

Mark your scantrons to answer Questions 1-18. Each question has only one answer. Each question is worth 2 pt.

CHP 5

1) What is the oxygen-to-hydrogen mass ratio for H_2O_2 ?

$2(1.01) + 2(16.00) = 34.02$
 $\frac{32.00}{34.02} = \frac{16}{17}$

- A) 0.125 B) 4 C) 8 **D) 16** E) none of the above

2) What is the formula mass for diboron tetrachloride?

B_2Cl_4 $2(10.81) + 4(35.45) = 163.422$

- A) 127.98 amu B) 198.89 amu C) 234.34 amu **D) 163.43 amu** E) none of the above

CHP 6

3) The mole has a value of 6.023×10^{23} . A) TRUE **B) FALSE**

4) One mole of chlorine gas has a mass of 35.45 grams. A) TRUE **B) FALSE**

5) How many atoms are in 5.80 moles of He? $5.80 \times 6.022 \times 10^{23} =$

- A) 6.02×10^{23} B) 1.03×10^{23} C) 4.00 **D) 3.49×10^{24}** E) none of the above

6) How many moles of Cu are in 1.48×10^{25} Cu atoms?

- A) 0.0408 **B) 24.6** C) 1.54×10^{25} D) 6.022×10^{23} E) none of the above

7) How many moles of iron are contained in 1.75 kg of iron?

$1750g / 55.847g$

- A) 3.13×10^{-2} B) 3.13×10^{-4} **C) 31.3** D) 3.13×10^4 E) none of the above

8) How many molecules of sulfur trioxide (molar mass = 80.06 g) are in 78.0 grams?

- A) 5.87×10^{23}** B) 7.33×10^{23} C) 3.76×10^{27} D) 0.974 E) none of the above

9) One mole of $(NH_4)_2HPO_4$ contains how many moles of hydrogen atoms?

- A) 4 B) 2 **C) 8** **D) 9** E) none of the above

10) An iron ore sample is found to be 35.00% Fe by mass. How many grams of ore is needed to obtain 454.0 grams of Fe?

- $454g \times \frac{100g \text{ ore}}{35.00g \text{ Fe}} =$
A) 297 B) 158.9 C) 295.1 D) 350.0 E) none of the above

11) What is the mass percent of chlorine in hydrochloric acid?

HCl $H: 1.01$
 $Cl: 35.45$
 $\frac{35.45}{35.45 + 1.01} = 97.2$

- ~~A) 2.8~~ B) 35.5 **C) 97.2** D) 70.1 E) none of the above

12) The simplest formula for hydrogen peroxide is HO . To determine its molecular formula, it is necessary to know

- A) the properties of hydrogen peroxide.
B) the density of hydrogen peroxide.
C) the molar mass of hydrogen peroxide.
D) the number of moles of hydrogen peroxide in 1.00 g of the substance.
E) none of the above

CHP 7

13) Which of the following is NOT evidence that a chemical reaction has occurred?

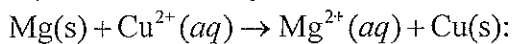
- A) color change
 B) solid formation
 C) gas formation
 D) emission of light
 E) All of the above are evidence of a chemical reaction.

CHP 16

14) In CrO_3 , the oxidation number of Cr is +3. A) TRUE B) FALSE

15) Reduction is the gain of electrons. A) TRUE B) FALSE

16) In the following reaction,



- A) Mg is the reducing agent and Cu is the oxidizing agent.
 B) Mg^{2+} is the reducing agent and Cu is the oxidizing agent.
 C) Cu is the reducing agent and Mg^{2+} is the oxidizing agent.
 D) Cu^{2+} is the reducing agent and Mg is the oxidizing agent.
 E) Mg is the reducing agent and Cu^{2+} is the oxidizing agent.

17) What is the oxidation state of sulfur in sulfuric acid is

- A) +1 B) +4 C) -2 D) +6 E) +5

18) Evidence of a redox reaction is when one substance transfers protons to another substance.

- A) TRUE B) FALSE

THERE ARE NO MORE SCANTRON QUESTIONS

Show all work for complete credit for the following problems

19) (8 pt) How many grams of $\text{HC}_2\text{H}_3\text{O}_2$ (molar mass is 60.06 g/mole) is there in a sample that contains 5.55×10^{24} hydrogen atoms?

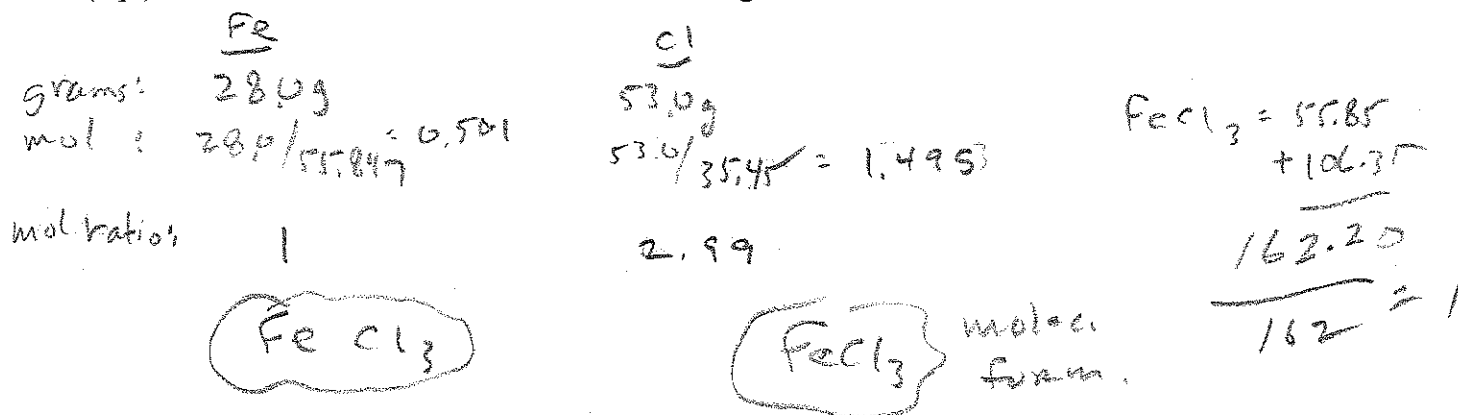
STEP

$$\textcircled{1} \quad 5.55 \times 10^{24} \text{ H} \times \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atoms}} = 9.216 \text{ mol H}$$

$$\textcircled{2} \quad 9.216 \text{ mol H} \times \frac{1 \text{ mol HC}_2\text{H}_3\text{O}_2}{4 \text{ mol H}} = 2.304 \text{ mol HC}_2\text{H}_3\text{O}_2$$

$$\textcircled{3} \quad 2.304 \text{ mol HC}_2\text{H}_3\text{O}_2 \times \frac{60.06 \text{ g HC}_2\text{H}_3\text{O}_2}{1 \text{ mol}} = 138 \text{ g HC}_2\text{H}_3\text{O}_2$$

- 20) (7 pt) An iron chloride compound contains 28.0 grams of iron and 53.0 grams of chlorine. Calculate the empirical formula for this compound?
 (4 pt) If the molar mass of this iron chloride is 162 g/mol what is its molecular formula?

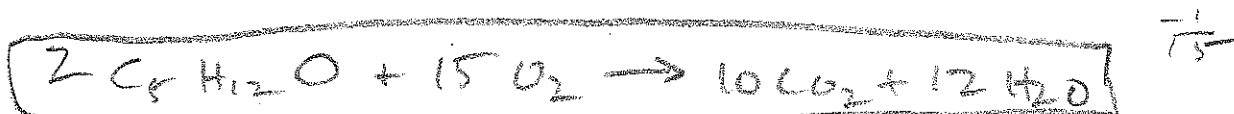


Write the balanced equations for each of the following chemical reactions and give the name of the type of reaction.

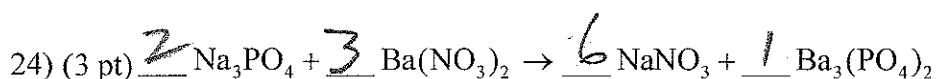
- 21) (7 pt) Nitrogen reacts with hydrogen to make ammonia. The name of this reaction is synthesis



- 22) (7 pt) Combustion of C₅H₁₂O



- 23) (3 pt) $\underline{2} HNO_3 + \underline{1} Mg \rightarrow \underline{1} Mg(NO_3)_2 + \underline{1} H_2$ The name of this reaction is single displacement



The name of this reaction is double displacement

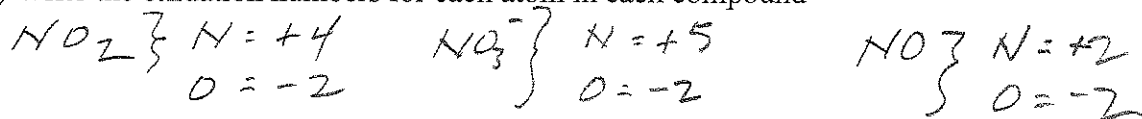
(4 pt) Write a sentence for this reaction using the names of the chemicals.

sodium phosphate reacts with barium nitrate to make sodium nitrate and barium phosphate

Chp 16

25. For the following oxidation-reduction reaction: $\text{NO}_2 \rightarrow \text{NO}_3^- + \text{NO}$

A) (3 pt) Write the oxidation numbers for each atom in each compound



B) Write the
(2 pt) oxidation half reaction:



(2 pt) reduction half reaction:



C) Write the balanced half reactions in acid.

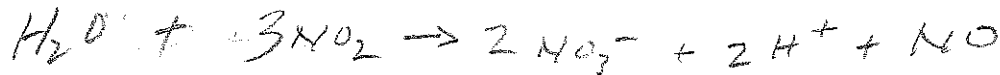
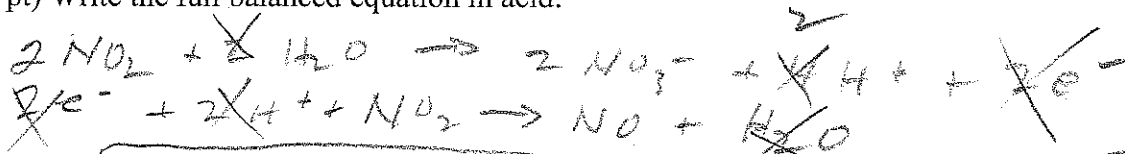
(4 pt) oxidation half reaction:



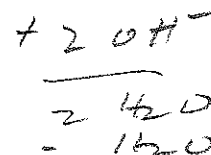
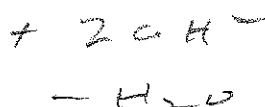
(4 pt) reduction half reaction:



D) (6 pt) Write the full balanced equation in acid:



E) (4 pt) Write the full balanced equation in base:



(25 pt)