Clayton Valley Charter High School

Chemistry

Benchmark #1 Review

2017-2018

Name: _____ Period: _____

Student Instructions:

1. Complete the entire review guide
2. This will count for credit.
3. Anything that you struggle with is something that you need to study.
4. Do not procrastinate - you will only struggle that much more on the benchmark exam.
5. *YES, the benchmark counts for actual points in your grade.* ***Not extra credit****.*

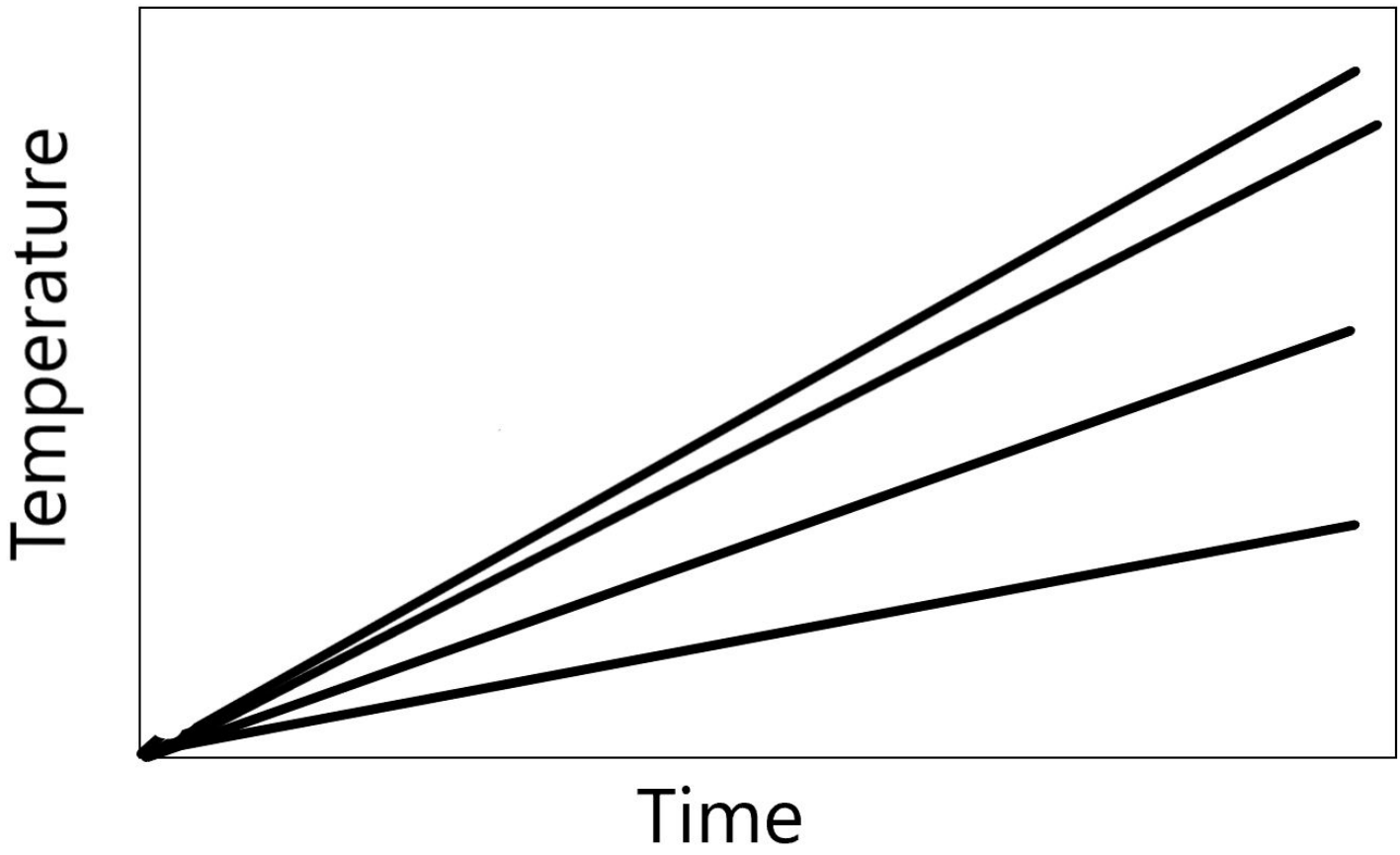
Part 1: Specific Heat Capacity

1. An unknown substance with a mass of 8.72 grams takes in 19.3 calories of energy as its temperature changes from 20℃ to 29℃. Determine the specific heat capacity of the substance, then use the chart to determine the identity of the substance. Box or circle your answer.

Brick	0.201 cal/g°C
Wood	0.550 cal/g°C
Fiber hardboard	0.500 cal/g°C
Tile	0.150 cal/g°C

Show work HERE!

2. Below is a graph of the substances from question 1 being heated on a stove. Given the specific heat capacities, label the lines on the graph based on the specific heat capacities of each substance.



3. It is the last week before school begins and your friend is hosting a pool party. The day before, your friend measured the pool temperature at 16.7°C, therefore he turned the water heater on so that the water would warm up to 25°C. The pool was filled up to the top, approximately 15,000 gallons or 56,781,150 mL. Assuming the pool is full of pure water, how much energy did it take to warm the pool up?

Useful Data for Water	
1 g = 1 mL	
Specific Heat Capacity	C=1 cal/g°C

4. You feel bad for your friend that he had to warm the pool for everyone and offer to give him money for some of the energy bill. The power company is charging your friend 12 cents/kWhr. Assuming that 1 kWhr = 59,845 cal, how much did it cost to heat the pool?

Part 2: Combustion/Energy

You are a weightlifter getting ready for U.S. Olympic qualifications. In order to prepare, your coach wants you to be ready to burn about 400 calories for the session in order to raise your body temperature 3 ℃. The average specific heat capacity of a protein bar is 0.67 cal/g℃

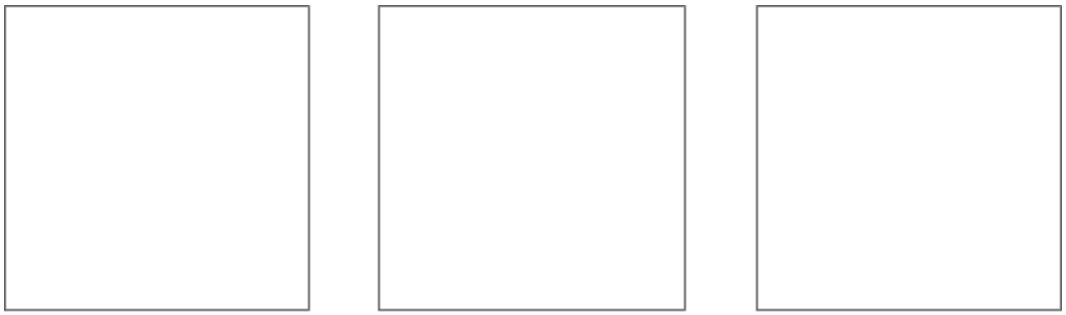
5. How many grams of protein bar would you need to eat to gain 400 calories of energy?

Protein Bar Data	
Calories	400 calories
Temperature Change	3 ℃
Specific Heat	0.67 cal/g℃

6. You go to Costco where there are many protein bar options: Pure Protein, Quest Bar and NitroTech. Given the following data, which bar would you choose to eat for the most protein within your calorie limit. Make sure you account for **all** nutrition facts.

Food (serving size)	Calories	Carbs	Fat	Protein
Pure Protein (50 g)	190 cal	17 g	6 g	20 g
Quest Bar (60 g)	190 cal	20 g	9 g	21 g
Nitro Tech(65 g)	240 cal	24 g	7 g	22 g

7. In the boxes, draw how the molecules are arranged for each state of matter:



Solid | Liquid | Gas

Part 3: Heat Transfer

It's a hot summer day, and you get into your car which has leather upholstery. When you sit in the car, you burn your rear end.

8. Draw a macroscopic and microscopic model of the heat transferring between you and the seat.

Macroscopic	Microscopic

9. Use your model to explain why leather upholstery isn't the best choice for cars. **Justify** your reasons by answering the following: What direction is the energy going? Why is it moving that way? How does this make the seat burn your rear end?

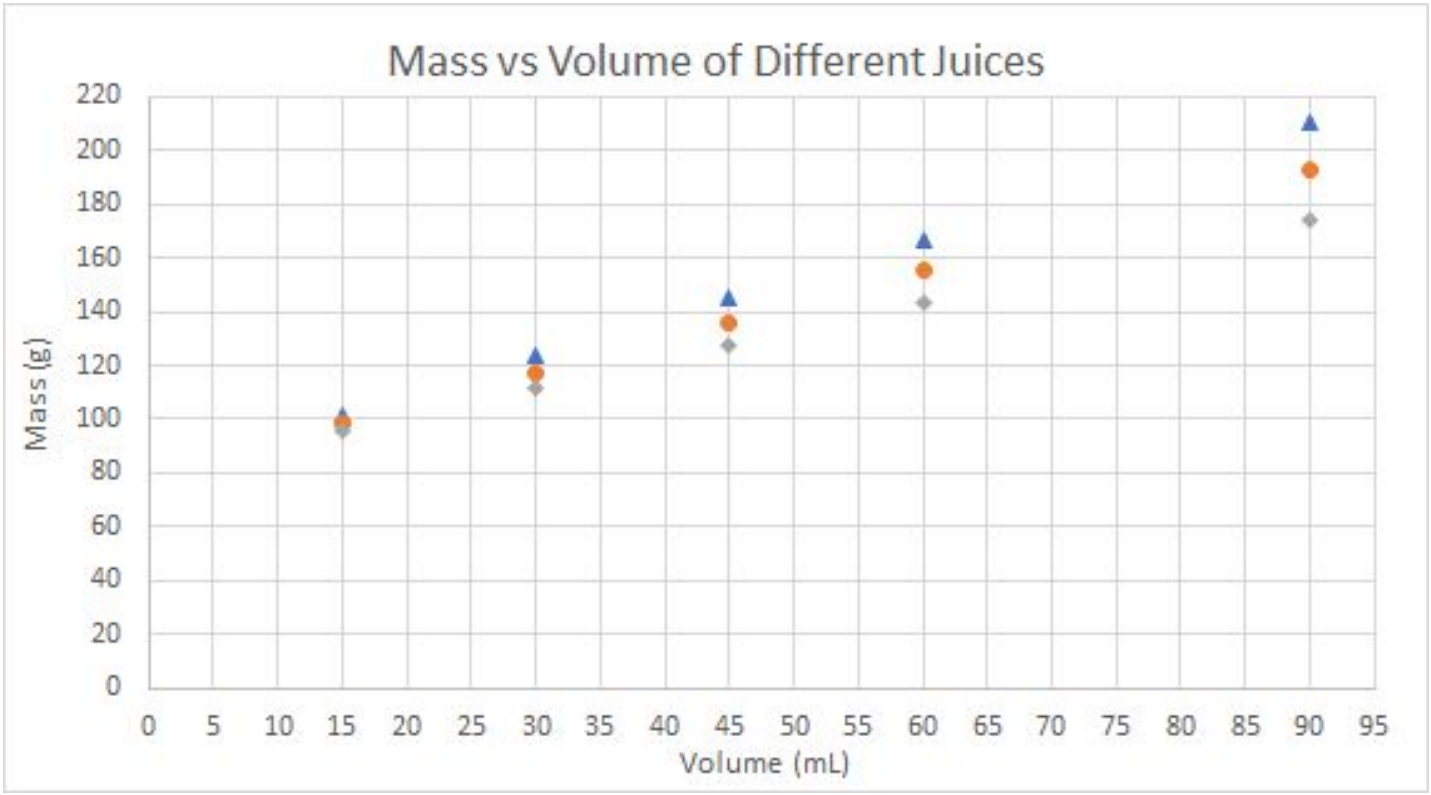
Part 4: Density

You decide to do a fun experiment involving density. You go into your refrigerator and you discover that you have three different juices. Carefully pouring so as to not mix the juices, you layer the juices so that it looks like the figure to the side.

10. Draw a particle model based on density for what you are observing.

Pomegranate Juice	Orange Juice	White Grape Juice

11. Look at the graph below: draw best fit lines for all similar points, and then identify and label which juice belongs to each line.



12. Based off your best fit lines, what is the mass of the empty glass holding the juices?

13. Pick one data point (ANY point on the line) for each juice and calculate the density.

Pomegranate Juice	Orange Juice	White Grape Juice