

name:_____

period:_____

Unit 2: Combustion

Lesson 2.1 Computing the Energy in Food

- The modern metric unit of energy is the joule.
- An older unit of energy is the calorie.
- To convert use: 1 calorie = 4.2 joules
- A food calorie = 1000 energy calories = 1 kilocalorie = 1 kcal

Find the **grams per serving**

Find the food **calories per serving** on the label - remember that these are actually kcal of energy.

Compute the kcal per gram:

$$\text{calories per serving} = \underline{300} \text{ kcal}$$

$$\text{grams per serving} = \underline{102} \text{ g}$$

$$\frac{\text{calories per serving}}{\text{grams per serving}} = \underline{2.9} \text{ kcal/g}$$

Nutrition Facts

Serving Size 1/2 cup (102g)

Servings Per Container 4

Amount Per Serving

| | |
|---------------------|-----------------------|
| Calories 300 | Calories from Fat 160 |
|---------------------|-----------------------|

% Daily Values*

| | |
|----------------------|------------|
| Total Fat 18g | 28% |
|----------------------|------------|

| | |
|------------------|------------|
| Saturated Fat 9g | 45% |
|------------------|------------|

| | |
|--------------|--|
| Trans Fat 0g | |
|--------------|--|

| | |
|-------------------------|------------|
| Cholesterol 45mg | 15% |
|-------------------------|------------|

| | |
|---------------------|------------|
| Sodium 250mg | 10% |
|---------------------|------------|

| | |
|-------------------------------|------------|
| Total Carbohydrate 33g | 11% |
|-------------------------------|------------|

| | |
|------------------|-----------|
| Dietary Fiber 1g | 4% |
|------------------|-----------|

| | |
|------------|--|
| Sugars 30g | |
|------------|--|

| | |
|-------------------|--|
| Protein 7g | |
|-------------------|--|

| | | |
|---------------|---|--------------|
| Vitamin A 15% | • | Vitamin C 0% |
|---------------|---|--------------|

| | | |
|-------------|---|---------|
| Calcium 15% | • | Iron 4% |
|-------------|---|---------|

* Percent Daily Values are based on a 2,000 calorie diet.

Lab Safety

1. You should always plan for the best, but prepare for the worst
2. What should you do **first** if you get chemicals in your eyes? call for help
3. What should you hold open while rinsing your eyes? eye lids
4. How long should you rinse your eyes? 15 - 20 minutes
5. What should you do if you get chemicals on your skin? rinse with water
6. How long should you rinse in the shower? 15 minutes
7. What are the three parts of the fire triangle? fuel, oxygen, heat
8. What should you do to a small lab fire? smother it
9. What do you do if your clothing is on fire? stop, drop and roll
10. What is the cardinal rule in an emergency?

Lesson 2.2 Bio-fuel Lab

Materials

Procedure

Measurements

| | Variable | value (unit) |
|---|---|--------------|
| 1 | Volume of water (ml) | 100 ml |
| 2 | Initial mass of food and paper (<i>g</i>) | |
| 3 | Final mass of food and paper (<i>g</i>) | |
| 4 | Δm line 2 - line 3 (<i>g</i>) | |
| 5 | Final temperature of the water ($^{\circ}\text{C}$) | |
| 6 | Initial temperature of the water ($^{\circ}\text{C}$) | |
| 7 | ΔT line 5 - line 6 ($^{\circ}\text{C}$) | |

Error Analysis

Human Errors

1. Human errors are caused by mistakes people make. What do you think could be a human error that would affect the data obtained in this lab?

Experimental Errors

1. Experimental errors are caused by the equipment or material being used. What do you think could be an experimental error that would affect the data obtained in this lab?

Lesson 2.3 Combustion Conference

1. What happened to the atoms and molecules in the nut when it burned?
2. Where did the energy for the fire come from and where did it go?
3. What happened to the water molecules when the water temperature increased

Lesson 2.4 Combustion Video

Watch the YouTube What is Combustion? and answer the questions below:

1. wood is a fuel used a lot in the past, and even today.
2. The three most widely used fuels today are coal, oil, and natural gas.
3. A newer fuel often used in rockets is hydrogen.
4. When a fuel is burned it always combines with oxygen.
5. Other products released during combustion are carbon dioxide and water that are emitted as a gas.
6. A very fast combustion reaction is called an explosion.
7. We use fast reactions in car engines.
8. Combustion reactions are used for: cooking, manufacturing, produce electricity, heating water, motor vehicles, and heating.

Word Bank

| | | |
|---------------|----------------|---------------------|
| car engines | carbon dioxide | coal |
| cooking | explosion | gas |
| heating | heating water | hydrogen |
| manufacturing | motor vehicles | natural gas |
| oil | oxygen | produce electricity |
| water | wood | |