

CHM 2045 Exam 2 Review
Academic Resources Center

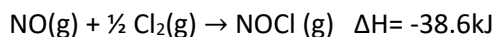
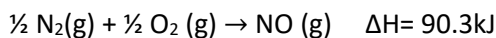
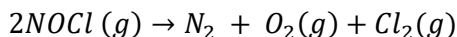
1. In a bomb calorimeter compartment surrounded by 2.45 kg of water, the combustion of 1.608 g of benzene, C_6H_6 (l), raised the temperature of the water from 25.720°C to 34.852°C. The heat capacity of the calorimeter is 0.923 kJ/°C. What is ΔE for the reaction in kJ/mol of C_6H_6 (l), the specific heat of water is 4.184 J/g°C.

- a. 93.6 kJ/mol
- b. -102.04 kJ/mol
- c. -4953.4 kJ/mol
- d. 4544.6 kJ/mol

2. If 130. grams of iron (0.450 J/g°C) at 120°C is combined with 120. grams of water (4.184J/g°C) at 22°C in an insulated container, what will be the final temperature of the water?

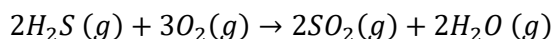
- a. 71.0 °C
- b. 32.2 °C
- c. 52.0 °C
- d. -9.08 °C

3. Calculate ΔH for the following reaction given the reactions below



- a. 103.4kJ
- b. 51.7 kJ
- c. -252.8 kJ
- d. -108.4kJ

4. Calculate the standard enthalpy of reaction for the following reaction. The standard heat of formations are as follows. $H_2S = -20.2 \text{ kJ/mol}$, $SO_2(g) = -296.8 \text{ kJ/mol}$, $H_2O(g) = -241.8 \text{ kJ/mol}$, $H_2O(l) = -285.8 \text{ kJ/mol}$



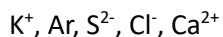
- a. -1036.8 kJ/mol
- b. 498.2 kJ/mol
- c. -1084.4 kJ/mol
- d. -518.4 kJ/mol

5. Which of the following statements is true about energy?

- a. The total change in energy is $q + w$
- b. A temperature increase of the surroundings indicates that the reaction is endothermic
- c. $Work = V\Delta P$
- d. The volume in a coffee cup calorimeter is always constant

6. Find the total work done by the combustion of methane at 1atm.
- 1 J
 - 0 J
 - 50.7 J
 - 101.3 J
7. Which of the following sets of quantum numbers is possible
- $n=2, l=2, m_l=1, m_s=1/2$
 - $n=3, l=2, m_l=3, m_s=-1/2$
 - $n=3, l=1, m_l=-1, m_s=1/2$
 - $n=1, l=0, m_l=0, m_s=1$
8. A portion of soup is 155 grams of water that is heated from 30 to 90 degrees C by a microwave with radiation of wavelength 0.22m. How many photons are absorbed by the water in the soup?
- 6.46×10^{20} photons
 - 4.31×10^{28} photons
 - 9.04×10^{25} photons
 - 6.02×10^{23} photons
9. How many orbitals are in the 5f electron shell?
- 5
 - 14
 - 4
 - 7
10. Which of the following is the electron configuration for copper?
- $[\text{Ar}]4s^23d^9$
 - $[\text{Ar}]5s^24d^9$
 - $[\text{Ar}]4s^13d^{10}$
 - $[\text{Ar}]4s^13d^5$
11. Which of the following electron configurations is paramagnetic?
- Kr
 - Ni
 - Mg
 - Zn
12. Which of the following pairs are isoelectronic?
- V^{3+}, Ca
 - $\text{S}^{2-}, \text{Ca}^{2+}$
 - $\text{Zn}^{2+}, \text{Ni}$
 - Ne, Ar

13. Rank the following atoms and ions in order of increasing size



- $K^+ < Ar < S^{2-} < Cl^- < Ca^{2+}$
- $Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$
- $S^{2-} < Cl^- < Ar < K^+ < Ca^{2+}$
- $Ar < K^+ < Ca^{2+} < Cl^- < S^{2-}$

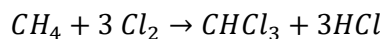
14. Which of the following values could represent the ionization energy for a calcium ion?

- IE1=5000 IE2=9000 IE3= 25000
- IE1=10,000 IE2= 15,000 IE3 = 20,000
- IE1=11,000 IE2=20,000 IE3= 22,000
- IE1= 1,000 IE2= 1,000 IE3=20,000

15. Which of the following reactions represents electron affinity?

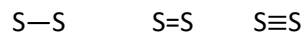
- $P(g) + e^- \rightarrow P^-(g)$
- $Na(s) + e^- \rightarrow Na^-(g)$
- $K(g) \rightarrow K^+(g) + e^-$
- $S(g) \rightarrow S^-(g) + e^-$

16. Calculate the standard enthalpy of formation for the following reaction. The bond enthalpies are as follows. C—H= 413kJ/mol, Cl—Cl= 243kJ/mol, C—Cl = -339 kJ/mol, H—Cl= -427kJ/mol



- 4401 kJ/mol
- 936 kJ/mol
- 4401 kJ/mol
- 936 kJ/mol

17. Place the following bonds in order of increasing bond length



- $S-S < S=S < S \equiv S$
- $S \equiv S < S=S < S-S$
- $S=S < S-S < S \equiv S$
- $S-S < S \equiv S < S=S$

18. Place the following bonds in order of increasing bond length



- $H-F < H-Cl < H-I < H-H$
- $H-H < H-I < H-Cl < H-F$
- $H-H < H-F < H-Cl < H-I$
- $H-I < H-Cl < H-F < H-H$

19. Order the following salts in order of increasing lattice energy: Calcium chloride, sodium chloride, potassium chloride, barium chloride
- Calcium chloride < sodium chloride < potassium chloride < barium chloride
 - Sodium chloride < potassium chloride < barium chloride < calcium chloride
 - Potassium chloride < sodium chloride < calcium chloride < barium chloride
 - Potassium chloride < sodium chloride < barium chloride < calcium chloride