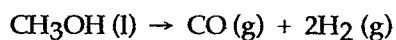


Name _____

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

- 1) The kinetic energy of a 7.3 kg steel ball traveling at 18.0 m/s _____ J.
A) 2.4×10^3 B) 7.3 C) 66 D) 1.2×10^3 E) 1.3×10^2
- 2) One joule equals _____.
A) 2 kg
B) 1 g · cm/s
C) 1 kg · m²/s²
D) 4.184 cal
E) none of the above
- 3) The ΔE of a system that releases 12.4 J of heat and does 4.2 J of work on the surroundings is _____ J.
A) 16.6 B) 12.4 C) -16.6 D) -8.2 E) 4.2
- 4) The internal energy of a system is always increased by _____.
A) withdrawing heat from the system
B) a volume compression
C) having the system do work on the surroundings
D) adding heat to the system and having the system do work on the surroundings
E) adding heat to the system
- 5) Of the following, which one is a state function?
A) q
B) H
C) w
D) heat
E) none of the above
- 6) Which of the following is a statement of the first law of thermodynamics?
A) Energy lost by the system must be gained by the surroundings.
B) 1 cal = 4.184 J (exactly)
C) A negative ΔH corresponds to an exothermic process.
D) $E_k = \frac{1}{2}mv^2$
E) $\Delta E = E_{\text{final}} - E_{\text{initial}}$

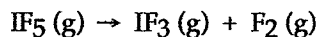
7) The value of ΔH° for the reaction below is +128.1 kJ:



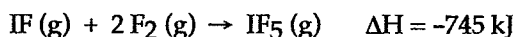
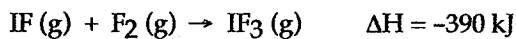
How many kJ of heat are released when 5.10 g of $\text{H}_2(\text{g})$ is formed as shown in the equation?

- A) 326 B) 62.0 C) 128 D) 653 E) 162

8) ΔH for the reaction

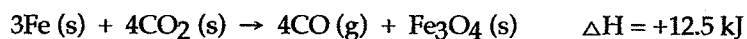
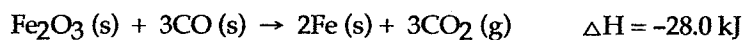


is _____ kJ, give the data below.



- A) +35 B) +355 C) -1135 D) +1135 E) -35

9) Given the following reactions



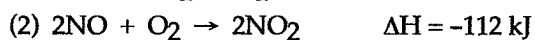
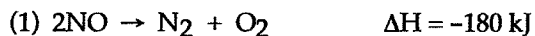
the enthalpy of the reaction of Fe_2O_3 with CO



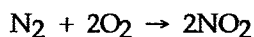
is _____ kJ.

- A) -109 B) 40.5 C) -59.0 D) -15.5 E) +109

10) Given the following reactions



the enthalpy of the reaction of nitrogen with oxygen to produce nitrogen dioxide



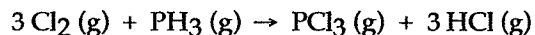
is _____ kJ.

- A) -146 B) 68 C) 292 D) -68 E) -292

11) Electromagnetic radiation travels through vacuum at a speed of _____ m/s.

- A) 10,000
- B) 186,000
- C) 125
- D) 3.00×10^8
- E) It depends on wavelength.

12) Given the data in the table below, $\Delta H^\circ_{\text{rxn}}$ for the reaction

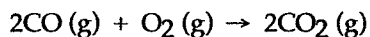


is _____ kJ.

Compound	ΔH°_f (kJ/mol)
$\text{PCl}_3 (\text{g})$	-288.07
$\text{HCl} (\text{g})$	-92.30
$\text{PH}_3 (\text{g})$	5.4

- A) 385.77
- B) 570.37
- C) -570.37
- D) -385.77
- E) The ΔH°_f of $\text{Cl}_2 (\text{g})$ is needed for the calculation.

13) Given the data in the table below, ΔH° for the reaction

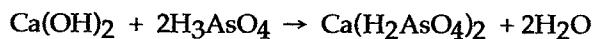


is _____ kJ.

Substance	ΔH°_f (kJ/mol)
$\text{CO} (\text{g})$	-110.5
$\text{CO}_2 (\text{g})$	-393.7
$\text{CaCO}_3 (\text{s})$	-1207.0

- A) -677.0
- B) -566.4
- C) -283.3
- D) 283.3
- E) The ΔH°_f of $\text{O}_2 (\text{g})$ is needed for the calculation.

14) Given the data in the table below, $\Delta H^\circ_{\text{rxn}}$ for the reaction

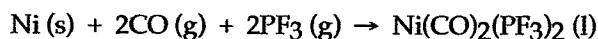


is _____ kJ.

Substance	ΔH_f° (kJ/mol)
Ca(OH) ₂	-986.6
H ₃ AsO ₄	-900.4
Ca(H ₂ AsO ₄) ₂	-2346.0
H ₂ O	-285.9

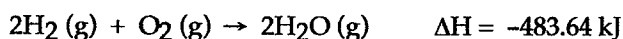
- A) -76.4 B) -130.4 C) -4519 D) -4219 E) -744.9

15) In the reaction below, ΔH_f° is zero for _____.

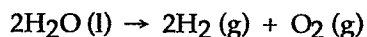


- A) PF₃ (g)
B) Ni (s)
C) Ni(CO)₂(PF₃)₂ (l)
D) CO (g)
E) both CO (g) and PF₃ (g)

16) Given the following reactions



the enthalpy for the decomposition of liquid water into gaseous hydrogen and oxygen



is _____ kJ.

- A) 527.65 B) -395.62 C) 439.63 D) -527.65 E) 571.66

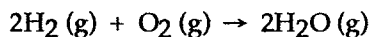
17) The temperature of a 15-g sample of lead metal increases from 22°C to 37°C upon the addition of 29.0 J of heat. The specific heat capacity of the lead is _____ J/g-K.

- A) 29 B) 1.9 C) 7.8 D) -29 E) 0.13

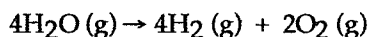
18) The molar heat capacity of a compound with the formula C₂H₆SO is 88.0 J/mol-K. The specific heat of this substance is _____ J/g-K.

- A) -88.0 B) 88.0 C) 6.88 x 10³ D) 4.89 E) 1.13

19) The enthalpy change for the following reaction is -486.3 kJ:

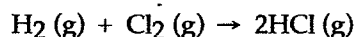


Therefore, the enthalpy change for the following reaction is _____ kJ:



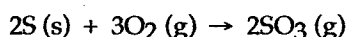
- A) 2.34×10^5 B) 483.6 C) 967.2 D) -967.2 E) -483.6

20) The value of ΔH° for the reaction below is -186 kJ. Calculate the heat (kJ) released from the reaction of 25 g of Cl_2 .



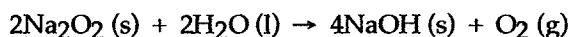
- A) -186 B) 66 C) 33 D) 47 E) 5.3×10^2

21) The value of ΔH° for the reaction below is -790 kJ. The enthalpy change accompanying the reaction of 0.95 g of S is _____ kJ.



- A) -12 B) 12 C) -790 D) 23 E) -23

22) The value of ΔH° for the reaction below is -126 kJ. The amount of heat that is released by the reaction of 25.0 g of Na_2O_2 with water is _____ kJ.



- A) 20.2 B) 80.8 C) 40.4 D) -126 E) 67.5

23) The change in the internal energy of a system that absorbs 2,500 J of heat and that does 7,655 J of work on the surroundings is _____ J.

- A) 10,155 B) $-5,155$ C) 5,155 D) 1.91×10^7 E) $-10,155$

24) The wavelength of light that has a frequency of $1.20 \times 10^{13} \text{s}^{-1}$ is _____ m.

- A) 2.50×10^{-5} B) 2.5 C) 0.0400 D) 12.0 E) 25.0

25) The frequency of a photon that has an energy of 3.7×10^{-18} J is _____ s^{-1} .

- A) 5.6×10^{15} B) 1.8×10^{-16} C) 2.5×10^{15} D) 2.5×10^{-15} E) 5.4×10^{-8}

26) The energy of a photon that has a frequency of $8.21 \times 10^{15} \text{s}^{-1}$ is _____ J.

- A) 5.44×10^{-18} B) 8.08×10^{-50} C) 1.26×10^{-19} D) 1.24×10^{49} E) 1.99×10^{-25}

27) The frequency of electromagnetic radiation required to promote an electron from $n = 2$ to $n = 4$ in a Bohr hydrogen atom is _____ Hz.

- A) 4.1×10^{-19} B) 4.1×10^{19} C) 5.4×10^{-19} D) 8.2×10^{14} E) 6.2×10^{14}

- 28) The energy (J) required for an electronic transition in a Bohr hydrogen atom from $n = 2$ to $n = 3$ is _____ J.
 A) 4.0×10^{-19} B) 4.6×10^{14} C) 3.0×10^{-19} D) -3.0×10^{-19} E) -7.9×10^{-19}
- 29) What is the De Broglie wavelength (m) of a 2.0 kg object moving at a speed of 50 m/s?
 A) 5.3×10^{-33} B) 3.8×10^{34} C) 2.6×10^{-35} D) 1.5×10^{35} E) 6.6×10^{-36}
- 30) All of the orbitals in a given electron shell have the same value of the _____ quantum number.
 A) spin B) azimuthal C) principal D) psi E) magnetic
- 31) The _____ quantum number defines the shape of an orbital.
 A) magnetic B) azimuthal C) principal D) spin E) psi
- 32) There are _____ orbitals in the third shell.
 A) 9 B) 16 C) 4 D) 1 E) 25
- 33) The total number of orbitals in a shell is given by _____.
 A) $2n + 1$ B) l^2 C) $2n$ D) $2l + 1$ E) n^2
- 34) At maximum, an f-subshell can hold _____ electrons, a d-subshell can hold _____ electrons, and a p-subshell can hold _____ electrons.
 A) 2, 12, 21 B) 18, 8, 2 C) 2, 8, 18 D) 14, 10, 6 E) 2, 6, 10
- 35) In which orbital does an electron in a phosphorus atom experience the greatest effective nuclear charge?
 A) 1s B) 2s C) 2p D) 3s E) 3p
- 36) $[\text{Ar}]4s^23d^{10}4p^3$ is the electron configuration of a(n) _____ atom.
 A) V B) Sn C) Sb D) As E) P
- 37) The ground state electron configuration of Fe is _____.
 A) $1s^22s^23s^23p^{10}$
 B) $1s^22s^23s^23p^63d^6$
 C) $1s^22s^22p^63s^23p^63d^64s^2$
 D) $1s^22s^22p^63s^23p^64s^24d^6$
 E) $1s^22s^22p^63s^23p^64s^2$
- 38) The ground-state electron configuration of _____ is $[\text{Ar}]4s^13d^5$.
 A) Cr B) Mn C) K D) V E) Fe

Consider the following electron configurations to answer the questions that follow:

- (i) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$
- (ii) $1s^2 2s^2 2p^6 3s^2 3p^5$
- (iii) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$
- (iv) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
- (v) $1s^2 2s^2 2p^4 3s^1$

- 39) An example of an electron configuration of a transition metal is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 40) An example of an excited state electron configuration for fluorine is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 41) The ground state electron configuration of an element with the largest number of valence electrons is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 42) The ground state electron configuration of an element belonging to group VIIA (17) is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 43) The ground state electron configuration of an element with the smallest number of valence electrons is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)

Consider the following electron configurations to answer the questions that follow:

- (i) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$
- (ii) $1s^2 2s^2 2p^6 3s^2 3p^6$
- (iii) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$
- (iv) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$
- (v) $1s^2 2s^2 2p^4 3s^3$

- 44) An electron configuration that violates Pauli's exclusion principle is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 45) An anomalous, yet correct, electron configuration of a transition metal is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 46) Which electron configuration belongs to group IIA (2) metal?
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 47) An electron configuration of a noble gas is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)
- 48) An electron configuration that belongs to a post-transition element is _____.
- A) (i) B) (ii) C) (iii) D) (iv) E) (v)

Answer Key

Testname: AP CH 5+6 PRETEST.TST

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

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