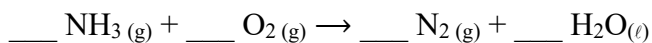


Multiple Choice: (4 points each. Put answers in left margin as capital letters.)

- Two isotopes of an element exist in the ratio 26.400 g/mol (47.222%) and 28.522 g/mol (52.778%). What is the weighted average of this sample (g/mol)?
A) 26.400 B) 27.402 C) 27.520 D) 27.461 E) 28.522
- Tomato soup is a
i) compound iii) heterogenous mixture v) solution
ii) pure substance iv) homogeneous mixture
A) i B) ii C) iii D) iv E) v
F) i and ii G) iii and v H) iv and v
- Which of the following aqueous acids is a weak acid?
A) HCl B) HClO₄ C) HNO₃ D) H₃PO₄ E) H₂SO₄
- Which of the following is a combustion reaction?
A) $\text{Cu}(\text{OH})_2(\text{aq}) + 2 \text{HNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2 \text{H}_2\text{O}(\ell)$
B) $\text{CH}_4(\text{g}) + 2 \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2 \text{H}_2\text{O}(\ell)$
C) $\text{FeCl}_3(\text{s}) + 3 \text{AgNO}_3(\text{g}) \rightarrow 3 \text{AgCl}(\text{s}) + 3 \text{Fe}(\text{NO})_3(\text{aq})$
D) $\text{Na}_2\text{CO}_3(\text{s}) \rightarrow \text{NaO}(\text{s}) + \text{CO}_2(\text{g})$
E) None is a combustion reaction.
- What is the oxidation number of the sulfur atom in MgSO₃?
A) -2 B) 0 C) +2 D) +4 E) +6
- For the reaction: $\text{Cu}(\text{OH})_2(\text{aq}) + 2 \text{HNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2 \text{H}_2\text{O}(\ell)$, which element is reduced?
A) Cu B) H C) N D) O E) None are reduced
- Enthalpy is the _____ for a system.
A) energy change D) heat change
B) energy change with no heat E) heat change at constant pressure
C) energy change with no work

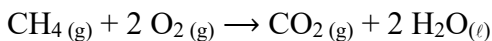
3. Complete the following: (10 points)



Calcium chloride reacts with potassium carbonate to yield calcium carbonate and potassium chloride. (Use solubility rules to predict the state of each material.)

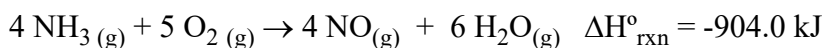
4. When a 5.00 g sample of KCl is dissolved in water in a calorimeter that has a total heat capacity of $3.04 \text{ kJ}\cdot\text{K}^{-1}$, the temperature decreases by 0.380 K. Calculate the molar heat of solution of KCl. (5 points)

5. Is the following reaction endothermic or exothermic? Explain. (5 points)



6. A system gains 782 kJ of heat, resulting in a change in internal energy of the system equal to +251 kJ. How much work is done? (5 points)

7. From the following data: (14 points)



- Is the reaction endothermic or exothermic?
- How much energy would be absorbed or released if 13.75 g of nitrogen monoxide formed?
- If an unknown quantity of ammonia is burned with a heat change of -425 kJ, what mass of ammonia burned?