

CHE 105 Spring 2019 Exam 3

Your Name: _____

Your ID: _____

Question #: 1

Which one is true of the enthalpy change (ΔH) of a reaction?

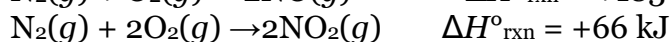
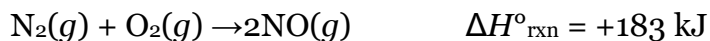
- A. ΔH is equal to q_p , the heat of the reaction under conditions of constant pressure.
 - B. ΔH is equal to the heat capacity in units of kJ/mol.
 - C. ΔH is equal to the sum of the potential and kinetic energies.
 - D. ΔH is only associated with exothermic processes.
-

Question #: 2

From the standard reaction enthalpies given below, what is $\Delta H^\circ_{\text{rxn}}$ for the following reaction?



Given:



- A. -150 kJ
 - B. -117 kJ
 - C. -333 kJ
 - D. +115 kJ
 - E. +238 kJ
-

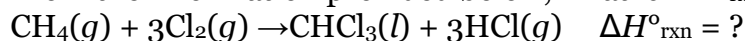
Question #: 3

Which reaction represents ΔH°_f , the standard enthalpy of formation, for $\text{Ca}(\text{NO}_3)_2$?

- A. $\text{Ca}(s) + 2\text{N}(g) + 6\text{O}(g) \rightarrow \text{Ca}(\text{NO}_3)_2(s)$
- B. $\text{Ca}^{2+}(aq) + 2\text{NO}_3^-(aq) \rightarrow \text{Ca}(\text{NO}_3)_2(aq)$
- C. $\text{Ca}(s) + 2\text{NO}_3(g) \rightarrow \text{Ca}(\text{NO}_3)_2(g)$
- D. $\text{Ca}(s) + \text{N}_2(g) + 3\text{O}_2(g) \rightarrow \text{Ca}(\text{NO}_3)_2(s)$

Question #: 4

From the information provided below, what is $\Delta H^\circ_{\text{rxn}}$ for the following reaction?

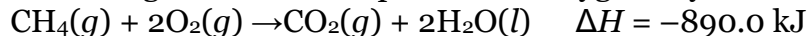


	ΔH°_f
$\text{CH}_4(g)$	-75 kJ/mol
$\text{CHCl}_3(l)$	-134 kJ/mol
$\text{HCl}(g)$	-92 kJ/mol

- A. -151 kJ
 - B. -335 kJ
 - C. +662 kJ
 - D. +117 kJ
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Question #: 5

Methane gas reacts in the presence of oxygen to yield carbon dioxide and water.



What is the result when 1.70 g of methane reacts with excess oxygen at constant pressure?

- A. 94 kJ of heat is absorbed by the reaction.
 - B. 33 kJ of heat is released by the reaction.
 - C. 94 kJ of heat is released by the reaction.
 - D. 33 kJ of heat is absorbed by the reaction.
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Question #: 6

A sunburn is caused by overexposure to radiation in which region of the electromagnetic spectrum?

- A. gamma-ray
- B. infrared
- C. X-ray
- D. ultraviolet
- E. microwave
- F. radio wave

Question #: 7

Which one occurs as the energy of a photon is increased?

- A. The frequency decreases.
 - B. The speed increases.
 - C. The wavelength increases.
 - D. The wavelength decreases.
 - E. Planck's constant decreases.
 - F. The uncertainty principle no longer is applicable.
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What occurs when waves of equal amplitude from two sources which are out of phase interact?

- A. constructive interference
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 - C. destructive interference
 - D. effusion
 - E. amplitude modulation
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Question #: 9

What is the energy of an emitted photon of green light with a frequency of 5.49×10^{14} Hz?

- A. 2.75×10^{-19} J
 - B. 3.64×10^{-19} J
 - C. 1.83×10^{-19} J
 - D. 4.68×10^{-19} J
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Question #: 10

How many photons are contained in a flash of green light (525 nm) that contains 189 kJ of energy?

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 - B. 2.10×10^{24} photons
 - C. 7.99×10^{30} photons
 - D. 4.99×10^{23} photons
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 - C. 387 nm
 - D. 885 nm
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What is the wavelength of light with a frequency of 7.30×10^{14} Hz?

- A. 765 nm
 - B. 88.3 nm
 - C. 325 nm
 - D. 411 nm
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Question #: 13

Which transition in a hydrogen atom represents **absorption** of a photon with the smallest energy?

- A. $n = 4$ to $n = 6$
 - B. $n = 4$ to $n = 1$
 - C. $n = 1$ to $n = 3$
 - D. $n = 4$ to $n = 1$
 - E. $n = 6$ to $n = 5$
-

Question #: 14

What is the wavelength if a 155 gram baseball is moving at 32.5 m/s?

- A. $7.60 \times 10^{-36} \text{ m}$
 - B. $1.32 \times 10^{-34} \text{ m}$
 - C. $2.15 \times 10^{-32} \text{ m}$
 - D. $3.57 \times 10^{-32} \text{ m}$
-

Question #: 15

Which statement about electron subshells and orbitals in atoms is **incorrect**?

- A. If a subshell contains two electrons, then it must be an s subshell?
 - B. Any orbital can contain zero, one, or two electrons, with two being the maximum.
 - C. A d subshell can hold more electrons than can a p subshell because the d subshell is composed of more orbitals than is the p subshell.
 - D. Each p subshell is composed of three p orbitals, so a p subshell can hold a maximum of six electrons.
-

Question #: 16

Which set of quantum numbers for an electron in the ground state of a neutral atom does **not** contain an error?

- A. $n = 4, l = 0, m_l = -1, m_s = +1/2$
 - B. $n = 3, l = 3, m_l = 1, m_s = +1/2$
 - C. $n = 5, l = 3, m_l = -3, m_s = -1/2$
 - D. $n = 3, l = 2, m_l = 3, m_s = -1/2$
-

Question #: 17

The quantum numbers of the outermost electron of an element in its ground state are $n = 6, l = 1, m_l = -1, m_s = +1/2$. What is the element?

- A. Gd
 - B. Te
 - C. Hf
 - D. Bi
-

Question #: 18

What is the ground state electron configuration of a neutral Mo atom?

- A. $[\text{Xe}]5s^25p^4$
 - B. $[\text{Kr}]5s^24d^4$
 - C. $[\text{Ar}]5s^24d^5$
 - D. $[\text{Kr}]5s^14d^5$
-

Question #: 19

Which one contains an isoelectronic pair?

- A. Ar and S^{2-}
 - B. S and Se
 - C. As^{3+} and Kr
 - D. Ar and Rb^{+}
-

Question #: 20

Which species is paramagnetic?

- A. Ca
 - B. O^{2-}
 - C. Cd^{2+}
 - D. Zn
 - E. Nb^{3+}
-

Question #: 21

The ionization energies (in kJ/mol) of a period 4 element are given below. Which element is it?
 $IE_1 = 590$ $IE_2 = 1145$ $IE_3 = 4912$ $IE_4 = 6491$ $IE_5 = 8153$

.

- A. K
 - B. Ca
 - C. Sc
 - D. Ga
 - E. Ge
-

Question #: 22

Based on the general trends in electronegativities, which bond is **most** polar?

- A. Si—S
 - B. Si—O
 - C. C—Si
 - D. C—N
 - E. Si—Si
-

Question #: 23

From Lewis theory, what is the chemical formula of the compound formed from calcium and nitrogen?

- A. CaN
 - B. CaN₂
 - C. Ca₂N₃
 - D. Ca₃N₂
 - E. Ca₃N₄
-

Question #: 24

Of the compounds shown below, which are exceptions to the octet rule?

XeF₂ IF₅ BF₃ NO SF₆

- A. only IF₅ and SF₆
 - B. only NO and BF₃
 - C. only XeF₂, IF₅, and SF₆
 - D. All of these compounds are exceptions to the octet rule.
-

Question #: 25

For the preferred structure of the OCN^- ion, which atom has a non-zero formal charge?

- A. O
 - B. C
 - C. N
 - D. None of these atoms would have a non-zero formal charge.
-

Question #: 26

The Lewis structure of the CO_3^{2-} ion and its resonance structures contain:

.

- A. one C–O single bond and two C=O double bonds.
 - B. two C–O single bonds and one C=O double bond.
 - C. three C=O double bonds.
 - D. two C–O single bonds and one carbon-oxygen triple bond.
-

Question #: 27

From the general properties of bonds, which statement is true?

- A. Ionic bonds are stronger than covalent bonds.
 - B. All bonds are of the same length.
 - C. Covalent triple bonds contain four electrons.
 - D. Covalent double bonds are shorter than covalent triple bonds.
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Question #: 28

The lattice energy:

- A. applies only for compounds with covalent bonding.
 - B. can be used to determine the lengths of double and triple bonds.
 - C. cannot be measured directly but can be calculated from a thermochemical cycle.
 - D. can be used to determine the formal charge on an atom.
-

Question #: 29

How many **lone pairs** of electrons are on the As atom in AsCl_3 ?

.

- A. 0
 - B. 1
 - C. 2
 - D. 3
-

Question #: 30

Which ionic compound would be expected to have the **largest** lattice energy?

- A. Rb_2O
- B. SrO
- C. KCl
- D. CO_2

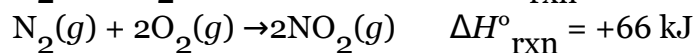
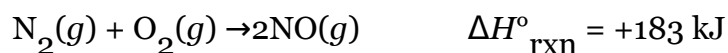
DRAFT
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Your Name: _____

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IUPAC Periodic Table of the Elements																	
1 IA																	18 VIIIA
1 H 1.008	2 He 4.0026																
3 Li 6.941	4 Be 9.012																
Key: atomic number Symbol atomic weight																	
11 Na 22.990	12 Mg 24.305	13 Al 26.982	14 Si 28.085	15 P 30.974	16 S 32.06	17 Cl 35.45	18 Ar 39.948										
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.630	33 As 74.922	34 Se 78.971	35 Br 79.904	36 Kr 83.798
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.95	43 Tc	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 lanthanides	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-103 actinides	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og



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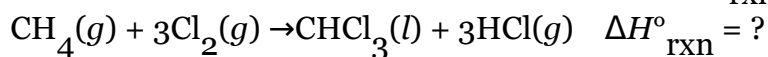
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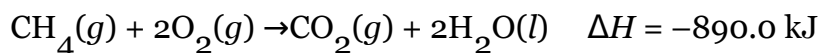


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