NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ UNIT 1 & A LITTLE OF UNIT 2: TAKE HOME!!!!

DIRECTIONS: This is graded … so we are going to generate some points here. It is an assessment of your mastery of the big ideas in Unit 1 (and some of Unit 2). Answer each of the following questions, by selecting or by providing the most correct response. You may, of course, use your notes, the internet and you may work with a friend. Don’t forget that you can search, online, your notes, by going to my website: [www.scientiaestubique.com](http://www.scientiaestubique.com) Please be sure to place every answer on the answer sheet.



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

1) An ice cube is placed into a room temperture glass of water.

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

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.

2) The following diagram represents a crude representation of a bond being made between two atoms.

bond of overlapping or shared electrons

atom 1 atom 2 atom 1 atom 2 molecule

Diagram 1 Diagram 2 Diagram 3

As the bond production proceeds from diagram 1 to diagram 3, the potential energy of the chemicals

1) increases and energy is absorbed from the environment

2) decreases and energy is released into the environment

3) remains the same and there is no energy conversion or transfer

3) 4.0 grams of hydrogen gas are reacted completely with 32 grams of oxygen gas to produce water.

Which of these is accurate?

1) Approximately 4.0 grams of water can be produced

2) Approximately 32 grams of water can be produced

3) Approximately 28 grams of water can be produced

4) Approximately 36 grams of water can be produced

4) When a **chemical reaction** is said to have occurred, there must have been a change in

1) the nucleus of the atoms 3) the electrons (cloud) of the atoms

2) the atomic number of the atoms 4) the neutrons of the atoms

5) Which of the following samples has the greatest *average kinetic energy*?

1) 50 grams of water at 35.0°C 3) 1,000 grams of water at 50.0°C

2) 100 grams of water at 75.0°C 4) 25 grams of water at 40.0°C

For questions 6-8, use the following table of Rf values, and your grasp of chromatography.

The following are the calculations of Rf values for a chromatography experiment of standard natural dyes

and of unknown samples related to those dyes. Use the numbers 1,2,3,4 to refer to the dyes when answering.

|  |  |
| --- | --- |
| Dye | Rf Values per  component |
| Standard Dye 1 | 0.891  0.399 |
| Standard Dye 2 | 0.551  0.219 |
| Standard Dye 3 | 0.722  0.611  0.124 |
| Standard Dye 4 | 0.400 |
| Unknown Mixture of Dye(s)  A | 0.719  0.609  0.398  0.125 |
| Unknown Mixture of Dye(s)  B | 0.553  0.222  0.890  0.401 |

6) Which standard dye is probably a single substance?

7) Unknown A is the effective equivalent of which dye(s)? (You may need to “X” more than one response)

8) Unknown B is the effective equivalent of which dye(s)? (You may need to “X” more than one response)

|  |  |
| --- | --- |
| 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** |

9) Use the table of Rf values found to the right.

Identify the standard dye(s) in Unknown Mixture

The unknown mixture contains

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

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

10) Which of the following terms represents what is known as “substances”?

1) compounds and mixtures 3) just mixtures

2) elements and mixtures 4) elements and compounds

11) Which of the following is an example of matter?

1) All of These 3) light

2) hydrogen gas 4) sound

12) The change in weight of an astronaut on the moon relative to her weight on the Earth is due to

1) a difference in the chemicals of the surrounding atmosphere

2) a loss in body mass

3) changes in the gravitational forces

4) the means by which we measure mass in different environments

13) In a closed system, 12 grams of carbon *reacted completely* with 32 grams of oxygen to produce

carbon dioxide according to the reaction equation: C(s) + O2(g) → CO2(g)

Based upon the concepts covered in our class, which statement is most accurate?

1) 44 grams of CO2 are produced

2) Fewer than 44 grams but more than 12 grams of CO2 are produced

3) Fewer than 12 grams of CO2 are produced

4) More than 44 grams of CO2 are produced

14) 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 could be used to help you identify the samples as copper and gold?

1) density 3) temperature

2) mass 4) volume

15) Which sample could occupy the volume of a 100 mL flask?

1) 25 cm3 Cu(s) 3) 50 cm3 SiO2(s)

2) 30 cm3 N2(g) 4) 75 cm3 Fe(s)

16) Which of the following would float on pure water at a temperature of 3.98℃? Water at this temperature

has a density of 1.00 g/mL

1) A substance with a mass of 1.38 g. and a volume of 1.33 mL

2) A substance with a mass of 534.23 grams and a volume of 522.3 mL

3) A substance with a mass of 22.64 g and a volume of 3.35 mL

4) A substance with a mass of 418.23 g and a volume of 436.2 mL

17) During chemical reactions, mass and energy are

1) decreased 3) conserved

2) increased 4) released

For question 18, determine the “truth” or accuracy of the Assertion and then the accuracy of the “Reason”. Then, select a pair of terms from 1-5, which describes the validity of the assertion and the validity and relationship of the reason.

ASSERTION REASON

1) True True statement and it correctly explains / predicts the assertion

2) True True statement but it does NOT correctly explain / predict the assertion

3) True False

4) False True

5) False False

For example:

**My professor has brown eyes because My professor wears glasses**

**The answer is "2".** Both statements are true. However, the wearing of glasses is unrelated with eye color.

**Assertion Reason**

18)  **When the mass of 10.0 grams of water is *because*  The density of a substance like water,**

**doubled to 20.0 grams, the density also doubles changes as the mass of the sample changes.**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

19) Which is true for an atom of ? An atom of  has;

1) 26 protons and 30 neutrons

2) 56 protons and 26 neutrons

3) 56 protons and 30 neutrons

4) 26 protons and 56 electrons

20) Which is true for an atom of Ar ? An atom of Ar has;

1) 18 electrons and 40 protons

2) 40 electrons and 22 neutrons

3) 18 electrons and 22 neutrons

4) 40 electrons and 18 protons

21) By definition, *isotopes* of the same element have the **same number** of:

1) protons, but a different number of neutrons

 2) neutrons, but a different number of electrons

3) protons, but a different number of electrons

4) neutrons, but a different number of protons

22) Which subatomic particle is described as having no charge?

1) neutron 2) electron 3) proton 4) beta particle

23) An atom of Ca has the same number of **neutrons,** as an atom of

1) Ca 3) Mg

2) K 4) Ni

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

1) 38 3) 14

2) 26 4) 12

25) Which of the following subatomic particles are found in the nucleus of an atom?

1) protons and isotopes 3) protons and electrons

2) neutrons and electrons 4) protons and neutrons

26) Using the Periodic Table, what is the name of the element made of atoms which have 13 protons per

atom?

1) aluminum 3) copper

2) cobalt 4) argon

Questions 27 – 32 are on the next pages. These pages should be stapled to your multiple choice

answer sheet, per the directions. They are “fill-in” and short answer responses. There is one

bonus question.

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ UNIT 1 & A LITTLE OF UNIT 2: TAKE HOME!!!!

DIRECTIONS: **Your** answer sheet **is due DURING class on 29 October 2020.**

Please be sure every answer is placed on this sheet. **For each multiple-choice question, please place an X** through the number of the answer you wish to have evaluated.

e.g.) 1 2 3 4 An “X” through 2 means your answer to the question is

choice 2

For questions 27-32 write clearly, or word process your responses and print out your answers. NO EMAIL versions are acceptable, for grading. If you choose to type out your responses, please be sure to include the question, and answer (just like a lab report) and then, **staple** the sheet(s) to this answer sheet. In the event of your absence on the above date, you must send pictures of every page of this answer packet to prove that the work is complete, **by 6:00 pm,** of 29 October 2020. The **hard copy matching those pictures** must be turned in at the next class. In the event that you do not meet either (minimum) requirement, a score of 0 points will be assigned.

1) 1 2 3

2) 1 2 3

3) 1 2 3 4 19) 1 2 3 4

4) 1 2 3 4 20) 1 2 3 4

5) 1 2 3 4 21) 1 2 3 4

6) 1 2 3 4 22) 1 2 3 4

7) 1 2 3 4 23) 1 2 3 4

8) 1 2 3 4 24) 1 2 3 4

9) 1 2 3 4 25) 1 2 3 4

10) 1 2 3 4 26) 1 2 3 4

11) 1 2 3 4 HEY! DID YOU “x” YOUR ANSWERS???

12) 1 2 3 4

13) 1 2 3 4

14) 1 2 3 4

15) 1 2 3 4

16) 1 2 3 4

17) 1 2 3 4

18) 1 2 3 4 5

For questions 27 and 28 your response should be from the point of view of the chemicals and answer

***decreases or increases***

27) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the potential energy of an electron as it moves from an energy shell close to

the nucleus of its atom, to an outer energy level

28) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the potential energy of hot water vapor as it condenses to a liquid onto a

bathroom mirror)

29) 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.

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

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

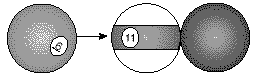
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30) A pool ball (#6) is rolling towards two stationary pool balls (#11 and the black).



<http://quest.nasa.gov/space/teachers/liftoff/images/7.13a.gif>

i) Compare the kinetic energy of #6 to that of #11 The kinetic energy of ball #6 is \_\_\_\_\_\_ than ball #11

1) greater, 2) lesser, 3) the same

ii) There is a potential energy between #6 and #11. What happens to the **potential energy** (not the

total energy) as # 6 nears #11? The potential energy:

1) increases 2) decreases 3) remains the same

Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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31) Compare the potential energy of the molecules of a solid substance to the potential energy of those

same molecules in the gas phase. Be sure to explain why there is a difference or why there is no

difference.

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32) Please explain your how a lake or pond freezes over. Be sure to explain how the ice ends up on the surface.

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BONUS (You cannot lose points if a response is missing or incorrect. You can only gain points, should your response be acceptable). **Why is the sky blue?**

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BONUS: (You cannot lose points if a response is missing or incorrect. You can only gain points, should your response be acceptable). **Explain the connection between carbon dioxide and climate change.**

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