D
- 3) B
- 4) A
- 5) D
- 6) B
- 7) C
- 8) B
- 9) E
- 10) D
- 11) C
- 12) E
- 13) D
- 14) A
- 15) B
- 16) C
- 17) B
- 18) D

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) In which set of elements would all members be expected to have very similar chemical properties?
 - A. Na, Mg, K
 - B. Ne, Na, Mg
 - C. O, S, Se
 - D. N, O, F
 - E. S, Se, Si

- 2) Screening of the nuclear charge by core electrons in atoms is _____.
 - A. essentially identical to that by valence electrons
 - B. more efficient than that by valence electrons
 - C. less efficient than that by valence electrons
 - D. responsible for a general decrease in atomic radius going down a group
 - E. both essentially identical to that by valence electrons and responsible for a general decrease in atomic radius going down a group

- 3) Atomic radius generally decreases as we move _____.
 - A. down a group; the period position has no effect
 - B. down a group and from right to left across a period
 - C. up a group and from left to right across a period
 - D. down a group and from left to right across a period
 - E. up a group and from right to left across a period

4) Of the choices below, which gives the order for first ionization energies?

- A. Ga > Ge > Se > Br > Kr
- B. Br > Se > Ga > Kr > Ge
- C. Kr > Se > Br > Ga > Ge
- D. Ga > Br > Ge > Kr > Se
- E. Kr > Br > Se > Ge > Ga

5) Which equation correctly represents the electron affinity of calcium?

- A. $\text{Ca}^- (\text{g}) \rightarrow \text{Ca} (\text{g}) + \text{e}^-$
- B. $\text{Ca} (\text{g}) \rightarrow \text{Ca}^+ (\text{g}) + \text{e}^-$
- C. $\text{Ca} (\text{g}) \rightarrow \text{Ca}^- (\text{g}) + \text{e}^-$
- D. $\text{Ca} (\text{g}) + \text{e}^- \rightarrow \text{Ca}^- (\text{g})$
- E. $\text{Ca}^+ (\text{g}) + \text{e}^- \rightarrow \text{Ca} (\text{g})$

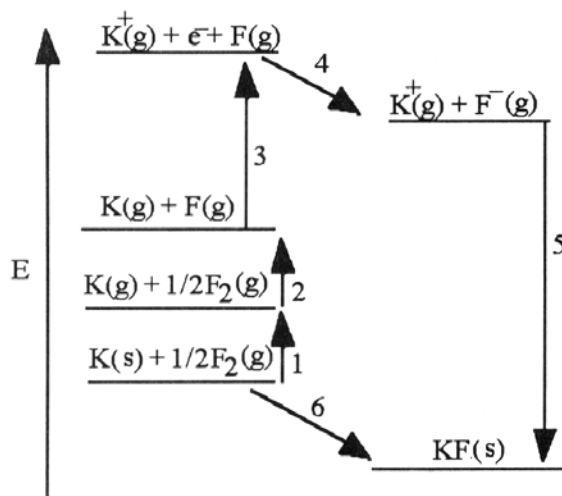
6) The list that correctly indicates the order of metallic character is _____.

- A. O > Se > S
- B. Sr > Ca > Mg
- C. F > Cl > Br
- D. Li > Na > K
- E. C > Ge > Si

7) Which of the following has eight valence electrons?

- A. Cl^-
- B. Ti^{4+}
- C. Na^+
- D. Kr
- E. all of the above

The diagram below is the Born–Huber cycle for the formation of crystalline potassium fluoride.



8) Which energy change corresponds to the electron affinity of fluorine?

- A. 2
- B. 5
- C. 1
- D. 6
- E. 4

9) Which of the following has the bonds correctly arranged in order of increasing polarity?

- A. O–F, Be–F, Mg–F, N–F
- B. Mg–F, Be–F, N–F, O–F
- C. O–F, N–F, Be–F, Mg–F
- D. N–F, Be–F, Mg–F, O–F
- E. Be–F, Mg–F, N–F, O–F

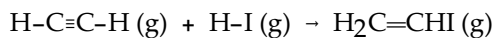
10) Resonance structures differ by _____.

- A. number of atoms only
- B. placement of electrons only
- C. number of electrons only
- D. placement of atoms only
- E. number and placement of electrons

11) A valid Lewis structure of _____ cannot be drawn without violating the octet rule.

- A. NF_3
- B. CF_4
- C. PO_4^{3-}
- D. SeF_4
- E. SiF_4

12) Using the table of average bond energies below, the ΔH for the reaction is _____ kJ.



Bond:	$\text{C}\equiv\text{C}$	$\text{C}=\text{C}$	$\text{H}-\text{I}$	$\text{C}-\text{I}$	$\text{C}-\text{H}$
D (kJ/mol):	839	614	299	240	413

- A. -931
- B. +506
- C. +129
- D. -506
- E. -129

Answer Key

Testname: PRACTICE_EXAM_3

- 1) C
- 2) B
- 3) C
- 4) E
- 5) D
- 6) B
- 7) E
- 8) E
- 9) C
- 10) B
- 11) D
- 12) E

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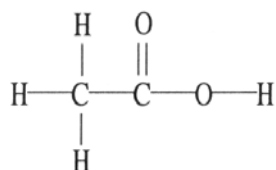
1) In counting the electron domains around the central atom in VSEPR theory, a _____ is not included.

- A. core level electron pair
- B. single covalent bond
- C. double covalent bond
- D. triple covalent bond
- E. nonbonding pair of electrons

2) The molecular geometry of the BrO_3^- ion is _____.

- A. trigonal pyramidal
- B. T-shaped
- C. bent
- D. trigonal planar
- E. tetrahedral

3) The molecular geometry of the left-most carbon atom in the molecule below is _____.

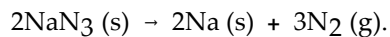


- A. trigonal bipyramidal
- B. tetrahedral
- C. trigonal planar
- D. T-shaped
- E. octahedral

- 4) Of the following molecules, only _____ is polar.
- A. BF_3
 - B. Cl_2
 - C. CBr_4
 - D. BeCl_2
 - E. SiH_2Cl_2
- 5) The hybridizations of iodine in IF_3 and IF_5 are _____ and _____, respectively.
- A. sp^3d^2 , sp^3d
 - B. sp^3d^2 , sp^3d^2
 - C. sp^3 , sp^3d
 - D. sp^3d , sp^3d^2
 - E. sp^3d , sp^3
- 6) A typical triple bond _____.
- A. consists of one σ bond and two π bonds
 - B. consists of three shared electrons
 - C. consists of six shared electron pairs
 - D. is longer than a single bond
 - E. consists of two σ bonds and one π bond
- 7) Based on molecular orbital theory, the bond orders of the H—H bonds in H_2 , H_2^+ , and H_2^- are _____, respectively
- A. 1, 0, and $1/2$
 - B. 1, 2, and 0
 - C. 1, $1/2$, and 0
 - D. 1, $1/2$, and $1/2$
 - E. 1, 0, and 0

- 8) A sample of a gas originally at 29 °C and 1.25 atm pressure in a 3.0 L container is allowed to contract until the volume is 2.2 L and the temperature is 11 °C. The final pressure of the gas is _____ atm.
- A. 0.38
 - B. 1.6
 - C. 2.1
 - D. 2.9
 - E. 2.8
- 9) The amount of gas that occupies 36.52 L at 68.0 °C and 672 mm Hg is _____ mol.
- A. 1.15
 - B. 127
 - C. 12.7
 - D. 878
 - E. 24.4
- 10) The molecular weight of a gas is _____ g/mol if 3.5 g of the gas occupies 2.1 L at STP.
- A. 5.5×10^3
 - B. 41
 - C. 37
 - D. 4.6×10^2
 - E. 2.7×10^{-2}
- 11) SO₂ (5.00 g) and CO₂ (5.00 g) are placed in a 750.0 mL container at 50.0 °C. The partial pressure of SO₂ in the container was _____ atm.
- A. 0.192
 - B. 4.02
 - C. 6.78
 - D. 2.76
 - E. 1.60

12) Automobile air bags use the decomposition of sodium azide as their source of gas for rapid inflation:



What mass (g) of NaN_3 is required to provide 40.0 L of N_2 at 25.0 °C and 763 torr?

- A. 1.64
- B. 1.09
- C. 71.1
- D. 160
- E. 107

13) Arrange the following gases in order of increasing average molecular speed at 25 °C.

He, O_2 , CO_2 , N_2

- A. He < O_2 < N_2 < CO_2
- B. CO_2 < He < N_2 < O_2
- C. He < N_2 < O_2 < CO_2
- D. CO_2 < O_2 < N_2 < He
- E. CO_2 < N_2 < O_2 < He

14) A tank containing both HF and HBr gases developed a leak. The ratio of the rate of effusion of HF to the rate of effusion of HBr is _____.

- A. 2.01
- B. 16.3
- C. 4.04
- D. 0.247
- E. 0.497

Answer Key

Testname: PRACTICE_EXAM_4

- 1) A
- 2) A
- 3) B
- 4) E
- 5) D
- 6) A
- 7) D
- 8) B
- 9) A
- 10) C
- 11) D
- 12) C
- 13) D
- 14) A