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 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) and using the ctrl-f function. **Please be sure to place every multiple choice answer on the answer sheet, with an “X”**



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**, such as combustion, or rusting, 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

6) 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

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

1) All of These 3) light

2) hydrogen gas 4) sound

8) Which of the following 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

2) mass

3) weight

4) volume

9) In a closed system, 12 grams of carbon *reacts 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

10) 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

11) 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)

12) 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

13) Assuming a closed system , during chemical reactions, mass and energy must be

1) decreased 3) conserved

2) increased 4) released

14) Consider a Connecticut home in February. Assume it is 18 F outside and approximately 70 F inside the

house. You are in the house, and you feel “drafts”. The drafts are most likely **caused by or due to**

1) Either of these

2) Warm air moving out of the house and cold air being pushed into it.

3) Cold air pushing into the house and pushing warm air out.

15) Which selection 1, 2, 3 or 4 describes the process of a body of water freezing over? Arrange the statements

a-d into the best sequence.

a) *Water cooling below 4C becomes less dense*

b) *Attractive forces between water molecules increase, ice, which is less dense than liquid water,*

*forms, and floats.*

c) *Water in contact with cold air, cools to 4C and becomes so dense that it sinks*

d) *Water is exchanged from top to bottom until the entire body of water is approximately 4 C.*

The statements in correct order of the process are:

1) c,d,a,b 3) a, d, c, b

2) c,b,a,d 4) b, a, d, c

For questions 16-18, 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**

16)  **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.**

17) **An atom is generally considered to be neutral *because* The number of protons and neutrons in the**

**in overall charge. nucleus of an atom do NOT always equal**

**each other in number.**

18) **Classically speaking the number of neutrons *because* Every neutron has an overall +1 charge.**

**determines the types of chemical reactions,**

**an atom undergoes.**

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

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

1) 26 neutrons and 30 protons

2) 26 protons and 30 neutrons

3) 56 protons and 30 neutrons

4) 26 protons and 56 electrons

20) Which is true 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

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

27) What is the isotopic notation for an atom with 11 electrons and 12 neutrons?

1) Na-12 3) Mg-23

2) V-12 4) Na-23

28) What is the isotopic notation for an atom with 7 protons and 9 neutrons?

1) 3)

2) 4)

29) Consider the ion P-3. What is the total number of electrons in the ion?

1) 15 3) 12

2) 18 4) 8

30) Which of the following has more electrons than protons?

1) Na+1 3) K0

2) Al+3 4) S-2

31) Using your periodic table and the table of electronegativities in your notes, which of the choices, represents

the element most likely to gain the electrons of a bond?

1) H (atomic number 1) 3) N (atomic number 7)

2) Na (atomic number 11) 4) I (atomic number 53)

32) Which of the following is most likely made with a **polar covalent bond(s)**?

1) CO2 3) O2

2) NaCl 4) CH4

Questions 33 – 35 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 are 3

bonus questions. You are welcome to do one, two, or all three.

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ UNIT 1 & UNIT 2: TAKE HOME!!!!

DIRECTIONS: **Your** answer sheet **is due AT THE START OF class on 12 April 2021. After that time, points are deducted.**

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. Staple this sheet to your free response pages.

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 4:30 pm,** of 12 April 2021. 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 19) 1 2 3 4

2) 1 2 3 20) 1 2 3 4

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

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

5) 1 2 3 4 23) 1 2 3 4

6) 1 2 3 4 24) 1 2 3 4

7) 1 2 3 4 25) 1 2 3 4

8) 1 2 3 4 26) 1 2 3 4

9) 1 2 3 4 27) 1 2 3 4

10) 1 2 3 4 28) 1 2 3 4

11) 1 2 3 4 29) 1 2 3 4

12) 1 2 3 4 30) 1 2 3 4

13) 1 2 3 4 31) 1 2 3 4

14) 1 2 3 32) 1 2 3 4

15) 1 2 3 4 **HEY! DID YOU “X” YOUR ANSWERS???**

16) 1 2 3 4

17) 1 2 3 4 5

18) 1 2 3 4 5

For questions 33 and 34 your response should be from the point of view of the chemicals and answer

***decreases or increases***

33) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the potential energy of an electron as it moves from an energy level close to

the nucleus of its atom, to an energy level further away from the nucleus.

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

bathroom mirror)

35) 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

Defense: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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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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BONUS: You cannot lose points … you can only gain points … so try it!

You have accompanied the brilliant, Lieutenant Toni Lavoisier on a police call. You have just finished an interview

with Al Chemy, the night watchman at *Tom’s House of Balloons and Bad Jokes.*

There has been a huge fire, destroying most of the warehouse. Also, the night deposits totally $25,000 are

missing. Al Chemy, has reported to Lt. Lavoisier (and to you), that the fire began when a scaffold holding hundreds

of 200-gallon tanks of helium gas had given way, causing tanks of helium to crash to the ground and to smash open.

He also reported that he saw huge sparks everywhere, caused by the crashing, and ripping metal. He figures that

these sparks ignited the helium. The whole place exploded into flames. He was lucky to get out alive. He had been

taking the money to the safe, when this all happened, and he dropped the money as he made his escape. The money

must have been burned up in the fire.

Lt. Lavoisier listened carefully. She already has a pretty good idea as to what should happen, but Lt. Lavoisier turns

to you for advice. Using your grasp of chemistry, and the situation, ***explain and defend*** what Lt. Lavoisier should

do with Al Chemy. Should she arrest Al on charges of grand theft and arson or release him and let him go home?

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