

## AP CHEMISTRY Practice EXAM

- Which one of the following statements about atomic structure is false?
  - The number of protons and neutrons is always the same in the neutral atom.
  - The electrons occupy a very large volume compared to the nucleus.
  - The protons and neutrons in the nucleus are very tightly packed.
  - Almost all of the mass of the atom is concentrated in the nucleus.
  - All of the above statements (a-d) are true.
  
- The numbers of protons, neutrons, and electrons in  ${}^{39}_{19}\text{K}^+$  are:
  - 20 p, 19 n, 20 e
  - 19 p, 20 n, 20 e
  - 19 p, 20 n, 18 e
  - 19 p, 20 n, 19 e
  - 20 p, 19 n, 19 e
  
- The correct name for FeO is
  - iron (I) oxide
  - iron oxide
  - iron (II) oxide
  - iron monoxide
  - iron (III) oxide
  
- Which of the following are incorrectly paired?
  - Ba, alkaline earth metal
  - O, halogen
  - Ni, transition metal
  - Ne, noble gas
  - K, alkali metal

5. All of the following are in aqueous solution. Which is incorrectly named?

- A)  $\text{H}_3\text{PO}_4$ , phosphoric acid
- B)  $\text{HCl}$ , hydrochloric acid
- C)  $\text{HCN}$ , cyanic acid
- D)  $\text{H}_2\text{SO}_4$ , sulfuric acid
- E)  $\text{HNO}_2$ , nitrous acid

6.  $w\text{PCl}_5 + x\text{H}_2\text{O} \rightarrow y\text{POCl}_3 + z\text{HCl}$

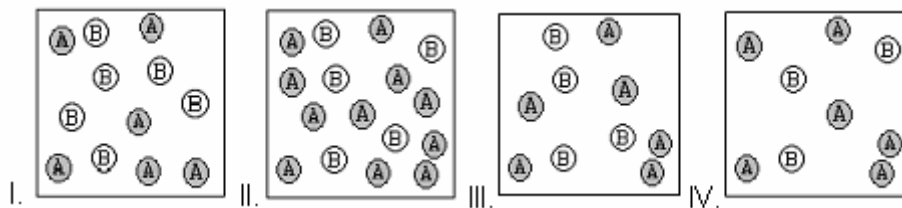
The above equation is properly balanced when

- A)  $w = 1, x = 2, y = 2, z = 4$
- B)  $w = 2, x = 2, y = 2, z = 1$
- C)  $w = 1, x = 1, y = 1, z = 2$
- D)  $w = 2, x = 2, y = 2, z = 2$
- E) none of these

7. A sample of ammonia has a mass of 78.8 g. How many molecules are in this sample?

- A)  $4.75 \times 10^{25}$  molecules
- B)  $1.30 \times 10^{23}$  molecules
- C)  $2.79 \times 10^{24}$  molecules
- D) 4.63 molecules
- E)  $1.70 \times 10^{25}$  molecules

8. A chemical reaction has the equation:  $2\text{A} + \text{B} \rightarrow \text{C}$ . In which case is B the limiting reactant?



- A) IV
- B) II
- C) I
- D) III
- E) None of these

9. How many atoms of hydrogen are present in 4.0 g of water?
- A)  $4.8 \times 10^{24}$
  - B)  $2.7 \times 10^{23}$
  - C)  $1.2 \times 10^{24}$
  - D)  $1.3 \times 10^{23}$
  - E) 0.44
10. A hydrocarbon (a compound consisting solely of carbon and hydrogen) is found to be 85.6% carbon by mass. What is the empirical formula for this compound?
- A)  $C_6H$
  - B)  $CH_6$
  - C)  $C_3H$
  - D)  $CH$
  - E)  $CH_2$
11. Gallium consists of two isotopes of masses 68.95 amu and 70.95 amu with abundances of 60.16% and 39.84%, respectively. What is the average atomic mass of gallium?
- A) 69.95
  - B) 69.55
  - C) 69.7468
  - D) 71.95
  - E) 70.15
12. A 15-g sample of lithium is reacted with 15 g of fluorine to form lithium fluoride:  
 $2Li + F_2 \rightarrow 2LiF$ . After the reaction is complete, what will be present?
- A) 0.789 moles lithium fluoride and 1.37 moles lithium
  - B) 2.16 moles lithium fluoride and 0.395 moles fluorine
  - C) 0.789 moles lithium fluoride only
  - D) 2.16 moles lithium fluoride only
  - E) none of these

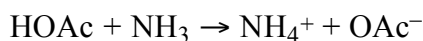
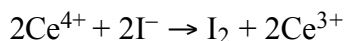
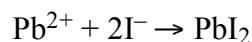
13. The net ionic equation for the reaction of calcium bromide and sodium phosphate contains which of the following species?

- A)  $\text{PO}_4^{3-}(\text{aq})$
- B)  $3\text{Ca}^{2+}(\text{aq})$
- C)  $6\text{NaBr}(\text{aq})$
- D)  $\text{Ca}^{2+}(\text{aq})$
- E)  $2\text{Ca}_3(\text{PO}_4)_2(\text{s})$

14. [SKIP] A student weighs out 0.562 g of KHP (molar mass = 204 g/mol) and titrates to the equivalence point with 36.78 mL of a stock NaOH solution. What is the concentration of the stock NaOH solution? KHP is an acid with one acidic proton.

- A)  $2.75 \times 10^{-3} \text{ M}$
- B) 0.0749 M
- C)  $1.01 \times 10^{-1} \text{ M}$
- D)  $1.53 \times 10^{-2} \text{ M}$
- E) none of these

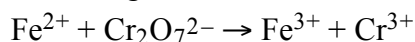
15. The following reactions:



are examples of

- A) acid-base reactions.
- B) unbalanced reactions.
- C) redox, acid-base, and precipitation reactions, respectively.
- D) precipitation, acid-base, and redox reactions, respectively.
- E) precipitation, redox, and acid-base reactions, respectively.

16. Given the following reaction in acidic media:



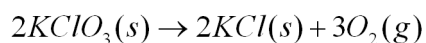
answer the following question: The coefficient for water in the balanced reaction is

- A) 1.
- B) 7.
- C) 5.
- D) 3.
- E) none of these

17. In which of the following does nitrogen have an oxidation state of +4?
- A)  $\text{HNO}_3$
  - B)  $\text{NaNO}_2$
  - C)  $\text{N}_2\text{O}$
  - D)  $\text{NH}_4\text{Cl}$
  - E)  $\text{NO}_2$
18. You mix 60. mL of 1.00M silver nitrate with 25 mL of 1.41M sodium chloride. What mass of silver chloride should you form?
- A) 10.1 g
  - B) 12.1
  - C) 5.1 g
  - D) 8.6 g
  - E) none of these
19. A 100 g sample of a metal was heated to  $100^\circ\text{C}$  and then quickly transferred to an insulated container holding 100 g of water at  $22^\circ\text{C}$ . The temperature of the water rose to reach a final temperature of  $35^\circ\text{C}$ . Which of the following can be concluded?
- A) The insulated container absorbed the majority of the thermal energy lost by the metal.
  - B) The metal temperature changed more than the water temperature did; therefore the heat capacity of the metal must be greater than the heat capacity of the water.
  - C) The metal temperature changed more than the water temperature did; therefore the metal lost more thermal energy than the water gained.
  - D) The final temperature is less than the average starting temperature of the metal and the water; therefore the total energy of the metal and water decreased.
  - E) The metal temperature changed more than the water temperature did, but the metal lost the same amount of thermal energy as the water gained.
20. In the reaction  $2\text{Ca}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{CaO}(\text{s})$ , which species is oxidized?
- A)  $\text{Ca}^{2+}$
  - B) Ca
  - C)  $\text{O}^{2-}$
  - D)  $\text{O}_2$
  - E) none of these

21. [SKIP] Use the kinetic molecular theory of gases to predict what would happen to a closed sample of a gas whose temperature increased while its volume decreased.
- A) The average kinetic energy of the molecules of the gas would decrease.
  - B) The number of moles of the gas would decrease.
  - C) Its pressure would decrease.
  - D) Its pressure would increase.
  - E) Its pressure would hold constant.
22. [SKIP] It is found that 250. mL of a gas at STP has a mass of 1.77 g. What is the molar mass?
- A) 11.2 g/mol
  - B) 22.4 g/mol
  - C) 50.6 g/mol
  - D) 7.08 g/mol
  - E) 159 g/mol

23. Given the equation



A 3.00-g sample of  $KClO_3$  is decomposed and the oxygen at  $24.0^\circ\text{C}$  and  $0.736\text{ atm}$  is collected. What volume of oxygen gas will be collected assuming 100% yield?

- A)  $9.83 \times 10^1\text{ mL}$
  - B)  $8.11 \times 10^2\text{ mL}$
  - C)  $5.40 \times 10^2\text{ mL}$
  - D)  $1.22 \times 10^3\text{ mL}$
  - E) none of these
24. [SKIP] A 8.06-g piece of solid  $\text{CO}_2$  (dry ice) is allowed to sublime in a balloon. The final volume of the balloon is 1.00 L at 300. K. What is the pressure of the gas?
- A) 4.51 atm
  - B) 198 atm
  - C) 0.222 atm
  - D) 3.05 atm
  - E) none of these

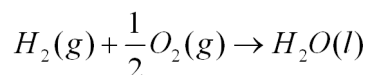
25. [SKIP] A sample of gas is in a 50.0-mL container at a pressure of 645 torr and a temperature of 25°C. The entire sample is heated to a temperature of 35°C and transferred to a new container whose volume is 72.1 mL. The pressure of the gas in the second container is:
- A) 189 torr
  - B) 462 torr
  - C) 626 torr
  - D) 961 torr
  - E) 433 torr

Use the following to answer questions 26-28.

Four identical 1.0-L flasks contain the gases He, Cl<sub>2</sub>, CH<sub>4</sub>, and NH<sub>3</sub>, each at 0°C and 1 atm pressure.

26. [SKIP] Which gas has the highest density?
- A) Cl<sub>2</sub>
  - B) NH<sub>3</sub>
  - C) all gases the same
  - D) CH<sub>4</sub>
  - E) He
27. [SKIP] For which gas do the molecules have the highest average velocity?
- A) Cl<sub>2</sub>
  - B) all gases the same
  - C) CH<sub>4</sub>
  - D) NH<sub>3</sub>
  - E) He
28. [SKIP] Which gas sample has the greatest number of molecules?
- A) He
  - B) Cl<sub>2</sub>
  - C) CH<sub>4</sub>
  - D) all gases the same
  - E) NH<sub>3</sub>

29. The total volume of hydrogen gas needed to fill the Hindenburg was  $2.00 \times 10^8$  L at 1.00 atm and  $25.1^\circ\text{C}$ . How much energy was evolved when it burned?

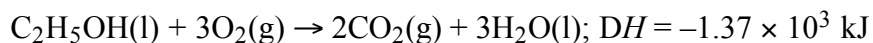


$$\Delta H = -286\text{kJ}$$

- A)  $4.68 \times 10^9$  kJ  
B)  $8.18 \times 10^6$  kJ  
C)  $2.86 \times 10^4$  kJ  
D)  $2.78 \times 10^6$  kJ  
E)  $2.34 \times 10^9$  kJ
30. Exactly 304.3 J will raise the temperature of 10.0 g of a metal from  $25.0^\circ\text{C}$  to  $60.0^\circ\text{C}$ . What is the specific heat capacity of the metal?
- A)  $0.869 \text{ J/g}^\circ\text{C}$   
B)  $72.8 \text{ J/g}^\circ\text{C}$   
C)  $1.15 \text{ J/g}^\circ\text{C}$   
D)  $10.1 \text{ J/g}^\circ\text{C}$   
E) none of these
31. Which of the following does *not* have a standard enthalpy of formation equal to zero at  $25^\circ\text{C}$  and 1.0 atm?
- A) Al(s)  
B)  $\text{F}_2(\text{g})$   
C) They all have a standard enthalpy equal to zero.  
D)  $\text{H}_2\text{O}(\text{l})$   
E)  $\text{H}_2(\text{g})$



32. Consider the reaction:



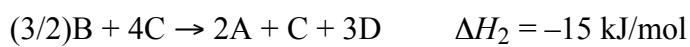
Consider the following propositions:

- I. The reaction is endothermic
  - II. The reaction is exothermic.
  - III. The enthalpy term would be different if the water formed was gaseous.
- A) I
  - B) II, III
  - C) II
  - D) III
  - E) I, II

33. The heat combustion of acetylene,  $\text{C}_2\text{H}_2(\text{g})$ , at  $25^\circ\text{C}$ , is  $-1299 \text{ kJ/mol}$ . At this temperature,  $\Delta H_f^\circ$  values for  $\text{CO}_2(\text{g})$  and  $\text{H}_2\text{O}(\text{l})$  are  $-393$  and  $-286 \text{ kJ/mol}$ , respectively. Calculate  $\Delta H_f^\circ$  for acetylene.

- A)  $625 \text{ kJ/mol}$
- B)  $-625 \text{ kJ/mol}$
- C)  $227 \text{ kJ/mol}$
- D)  $2376 \text{ kJ/mol}$
- E) none of these

34. Consider the following processes:



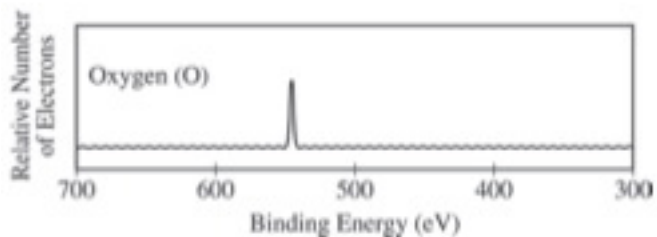
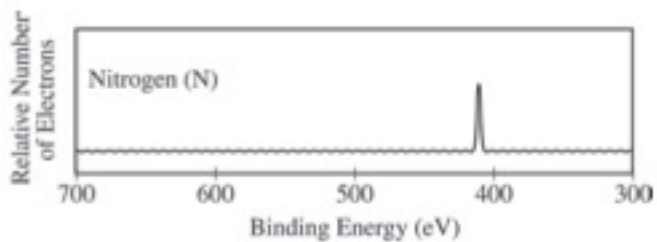
Calculate  $\Delta H$  for:  $\text{C} \rightarrow \text{E} + 3\text{D}$

- A)  $0 \text{ kJ/mol}$
- B)  $10 \text{ kJ/mol}$
- C)  $-20 \text{ kJ/mol}$
- D)  $-10 \text{ kJ/mol}$
- E)  $20 \text{ kJ/mol}$

35. Which of the following frequencies corresponds to light with the longest wavelength?
- A)  $4.12 \times 10^5 \text{ s}^{-1}$
  - B)  $9.12 \times 10^{12} \text{ s}^{-1}$
  - C)  $8.50 \times 10^{20} \text{ s}^{-1}$
  - D)  $3.00 \times 10^{13} \text{ s}^{-1}$
  - E)  $3.20 \times 10^9 \text{ s}^{-1}$
36. Order the elements S, Cl, and F in terms of increasing ionization energy.
- A) S, F, Cl
  - B) S, Cl, F
  - C) F, S, Cl
  - D) F, Cl, S
  - E) Cl, F, S
37. [SKIP] When ignited, a uranium compound burns with a green flame. The wavelength of the light given off by this flame is greater than that of
- A) infrared light.
  - B) radio waves.
  - C) red light.
  - D) ultraviolet light.
  - E) none of these
38. The electron configuration of indium is
- A)  $1s^2 3s^2 2p^6 3s^2 3p^6 4s^2 4p^6 4d^{10} 5s^2 5d^{10} 5p^1$
  - B)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^1 5d^{10}$
  - C)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^1$
  - D)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4d^{10} 4p^1$
  - E) none of these
39. [SKIP] What is the wavelength of light that is emitted when an excited electron in the hydrogen atom falls from  $n = 5$  to  $n = 4$ ?
- A)  $4.90 \times 10^{-20} \text{ m}$
  - B)  $1.46 \times 10^{-6} \text{ m}$
  - C)  $2.47 \times 10^{-5} \text{ m}$
  - D)  $4.05 \times 10^{-6} \text{ m}$
  - E) none of these

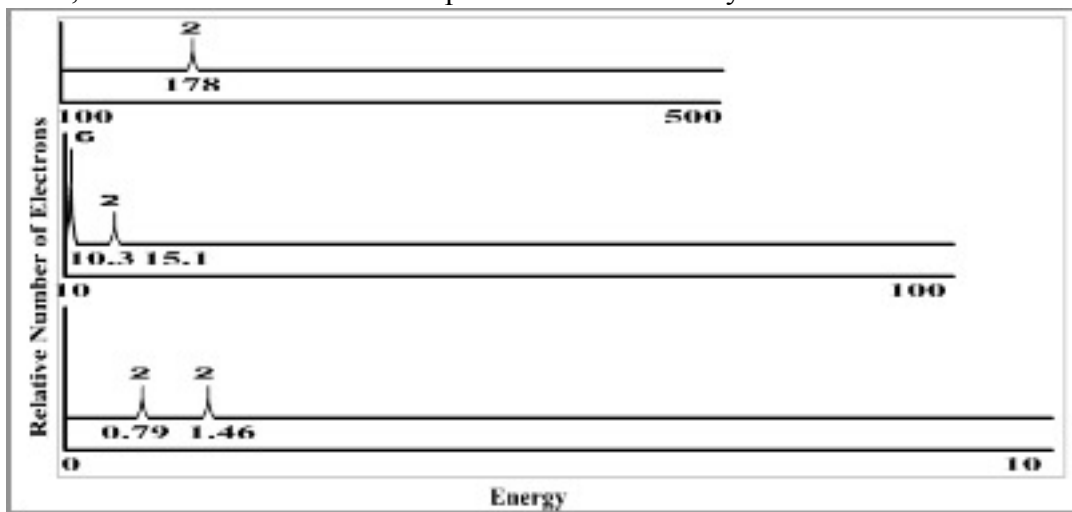
40. [SKIP] When an electron in a 2p orbital of a lithium atom makes a transition to the 2s orbital, a photon of approximate wavelength 670.7 nm is emitted. The energy difference between these 2p and 2s orbitals is
- A)  $1.332 \times 10^{-31}$  J
  - B)  $2.962 \times 10^{-19}$  J
  - C)  $2.962 \times 10^{-17}$  J
  - D)  $2.962 \times 10^{-28}$  J
  - E) none of these
41.  $\text{N}_2$  molecules absorb ultraviolet light but not visible light.  $\text{I}_2$  molecules absorb both visible and ultraviolet light. Which of the following statements explains the observations?
- A)  $\text{N}_2$  molecules are more polarizable than  $\text{I}_2$  molecules.
  - B) Visible light does not produce transitions between electronic energy levels in the  $\text{N}_2$  molecule but does produce transitions in the  $\text{I}_2$  molecule.
  - C) More energy is required to remove an electron from an  $\text{I}_2$  molecule than is required to remove an electron from a  $\text{N}_2$  molecule.
  - D) More energy is required to make  $\text{N}_2$  molecules vibrate than is required to make  $\text{I}_2$  molecules vibrate.
  - E) The molecular mass of  $\text{I}_2$  is greater than the molecular mass of  $\text{N}_2$ .
42. Which of the following atoms or ions has 3 unpaired electrons?
- A) Al
  - B)  $\text{S}^{2-}$
  - C) N
  - D)  $\text{Zn}^{2+}$
  - E) O

43. The photoelectron spectra below show the energy required to remove a 1s electron from a nitrogen atom and from an oxygen atom. Which of the following statements best accounts for the peak in the upper spectrum being to the right of the peak in the lower spectrum?

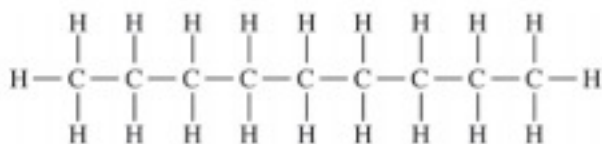


- A) Electrons in the p subshell of oxygen atoms provide more shielding than electrons in the p subshell of nitrogen atoms.
- B) Oxygen has an even number of valence electrons, as opposed to nitrogen with an odd number of valence electrons.
- C) There are more electron-electron repulsions in oxygen atoms than in nitrogen atoms.
- D) Nitrogen atoms have a half-filled p subshell.
- E) Nitrogen atoms have a smaller nuclear charge than oxygen atoms.

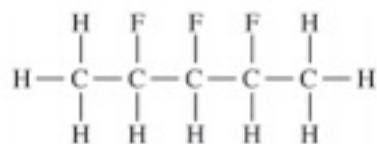
44. Looking at the binding energy below obtained from photoelectron spectrum for a silicon atom, the 3s electrons would be represented at how many eV?



- A) 15.1
- B) 10.3
- C) 1.46
- D) 17.8
- E) 0.79



Nonane



2,3,4-trifluoropentane

Consider the molecules represented above and the data in the table below.

Compound	Molecular Formula	Molar Mass (g/mol)	Boiling Point (°C)
Nonane	$\text{C}_9\text{H}_{20}$	128	151
2,3,4-trifluoropentane	$\text{C}_5\text{H}_7\text{F}_3$	126	89

45.

Nonane and 2,3,4-trifluoropentane have almost identical molar masses, but nonane has a significantly higher boiling point. Which of the following statements best helps explain this observation?

- A) The molar masses of the two compounds are nearly identical.
- B) The C–F bond is easier to break than the C–H bond.
- C) The C–F bond is more polar than the C–H bond.
- D) The carbon chains are farther apart in a sample of nonane than they are in 2,3,4-trifluoropentane.
- E) The carbon chains are longer in nonane than they are in 2,3,4-trifluoropentane.

46. Which of the following ionic compounds has the smallest lattice energy, i.e., the lattice energy least favorable to a stable lattice?

- A) LiF
- B) NaCl
- C) BaO
- D) CsI
- E) MgO

47. Which of the following bonds is least polar?

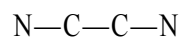
- A) S—Cl
- B) Br—Br
- C) H—C
- D) They are all nonpolar.
- E) C—O

48. Which of the following exhibits resonance?
- A)  $\text{NO}_2$
  - B)  $\text{PCl}_5$
  - C)  $\text{H}_2\text{O}$
  - D)  $\text{CH}_4$
  - E) At least two of the molecules (a-d) exhibit resonance.
49. The bond angles about the carbon atom in the formaldehyde molecule,  $\text{H}_2\text{C}=\text{O}$ , are about:
- A)  $120^\circ$
  - B)  $180^\circ$
  - C)  $109^\circ$
  - D)  $90^\circ$
  - E)  $60^\circ$
50. The  $\text{Cl-Kr-Cl}$  bond angle in  $\text{KrCl}_4$  is closest to
- A)  $120^\circ$
  - B)  $360^\circ$
  - C)  $150^\circ$
  - D)  $109^\circ$
  - E)  $90^\circ$
51. Which of the following molecules has no dipole moment?
- A) none
  - B)  $\text{H}_2\text{O}$
  - C) all
  - D)  $\text{CO}_2$
  - E)  $\text{NH}_3$
52. In the cyanide ion ( $\text{CN}^-$ ), the nitrogen has a formal charge of
- A) -2
  - B) -1
  - C) +1
  - D) +2
  - E) 0

53. What type of structure does the  $\text{XeOF}_2$  molecule have?
- A) octahedral
  - B) trigonal planar
  - C) trigonal pyramidal
  - D) T-shaped
  - E) tetrahedral

Use the following to answer question 54.

Consider the skeletal structure shown below:

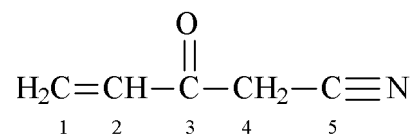


Draw the Lewis structure and answer the following:

54. How many of the atoms are  $sp$  hybridized?
- A) 0
  - B) 1
  - C) 2
  - D) 4
  - E) 3



55. Consider the molecule

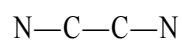


Specify the hybridization of each carbon atom.

	C-1	C-2	C-3	C-4	C-5
A)	$sp^2$	$sp^2$	$sp^2$	$sp^3$	$sp^3$
B)	$sp^2$	$sp$	$sp$	$sp^2$	$sp$
	C-1	C-2	C-3	C-4	C-5
C)	$sp^2$	$sp^2$	$sp^3$	$sp^3$	$sp^3$
D)	$sp^2$	$sp^2$	$sp^2$	$sp^3$	$sp$
E)	$sp^2$	$sp^2$	$sp^3$	$sp^3$	$sp^2$

Use the following to answer question 56.

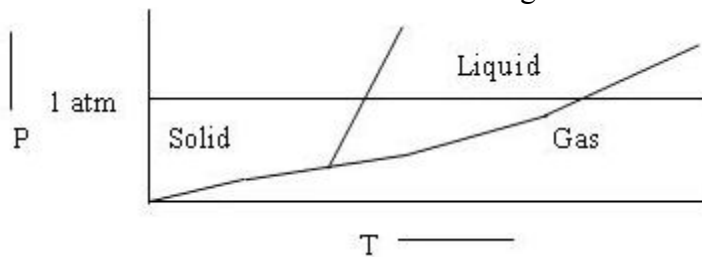
Consider the skeletal structure shown below:



Draw the Lewis structure and answer the following:

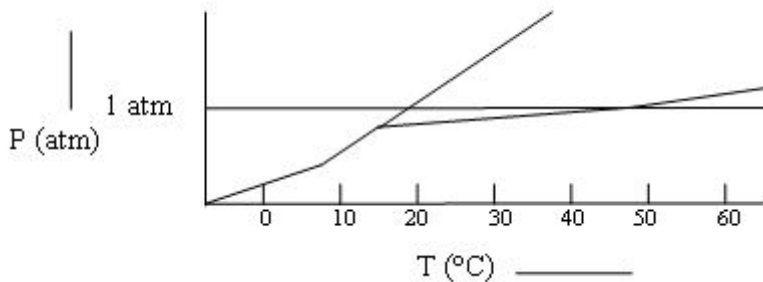
56. How many pi bonds does the molecule contain?
- A) 0
  - B) 4
  - C) 6
  - D) 7
  - E) 2
57. What hybridization is predicted for the nitrogen atom in the  $\text{NO}_3^-$  ion?
- A)  $\text{sp}^3\text{d}^2$
  - B)  $\text{sp}^2$
  - C)  $\text{sp}^3\text{d}$
  - D)  $\text{sp}^3$
  - E) none of these
58. Which of the compounds below is an example of a network solid?
- A)  $\text{SiO}_2(\text{s})$
  - B)  $\text{C}_{25}\text{H}_{52}(\text{s})$
  - C)  $\text{MgO}(\text{s})$
  - D)  $\text{NaCl}(\text{s})$
  - E)  $\text{S}_8(\text{s})$

59. Choose the correct statement about the diagram below.



- A) The diagram is qualitatively correct for water.
- B) The diagram shows that the melting point of the solid increases with increasing pressure.
- C) The diagram shows the triple point above 1 atm pressure.
- D) The diagram could represent the phase diagram of  $\text{CO}_2$ .
- E) None of the above statements is correct.

60. Below is a phase diagram for compound X. The normal boiling point of X is most likely:



- A) 0°C
- B) 73°C
- C) 47°C
- D) 21°C
- E) 18°C

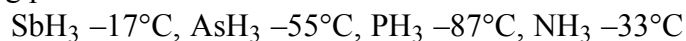
61. Assume 12,500 J of energy is added to 2.0 moles (36 grams) of H<sub>2</sub>O as an ice sample at 0°C. The molar heat of fusion is 6.02 kJ/mol. The specific heat of liquid water is 4.18 J/mol K. The molar heat of vaporization is 40.6 kJ/mol. The resulting sample contains which of the following?

- A) only water vapor
- B) ice and water
- C) water and water vapor
- D) only water
- E) only ice

62. [SKIP] Which of the following should have the lowest boiling point?

- A) HF
- B) NH<sub>3</sub>
- C) N<sub>2</sub>
- D) H<sub>2</sub>O
- E) Na<sub>2</sub>S

63. [SKIP] The elements of group 5A, the nitrogen family, form compounds with hydrogen having the boiling points listed below:

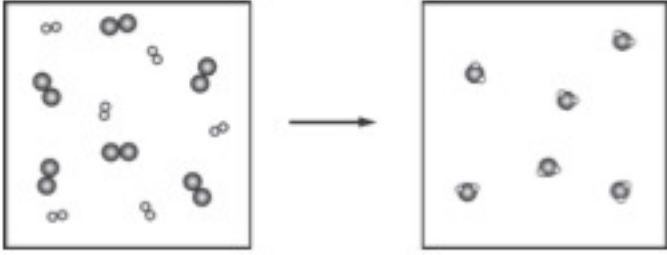
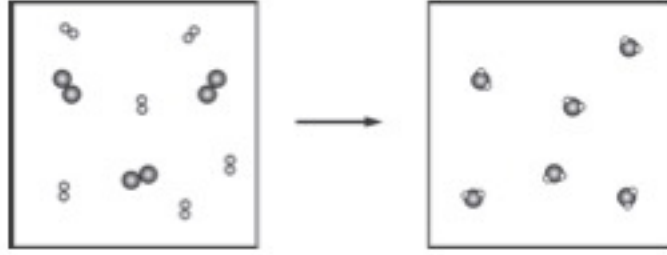
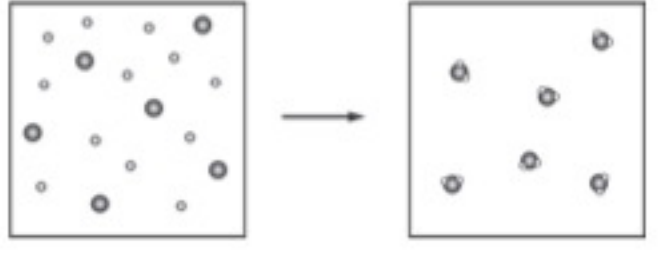
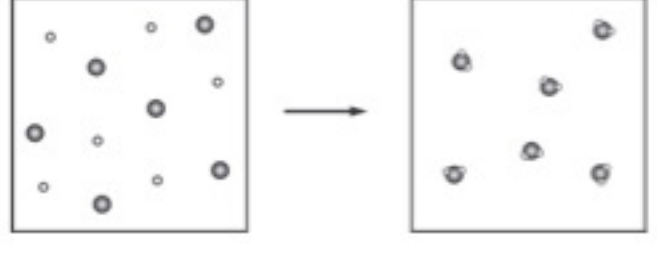


The first three elements illustrate a trend where the boiling point decreases as the mass decreases; however, ammonia ( $\text{NH}_3$ ) does not follow the trend because of

- A) dipole-dipole attraction.
  - B) metallic bonding.
  - C) London dispersion forces.
  - D) hydrogen bonding.
  - E) ionic bonding.
64. [SKIP] Which one of the following decreases as the strength of the attractive intermolecular forces increases?
- A) The extent of deviations from the ideal gas law.
  - B) The vapor pressure of a liquid.
  - C) The heat of vaporization.
  - D) The normal boiling temperature.
  - E) The sublimation temperature of a solid.
- 65.[SKIP] 2.80 L of an aqueous solution containing 25.00 g of KCl dissolved in pure water is prepared. The molarity of the solution is:
- A) 0.240 M
  - B) 0.120 M
  - C) 0.0599 M
  - D) 8.35 M
  - E) 8.93 M
66. [SKIP] A solution containing 292 g of  $\text{Mg}(\text{NO}_3)_2$  per liter has a density of 1.108 g/mL. The molality of the solution is:
- A) 5.50 m
  - B) 2.41 m
  - C) 2.00 m
  - D) 6.39 m
  - E) none of these

67. [SKIP] The vapor pressure of water at  $90^{\circ}\text{C}$  is  $0.692\text{ atm}$ . What is the vapor pressure (in atm) of a solution made by dissolving  $1.77\text{ mole(s)}$  of  $\text{CsF(s)}$  in  $1.00\text{ kg}$  of water? Assume that Raoult's law applies.
- A)  $0.736\text{ atm}$
  - B)  $0.671\text{ atm}$
  - C)  $0.651\text{ atm}$
  - D)  $0.692\text{ atm}$
  - E) none of these
68. [SKIP] If  $2.00\text{ g}$  of helium gas and  $3.37\text{ g}$  of oxygen gas are mixed together, what is the mole fraction of helium in the solution?
- A)  $0.826$
  - B)  $0.105$
  - C)  $0.372$
  - D)  $1.21$
  - E)  $0.174$

69. Which of the following particulate diagrams best shows the formation of water vapor from hydrogen gas and oxygen gas in a rigid container at 125°C?

- A) 
- B) 
- C) 
- D) 
- E) None of the above are a correct representation.

	NaF	MgO
Boiling Point (°C)	1695	3600

	Na <sup>+</sup>	Mg <sup>2+</sup>	F <sup>-</sup>	Cl <sup>-</sup>	O <sup>2-</sup>
Ionic Radius (pm)	76	72	133	181	140

70.

Based on the data in the tables above, which of the following statements provides the best prediction for the boiling point of NaCl?

- A) NaCl will have a boiling point between that of NaF and MgO because the covalent character of the bonds in NaCl is intermediate between that of MgO and NaF.
- B) NaCl will have a higher boiling point than MgO because the ions are spaced farther apart in NaCl.
- C) NaCl will have a lower boiling point than MgO because the ions are spaced farther apart in NaCl.
- D) NaCl will have a higher boiling point than MgO because the energy required to transfer electrons from the anion to the cation is larger in NaCl than in MgO.
- E) NaCl will have a lower boiling point than NaF because the coulombic attractions are weaker in NaCl than in NaF.

## Answer Key - 13FallFinalExam

1. A
2. C
3. C
4. B
5. C
6. C
7. C
8. B
9. B
10. E
11. C
12. A
13. B
14. B
15. E
16. B
17. E
18. C
19. E
20. B
21. D
22. E
23. D
24. A
25. B
26. A
27. E
28. D
29. E
30. A
31. D
32. B
33. C
34. D
35. A
36. B
37. D
38. C
39. D
40. B
41. B



- 42. C
- 43. E
- 44. C
- 45. E
- 46. D
- 47. B
- 48. A
- 49. A
- 50. E
- 51. D
- 52. E
- 53. D
- 54. D
- 55. D
- 56. B
- 57. B
- 58. A
- 59. B
- 60. C
- 61. D
- 62. C
- 63. D
- 64. B
- 65. B
- 66. B
- 67. C
- 68. A
- 69. B
- 70. E