1. Which atom has the largest first ionization energy?

(1) Ne (2) Ar (3) Cl (4) S

2. Which set of quantum numbers is correct and consistent with n = 4?

(1) $\ell = 3$, $m_\ell = -3$, $m_s = +1/2$

(2) $\ell = 4$, $m_\ell = 2$, $m_s = -1/2$

(3) $\ell = 2$, $m_\ell = 3$, $m_s = +1/2$

(4) $\ell = 3$, $m_\ell = -2$, $m_s = +1$

3. The ground-state electronic configuration of the manganese (Mn) atom is

(1) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^5$

(2) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$

(3) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^5$

(4) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$

4. The shape which most closely describes the NF_3 molecule is

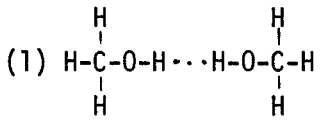
(1) octahedral. (3) trigonal pyramidal

(2) trigonal planar. (4) tetrahedral.

5. An acceptable Lewis dot structure for N_2O is

(1) :Ö-N-N: (2) :Ö=N=N: (3) :Ö-N≡N: (4) :Ö=N≡N:

6. Which best represents "hydrogen bonding" in liquid methanol (CH_3OH)?

(1)


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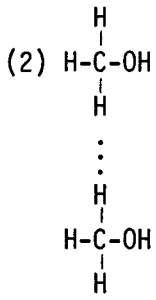
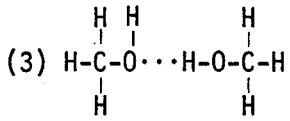
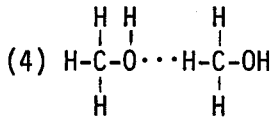


(3)


(4)


7. The pH of a 0.03 M HCl(aq) solution is

(1) 1.5 (2) 2.5 (3) 3.5 (4) 12.5

8. Which substance dissolves in water to form an acidic solution?

(1) KCl (2) Na_3PO_4 (3) NH_4Cl (4) Na_2CO_3

9. A mixture of 0.60 mol $Cl_2(g)$ and 0.40 mol $F_2(g)$ was allowed to come to equilibrium in a 1000-mL flask. If 2x represents the molar concentration of ClF(g) at equilibrium, which expression represents the equilibrium constant?

$$Cl_2(g) + F_2(g) \rightleftarrows 2ClF(g)$$

(1) $\dfrac{x^2}{(0.60 - x)(0.40 - x)}$

(2) $\dfrac{(2x)^2}{(0.60 - x)(0.40 - x)}$

(3) $\dfrac{2x}{(0.60 - x)(0.40 - x)}$

(4) $\dfrac{2x^2}{(0.60 - x)(0.40 - x)}$

10. For the reaction

$$2\ SO_2(g) + O_2(g) \rightleftarrows 2\ SO_3(g) \quad \Delta H^o = -190\ kJ$$

carried out at constant volume, the concentration of O_2 at equilibrium will increase if

(1) SO_2 is added to the system.

(2) SO_3 is added to the system.

(3) the temperature of the system is lowered.

(4) an inert gas is added to the system.

Answers: 1: (1) 2: (1) 3: (4) 4: (3) 5: (2) 6: (3) 7: (1) 8: (3) 9: (2) 10: (2)