Sample Multiple Choice Questions

11. Consider the reaction: $H_2\,(g) + I_2\,(g) \rightarrow 2\,HI\,(g)$. Which of the following is true.
    A) ΔH° is negative, and $\Delta H^\circ = \Delta E^\circ$
    B) ΔH° is positive, and $\Delta H^\circ = \Delta E^\circ$
    C) ΔH° is negative, and $\Delta H^\circ \neq \Delta E^\circ$
    D) ΔH° is positive, and $\Delta H^\circ \neq \Delta E^\circ$
    E) $\Delta H^\circ_{rxn} = \Delta H^\circ_f\,(HI\,(g))$

13. The heat of combustion of one mole of solid napthalene ($C_{10}H_8$) to liquid water and gaseous carbon dioxide is -5162 kJ. Calculate the standard heat of formation of napthalene.
    A) 1.02×10^4 kJ/mol
    B) 2051 kJ/mol
    C) 259 kJ/mol
    D) 84 kJ/mol
    E) -168 kJ/mol

12. Which of the following reactions is not exothermic?

    A) $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$
    B) $Ba(OH)_2 \cdot 8H_2O(s) + 2NH_4Cl(s) \rightarrow BaCl_2(aq) + 10H_2O(l) + 2NH_3(aq)$
    C) $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$
    D) $2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(g)$
    E) $Al(s) + Br_2(l) \rightarrow AlBr_3(s)$

13. The addition of 3.31 kJ of heat to a 300. g sample of mercury at 19.0 ˚C caused the temperature to rise to 99.0 ˚C. What is the specific heat of mercury?

    A) $41.4\ \frac{J}{g \cdot ^\circ C}$
    B) $7.25\ \frac{J}{g \cdot ^\circ C}$
    C) $0.581\ \frac{J}{g \cdot ^\circ C}$
    D) $0.138\ \frac{J}{g \cdot ^\circ C}$
    E) $0.111\ \frac{J}{g \cdot ^\circ C}$

14. Which of the following equations is an example of a standard formation reaction?

A) $Ca_{(s)} + CO_{(g)} + O_{2(g)} \rightarrow CaCO_{3(s)}$
B) $HgO_{(s)} \rightarrow Hg_{(l)} + O_{2(g)}$
C) $2C_{(s)} + O_{2(g)} \rightarrow 2CO_{(g)}$
D) $2Cl_{(g)} \rightarrow Cl_{2(g)}$
E) $Cl_{2(g)} + \frac{1}{2} O_{2(g)} \rightarrow Cl_2O_{(g)}$

15. For which of the following reactions is $\Delta E = \Delta H$?

A) $HgO_{(s)} \rightarrow Hg_{(l)} + O_{2(g)}$
B) $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$
C) $2NH_4Cl_{(s)} \rightarrow N_{2(g)} + 4H_{2(g)} + Cl_{2(g)}$
D) $N_{2(g)} + 2O_{2(g)} \rightarrow 2NO_{2(g)}$
E) $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

9. Which of the following elements has the largest ionization energy?

A) O
B) B
C) I
D) Cs
E) S

10. Which of the following is isoelectronic with Ba^{2+}?

A) Ca^{2+}
B) La^{2+}
C) O^{2-}
D) I^-
E) Rn

11. Which of the following has the smallest radius?

A) N
B) B
C) Al
D) Be
E) C

13. A possible set of quantum numbers for the last electron added to complete the ground state electron configuration for a neutral zinc atom is,

	n	l	m_l	m_s
A)	3	2	+2	$-\frac{1}{2}$
B)	4	1	-1	$-\frac{1}{2}$
C)	3	1	0	$+\frac{1}{2}$
D)	4	3	0	$+\frac{1}{2}$
E)	4	2	-2	$+\frac{1}{2}$

15. An atom of the element X has the electron configuration

$$1s^2 2s^2 2p^6 3s^2 3p^3$$

The compound most likely to form with Br is,

A) XBr
B) XBr_2
C) X_2Br_3
D) XBr_3
E) X_3Br_2

16. What is the electron configuration of a Co^{3+} ion?

A) $[Ar]4d^6$
B) $[Ar]3d^6$
C) $[Ar]4s^2 3d^{10}$
D) $[Ar]4s^2 3d^4$
E) $[Ar]4s^2 3d^7$