1) Neon atoms produce characteristic spectral lines when their electrons
- (A) return to lower energy levels.
- (B) orbit the nucleus in a single energy level.
- (C) remain in their normal energy levels and move faster.
- (D) remain in their normal energy levels and move slower.

2) How does the pH of the mixture change as hydrochloric acid, HCl, is slowly added to a solution of sodium hydroxide, NaOH?
- (A) The pH decreases and may go below 7.
- (B) The pH increases and may go above 7.
- (C) The pH decreases to 7 and stops.
- (D) The pH increases to 7 and stops.

3) What is the electron dot diagram for the nitrogen atom?

(A)  (B)  (C)  (D) 

4) Which expression represents the dissolving of sodium sulfate in water?
- (A) $Na_2SO_{4(s)} \rightarrow 2Na^{+}_{(aq)} + SO_4^{2-}{}_{(aq)}$
- (B) $Na_2SO_{4(s)} \rightarrow Na_2^{+}{}_{(aq)} + SO_4^{2-}{}_{(aq)}$
- (C) $Na_2SO_{4(s)} \rightarrow 2Na^{+}_{(aq)} + 4SO^{2-}{}_{(aq)}$
- (D) $Na_2SO_{4(s)} \rightarrow 2Na^{+}_{(aq)} + S^{6+}_{(aq)} + O_4^{2-}{}_{(aq)}$

5) How many moles of oxygen, O_2, are produced from 3.0 mol of potassium chlorate, $KClO_3$, in this equation? $2KClO_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)}$

(A) 6.0 (B) 9.0 (C) 3.0 (D) 4.5

6) Which set contains only transition elements?
- (A) elements 11, 12 and 13
- (B) elements 15, 16 and 17
- (C) elements 26, 27 and 28
- (D) elements 48, 49 and 50

7) Which element has chemical properties most similar to those of the element calcium, Ca?

(A) carbon, C (B) potassium, K (C) sodium, Na (D) strontium, Sr

8) Which element of Period 3 has the largest radius?

(A) Na (B) Al (C) P (D) Cl

9) How does the average kinetic energy (*KE*) of hydrogen molecules compare with that of oxygen molecules when both gases are at 25 °C?
- (A) They have equal *KE*'s.
- (B) The *KE* of hydrogen is $^1/_4$ as great.
- (C) The *KE* of hydrogen is $^1/_{16}$ as great.
- (D) The *KE* of hydrogen is 4 times as great.

10) Most substances having molar masses near that of water are gases at room temperature. Water is an exception because of its
- (A) ionic bonds.
- (B) hydrogen bonds.
- (C) metallic bonds.
- (D) van der Waals forces.