Name: _____ **ID: A**

Problem

Three lab partners decided to design an experiment to determine the number of calories in an Oreo cookie.. They determined the mass that the Oreo lost as it burned. They also determine the heat gained by the water as the cookie burned..

The table shows data taken from their experiment.

Initial mass of the Oreo (g)	160.0
Initial temperature of water ($°C$)	21.3
Final temperature of the water ($°C$)	31.4

Final mass of the Oreo (g)	157.8
Mass of water (g)	348.0

22. a. From the data, determine how many calories the Oreo gave off as it burned? (note: the specific heat of water is 1 cal/(g·°C)). Give you answer in both calories and Calories.

b. Convert your answer into Calories per gram of cookie burned.

c. Below is a copy of nutrition information off the back of an Oreo package. Calculate the % error of this group.

Nutrition Facts
Serving Size 6 cookies (28g)
Servings Per Container about 11

Amount Per Serving	
Calories 120	Calories From Fat
	% Daily Value*
Total Fat 4g	**6%**
Saturated Fat 0.5g	
Polyunsaturated Fat 0g	
Monounsaturated Fat 1g	
Cholesterol 5mg	**2%**
Sodium 105mg	**4%**
Total Carbohydrate 20g	**7%**
Dietary Fiber Less than 1 gram	**2%**
Sugars 7g	
Protein 2g	

23. Write a chemical equation for the neutralization of
    a.sodium hydroxide (NaOH) and hydrochloric acid (HCl)

    b. potassium hydroxide (KOH) and sulfuric acid (H_2SO_4).

24. During a titration, 0.200*M* HCl is added to a NaOH solution of unknown concentration. What is the concentration of the NaOH solution if 20.0 mL of it is neutralized by 30.7 mL of the standard solution?