NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ “BRING IT ON HOME” \_\_\_\_\_/ 53 pts

Directions: Use your notes, the blog, a friend, the internet, a book, an article … whatever you can find to help answer the following questions. I am trying to assess what you are taking in from our lectures, labs and discussions. Put together your learning…

Yes, this graded. Type out your responses (As much as I like and respect you, I do not want to try to read your handwriting). Staple your typed responses to questions 1 – 8 with these pages and your handwritten responses to those on pages 3 -5 on: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

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1) You are helping a sibling earn their Scouts badge in science. They are asked to identify the difference

between matter and energy. Using ideas from this course, how might you help your sibling understand how

to identify what is matter as opposed to energy? (5 pts)

2) Which reaction is **improbable**, assuming the complete reaction of only pure samples of the reactants,

in a closed system? **Circle 1 or 2** and then **explain your thinking** as to why it is **improbable**. (5 pts)

(1) 3 Fe + 4 H2O → 4 H2 + Fe3O4 + 2 CaSO4

(2) 2 Al + 3 Fe(NO3)2 → 2 Al(NO3) 3 + 3 Fe

**I believe choice \_\_\_\_ is improbable because:**

3) A sample of a solid is in a closed system. In a second closed system, there is an equal mass of a gas.

Both systems are heated so that their temperatures are doubled (e.g. from 20 °C to 40 °C). The solid

remains a solid. The gas sample remains gaseous.

Explain as to which system (the solid or the gas) undergoes the greatest change in pressure?

You may find using the equation Pressure = (mass)(acceleration)/Area to be helpful. (5 pts)

4) When the mass of 10.0 grams of water is doubled to 20.0 grams, does the density of the water sample

increase, decrease or remain the same? Explain your reasoning **using the ideas of extensive and intensive**

properties of matter. (5 pts)

5) A friend in biology does not understand what the charge of +2 means in the symbol of calcium ion Ca+2.

a) What subatomic particle does the + sign symbolize? (2 pts)

b) What does a charge of +2 imply? You may find it helpful to compare Ca+2 to Ca0 (3 pts)

6) The forms of electromagnetic energy (e.g., infrared, microwave, visible light, radio waves etc.) are related

to each other in several ways. For instance, they are each forms of “light”, they travel in sinusoidal waves

with various frequencies and wavelengths and are essentially *produced in the same way*. In a few

sentences, please explain how the various forms of electromagnetic energy are related, ***in terms of how***

***they are produced.***In your response be sure to **use the term potential energy**. (5 pts)

7) A variety of gaseous molecules found in the Earth’s atmosphere, like CO2, H2O and CH4 (methane) may be

described as infrared reactive, and they are often referred to as greenhouse gases. Explain how such infrared

reactive molecules are responsible for warming the lower atmosphere of the Earth. In your response be sure

to **use the terms, potential energy, & electromagnetic energy.** (10 pts)

8) About 25% of the universe’s mass is due to helium. The isotopes of helium are monatomic chemical species.

This means that helium is NOT bonded to any other species – especially here on Earth. (We suspect that

very little helium is bonded to anything in the universe for that matter!) It is one reason why it is classified

as a Noble Gas – It just does not seem to bond and so, it is NOT found in compounds here on Earth.

Helium is not very common here on Earth. As written, it doesn’t make compounds, and until recently, most

of it leaked out into space.

However, the atmospheric abundance of the helium-4 (4He) isotope is rising here on Earth, because 4He is

released during the burning and extraction of fossil fuels. The researchers report that it is increasing at a very

small but, for the first time, clearly measurable rate. The 4He isotope itself does not add to the greenhouse

effect that is making the planet warmer, but measures of it could serve as indirect markers of fossil-fuel use.

Why **doesn’t helium** contribute to climate change? (Hint: It’s not because it leaks out to space…) (5 pts)

This section is divided into a multiple choice section, a fill-in section and a short answer section. You may write your responses for the multiple choice questions – there is no need to type. Just place the answer on the line next to each question.

**Multiple Choice: Place your response on the line next to each number.**

\_\_\_\_9) Select which is accurate for an atom of ? An atom of has

1) 15 electrons and 15 protons

2) 31 electrons and 16 neutrons

3) 31 electrons and 22 neutrons

4) 22 electrons and 15 protons

\_\_\_\_10) An atom of Ca has the same number of **neutrons,** as an atom of

1) Ca 3) Mg

2) K 4) Ni

\_\_\_\_11) An atom has 14 electrons and a mass number of 26. The atomic number should be equal to

1) 38 3) 12

2) 26 4) 14

\_\_\_\_12) According to our work in class and the video “Why are plants green instead of black” found at:

<https://www.youtube.com/watch?v=X96d1YEN_fQ> The narrator states that plants “…absorb

multiple other colors of light from either end of the spectrum. Bluer wavelengths have more energy

than greener wavelengths, while redder wavelengths have less”.

The differences in ***the energy*** of the various wavelengths of light are due primarily to:

1) the speed of the wavelength

2) the frequency of the wavelength

3) the motion of protons and neutrons in atoms

\_\_\_\_13) Chemical bonds may be described as a form of:

1) light energy 3) microwave energy

2) infrared energy 4) potential energy

\_\_\_\_14) When a chemical reaction is said to have occurred, there must have been a change in

1) the nuclei of the atoms 3) the neutrons of the atoms

2) the atomic numbers of the atoms 4) the electron clouds of the atoms

**DIRECTIONS: For questions 15-17 use the following diagram. There are only two choices for each question. This question set focuses upon the interpretation of chemical symbolism.**

Shape

Description automatically generated (point A)

\_\_\_\_\_15) Is this a compound or an element?

1) compound 2) element

\_\_\_\_\_16) Find the spot to which the arrow is pointing, "Point A".

What is the atom at point A?

1) oxygen 2) hydrogen 3) carbon 4) indeterminate

\_\_\_\_\_17) A total of how many electrons are used to make any single bond

in this chemical?

1) 1 2) 2 3) 8 4) 4

\_\_\_\_\_18) An ice cube is placed into a room temperture glass of water.

Describe the flow of energy between the ice cube and the drink.

http://www.snwa.com/html/wq\_taste\_tests.html

1) energy flows from the ice to the water

2) energy flows from the water to the ice

3) energy flows in both directions, simultaneously, from ice to water and

water to ice.

\_\_\_\_\_19) Select the most correct choice.

4.0 grams of hydrogen gas are reacted completely with 32 grams of oxygen gas to produce water.

Which of these is accurate?

1) A maximum of 4.0 grams of water can be produced

2) A maximum of 32 grams of water can be produced

3) A maximum of 28 grams of water can be produced

4) A maximum of 36 grams of water can be produced

\_\_\_\_\_20) Select the most correct choice.

Which of the following dimensions (descriptors) of matter undergoes the **greatest** change in value, when

comparing an astronaut on Earth, and that same person on the Moon? The dimension which changes the

most is:

1) density 3) weight

2) mass 4) volume

\_\_\_\_\_21) Select the most correct choice.

Imagine you have a sample of copper and one of gold, but you don’t know which sample is which. Of the

following properties, which property is best when trying to identify the samples as copper and gold? (2 pts)

1) density 3) temperature

2) mass 4) volume

**\_\_\_\_\_BONUS1:** Use the table of Rf values. Identify the standard dye(s) in the Unknown Mixture

The unknown mixture contains

|  |  |
| --- | --- |
| Standard Dye Mixture | Components and Rf Values |
| Standard Dye 1 | A = 0.24  B = 0.71 |
| Standard Dye 2 | A = 0.53  B = 0.49  C = 0.99 |
| Standard Dye 3 | A = 0.11  B = 0.21 |
| Standard Dye 4 | A = 0.81  B = 0.56  C = 0.50 |
| Unknown Mixture | **A = 0.55**  **B = 0.51**  **C = 0.73**  **D = 0.80**  **E = 0.24** |

1) Standard dyes 1 & 4 3) Standard dyes 3 & 1

2) Standard dyes 2 & 1 4) Standard Dyes 2 & 4

BONUS2:  (You cannot lose points if a response is missing or incorrect. You can only gain points, should your response be acceptable). Identify one idea from the semester thus far that has been changed or that you have learned. Tell me a little about it. (This is sort of like a reflection from lab … What are you taking with you?)

You may hand write this section – but be neat! And yes, if you are really concerned, you may type out a response.

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