

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

- How much water would increase in temperature by $14.1\text{ }^{\circ}\text{C}$ if 72.7 J of heat were added to it. The specific heat of water is $4.184\text{ J/g}\cdot^{\circ}\text{C}$.
A) 0.0464 g B) 0.811 g C) 1.23 g D) 429 g E) None of these
- The correct number of protons, neutrons, and electrons in S^{-} (S-31) is:
A) 15p, 16n, 14e C) 16p, 15n, 15e E) 16p, 15n, 17e
B) 15p, 16n, 16e D) 16p, 15n, 16e
- What is the charge on nickel in VPO_4 ?
A) 0 B) +2 C) +3 D) +4 E) +6
- Which of the following is molecular oxygen?
A) O B) O_2 C) O_3 D) O_4 E) O_5
- Calculate the molar mass (g/mol) for the compound, titanium(IV) sulfate, $\text{Ti}(\text{SO}_4)_2$.
A) 95.93 B) 143.92 C) 191.79 D) 239.99 E) 287.53
- What percentage of aluminum chloride is aluminum?
A) 13.4% B) 19.9% C) 26.7% D) 34.6% E) 49.9%
- Which of the following is true for the reaction: $\text{AgCl}_{(\text{s})} + 126\text{ kJ} \rightarrow \text{Ag}^{+}_{(\text{aq})} + \text{Cl}^{-}_{(\text{aq})}$
A) the reaction is exothermic, and the heat of the reaction is positive
B) the reaction is exothermic, and the heat of the reaction is negative
C) the reaction is endothermic, and the heat of the reaction is positive
D) the reaction is endothermic, and the heat of the reaction is negative
E) none are true
- Which of the following processes is most likely to be endothermic?
A) Water freezing C) A light bulb emitting light E) A block resting on a table
B) Coal burning D) The reaction of sodium and water
- For the reaction: $\text{MnO}_{2(\text{s})} + 4\text{ HCl}_{(\text{aq})} \rightarrow \text{MnCl}_{2(\text{aq})} + \text{Cl}_{2} + 2\text{ H}_2\text{O}_{(\ell)}$, how many moles of MnO_2 are consumed when 15.2 moles of H_2O are produced?
A) 7.6 mol B) 15.2 mol C) 22.8 mol D) 30.4 mol E) none of these

10. How many moles of MnO_2 are needed to completely react with 24.8 grams of HCl ?

- A) 0.170 mol B) 0.340 mol C) 0.680 mol D) 1.32 mol E) 2.72 mol

Discussion Questions:

1. Define: (4 points each)

combustion reaction –

empirical formula –

theoretical yield –

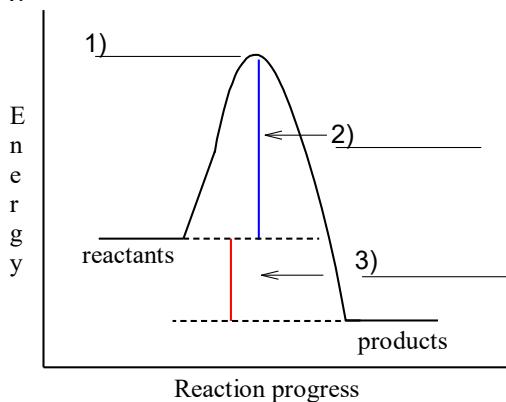
Fill-in-the-blanks (4 points each)

1. _____ silicon tetrafluoride, N_2O_4 _____

2. _____ copper(I) oxide, $\text{Mg}(\text{NO}_3)$ _____

3. Avogadro's number = _____

4.



For questions 4-5, provide reaction types, but do not use the same type twice.

5. $\text{CH}_4(\text{g}) + 3 \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2 \text{H}_2\text{O}(\ell)$ _____

6. $\text{PbCO}_3(\text{s}) \rightarrow \text{PbO}(\text{s}) + \text{CO}_2(\text{g})$ _____

7. Balance: _____ $\text{C}_3\text{H}_8(\text{g}) +$ _____ $\text{O}_2(\text{g}) \rightarrow$ _____ $\text{CO}_2(\text{g}) +$ _____ $\text{H}_2\text{O}(\ell)$

8. When solutions of magnesium bromide and lithium carbonate are mixed, solid magnesium carbonate forms and lithium bromide remains in solution. Write the balanced equation.

Show your work problems

1. Milk of magnesia is one of the oldest antacids. The material is a slurry of a magnesium compound in water. The compound is 41.7% magnesium, 54.9% oxygen, and 3.5% hydrogen. The mineral weighs about 60 g per mole. What are its empirical and molecular formulas? (You may **NOT** work backwards from the molar mass.) (6 points)

2. When silver(I) nitrate is mixed with calcium chloride according to the reaction:
- $$2 \text{AgNO}_3 (\text{aq}) + \text{CaCl}_2 (\text{aq}) \rightarrow 2 \text{AgCl}_{(\text{s})} + \text{Ca}(\text{NO}_3)_2 (\text{aq})$$
- silver(I) chloride forms. What is the maximum mass of silver(I) chloride that can be produced by combining 3.00 g of each reactant? What is the percent yield if 1.50 g AgCl is produced? (8 points)

3. Write the balanced equation for

